

Oswald-Egg, Maria Esther (Ed.); Kemper, Johanna (Ed.)

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Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics
Düsternbrooker Weg 120
24105 Kiel (Germany)
E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)
<https://www.zbw.eu/>

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KOF Swiss Economic Institute

The KOF Education System Factbook:
Mexico

Edition 1, May 2017

KOF

ETH Zurich
KOF Swiss Economic Institute
LEE G 116
Leonhardstrasse 21
8092 Zurich, Switzerland

Phone +41 44 632 42 39
Fax +41 44 632 12 18
www.kof.ethz.ch
kof@kof.ethz.ch

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List of Abbreviations

ALTRATEC	German-Mexican Alliance for Technology Transfer
BDI	Federation of German Industries
BiBB	German Federal Institute for Vocational Education and Training
BMBF	Federal Ministry of Education and Research
BMZ	German Federal Ministry for Economic Cooperation and Development\$
CAE	Capacitación Automotriz
CAMEXA	German-Mexican Chamber of Industry and Commerce
CBT	Centro de Bachillerato Tecnológico
CECyTE	State Centers for Scientific and Technological Studies
CENEVAL	National Evaluation Center for Higher Education
CEPPEMS	State Commissions for the Planning and Programming of Upper Secondary Education
CET	Centro des Estudios Tecnológicos
CFF	Common Curriculum Framework
CIIDET	Interdisciplinary Centre for Research and Teaching Technical Education
CONALEP	National College of Technical and Professional Education
CONOCER	Council for Normalisation and Certification
COPAES	Council for Accreditation of Higher Education
COSDAC	Sectorial Coordination for Academic Development
CSG	Colegio Superior de Gastronomía
DET	Australia Department of Education and Training
DG	Directorate General
DGCFT	DG of Training Centers for Work
DGECyTM	DG of Sea Science and Technology Education
DGEST	Directorate General of Higher Technological Education
DGETA	DG of Agriculture and Livestock Education
DGETI	Directorate General of Industrial Technological Education
DGETI	Directorate-General of Industrial Technological Education
GCI	Global Competitiveness Index
GDP	Gross Domestic Product

GII	Global Innovation Index
GIZ	Deutsche Gesellschaft für International Zusammenarbeit
IAP	Instituto de Administración Pública Chiapas
ICAT	Institutes of Training for Work
IDB	International Development Bank
iMOVE	Initiative of the German Federal Ministry of Education and Research (BMBF) as part of the Federal Institute for Vocational Education and Training (BIBB)
INEA	National Institute of Adult Education
ISCED	International Standard Classification of Education
KOF	Swiss Economic Institute
MMFD	Mexican Model of Dual Vocational Education and Training
OECD	Organization for Economic Co-operation and Development
PET	Professional Education and Training
RIEMS	Comprehensive Reform for Upper-Middle Education
SEMS	Under-Secretariat for Upper Secondary Education
SEP	Secretariat of Public Education
SNB	National Baccalaureate System
SNC	National Competence System
SNIT	National System of Technical Institutes
STPS	Ministry of Labor and Social Welfare
UIS	UNESCO Institute for Statistics
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCO-IBE	UNESCO International Bureau of Education
UNESCO-UIL	UNESCO
UNESCO-UIS	UNESCO Institute for Statistics
VET	Vocational Education and Training
VPET	Vocational Professional Education and Training
VPETA	Vocational and Professional Education and Training Act
WEF	World Economic Forum
YLMI	Youth Labor Market Index

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FOREWORD

The increasing competitiveness of the world economy as well as the high youth unemployment rates after the worldwide economic crises have put pressure on countries to upgrade the skills of their workforces. Consequently, vocational education and training (VET) has received growing attention in recent years, especially amongst policy-makers. For example, the European Commission defined common objectives and an action plan for the development of VET systems in European countries in the *Bruges Communiqué on Enhanced European Cooperation in Vocational Education and Training for 2011-2020* (European Commission, 2010). In addition, a growing number of US states and other industrialized, transition, and developing countries (for example Hong Kong, Singapore, Chile, Costa Rica, Benin and Nepal) are interested in either implementing VET systems or making their VET system more labor-market oriented.

The appealing outcome of the VET system is that it improves the transition of young people into the labor market by simultaneously providing work experience, remuneration and formal education degrees at the secondary education level. If the VET system is optimally designed, VET providers are in constant dialogue with the demand-side of the labor market, i.e. the companies. This close relationship guarantees that the learned skills are in demand on the labor market. Besides practical skills, VET systems also foster soft-skills such as emotional intelligence, reliability, accuracy, precision, and responsibility, which are important attributes for success in the labor market. Depending on the design and permeability of the education system, VET may also provide access to tertiary level education (according to the ISCED classification): either general education at the tertiary A level or professional education and training (PET) at the tertiary B level. PET provides occupation-specific qualifications that prepare students for highly technical and managerial positions. VET and PET systems are often referred to together as “vocational and professional education training (VPET)” systems.

Few countries have elaborate and efficient VPET systems. Among these is the Swiss VPET system, which is an example of an education system that successfully matches market supply and demand. The Swiss VPET system efficiently introduces adolescents to the labor market, as shown by Switzerland’s 2007-2017 average youth unemployment rate of 8.1 percent compared to 14.8 percent for the OECD average (OECD, 2017).

Though not many countries have VPET systems that are comparable to Switzerland’s in terms of quality, efficiency and permeability, many have education pathways that involve some kind of practical or school-based vocational education. The purpose of the KOF Education System Factbook Series is to provide information about the education systems of countries across the world, with a special focus on vocational and professional education and training.

In the KOF Education System Factbook: Mexico, we describe Mexico's vocational system and discuss the characteristics that are crucial to the functioning of the system. Essential components comprise the regulatory framework and the governance of the VPET system, the involved actors, and their competencies and duties. The Factbook also provides information regarding the financing of the system and describes the process of curriculum development and the involved actors.

The Factbook is structured as follows: First, we provide an overview of Mexico's economy, labor market, and political system. The second part is dedicated to the description of the formal education system. The third section explains Mexico's vocational education system. The last section offers a perspective on Mexico's recent education reforms and challenges to be faced in the future.

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The KOF Education System Factbooks is regarded as work in progress. The authors do not claim completeness of the enclosed information, which has been collected carefully and consciously. Any suggestions for improvement are welcome!

Contact: factbook@kof.ethz.ch

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1. Mexico's Economy and its Political System

One of the main purposes of an education system is to provide the future workforce with the skills needed in the labor market. The particularities of a country's economy and labor market are important factors determining the current and future demand for skills, and will be described in the first part of this Factbook. This section also provides an overview of Mexico's political system with emphasis on education politics.

1.1 Mexico's Economy

Mexico has the second largest population in Latin America; with 121 million inhabitants, it follows only Brazil. Officially called the United Mexican States (*Estados Unidos Mexicanos*), the federal republic is composed of 31 states and the federal district of Mexico City. Roughly half of the populace lives in the country's center, while the dry north and tropical south are less populated. (Encyclopædia Britannica, 2016)

Income inequality is relatively high in Mexico: according to the Gini-Index, it is the second most unequal country (Gini-index of 0.48 in 2012) among the OECD countries just after Chile (Gini-index of 0.50). Inequality has been rising in recent years (OECD, 2016c).¹ While landowners and investors form the upper part of the income distribution, the lower part consist of rural and urban people with very low incomes. The middle class is relatively small (Encyclopædia Britannica, 2016).

GDP per capita in 2014 was \$US17,315 (value adjusted for \$ international purchasing power). The country is ahead of Brazil (\$ international 15'893) but behind Chile (\$ international 22'071), which had the highest GDP per capita among major countries in Latin America in 2014 (World Bank, 2016). Between 1990 and 2015, Mexico experienced 95 percent real GDP growth (constant prices, constant PPPs, OECD base year) compared to the average OECD country, which grew 69 percent over the same period. The compound annual growth rate (CAGR) for this period was 2.7 percent in Mexico and 2.1 percent in the average of OECD members (OECD, 2016a). The country's official currency is the Mexican Peso, which is currently traded at 0.053 Pesos per \$US (exchange rate as of June, 27th 2016).

The tertiary sector generates almost two thirds of the country's GDP. It also employs about the same percentage of the working population. One important aspect regarding the structure of México's economy is the importance of its industrial sector: it accounts for over one third of

¹ The Gini Coefficient is a measure for income inequality. The Gini is zero if everyone has the same income and is one if a single person has all the income. Income refers to income after taxes and transfers, adjusted for difference in household size (<http://www.oecd.org/social/income-distribution-database.htm>).

total value added, half of which comes from the manufacturing sector. This is remarkable because only around one fourth of Mexico's employees hold industrial jobs. In contrast, agriculture adds less than four percent to GDP, while over 13 percent of all employed persons earn their living in this sector. The high share of people working in the agricultural sector is in stark contrast to the structure of the EU-28 economies, where the agricultural sector accounts for only about one third of total employment.

Table 1: Value added and employment by sector, 2014

Sector	Country: Value added (%)	EU-28: Value added (%)	Country: Employment 2013 (%)	EU-28: Employment (%)
Primary sector	3.5	1.5	13.4	4.8
Agriculture, hunting and forestry, fishing	3.5	1.5	13.4	4.8
Secondary sector	34.3	24.4	23.6	21.7
Manufacturing, mining and quarrying and other industrial activities	17.7	19.0	n/a	15.5
of which: Manufacturing	17.6	15.5	n/a	13.9
Construction	7.4	5.4	n/a	6.2
Tertiary sector	62.3	74.1	62.4	73.5
Wholesale and retail trade, repairs; hotels and restaurants; transport; information and communication	27.5	24.1	n/a	27.6
Financial intermediation; real estate, renting & business activities	15.2	27.3	n/a	16.2
Public administration, defense, education, health, and other service activities	19.6	22.7	n/a	29.7

Source: Own illustration based on Eurostat (2015a; 2015b) and World Bank (2015)

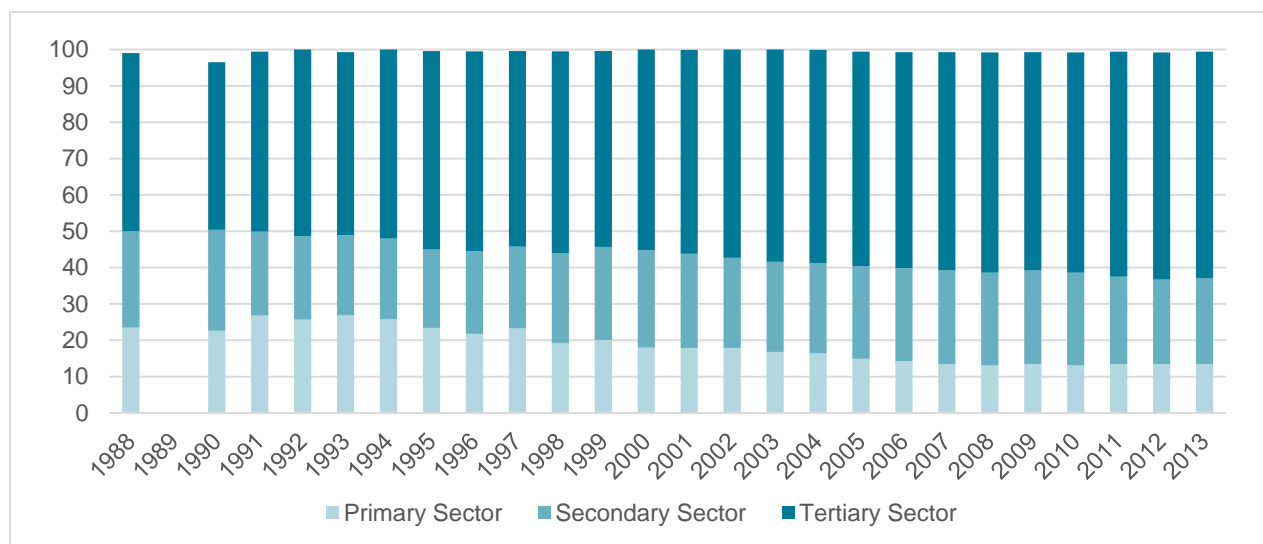
The economy's sectoral employment trends have evolved similarly to those of many industrial countries. Since the late 1980's, employment in agriculture decreased by roughly 50 percent. Employment in the industrial sector remained relatively steady with a slight downward tendency, while employment in the tertiary sector expanded substantially. Compared to other industrialized countries, the relative stability of employment in Mexico's industrial sector stands out (see Figure 1). Employment in most other industrialized countries dropped in both agriculture and manufacturing while employment in the service industry expanded strongly.

In the World Economic Forum's Global Competitive Index, Mexico reached rank 57 out of 140 in the 2015-16 assessment. This marks an improvement of four places compared to previous rankings. The negative effects of institutional weakening were compensated by improved efficiency of financial markets, business sophistication and improved innovation capacity. The report concludes that reforms generated visible improvements although various challenges remain. Mexico continues to score very low in the categories labor market, private and public

institutions. These low scores stem from the continuing prevalence of corruption, which is considered the highest hurdle for doing business (WEF, 2016).

In the 2015 Global Innovation Index, Mexico also reached rank 57 out of 141 countries examined. Mexico's key innovation strengths lie in knowledge absorption and diffusion, while innovation linkages and political stability are listed as weaknesses. Although it was identified as scoring above average for the Latin American region, Mexico is not considered an innovation outperformer. The data for 2015 showed that only Chile, Colombia, and Costa Rica exceeded their expected performance on the index. Mexico and Peru are next in line and thus still ahead of major Latin American economies such as Brazil and Argentina. (Dutta, Lanvin, & Wunsch-Vincent, 2015)

Figure 1: Employment by sector (as % of total employment), 1988-2013



Source: own illustration based on World Bank (2015).

1.2 The Labor Market

In the first part of this section, we will describe the general situation of Mexico's labor market. In the second part, we will refer to the youth labor market in particular.

1.2.1 Overview of Mexico's Labor Market

In principle, Mexico's law secures the workers' rights to form and join labor unions, collective bargaining and strike in both the private and public sector. However, the enforcement of these laws was not guaranteed in the past. The government frequently failed to enforce labor laws, which left few options for workers to fight violations in areas such as freedom of association and working conditions. In addition, conciliation and arbitration boards often failed to impartially govern activities such as union elections and strikes (U.S. Department of State, 2015).

The U.S. Department of State concludes that:

“Workers exercised their rights to freedom of association and collective bargaining with difficulty. The process for registration of unions was politicized, and the government, including the conciliation and arbitration boards, occasionally used the process to reward political allies or punish political opponents. According to union organizers, the government, including the conciliation and arbitration boards, frequently rejected registration applications for new locals of independent unions and for new unions on technicalities.” (U.S. Department of State, 2015, p. 19)

In December of 2014, a series of four newspaper articles in the Los Angeles Times exposed a plethora of violations of human and workers’ rights in Mexico. According to the series, Mexican law enforcement failed on various occasions to act on violations regarding the minimum wage, forced labor, child labor, discrimination against indigenous groups, debt bondage, withheld social benefits, exposure to toxic pesticides and various other human and worker’s rights (Los Angeles Times, 2014; U.S. Department of State, 2015). These observations are confirmed by the NGO Human Rights Watch (2015), which concludes that a 2012 reform of labor laws failed to improve transparency and the formation of independent unions in a system where unions are predominantly pro-management.

According to the OECD Index of Employment Protection, a multi-dimensional index that quantifies the strictness of employment protection legislation, Mexico performs relatively well. It scores 2.6 points in the index that quantifies the protection of permanent workers and 2.3 in the index that quantifies the protection of temporary workers, putting it within the top 20 of all countries for which this indicator is available. For comparison, Switzerland scores 2.1 and 1.4 points in these categories (OECD, 2015b). However, this indicator only measures the *de jure* strictness of labor protection rather than the *de facto* protection, i.e. enforcement.

Table 2 shows the labor force participation and unemployment rate by age in 2015, Table 3 the labor force participation and unemployment rate for those aged 25-64 by educational attainment in 2014. Across all age groups and independent of educational attainment, Mexico’s unemployment rate was lower than the OECD average in both years. However, labor force participation is also lower than the OECD average.

As in many OECD countries, youth unemployment in Mexico is higher than the total unemployment rate (15-64 years). Compared to the OECD average, the official youth unemployment rate is relatively low. Compared to the rates currently observed in various southern European countries, Mexico’s situation seems to be relatively unproblematic.

Table 2: Labor force participation rate, unemployment rate by age, 2015

	Labor force participation rate		Unemployment rate	
	Mexico	OECD average	Mexico	OECD average
Total (15-64 years)	63.4	71.3	4.5	7.0
Youth (15-24 years)	44.3	47.1	9.0	14.0
Adults (25-64 years)	70.5	76.9	3.5	6.0

Source: Own illustration, OECD (2016b).

Consistent with the OECD average, labor force participation increases steadily with increasing educational attainment in Mexico. However, this is less pronounced in Mexico than in the OECD average (Table 3). In contrast, unemployment rates show the opposite tendency in Mexico if compared to the OECD average: while unemployment decreases drastically with rising educational attainment in the OECD average, unemployment in Mexico increases at higher levels of education levels.

Table 3: Labor force participation rate, unemployment rate by educational attainment (people aged 25-64), 2014

	Labor force participation rate		Unemployment rate	
	Mexico	OECD average	Mexico	OECD average
Less than upper secondary education	63.0	63.2	3.0	13.5
Upper secondary level education	73.0	79.6	4.0	8.0
Tertiary education	79.0	87.6	5.0	5.3

Source: Own illustration, OECD (2016b).

Taking together the relatively low unemployment rate and labor force participation rates that are somewhat comparable to the OECD average, it is questionable to what extent these numbers represent the Mexican labor market. Regarding the numbers for Mexico in Table 2 and Table 3, it is not completely clear whether these refer to the formal or the informal sector, in other words, if they are representative for the formal sector. While this is different for the OECD average. Since the informal sector is quasi non-existent in most OECD countries, the OECD average in Table 2 and Table 3 refers to the formal sector. As a consequence, comparing the numbers for Mexico with that for the OECD average may be misleading-especially if the informal sector is economically important for Mexico.

In fact, the informal sector is quite large in Mexico. Roughly 46 percent of Mexican employees worked in the informal sector in December 2015. The informality rate is highest among self-employed workers or employers (81 percent) and lower among regular wage earners (37

percent). Informal employment is highest within the age groups 16 to 22 and 51 and older. Employees aged 23 to 50 have the lowest rates of informal employment (Banco de México, 2015).

An analysis by industry reveals marked differences across sectors: in the primary sector, which includes construction, restaurants and accommodation, more than 60 percent of employees work under informal conditions. In contrast, for mining, social service, government, international organization, professional and financial service jobs, formal employment is predominant. The informality rate in these sectors is between 5 and 28 percent, which indicates that labor organizations likely have a stronger presence. In addition, the informality rate of employees working more than 30 hours per week is roughly half that of those who work less than 30 hours per week. The *Banco de México* estimates, depending on the estimation model, between 12 and 22 percent of Mexican workers are working in informal conditions involuntarily (Banco de México, 2015).

Another issue of the Mexican labor market is underemployment. Underemployment refers to a situation where highly skilled workers have to work in low-skilled/ and or low-paid jobs, as well as to a situation where workers can only work part-time but would rather work full-time. Mexico's official underemployment rate has fluctuated around 8 percent for the past two years. In May 2016 it was 8.3 percent (INEGI, 2016). This may be partially due to the relatively high levels of informal employment in Mexico.

1.2.2 The Youth Labor Market

The KOF Swiss Economic Institute developed the KOF Youth Labour Market Index (KOF YLMI) to compare how adolescents participate in the labor market across countries (Renold et al., 2014). The foundation for this index is the critique that a single indicator, such as the unemployment rate, does not suffice to describe the youth labor market adequately nor provide enough information for a comprehensive cross-country analysis. To increase the amount of information analyzed and to foster a multi-dimensional approach, the KOF YLMI consists of twelve labor market indicators² that are grouped into four categories.

² The data for these indicators are collected from different international institutions and cover up to 178 countries for the time period between 1991 and 2012.

The first category describes the *activity state* of youth (ages 15-24 years old) in the labor market. Adolescents are classified according to whether they are employed, in education, or neither (unemployed, discouraged and neither in employment nor in education or training; see info box to the right). The category *working conditions* and the corresponding indicators reflect the type and quality of jobs the working youth have. The *education* category accounts for the share of adolescents in education and training and for the relevance of and their skills on the labor market. The fourth category, *transition smoothness*, connects the other three categories by capturing the school-to-work transition phase of the youth. Each country obtains a score of 1 to 7 on each particular indicator of the KOF YLMI. A higher score reflects a more favorable situation regarding the youth labor market and a more efficient integration of the youth into the labor market.

Dimensions of the KOF YLMI
Activity state <ul style="list-style-type: none"> - Unemployment rate - Relaxed unemployment rate³ - Neither in employment nor in education or training rate (NEET rate)
Working conditions <p>Rate of adolescents:</p> <ul style="list-style-type: none"> - with a temporary contract - in involuntary part-time work - in jobs with atypical working hours - in work at risk of poverty⁴Vulnerable unemployment rate⁵
Education <ul style="list-style-type: none"> - Rate of adolescents in formal education and training - Skills mismatch rate
Transition smoothness <ul style="list-style-type: none"> - Relative unemployment ratio⁶ - Long-term unemployment rate⁷ <p>Source: Renold et al. (2014).</p>

One of the major drawbacks of the KOF YLMI is data availability. When data is lacking, a category can occasionally be based on a single indicator or must be omitted entirely when not a single indicator for that category exists in a given country. A lack of indicators can make comparisons across certain countries or groups of countries problematic and sometimes even impossible.

1.2.3 The KOF Youth Labor Market Index (KOF YLMI) for Mexico

The state of the youth labor market is of critical importance to Mexico's economy. In 2015, 50 percent of the country's population was under the age of 27.6 years. The median age of the population in the neighboring United States is over 10 years higher at 37.8 percent. (CIA, 2016)

Due to missing data, the KOF YLMI for Mexico can only be created based on five indicators: the unemployment rate, NEET rate, vulnerable employment rate, relative unemployment ratio and the incidence of long-term unemployment rate. Figure 2 shows the evolution of the KOF

³ It is calculated as the number of unemployed and discouraged workers as a share of the entire labor force. Discouraged workers have given up the search for work (not actively seeking), although they have no job and are currently available for work (also: "involuntary inactive").

⁴ Those who cannot make a decent living out of their earnings, being at risk of poverty as a percentage of the working population.

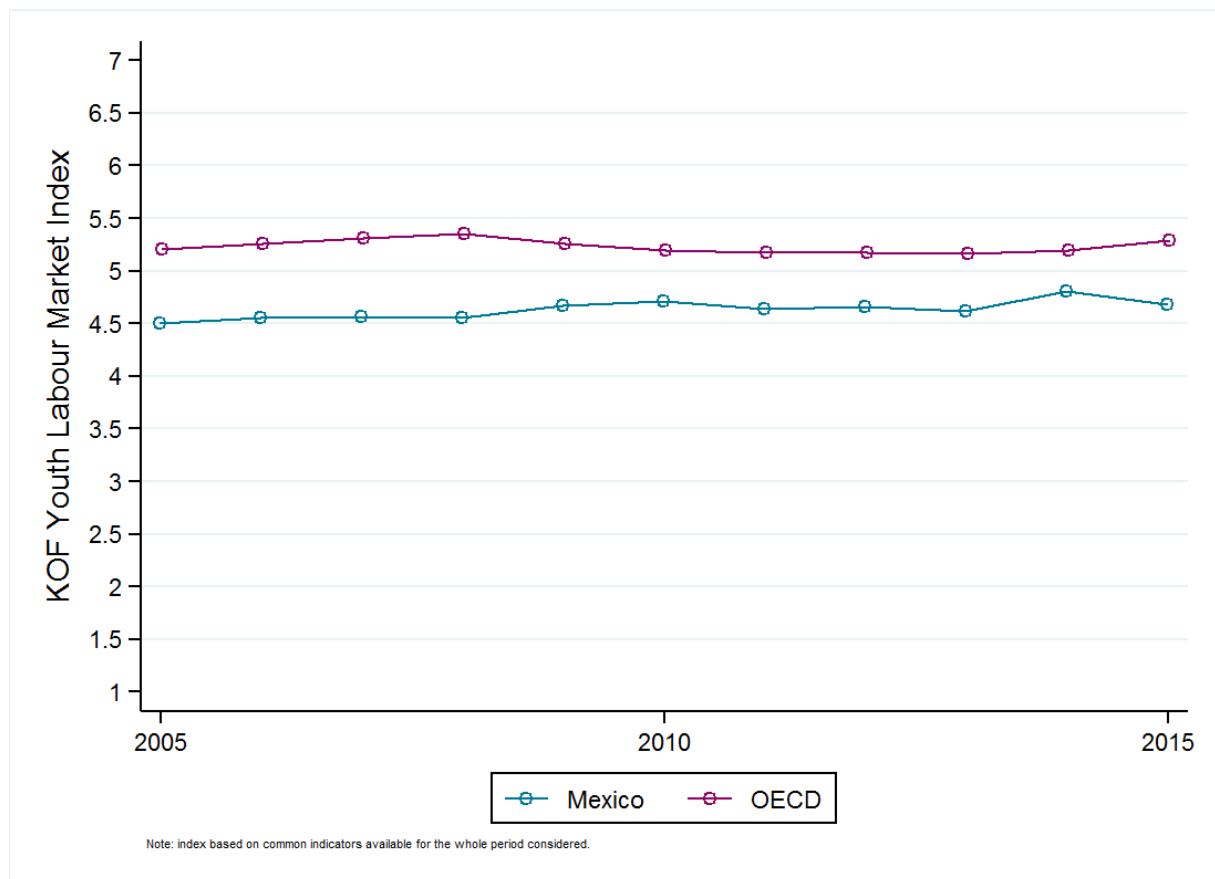
⁵ Share of the employed population working on their own account or those working in their family business and thus contributing to the entire family income. Both are less likely to have formal work arrangements and are therefore less protected by labor laws and more exposed to economic risk.

⁶ Is defined as the youth unemployment rate (15-24 years) as a share of the adult unemployment rate (25+). If the youth cohort is affected in the same way than the adult group with respect to unemployment, then the relative unemployment ratio will be equal to one. If the youth are relatively more affected, then the ratio will be bigger than one.

⁷ Those unemployed for more than one year (52 weeks) in the total number of unemployed (according to the ILO definition).

YLM based on these five indicators for Mexico and the OECD average for the time from 2005 to 2015. Over the entire time, the KOF YLM for Mexico is below that for the OECD average. However, the gap has minimally lowered over time. Again, it must be kept in mind that the data for the KOF YLM for Mexico may not be representative for the Mexican labor market, since it is not completely clear if these refer to the formal or informal sector employment.

Figure 2: YLM-Indicators Mexico versus OECD, 2005-2015



1.3 The Political System

Understanding both the basics of a country's political system and its political goals with respect to its education system are crucial for understanding its education system in a broader sense. In the first part, we explain Mexico's political system in general terms. The politics and goals of the education system are referred to in the second part.

1.3.1 Overview of the Mexico's Political System

The United States of Mexico proclaimed independence from Spain in 1810 and was officially recognized by Spain in 1827. The state is organized as a federal presidential republic with 31 states and one federal district. The president acts as both chief of state and head of government. He or she also appoints the cabinet, while the appointments of the attorney

general, the head of the Bank of Mexico, and senior treasury officials require Senate approval (CIA, 2016).

The country's legislative branch is organized in a two-chamber system, called *Congreso de la Union*. It is comprised of a Senate (128 seats) and a Chamber of Deputies (500 seats). Members of the Senate serve six-year terms, while members of the chamber of deputies are re-elected every three years. The justice system contains a Supreme Court with twelve justices and the Electoral Tribunal of the Federal Judiciary, which consists of the superior court and five regional courts (CIA, 2016).

The country has a long and unfortunate history of drug related violence and corruption. In the World Bank's Worldwide Governance Indicators, Mexico places in the upper midfield in the categories "Voice and Accountability", "Government Effectiveness" and "Regulatory Quality" (scores between the 45th and 68th percentiles). Mexico's rank in these categories has been relatively stable over the past 20 years. Mexico's standing is drastically different in the remaining categories: in "Rule of Law", "Control of Corruption" and "Political Stability and Absence of Violence/Terrorism" Mexico's rank has steadily dropped since the early 2000's. Most notably, Mexico's international rank in corruption control decreased substantially since President Peña Nieto was elected in 2012 (World Bank, 2014).

The recent movements of these governance indicators are consistent with the perception that over the past decade Mexico has slid deeper into a seemingly never-ending circle of drug- and corruption-related violence. This trend manifests itself in a murder rate that has more than doubled since the early 2000's (World Bank, 2015). Additionally, law enforcement and military forces have been allegedly involved in numerous capital crimes, including murders, torture and kidnappings. Citizens, migrants, human rights defenders and journalists have been frequently intimidated, kidnapped or murdered by organized criminal groups, while prosecution rates of all forms of crime remain extremely low (U.S. Department of State, 2015).

In the Economist's 2015 Democracy Index, Mexico dropped to rank 66 out of 167 countries analyzed and is thus classified as a flawed democracy. Since 2012, the country's position in the index dropped by 15 ranks. Contrastingly, Mexico's scores in "electoral process and pluralism", "political participation" and "civil liberties" are relatively high. The scores are lower for "political culture" and "functioning of government" (Economist, 2015). In Transparency International's 2015 Corruption Perception Index, Mexico placed 95th out of 168 countries investigated and thus well below the upper half of the ranking (Transparency International, 2016).

1.3.2 Politics and Goals of the Education System

Articles 3 and 31 of Mexico's political constitution and the general education act define the right to education and the conditions for provision of the respective services. Article 3 of the constitution guarantees the right to education for all and states: "*the state-federal government, states, Federal District and municipalities shall provide pre-primary, primary and secondary education.*" The compulsory part of the education system, referred to as "basic education," covers pre-primary, primary, and lower and upper secondary education. According to the constitution, education provided by the government should be secular, free and democratic (SEP, 2016).

The extent of autonomy varies across different levels of the education system. In primary and lower secondary education, the federal government makes roughly 41 percent of all decisions. 42 percent of decisions are made on the state level while schools make decisions in 17 percent of cases. This division of authority remained relatively stable between 2003 and 2011. Compared to the OECD average, where the government and states typically make roughly 38 percent of decisions, the Mexican federal government and its states have relatively high control over the education system. In upper secondary and tertiary education, the schools typically enjoy more autonomy. As of 2010, there were 854 public and 1,740 private institutions in tertiary education (OECD, 2013a).

The Mexican government recently introduced several policies to prioritize and improve the quality of its education system. One example is the Pact for Mexico, which the federal government signed into law in December 2012. The pact is an agreement between major political parties and the federal government that aims to increase enrolment in upper secondary education to 80 percent and in tertiary education to 40 percent. Additionally, teaching and learning conditions are to be improved by increasing the schools' autonomy. Finally, the pact aims to create a professional teaching service and a more transparent and consolidated evaluation authority.

However, these policies fall short in numerous areas. Mexican students' scores in standardized tests such as PISA are notoriously low. A particularly visible problem area in the Mexican education system is in the state of Oaxaca, where teachers frequently clash violently with the authorities during protests. In July 2016, the government backed down on an education reform of teacher training and qualification attestation. Teachers' unions now remain in control of allocating teachers to positions without a proper qualification screening, which takes its tolls on education quality (Shepherd, 2015). Another major problem is the discrimination against the indigenous population in the higher education system. According to Schmelkes (2009) indigenous Mexicans are underrepresented in higher education. While they make up

approximately 10 percent of the population, it is estimated that only between 1 and 3 percent of higher education enrollees are indigenous. In an equitable education system, this percentage would be much higher. Intercultural universities struggle to gather the necessary financial resources and students suffer from poor living conditions. Intercultural students often also come from households of low educational attainment and thus lag behind their peers (Schmelkes, 2009).

Between 2003 and 2012, Mexico increased the enrollment of 15 year olds in formal education from 58 percent to almost 70 percent. However, the quality of Mexican schools still leaves room for improvement (OECD, 2014c).

2. Formal System of Education

Mexico's education system is divided into seven levels, according to the International Standard Classification of Education (ISCED) 2011 of the UNESCO Institute for Statistics (2012).

Figure 3 illustrates the different stages of the education system as reported by UNESCO (2013) and OECD (2013a) grouped by ISCED level.

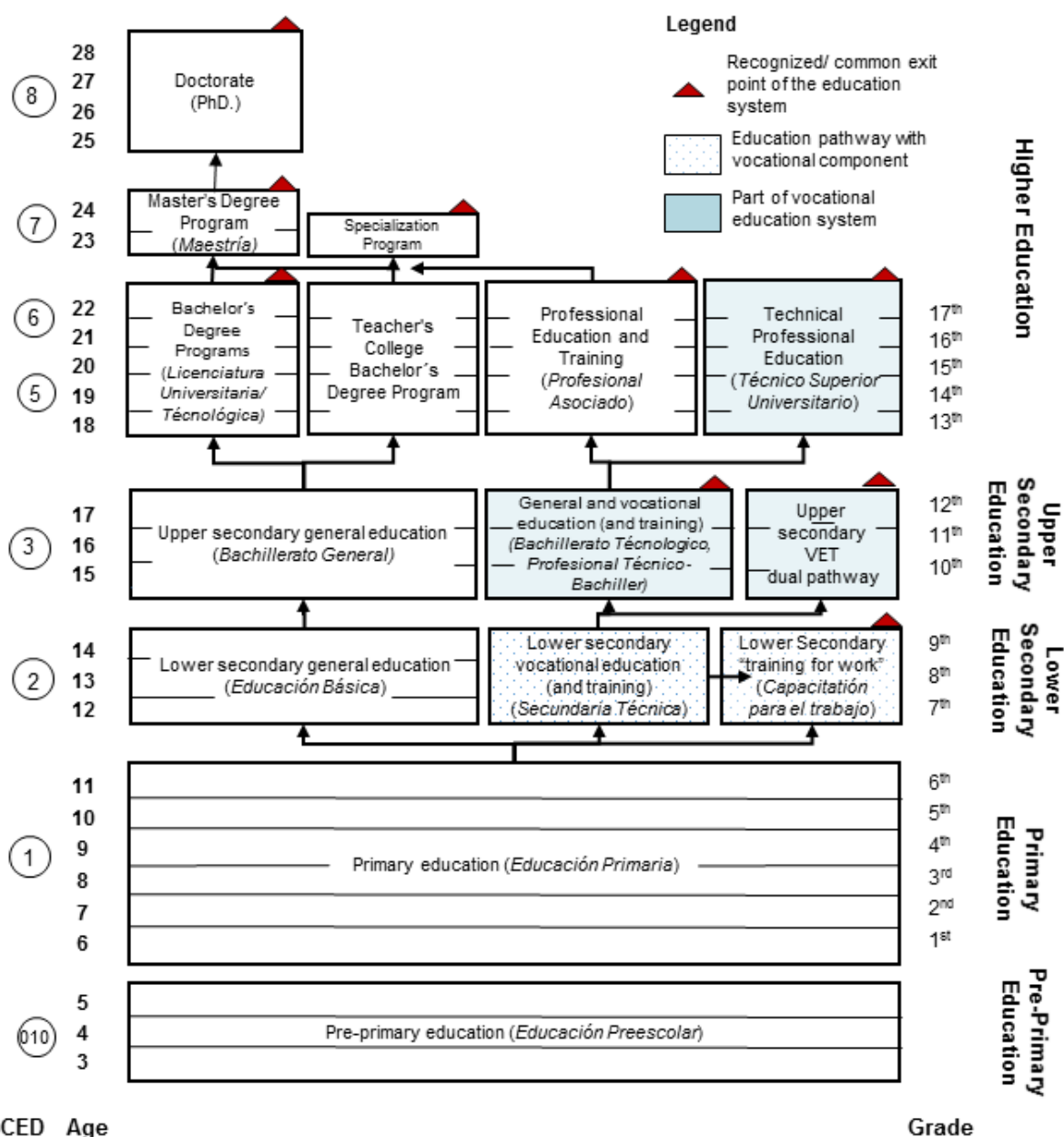
Table 4: Enrollment at different educational levels, 2014

Educational level	ISCED 2011	Enrolment (thousands)	Enrolment (% of total)
Total students	0 – 8	41,121	100.0
Early childhood educational development programs	0	243	0.6
Pre-primary education	0	4,798	11.7
Early childhood education	0	5,041	12.3
Primary education	1	14,627	35.6
Secondary education	2 – 3	12,993	31.6
<i>Lower secondary education</i>	2	8,311	20.2
<i>Of which vocational education</i>	2	1,734	4.2
<i>Upper secondary education</i>	3	4,682	11.4
<i>Of which vocational education</i>	3	384 ⁸	0.9
Post-secondary non-tertiary education	4	n/a	n/a
Tertiary education	5 – 8	3,419	8.4
<i>Short-cycle tertiary education</i>	5	148	0.4
<i>Bachelor's or equivalent level</i>	6	3,043	7.4
<i>Master's or equivalent level</i>	7	200	0.5
<i>Doctoral or equivalent level</i>	8	29	0.1

Source: Own illustration based on datasets provided by UNESCO-UIS (2016a)

⁸ 2012 figure, more recent data unavailable in UIS (2016a)

Figure 3: The Mexican education system



Source: Own illustration based on UNESCO (2013) and OECD (2013a)

According to UIS (2016a), roughly 41.2 million students were enrolled in the Mexican education system across all levels in 2014. This corresponds to roughly one third of the country's population. Table 4 shows enrolment across all stages of the education system.

The educational attainment of the population aged 25 years and older is diverse. More than 20 percent of this generation never completed primary education and another 20 percent quit school after primary education. Roughly 40 percent finished lower or upper secondary education and a mere 15 percent went on to tertiary education. Table 5 shows a detailed

disaggregation of educational attainment in the adult Mexican population aged 25 years and older.

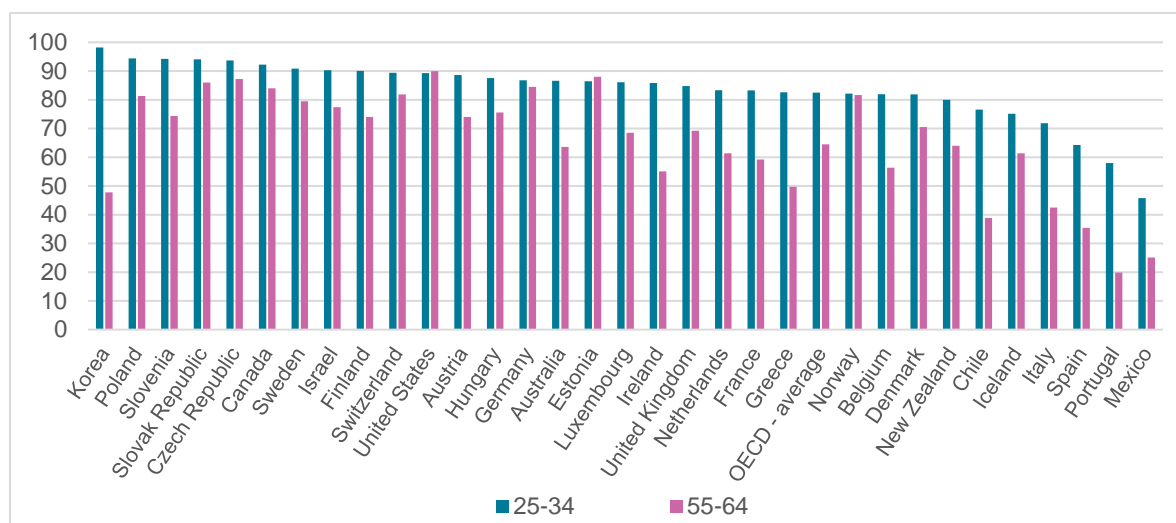
Table 5: Educational attainment (in thousands and in percent) of the population aged 25 years and older, 2014

Educational level	ISCED 2011	Educ. attained (in thousands)	Educ. attained (in % of total)
Total population aged 25 years or older		67,082	100.0
No schooling	0	5,225.3	7.8
Incomplete primary	0	8,997.4	13.4
Primary education	1	14,276.8	21.3
Secondary education	2 – 3	28,862.9	43.1
<i>Lower secondary education</i>	2	17,220.0	25.7
<i>Upper secondary education</i>	3	11,642.9	17.4
Post-secondary non-tertiary education	4	n/a	n/a
Tertiary education	5 – 8	9,674.8	14.5
<i>Short-cycle tertiary education</i>	5	318.3	0.5
<i>Bachelor's or equivalent level</i>	6	8,522.3	12.7
<i>Master's or equivalent level</i>	7	777.8	1.2
<i>Doctoral or equivalent level</i>	8	56.4	0.1
Unknown	n/a	44.8	0.1

Source: Own illustration, based on UNESCO-UIS (2016).

Educational attainment, although low in Mexico compared to other OECD countries, has increased dramatically over the past 30 years. Figure 4 shows the percentage of the population that attained upper secondary education in two different age groups.

Figure 4: Population that has attained upper secondary education in OECD countries (2012)



Source: OECD (2015a).

While Mexicans aged 25 to 34 still have the lowest completion rate of upper secondary education (46 percent) among their OECD peers, the rate has increased dramatically

compared to the Mexicans aged 55 to 64. We remind the reader that as described in section 1.2.3, the median age of Mexico's population is only 27.6 years.

2.1 Pre-Primary Education

Pre-primary education (*Educación Preescolar*) is compulsory for children aged three to five years. The focus of pre-primary education is the development of children's cognitive, social and physical abilities (UNESCO-UIS, 2013). In 2014, net enrolment in pre-primary education was 69 percent (UNESCO-UIS, 2016c). Article 3 of Mexico's constitution states that the provision of basic mandatory education is a responsibility of the government and that basic education must be offered free of charge (UNESCO-IBE, 2010).

2.2 Primary Education

Students typically enter primary education (*Educación Primaria*) at the age of six. Primary school lasts for six years. In 2014, net enrolment in primary education was 95 percent (UNESCO-UIS, 2016c). In 2013, 92 percent of students in primary education were enrolled in public schools, which is slightly more than the OECD average of 89 percent (OECD, 2014a). Besides regular primary education, Mexico also has education programs for children with special needs (UNESCO-UIS, 2013).

2.3 Lower Secondary Education

Lower secondary education (*Educación Básica*) contains two pathways: a general education pathway and a combined general education and vocational pathway (*Secundaria Técnica*). The typical entry age for lower secondary education is 12. Most students choose the general education pathway (*Educación Secundaria*), which takes three years to complete and aims to prepare students for upper secondary education. Upon completion, students receive a secondary education certificate. This degree enables students to move to upper secondary education (UNESCO, 2013; UNESCO-IBE, 2010). The vocational pathway consists of a combination of general education and vocational training. The program takes three years to complete (iMOVE, 2012). More details on the vocational pathway are provided in section 3.1. Lower secondary education is mandatory since 1993. Students typically complete lower secondary education at the age of 14 or 15 (UNESCO, 2015). In 2013, 89 percent of the students were enrolled in public institutions, slightly more than the OECD average of 86 percent (OECD, 2014a).

2.4 Upper secondary Education

Students typically enter upper secondary education when they are 15 years old. Upper secondary education (*Educación Media-Superior*) was declared mandatory in 2010 (BiBB, 2013b). It is divided into three pathways, of which two are vocational. In 2013, roughly 81 percent of students attended public institutions (OECD, 2014a).

The general education program takes three years to complete and is similar to the traditional high school model that is prevalent in many OECD countries. It aims to prepare students for tertiary education. Students choose a specialization area and receive the associated general baccalaureate or a baccalaureate of cooperation, pedagogical sciences or arts upon graduation (*Bachillerato General*, *Bachillerato por Cooperación*, *Bachillerato Pedagógico* and *Bachillerato de Arte*). Any of these diplomas allows students to enroll in tertiary education. The roughly 92 percent of students in upper secondary education pursue one of these classic high school degrees without a vocational focus (see also Table 4) (UNESCO, 2013).

Both vocational programs typically last three years (OECD, 2009a). One of the two vocational pathways, which awards the so-called *Bachillerato Tecnológico*, is a combination of general and vocational programs. It is taught at technical high schools and allows students to enter tertiary education or to start working in a technical profession (UNESCO, 2013).

The second vocational program, which awards the so-called *Profesional Técnico –Bachiller* mostly covers vocational topics. The program trains professionals for industrial, trading, service and agricultural activities (UNESCO, 2013). Both vocational programs will be described in the third chapter in more detail.

2.5 Postsecondary / Higher Education

The tertiary level of the education system comprises general as well as professional education and training (PET) programs. PET is the vocational education program at the tertiary level. In 2013, roughly, 31 percent of Mexican university students were enrolled in private universities (OECD, 2014a).

Mexico's universities offer a multitude of general education programs that result in a *Licenciatura*, which is the equivalent to a Bachelor degree. The *Licenciatura* is offered at normal (*Licenciatura Universitaria*) and technical universities (*Licenciatura Tecnológica*). It typically takes four to five years to complete (UNESCO-UIS, 2013). Both the general and technical degrees enable students to continue at the so-called *Posgrado* level, which comprises the Master (*Maestría*) and the Doctorate degree levels (*Doctorado*). The admission to a Master program is conditional on a relevant Bachelor degree. It typically takes two years

to complete. In order to enter a program at the Doctorate degree level, either a Bachelor's or Master's degree is required (UNESCO-UIS, 2013).

As an alternative to general education programs at the tertiary level, professional education and training (PET) programs are offered at technical institutes (*Institutos Tecnológicos*) and lead to a technical (*Técnico Superior Universitario*) or associate certificate (*Profesional Asociado*). The curriculum of these institutes has vocational characteristics and focuses on technical professions. After two to three years of study, students can earn a vocational certificate. According to UNESCO, this certificate does not allow progression to postgraduate programs. On the contrary, a report of EP-Nuffic (2015) states that progression into advanced stages of *Licenciatura* programs is possible with such degrees. A vocational certification paves the way to postgraduate studies (UNESCO, 2013).

2.6 Adult Education and Literacy Program

Most of the adult education programs in Mexico are provided through the National Institute of Adult Education (INEA). The institute promotes and develops services to increase literacy among adults at different levels. It focuses on individuals aged 15 and older (INEA, 2016). The main education program is called Education Model for Life and Work (*Modelo Educación para la Vida y el Trabajo - MEVyT*). The program is regarded as an innovative model for adult education and is implemented in a collaboration between the INEA and the states' Adult Education Institutions (IEEAs), NGOs, local governments and private companies (UNESCO-UIL, 2016). According to a 2015 article in Education Week, the INEA has close to 78,000 facilitators throughout the country, which engage so-called circles of study. These circles have an average of ten adult students. The article credits INEA with great cost efficiency, claiming that it spends only US\$ 750 per year on each student while still achieving good results. Nationwide, over 1.5 million students are enrolled in INEA's program (Education Week, 2015). The UNESCO lists numerous positive effects of these programs, such as improved living standards, better understanding of various health issues, improved social networks and capacity for functional relationship. Additionally, 63 percent of students stated that they managed to achieve occupational advancements thanks to their studies (UNESCO-UIL, 2016).

2.7 Teacher Education

The education of teachers takes place in undergraduate tertiary education and offers a specialized Bachelor's degree (*Educación Normal Licenciatura*). This stage of the education system is divided into four general pathways, in which aspiring teachers specialize in pre-primary education, primary education, lower secondary education, impaired or special-capability children education and physical education (UNESCO-UIS, 2013). As mentioned in

section 1.3.2, teacher qualification is often problematic in Mexico's education system. For example, teachers' unions in Oaxaca allegedly hire underqualified teaching personnel based on personal relationships or in exchange for payment.

3. The System of Vocational and Professional Education and Training

This section of the Factbook describes the vocational education and training (VET) system at the upper secondary level and the professional education and training system (PET) at the tertiary level. Thereby, the term vocational and professional education and training (VPET) refers to both the VET and the PET systems.

3.1 Vocational Education and Training (VET; Upper Secondary Education Level)

The Mexican VET system was founded in 1979 and underwent curriculum adjustments in 1990, 97, 2003 and 2008 as reactions to changing economic circumstances. Since 1995, the program contents have shifted to competence-based education and an outreach program has been in place geared towards marginalized communities. In 1999, changes were implemented that moved vocational education from a heavily centralized system to a federalized system (BiBB, 2013).

As mentioned in section 2.3 and 2.4, VET is offered at the lower and at the upper secondary education level.

VET pathways at the lower secondary education level

There are two education pathways with vocational components at the lower secondary education level. The first is a fixed part of the formal education level and provides further access to upper secondary education and the labor market. The second pathway only provides access to the labor market.

The first pathway with a vocational component (*Secundaria Técnica*) consists of a combination of general education (40 hours a week) and vocational training (8-16 hours a week). It normally takes three years to complete. For the vocational part, students must choose one out of roughly 20 specializations, which are distributed across the agricultural, forestry, engineering, clothing industry, trading or commercial sector (iMOVE, 2012). When entering this pathway, students are typically 12 years old. This pathway prepares students for VET programs at the upper secondary education level or for direct entry into the labor market (SEP, 2000).

In the school year 2010/11, about 28.3 percent of all students at the lower secondary education level were enrolled in the VET program.

The second pathway with a vocational component is called the “training for work” (*Capacitación para el trabajo*) program. It typically takes 3 to 6 months to complete and consists of 50 percent theory and 50 percent practical training. After completion, it provides direct access to the labor market (OECD, 2009a).

VET at the upper secondary education level

In 2014, about 40 percent of all Mexican students in upper secondary education were enrolled in a VET program. VET programs can either be school-based or dual. The vast majority of VET programs are school-based. Meanwhile, the dual VET system is rather underdeveloped. Consequently, only a small fraction of students are enrolled in a dual VET program.

School-based VET

Students typically enter VET at the upper secondary level („Educación Media-Superior”) when they are 15 years old. There are two different school-based VET pathways at the upper secondary education level. Both take three years to complete and provide access to higher education. The first pathway is a combination of general (60 percent) and vocational (40 percent) education (OECD, 2009a). This pathway is taught at technical high schools. The curriculum contains basically the same topics as the purely general education program. In addition to these topics, it also focuses on a particular technical field. As in the general education program, students graduate after three years and receive a technical baccalaureate (*Bachillerato Técnico*). This diploma allows students to enter tertiary education or to start working in a technical profession (UNESCO-UIS, 2013).

The second vocational pathway has a slightly higher vocational content (65 percent) and fewer general topics (35 percent) (OECD, 2009a). The program aims to train professionals for industrial, trading, service and agricultural activities. Students who complete this pathway receive the vocational upper secondary education certificate (*Profesional Técnico - Bachiller*). Initially, this pathway was designed to prepare students for a direct entry into the labor market. As such, it was a dead-end educational pathway. However, due to a recent reform, now students with this type of degree have the option to advance to tertiary education (UNESCO-UIS, 2013).

Usually, more than two thirds of the students in either of the school-based VET programs are enrolled at one of the institutions run by the National College of Technical and Professional Education (CONALEP), which is a public institution. The vocational part of both school-based

VET pathways consists of basic training in more general vocational topics and training in the chosen vocational specialization. After two years at the vocational school, students are allowed to complete their obligatory internship in a relevant field. This internship lasts around 360 hours (assuming a working time of ca. 40 hours per week results in ca. 3 months) and is carried out in a firm that is recognized as a training firm by CONOCER (BiBB, 2013b).

According to the BiBB (2013a), as of 2012 there were 46 professions for vocational training in the upper secondary education stage. Over 16,000 teachers were active across 302 campuses, 8 centers for Technological Assistance and Services (CAST), and 110 mobile units to attend to communities. Table 6 lists career path examples listed in a report by the German Federal Institute for Vocational Education and Training (BiBB).

Table 6: Career paths in vocational education in 2012-13

Careers Pathways 2012-2013	
Maintenance and installation	Processes of production and physical transformation
Automobile Industrial electromechanics Maintenance of motors Aircraft covering Refrigeration and air conditioning Alternative sources of energy	Building Clothing Industry Metal mechanics Security and civil protection
Processes of production and chemical-biological transformation	Electricity and electronics
Industrial Chemist Food processing Metallurgy	Mechatronics Maintenance of electronic systems Electricity distribution networks
Information technology and communications	Service Careers
Informatics Telecommunication Maintenance of computing equipment	Accounting and administration Tourism Transport Health Culture and recreation

Source: own illustration based on BiBB (2013)

Dual VET

Between 1993 and 1998, a first attempt was made to implement a dual vocational system, modelled after a German approach. The system was mostly based on a partnership with Mercedes-Benz. It trained apprentices to become motor vehicle and electrical mechanics or industrial plant electronics technicians, but it collapsed when Mercedes-Benz introduced a

recruitment freeze in 1999. Between 1999 and 2007 the participant numbers in the program were negligible, although it did continue. By the end of 2008, CONALEP relaunched the program because they found that students that had finished an apprenticeship in the first phase of the program performed well in the labor market and found adequate employment. Since then, the number of trainees have shown fast growth and reached 1,200 individuals in 2013 (2013b). Under the *Education Sector Program 2013-2018*, the Secretariat of Public Education (SEP) intends to expand the program further, aiming for 10,000 trainees by 2018 (SEP, 2016). Since 2014, Mexico has maintained a partnership with two German Ministries: under the project name “Further development of the Mexican dual VET model (MMFD)” the SEP collaborates with the German Federal Ministry for Economic Cooperation and Development (BMZ), and the Federal Ministry of Education and Research (BMBF) (BiBB, 2016).

The current dual VET program lasts three years. In order to participate in such a program, students must be at least 16 years old and must be enrolled in a teaching institution that offers the dual VET pathway (e.g. CONALEP). The program consists of practical training (75 percent) at the workplace and under the guidance of a supervisor, who must follow an agreed upon work plan, and theoretical training (25 percent) provided by the schools through an e-learning platform (BiBB, 2013b). As a third component of the dual VET system, students receive supplemental training in inter-company courses (six in total). The training offered in these courses include topics that have to be taught according to the training regulations, but cannot be covered by the individual training firms due to a lack of material or teaching equipment. The courses take place twice a year and last for three weeks (BiBB, 2013b). The curricula of the programs must comply with the competency standards for the system, which are listed in the National Competence System (*Sistema Nacional de Competencias*) (SNC) (UNESCO-UIS, 2016c). According to the BiBB, the curricula are based on the German training regulations and framework curricula and adapted to the needs of the local labor markets (BiBB, 2013b). The evaluation of students is carried out by the school and the firm (UNESCO-UIS, 2016c). The final examinations are done by the teaching staff from the CONALEP. Marks are given for the inter-company training measures, the assessments of the companies, and a final project. Students that complete a vocational program with CONALEP may also take an additional exam at the German-Mexican Chamber of Industry and Commerce (CAMEXA) in order to obtain a chamber certificate corresponding to the German dual model. Since the vast majority of students are not in a dual VET program, this option is reserved for very few students (roughly 0.025 percent of students in upper secondary education in 2012) (BiBB, 2013b). As described later, the companies must basically bear all the associated costs of their trainees. In 2011, a scholarship system was introduced to reduce some of the financial burden borne by the companies (for more details, see section 3.6).

3.2 Professional Education and Training (PET; Post-Secondary Level)

The Mexican PET system is mainly based in undergraduate tertiary education (see section 2.5). Students attain technical professional education at specialized technical institutions or regular universities that offer vocational programs. Students completing training at a regular university earn the degree of university technical professional education (*Técnico Superior Universitario*, also referred to as *Profesional Asociado*). If they complete a program at a technical institution, the pathway is called technical professional education (*Técnico Superior*). The programs typically take between two and three years to complete. Some universities classify such titles as intermediate degrees. Depending on the program, students can also transfer into different stages of regular bachelor's programs (*Licenciatura*) with these degrees, depending on specialization and region (EP-Nuffic, 2015). The Mexican PET institutions show similarities to the community colleges in the United States.

3.3 Non-formal vocational and professional education

Various government and non-government institutions also offer non-formal VPET programs. For example, INEA provides some vocational programs along with literacy initiatives. Additionally, youth above the age of 16 can choose a vocational track or enter adult education at the lower secondary level. Another provider of non-formal VPET programs is the Ministry of Labor and Social Welfare (*Secretaría del Trabajo y Previsión Social, STPS*) (UNESCO, 2015).

3.4 VET Initiatives Supported by other Countries

The German Federal Institute of Vocational Education and Training (BIBB) supports VET initiatives in Mexico. BIBB's main focus is developing and implementing the Mexican dual VET system.

BIBB and its Mexican partner institute CONALEP first signed a cooperation agreement in 2009. The aim of the cooperation is to provide technical advice and to support the establishment of institutional and legal frameworks. Additionally, they introduced dual elements to the Mexican VET system. BIBB took a leading advisory role in the creation of the occupational profiles for the motor vehicle mechatronics technician and driver training occupations (BiBB, 2015a).

In 2013, the first VET pilot project was launched under the Mexican model of dual education and training (*Modelo Mexicano de Formación Dual, MMFD*) (BiBB, 2015b). Although the Mexican and the German dual VET systems have some core features in common, the Mexican model had to be fully adapted to local needs and requirements (UNESCO, 2015).

In 2015, the Mexican and German governments reaffirmed their willingness to strengthen cooperation by signing a “Joint Declaration of Intent” on cooperation in VET. Both countries agreed to contribute €5 million in order to develop MMFD and promote the joint initiative between the state and business sectors (BiBB, 2015c).

The same year, the German Federal Ministry for Economic Cooperation and Development (BMZ) commissioned the German Agency for International Cooperation (GIZ) to support the SEP and the Employers’ Confederation (COMPAREX) in refining MMFD. The GIZ and BIBB joined forces to provide integrated consultancy services from a single source within the scope of MMFD by 2019. The BMZ and the BMBF support this cooperation project with €5.6 million (GIZ, 2015).

The non-profit company ALTRATEC (German-Mexican Alliance for Technology Transfer) offers a variety of services that focus on dual training. They assist various schools and enterprises in setting up a dual education systems and provide advisory services to educational ministries. Its largest customer is CONALEP (iMOVE, 2012). ALTRATEC is supported by important German partners such as the BIBB and the Federation of German Industries (BDI). In cooperation with ALTRATEC, CONALEP and companies define which competences companies require and which learning fields should be included (BiBB, 2013b).

Mexico is an economically important location for Germany. There are around 1,400 companies in Mexico involving German capital participation. These companies are mainly concentrated in the automotive, pharmaceutical / chemical and logistics industries. These companies are frequently faced with the problem of finding trained specialists (BiBB, 2015c; Der Tagesspiegel, 2016).

Another country supporting VET initiatives in Mexico is Australia. The Australian Department of Education and Training (DET) and the SEP first signed a “Memorandum of Understanding” on cooperation in education and training. The memorandum was first signed in 2003 was renewed twice, in 2008 and in 2015. Although the cooperation has existed for the past 10 years, Australia’s engagement with Mexico is still relatively small. Potential commercial opportunities for Australian VET providers to involve themselves in the Mexican economy exist in the form of the oil and gas sectors, which lack technically skilled workers. Australia with its oil, gas and energy experience, could play a larger role in providing these sectors with specialized VET qualifications (Foreign Affairs, Defence and Trade Committee Australia, 2015)

3.5 Regulatory and Institutional Framework of the VPET System

3.5.1 Central Elements of VPET Legislation

The following elements of legislation are the most important in the context of VPET and are listed in UNESCO's world TVET database (UNESCO, 2015):

- i. The most recent legislation is the Agreement on Dual Training. Signed into law in 2015, it establishes and governs the renewed expansion of the Mexican dual training system.
- ii. The General Law on Education (*Ley General de Educación*) (2006) regulates the education system in Mexico and specifically assigns responsibility to both the federal and state governments for the administration of VPET.
- iii. Article 38 of the Law on Public Federal Administration (1976) established and defined the duties and competences of the Secretariat of Public Education (SEP). It was last revised in 2003.
- iv. The Law on Higher Education (1976) established the terms and contents of the tertiary education level in Mexico. This law encourages tertiary education institutions to promote, establish and support educational, scientific, technical and artistic services.

3.5.2 Key Actors

Numerous governmental and non-governmental bodies hold different positions in the Mexican VPET system. In some cases, their activities are not confined to the VPET system alone. The institutional landscape of the Mexican VET system is very complex compared to international standards, as it is composed of over a dozen subsystems with many school types and corresponding administrative divisions. Below, we list the most important bodies that have a stake in vocational or professional education.

Government

The Secretariat of Public Education (SEP) has sole responsibility for the regulation of general and vocational education in Mexico. While the SEP is responsible for general and vocational education, training for work and teachers training and certification, the Ministry of Labor only has influence over the work-based part of training and certification matters. According to the General Education Law, both federal and state governments are responsible for the administration of the VPET system. On the federal level, the SEP and its Under-Secretariat for Upper Secondary Education (Subsecretaría de Educación Media Superior, SEMS) are responsible for VET formalities corresponding to the VET programs. As part of the federal

government, they manage upper secondary VET through various Directorates-General (DG) such as the Directorate-General of Industrial Technological Education (DGETI), DG of Agriculture and Livestock Education (DGETA), DG of Sea Science and Technology Education (DGE CyT) and DG of Training Centers for Work (DGCFT). Given the decentralization of the VPET system (see section 3.1), the SEP collaborates with numerous national and regional institutions (UNESCO, 2015; OECD, 2009a).

On the state level, each state government has its own Ministry of Education that is responsible for the administration of “decentralized institutions of state governments with federal participation,” such as the State Centers for Scientific and Technological Studies (CECyTE) and Institutes of Training for Work (ICAT). Just as for CONALEP, both federal and state governments are responsible for the administration. Because state governments are also responsible for the “decentralized institutions of the federations”, they manage most of the CONALEP schools, except for CONALEP schools in Mexico City and Oaxaca, which are managed by the federal government. (UNESCO, 2015).

CONALEP is the main governmental body that monitors the VET system. It is one of the leading VET institutions providing VET programs in compliance with the MMFD.

According to UNESCO (2015, p. 9) CONALEP’s primary objectives are to:

- Develop new programs according to the demands of the labor market;
- Update the curriculum and teaching equipment;
- Reduce the failure and school drop-out rate;
- Implement strategies to develop scholarship programs for students;
- Strengthen CONALEP’s international cooperation in the field of VET;
- Implement strategies to expand the number of opportunities for students to attend schools; and to
- Promote links with the industrial sector to reduce the unemployment rate.

According to UNESCO (2015), there are two other important institutions involved in the governance of the Mexican VET system: The Directorate General of Higher Technological Education (*Dirección General de Educación Superior Tecnológica, DGEST*) and the Directorate General of Industrial Technological Education (*Dirección General de Educación Tecnológica Industrial, DGETI*). The DGEST is responsible for the National System of Technical Institutes (*Sistema Nacional de Institutos Tecnológicos, SNIT*), whose purpose is to strengthen VET by improving VET services offered, ensure better access to VET programs, promote the application of Information and Communications Technology in VET programs, and to improve school and institution management structures. The DGETI also deals with

vocational education and its aim is to provide training on technological expertise in the industrial, commercial and service sectors (UNESCO, 2015).

The Council for Accreditation of Higher Education (COPAES), founded in 2000, is the only institution that is entitled by the SEP to give official recognition to accrediting agencies of academic programs. Accreditation bodies recognized by the COPAES carry out the evaluation process leading to the accreditation of programs of undergraduate, graduate or professional senior technical associates. They look specifically in defined areas of knowledge and evaluate both public and private institutions around the country. An official recognition from an accreditation body and the accreditation of academic programs takes five years to obtain. Once approved, the institutions are late subject to a recognition renewal process every 5 years (UNESCO-IBE, 2010).

Representation and advisory bodies

In countries with well-developed VET systems (e.g., Germany, Switzerland and Austria), employers' associations and trade unions participate actively in the development and modernization of the VET system. Contrastingly, employers' engagement in Mexico's VPET system remains weak. On the national level, Mexico does not have an official body that involves employers. At state level, the State Commissions for the Planning and Programming of Upper Secondary Education (CEPPEMS) is responsible for the coordination between state level authorities and various subsystems. However, since the CEPPEMS includes few employer representatives, they play a minor role in these commissions (OECD, 2009a). There is still no legally binding concept that integrates employer, employee representatives and the state as equal partners in the development of a dual VET system (BiBB, 2013b).

The CONOCER, which also acts as an advisory body, provides technical assistance for companies and federal entities by forming Management Committees (*Comite de Gestion por Competencias*). The aim of this committee is to represent the interests of the industry, company owners and managing directors, chambers of commerce, and trade unions. The committees are also involved in the evaluation and certification procedure and in defining competence-based standards. CONOCER is the only body in Mexico that can approve official certificates of competency (UNESCO, 2015). However, CONOCER has limited power to make decisions because from an organizational perspective it is subordinated to the SEP (World Bank, 2013).

The National Evaluation Center for Higher Education (CENEVAL) is a non-governmental and non-profit organization whose main responsibilities are the design and application of evaluation tools for the assessment of knowledge, skills and competencies, as well as for analysis and dissemination of test results at all educational levels. It was established in 1994 (OECD, 2012).

Education and training providers

The most important VET provider is CONALEP. It is responsible for around 300,000 vocational students studying in 501 schools across Mexico, corresponding to 76.5 percent of all vocational students (UNESCO, 2015).

In addition to CONALEP, the CBT (Centro de Bachillerato Tecnológico), the CET (Centro de Estudios Tecnológicos) and the CECyTE also provide vocational education through their schools (BiBB, 2013b). Federal and governmental Directorates-general such as the DGETA, DGETI, and DGEcyTM manage these institutions (see Table 7) (OECD, 2009a). Training for work is offered by the DGCFT (World Bank, 2013).

In addition to the public VET institutions, such as the CONALEP, there are many private VET providers. There is for example the *Capacitación Automotriz Especializada* (CAE) that is specialized for VET in motor vehicle mechanics, the *Colegio Superior de Gastronomía* (CSG) that is a leading provider for cook training and the *Instituto de Administración Pública Chiapas* (IAP) which is the best-known institution for job profiles in the field of state administration. Especially, there are many German-owned companies providing VET in Mexico: Volkswagen de Mexico describes itself as the pioneer of the dual VET in Mexico, having provided vocational training for the past 50 years. In their VET center, they primarily train specialist for their own needs. Bosch de Mexico is another company that has been successfully providing VET for years (iMOVE, 2012; Volkswagen, 2016).

The following table (next page) offers an overview of the subsystems and schools in Mexican public upper secondary VET.

Table 7: Subsystems and Schools in Mexican VET

VET Programs	Centralized units of Secretariat of Public Education (SEP) and its Under-Secretariat for Upper Secondary Education (SEMS) - (SEP-SEMS)		Decentralized units of state governments, with federal participation		Decentralized units of the federation	
	Administrative unit	School(s)	Administrative unit	School(s)	Administrative unit	School(s)
Technical Baccalaureate (Bachillerato Tecnológico) ISCED 3	Directorate General (DG) for Industrial Technological Education (DGETI)	CETIS CBTIS	DG for Industrial Technological Education (DGETI)	CECyTE	Centre for Technical Industrial Education (CETI)	
	DG for Agriculture and Livestock Education (DGETA)	CBTA CBTF				
	DG for Sea Science and Technology Education (DGE-CyTM)	CETMAR CETAC				
Technical - Professional Baccalaureate (Professional Técnico – Bachiller) ISCED 3			DGETI	CECyTE	National College of Technical Education (CONALEP)	CONALEP
Training for Work ISCED 2	DG for Training for Work (DGCFT)	CECATI	DG for Training for Work (DGCFT)	ICAT		

Source: own illustration based on OECD (2009a)

3.6 Educational Finance of the VPET System

The federal and state governments cover most educational expenditures for VPET. The main financially responsible bodies are the SEP, the STPS, and the Ministry of the Economy (*Secretaría de Economía*), which sets the public sector's education budget (UNESCO, 2015).

At first glance, the financing of the Mexican VET system has a simple outline. The initial technical training (technical education) is funded by the SEP along with the states' government.

Regarding company-based training in the dual VET program, companies that provide training bear the costs for their trainees. They cover the costs for the intercompany measures, training staff, workplace equipment, books, working clothes, IT systems equipped with an e-learning platform and the examinations at CAMEXA. In addition, the companies pay the apprentices a training allowance (BiBB, 2013b).

Mexico's financial structure differs from that of other OECD countries, where it is common that some of the workplace training costs are covered by public funds to lower the employer's expenses (OECD, 2009a). With the aim of attracting more companies to participate in the dual type VET model, the state government of the state of Mexico (*Estado de México*) launched a "scholarship program for dual vocational education and training" via its funding agency, the Mexican Council for Science and Technology (*Consejo Mexiquense de Ciencia y tecnología, COMECYT*). Through the program, this state government covers some of the costs and reduces the financial burden on the participating companies. This scholarship model shows that a financial partnership between the state and industry is possible in Mexico, which can further stimulate employers' participation in dual training. In the long term, however, the scholarship model must be further developed to ensure that the main responsibility for financing remains with trade and industry (BiBB, 2013b). For example, the state government of Estado de Mexico (via COMECYT) has proposed that the state funds a decreasing share of the training remuneration during the three years of education. Therefore, the proportion of the training paid by the companies would increase as the skills of the trainees increase (BiBB, 2013b).

Investment in education has increased over the past decade. Between 2000 and 2010, education expenditure rose from 5.0 percent to 6.2 percent of Mexico's GDP. Roughly half of these funds are used for primary and lower secondary education. 80.5 percent of funds for education come from public sources while the remaining 19.5 percent are provided by private sources. The share of total funds invested in upper secondary and tertiary education is below average, compared to other OECD countries. Nevertheless, expenditure per student at the primary, secondary, and post-secondary non-tertiary level increased by 23 percent between 2000 and 2010 (OECD, 2013a).

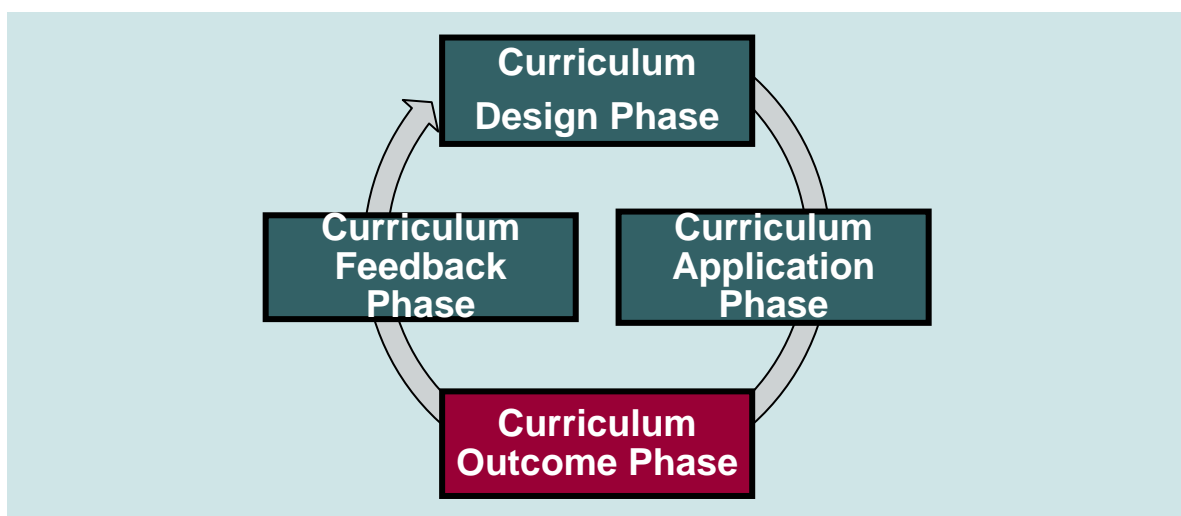
The OECD (2013a) identifies three main trends in its education policy outlook on Mexico. First, Mexico spends a relatively low share of educational funds on school infrastructures and educational materials in pre-tertiary education compared to other OECD countries. Second, the proportion of funds spent on teacher salaries is among the highest among the OECD countries. In 2010, 93.3 percent of funds for pre-tertiary education were spent on educational staff, while the OECD-average was only 78.2 percent. Third, the spending gap between

students in pre-tertiary and those in tertiary education is among the largest of all OECD countries, with an under-proportional expenditure at the tertiary level (OECD, 2013a).

3.7 Curriculum Development

The curriculum is a central element to a well-functioning VPET system, as it defines the framework and the standards of the education system. The development of a curriculum can be divided into a three-step process with a curriculum design, a curriculum application and a curriculum feedback phase. This theoretical concept is called the Curriculum Value Chain and is depicted in the picture below (CVC; for more details see (Bolli, et al., 2016)).

Figure 5: Curriculum Value Chain (CVC)



Source: (Bolli, et al., 2016)

In the curriculum design phase, VET curriculum content and qualification standards are decided upon by the relevant actors. The discussion in the subchapter below focuses on the degree and the amount of stakeholder participation in curriculum design in Mexico. The curriculum application phase revolves around the implementation of the curriculum. Because learning environments differ heavily across countries—especially with respect to the prevalence of workplace learning—the curriculum application subchapter in this Factbook focuses on those learning environments. Specifically, it addresses where learning takes place and whether the curriculum dictates both school and workplace learning or only one of the two. Finally, curriculum outcomes can be collected and analyzed in the curriculum feedback phase. This evaluation process is important as the feedback may render a more refined curriculum design.

3.7.1 Curriculum Design Phase

The design phase is crucial to the whole curriculum building process. In order to ensure that the skills taught in the VPET programs correspond to the needs of the labor market, experts from companies should be involved in defining the qualification standards and learning contents of the curricula.

The Sectorial Coordination for Academic Development (*Coordinación Sectorial de Desarrollo Académico, COSDAC*) is a subordinate to the SEMS of the SEP. COSDAC is responsible for the coordination of curriculum content at the upper secondary education level, including VET (World Bank, 2013). They coordinate the educational planning and promote innovation and quality improvements within the framework of the Comprehensive Reform for Upper-Middle Education (*Reforma Integral de la Educación Media Superior, RIEMS*) to establish a National Baccalaureate System (*Sistema Nacional de Bachillerato, SNB*). The COSDAC examines relevant professional standards of the career paths to align the curriculum content with employer and productive sector requirements (IDB, 2014).

COSDAC is also responsible for fostering education planning with respect to productive sector requirements and aligning education efforts with the country's growth strategy.

According to IDB (2014, S. 28), COSDAC's key activities include:

- The design and implementation of the Common Curricular Framework (CCF)
- Teacher training at the upper-secondary level and professional development programs at the staff and managerial levels
- Educational research, innovation projects, and the development of information technologies related to education

Although the Ministry of Labor and Social Welfare (STPS) participates in the regulation and coordination of training for work, it focuses more on labor relations than on curriculum development (World Bank, 2013). Another actor involved in the curriculum design phase is CONALEP (see 3.5.2 Key Actors). CONALEP designs its own curriculum within the Common Curricular Framework based on industry needs. The curriculum design process at CONALEP uses a competency-based methodology (IDB, 2014).

3.7.2 Curriculum Application Phase

The process of implementing curriculum in the learning environment is important to achieving the intended learning outcome.

As described in Section 3.1, VET programs at the upper secondary education level have both school and a work-based component. The COSDAC is responsible for the integration of the

Common Curricular Framework at this level. As for the VET system, education institutions - in particular the CONALEP schools – create and change their courses according to the needs of the local labor markets. Even if they respect the needs of the local labor markets, their plans still have to be approved by COSDAC (IDB, 2014). Both VET programs, the Technical Baccalaureate and Technical-Professional Baccalaureate, normally take three years to complete. The curriculum of the Technical Baccalaureate (*Bachillerato Tecnológico*), which is offered by various subsystems (see Table 7: Subsystems and Schools in Mexican VET), is composed of 60 percent general subjects and 40 percent vocational subjects. The curriculum of the Technical-Professional Baccalaureate (*Professional Técnico – Bachiller*), mainly provided by CONALEP, includes 35 percent general subjects and 65 percent vocational subjects. Students must also complete an additional 360 hours of practical training (OECD, 2009a).

The PET program at the post-secondary level is based mostly on school-based education (see 3.2). Similarly to the VET programs, the universities and institutions that are involved in PET follow an approach that is competency-based and oriented towards the needs of the local industries (IDB, 2014).

3.7.3 Curriculum Feedback Phase

The curriculum feedback phase addresses with the question of if and how educational outcomes are analyzed. Based on the feedback, the curriculum can be re-worked and improved.

The SEP monitors quality assurance and CONOCER (under the SEP) is responsible for the VET qualifications (UNESCO, 2015). They have been working together on improving training, evaluation, and certification in the workplace. CONOCER also helps to involve companies and chambers of commerce in defining competence-based standards as well as in the evaluation and certification procedure of VET (see 3.5.2). However, the Mexican VET lacks a comprehensive National Qualifications Framework and the existing Common Curricular Framework (CCF) barely includes a review mechanism (OECD, 2009a). Due to the lack of instruments to identify future needs of skills and the lengthy and bureaucratic process for updating curricula, the COSDAC faces difficulties to keep up-to-date with industry trends (IDB, 2014). The RIEMS reform from CONOCER should address the risk that VET curricula and qualifications do not reflect the labor market needs by creating an updating mechanism of competences and qualifications, as well as linking the competences defined by CONOCER and upper secondary VET (OECD, 2009a).

In order to ensure the relevance of academic PET programs over time, each technological university has an Advisory Council (*Consejo de Vinculación y Pertinencia*) that links the

university with the local industry, monitors PET programs, and evaluates the job performance of alumnae after graduation. These advisory councils make recommendations about adjustments to the curriculum by taking into account specific opinions of employers and the labor market in general (IDB, 2014).

3.8 Supplying Personnel for the VPET System (Teacher Education)

The Secretariat of Public Education (SEP) is also responsible for the quality of VPET teachers and trainers. At the postgraduate level, the Interdisciplinary Centre for Research and Teaching Technical Education (*Centro Interdisciplinario de Investigación y Docencia en Educación Técnica, CIIDET*) is responsible for teachers' specializations programs in basic education and information technology. Continuing education programs for teachers are also offered by the CIIDET. To attend one of those specialization programs at the postgraduate level, a prospective VPET teacher requires an undergraduate degree from a pedagogical training institution (e.g. from the *Instituto Superior de Formación Docente*), work experience, and success in the selection process (UNESCO, 2015).

Mexico encourages VPET teachers and trainers to gain further professional experience and keep their vocational skills up to date by continuing to work in the industry part-time (OECD, 2014b).

The SEP defines the states' accreditation of teaching staff in private VPET schools by education level. The minimum requirement for prospective teachers is tertiary degree in a technically relevant field (iMOVE, 2012).

4. Major Reform in the Past and Challenges for the Future

4.1 Major reforms

The Integral Reform of Upper-secondary Education (RIEMS) was introduced in 2007 with the objective of improving the quality, relevance, equity and coverage of the upper secondary education level (OECD, 2013b). Instead of replacing the existing upper-secondary programs, the reform aims to ensure national coherence and an up-to-date curriculum by developing a consolidated National Baccalaureate System (*Sistema Nacional de Bachillerato, SNB*). In order to achieve this, the RIEMS reform includes the following elements (IDB, 2014, S. 27):

- Definition of new coordination and regulation structures
- Development of a skills-based Common Curriculum Framework (CFF) (see COSDACS's key activities)

- Development of additional assessments: one for school accreditation and another for student qualifications (measuring the attainment of skills)
- Set of new tools and institutions geared toward professionalization of management, teacher training, and comprehensive student assessment
- Mentoring and student welfare support, including tutoring, career counseling, and scholarships

With the RIEMS reform, Mexico has taken important steps in the consolidation of the national baccalaureate system with a common curriculum that provides all students with a core of generic competencies aligned to the productive sector's needs (IDB, 2014). The remit of the RIEMS includes VET as well as clearly goes beyond it (OECD, 2009b).

However, the main reform regarding the VPET system is the Education Sector Program 2013-2018 (*Programa Sectorial de Educacion*). Its main objective is to strengthen the relevance of job training and of upper secondary and tertiary education for the needs of the labor market. One important task has been the introduction of the Mexican model of dual education (MMFD) which complies with the following requirements (UNESCO, 2015, p. 12):

- Dual training programs lasting at least three years
- Students must be enrolled in an institution offering the dual system and must be at least 16 years old
- The curriculum is consistent with the competency standards listed in National Competence System (*Sistema Nacional de Competencias, SNC*)
- The program is divided into theoretical knowledge taught by a professor and practical knowledge taught in the workplace by a supervisor according to an agreed work plan
- Student evaluation is carried out by the school and the company and is administered through a set of guidelines

4.2 Major challenges

Compared to other OECD countries, Mexico's VET program is one of the smallest: In 2011, only 4 percent of students graduated from upper secondary VET, compared to an OECD average of 47 percent. As for PET programs on the tertiary level, only 2 percent of students graduated from this type of programs, compared to an OECD average of 11 percent (OECD, 2013a).

According to the reports of OECD (2011) and UK Trade and Investment (TVET UK, 2013), the VET system in Mexico faces several challenges. The coordination and coherence between the various subsystems in the upper secondary VET system remains a challenge because those

subsystems have partly diverging interests that hinder policy development. At present, workplace training for VET students varies widely in quantity and quality. According to OECD studies, there is a weak connection between the VET system and employers' side, which finds expression in the low involvement of employers and companies in VET policy development regarding curriculum development. Apart from this, investment incentives are low and companies invest little in VET. Updating VET qualifications and therefore improving their status and recognition in the labor market poses another challenge. In general, the development of a comprehensive National Qualifications Framework for vocational education is a challenge that must be addressed. As for VET teachers and trainers, teacher training programs should be improved to avoid insufficient pedagogical preparation.

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