Executive Summary

This is an updated version of the report produced originally in December 2012 by the same authors. In addition to this narrative report there are some tabular annexes on policies and initiatives available separately.

There is specific coverage of the May 2014 policy and initiatives development related to OER.

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1.   Overview

1.1   Introduction

México, or, more correctly *EstadosUnidos Mexicanos* (the United Mexican States),is located in continental North America, where it shares a northern border with the USA, and a southern border with Belize and Guatemala, although the Mexican states of Campeche, Chiapas, Tabasco, Quintana Roo, and Yucatán, are frequently considered to be part of the Central American region. México is a federal republic comprising thirty-one autonomous states and the Federal District municipality of México City. México has a land mass of 1,964,375 square kilometres, which makes it the 5th largest nation in the Americas, and the 14th largest on the globe.

In 2013, México had a population of 118 million, making it the second most populous country in Latin America and the eleventh most populous in the world. It is the most populous Spanish-speaking country, which makes it the largest hispanophone nation in the world, but it is also one of the most linguistically diverse countries on earth, and over sixty different indigenous languages (which are protected in law) are spoken by over six million people. The capital, México City, has 15 million people, which makes it the largest metropolis in the Americas and the 3rd most populous metropolitan area in the world. The particular demographic features of this large overall population have important implications for educational provision – in 2010 48.1% of the total population were aged 24 or less, and within this cohort, 29.4% were under the age of 15.

1.2   México and the N-11

In terms of total GDP, the combination of a population of 118 million and GDP per capita over US$14,364 makes México the fourteenth largest economy in the world in terms of nominal GDP and the tenth largest in terms of GDP by purchasing power parity. México is the only Latin American member of the O.E.C.D. (since 1994) and, along with the USA and Canada, is a partner in the North American Free Trade Agreement, the largest free trade conglomerate in the world (by value) after the European Union.

The N-11 (2013)		GDP (PPP)	
Country	Population	Total (Billions)	Per capita
Bangladesh	150,039,000	$324.6	$2,575
Egypt	84,550,000	$576.4	$6,964
Indonesia	237,641,000	$1,285	$5,433
Iran	77,176,930	$988.4	$13,337
México	118,337,000	$1,845	$16,002
Nigeria	174,507,539	$509.9	$3,027
Pakistan	182,490,721	$574.1	$3,623
Philippines	99,676,800	$454.3	$4,771
South Korea	50,004,441	$1,666	$34,155
Turkey	73,723,000	$1,167	$16,263
Vietnam	90,388,000	$358.9	$4,231

In 2005, Goldman Sachs identified México as the largest of the Next 11 (N-11) states which, after the BRIC nations, could greatly impact the global economy. The other N-11 countries include Bangladesh, Egypt, Indonesia, Iran, Korea, México, Nigeria, Pakistan, Philippines, Turkey and Vietnam. At the end of 2011, the four major countries (México, Indonesia, Nigeria and Turkey) also

known as MINT, made up 73 % of the total GDP of the N-11 countries. Of the N-11 states, México has the largest total GDP, and the third highest GDP per capita. The World Bank considers México to be a newly industrialized upper-middle income country and an emerging power. In January 2013, PricewaterhouseCoopers (PwC) estimated that by 2050 México could be the world's seventh largest economy.

For further information see:

http://es.wikipedia.org/wiki/Mexico

http://en.wikipedia.org/wiki/Next_Eleven

http://www.pwc.com/en_GX/gx/world-2050/assets/pwc-world-in-2050-report-january-2013.pdf

2.   Education in México

2.1   Legislation and Recent Policy Initiatives

The 1917 Mexican Constitution provides an overarching guarantee, under Article 3.7, that all education given by the state is free, secular, democratic and organised nationally, and that attendance at pre-school, primary and secondary levels is compulsory. Hence religious instruction is prohibited in public schools; however, religious associations are free to maintain private schools (which, unlike in some countries, receive no public funds). Proof of Mexican citizenship is required to attend public schools for free, but foreigners can attend public schools by paying a tuition fee. Education is provided by federal, state, and municipal authorities but, since 1921, all aspects of educational provision (including, artistic, sports and special education) at all levels and across all jurisdictions, has been managed and co-ordinated by the Secretaría de Educación Pública (SEP). In addition, each of the Mexican states has similar agencies which regulate and manage the education within the lower and local tiers of government. Although the majority of education is provided by the state at no cost, there are privately funded educational institutions at all levels of Mexican education. However, these private providers are also all subject to regulation by the SEP. Hence educational standards are set by this Ministry at all levels except in "autonomous" universities chartered by the government (e.g. UNAM). Accreditation of private schools is accomplished by mandatory approval and registration with SEP.

Additionally, the 1993 Ley General De Educación, specifies, in Articles 4,5,6,7, these rights to education in more detail. Under the General Education Act, the federal government is in charge of issuing the rules for basic education and teachers' colleges, defining guidelines, plans and programmes along with local educational authorities; programming the academic calendar; and preparing and printing free books for students, as well as national planning and assessment. Local education authorities are in charge of providing services for early childhood education, basic education and special education and teachers' colleges, as well as professional training and development for the teachers of basic education. Municipalities may promote and provide any type of educational services, but in case of México City (Federal District), basic education and teachers' colleges services are provided by the SEP. In sum, educational services are provided by the federal government (SEP and other secretariats of the Executive Branch), state and municipal governments, autonomous institutions and private individuals.

The Mexican government has implemented a range of education policy reforms in recent years. In 2012, a comprehensive reform of basic education introduced a competency-based curriculum. In addition to making upper secondary education compulsory in 2012 (with a goal of universal coverage by 2022), A National System of Upper Secondary Education (Sistema Nacional de Bachillerato, 2009) was introduced to provide a coherent framework of upper secondary education

through better academic guidance, a monitoring system for institutions, and mechanisms to deliver education (e.g. teacher training, school leadership professionalisation, infrastructure, scholarships).The Pact for México (2012) and the Reform of the Mexican Constitution (2013), consolidated commitments in education – in teaching, school policy, and evaluation and assessment. These reforms culminated in the new professional teaching service law (2013), which aims to clarify the processes for selection, recruitment, training, promotion and evaluation of teachers, school leaders and supervisors and promotes a new technical assistance service for schools. Another law has granted autonomy to the National Institute for Educational Assessment and Evaluation (Instituto Nacional para la Evaluación de la Educación, INEE).

On 1ˢᵗ December 2012, following victory in a national election, Enrique Peña Nieto, the candidate from the party of the Institutional Revolution (Partido Revolucionario Institucional), took up the Presidency of México for a six year term. For 71 years from 1929, the PRI had held presidential power in México, but in 2000, were defeated by the candidate from the centre-right National Action Party (Partido Acción Nacional), Vincente Fox. This feat was repeated in 2006 when the PAN candidate Felipe Calderón, was victorious in the Presidential election. Calderón pledged to address the problem of violence associated with the drugs trade in México. Despite a high profile campaign, which deployed the army and lead to the death of circa 60,000 people, Calderón's anti-narco policy was viewed as a failure, which enabled the PRI to return to office under Peña Nieto.

The new government has enacted reforming legislation that is designed to have profound impact on the provision of education and also the nation's ICT infrastructure. In May 2013, Peña Nieto's administration unveiled a new National Development Plan. The Plan has five major goals, one of which, México con Educación de Calidad (México with Quality Education), is considered central to the development and reform of México's educational system up until 2018. In order to deliver quality education, the National Plan outlined the following strategic goals:
- Establish a teacher professionalisation system that promotes training, selection, updating and evaluation of teachers and technical-pedagogical staff.
- Modernise the infrastructure and equipment of schools.
- Ensure that the plans and study programmes are relevant and help students successfully make progress in their educational career, as well as developing significant learning and skills that will serve them throughout their lives.
- Promote the incorporation of new information and communication technologies in the teaching-learning process.
- Reduce dropout, improve school leavers' efficiency at each educational level and increase transition rates from one level to another.
- Promote a National Evaluation System which orders, articulates and rationalises the measurement and educational assessment elements and processes.
- Expand opportunities for access to education in all regions and sectors of the population.
- Expand support for children and young people in disadvantaged or vulnerable situations.
- Create new educational services, expand and fully utilise the existing capacity of the schools.

Expansion in the use of new information and communication technologies is seen as crucial to the successful implementation of the new National Development Plan. Consequently, in November 2013, six months after the inauguration of the National Development Plan, President Peña Nieto unveiled a National Digital Strategy for México. The fundamental purpose of the Strategy is to achieve a *Digital México* in the adoption and use of ICT to maximize their economic, social and political impact on enhancing the quality of life of people. The National Digital Strategy is a five year plan designed to encourage the adoption and development of the Information and Communication technologies and bring México into the Information Society and the Knowledge Economy. The strategy is very similar to that adopted by President Vincente Fox's e-México

Strategy – see the section on The Internet in México, below. The National Digital Strategy outlines the challenges that México faces in the new global digital environment and the manner in which they will be overcome. With respect to Quality Education, the Digital Strategy aims to achieve the following objectives:

- Develop a national policy for the adoption and use of ICTs in the learning-teaching process of the National Education System by:
  - providing ICT infrastructure for all the schools in the education system.
  - expanding digital skills among students through teaching practices.
  - creating digital content aligned with the master plans and promoting the evaluation of these plans in order to incorporate the use of ICTs.
  - incorporating ICTs into teacher education as a skill and teaching tool
- Expand the range of educational services by digital means by:
  - consolidating the existing digital universities in all fields of study to expand the range of educational services offered.
  - developing new educational alternatives on the basis of the supply and demand of human capital through training in technology-related areas.
  - expanding the supply of online educational contents
- Develop a digital cultural agenda by
  - developing a national strategy of digitization, online digital preservation and accessibility of the cultural heritage of México and culture in general.
  - providing national cultural infrastructure with ICT access.
  - encouraging the development of creative industries in the field of culture.
  - creating digital platforms for the supply of cultural contents.
  - promoting the creation and innovation of culture by digital means.
- Improve educational management through the use of ICTs by:
  - developing tools to facilitate educational management at the school level in state education secretariats and the Secretariat of Education.
  - building databases that integrate information from the National Education System into the Information and Educational Management System.

Whether or not this very ambitious educational policy agenda will be successfully achieved within the six year Presidential period remains to be seen. The Mexican National Educational Workers Union (Sindicato Nacional de Trabajadores de la Educación, SNTE) is the largest trade union in Latin America and has strong historical links to the Partido Revolucionario Institucional. In the past, the political power of the teaching union has been sufficient to enable it to resist any attempts by the national government to reform the educational system in México.

2.2 Mexico's New OER initiative: May 2014

On 20 May 2014, in order to promote the use of Open Access Learning Materials, the Mexican government undertook a major legislative amendment of the Law on Science and Technology, the General Education Law and the Organic Law of the National Council of Science and Technology. The Act establishes national legal grounds for the regulation of Open Access in the country and empowers the National Council for Science and Technology, CONACYT- as the agency responsible for planning and promoting the national strategy on the use of institutional repositories to enable complete access to the results of publicly funded research.

The President of Mexico, Enrique Pena Nieto said that the new legislation will further democratize the use of the digital knowledge and information, allowing all Mexicans, free access to the fruits of academic and scientific research production, which was partially or wholly financed with public

funds. He also recognized the challenge to create a high quality, social and cultural national repository, with open access to all scientific, technological and innovation resources, made available for Mexicans to access, by the means of new information and communications technologies.

Mexico is now the 4th Latin American country and the 8th globally, to enact such laws allowing open access. It is expected that 93% of the research generated under open access conditions will be available. Mexico is party to the Latin American REFERENCIA (Red Federada de Repositorios Institucionales de Publicaciones Científicas) initiative, under which member countries have signed regional agreements to optimize network initiative on institutional repositories, and have also generated commitments related to the incorporation of national strategies in the field. The purpose of LA REFERENCIA is to create an agreed strategy and framework agreements for the construction and maintenance of a federated network of institutional repositories of scientific publications for storing, sharing, giving visibility and open access to the scientific production of Latin American states.

These reforms to the Mexican legislation are the result of publicly funded research, sponsored by the Vice President of the Senate, Senator Ana Lilia Herrera, undertaken by pioneer institutions like National Autonomous University of Mexico, the Autonomous University of the State of Mexico, to create the repository REDALYC (Red de Revistas Científicas de América Latina y el Caribe, España y Portugal), which has more than 328,000 items, to promote international scientific cooperation. Only two institutions in Mexico have a mandate to operate repositories with open access: the Autonomous University of the State of Mexico and the Autonomous University of Nuevo León. The minutes with the draft decree, which amended and supplemented a number of provisions of the Law on Science and Technology, the General Education Law and the Organic Law of the National Council Science and Technology, to allow open access to state-funded research, was unanimously approved on April 8, by the Chamber of Deputies of Mexico was published in the *Official Journal of the Federation* on 20/05/2014, and came into effect the day after its publication.

The National Repository will be operated by CONACYT and its main function will be the "collection, preservation, management and electronic access to information and quality content" produced by state funded projects. The repository will "operate using international standards which will allow to search, read, download full texts, reproduce, distribute, import, export, identify, store, preserve and retrieve information gathered" (Article 70). The legislation specifies that: "The CONACYT has a term up to 18 months from the issuance of the guidelines and rulings, to train, to convene, organize and coordinate all the institutions and agencies in the area of open access, dissemination of information and operation of the National Repository."

Further information on the impact of this national OER initiative is given below in the section of the report on OERs.

2.3   Recent Trends

As befits a rapidly developing N-11 nation, México's educational performance has improved in recent years, and the average level of educational attainment in México is rising very fast. The National Education System currently serves 35.2 million children and young people in school modality. Basic education (covering pre-school plus primary and secondary schools) represents 73.4% of the enrolments to the educational system, with 4.8 million students served in preschool, 14.8 million in primary and 6.3 in secondary education. Basic education encompasses about 1.2 million teachers in nearly 228,000 schools. The expansion of basic education and the gradual

decline in the school-age population have helped to achieve high coverage levels. Participation in early childhood education is now almost 100%, and children aged 5 to 14 are attaining primary and lower secondary education, but there is a gap in upper secondary enrolment, graduation and performance. The completion rate of basic education is low: for every 100 children who enter primary school, only 76 complete secondary in a timely manner. 4.4 million students attend upper secondary education and for every 100 high school graduates, 85.9 enrol in an institution of higher education. The enrolment in higher education is 3.3 million students, representing a participation rate of 29.2% among those leaving upper secondary school.

In 2011, 44% of 25-34 year-olds cohort had at least an upper secondary qualification, which was nearly twice the comparable figure of 23% for those aged 55-64. Similarly during the same year, only 12% of those aged 55-64 had a tertiary education qualification, compared with 23% of 25-33 year olds. Additionally, upper secondary graduation rates have been increasing at an annual average of 3.6% between 2000 and 2011, but at 47% they are still well below the OECD average of 83.8%. Around 32.3 million adults have not completed basic education, equivalent to 38.5% of the population the age of 15 years. There are more than 5.1 million illiterate people in México, a situation that limits their integration into the labour market. Similarly, it is also estimated that about 15 million people over 18 have not completed high school, a requirement for access to better job opportunities. However, for those in education at age 15, México's PISA score increased between 2006 and 2009 in mathematics but performance in the other PISA scores for reading, mathematics and science remains among the lowest across OECD countries, such that México's educational performance at age 15 and attainment in secondary education are lower than the OECD average. Tertiary education graduation rates have also been increasing, but they remain below the OECD average, with just 23% of 25-34 year-olds attaining tertiary education, compared to the OECD average of 39%. Moreover, in 2011, of all the OECD nations México had the third highest proportion of 15-29 year-olds who were neither employed nor in education or training (NEET). Moreover, 66% of those in this age cohort were not in education, and 25% of that age group were NEET. México's overall public expenditure on education is close to the OECD average, yet its expenditure per student is low. From 2005 to 2010, expenditure per student for primary, secondary and post-secondary non-tertiary educational institutions increased by 4%. Although this rate of increase is lower than the OECD average of 17%, educational expenditure on these sectors comprised 4% of GDP in 2010, which was above the OECD average of 3.9% of GDP.

2.4   Basic education (Primary and Secondary)

Basic education, from the age of 6 to 14 is freely provided in state schools for all children. In México, although some children attend pre-school from the age of 0 to six years (in children's centres, day care, preschool or kindergarten), this is not formally part of basic education. Basic education is normally divided into:

- *primaria*, which is primary school and comprises Basic Education grades 1-6 – it needs to be completed (as evidenced by an official certificate) to enter into lower-secondary education;
- and *secundaria*, which is secondary school, middle school or junior high school comprising Basic Education grades 7-9 – it needs to be completed (as evidenced by an official certificate) to enter into upper-secondary education(high school).

However, many students opt to continue with their secondary education for the remaining three years of secondary school, at the end of which they can take qualifications to gain certificates to enable them to enter higher education. The system is summarised in the following table:

Minimum age	School Year	School	
		Type	*Level*
2	N/A	Nursery	Maternal
3	1 de pre-escolar	Kinder /Jardin de Niños	Educación preescolar
4	2 de pre-escolar		
5	3 de pre-escolar		
6	1 de primaria	Primary school/Elementary school	Educación Básica: Primaria
7	2 de primaria		
8	3 de primaria		
9	4 de primaria		
10	5 de primaria		
11	6 de primaria		
12	1 de secundaria	Secondary school/Middle school /Junior High School	Educación Básica: Secundaria
13	2 de secundaria		
14	3 de secundaria		
15	4 de secundaria /1 de preparatoria	High School	Preparatoria/Bachillerato/ Educación media superior
16	5 de secundaria /2 de preparatoria		
17	6 de secundaria /3 de preparatoria		

In addition, adult education is provided for people older than 15 years of age who have not studied or completed basic education. It includes: literacy, primary education, lower-secondary education and job training.

In 2010, the number of young people under 15 years of age (i.e. those for whom education is compulsory) was 33,056,047, which accounts for 29.4% of the population. The main language of instruction is Spanish. However, under Article 11 of the 2003 Ley General de Derechos Lingüísticos de los Pueblos Indígenas, the federal education authorities have to ensure bilingual education up to the age of 14, for indigenous linguistic groups. Additionally, there are some private schools that have adopted English (in most cases) or (in some cases) French as the language of instruction for all subjects.

For further information see:

El Plan Nacional de Desarrollo 2013-2018 – http://pnd.gob.mx, http://es.wikipedia.org/wiki/Plan_Nacional_de_Desarrollo_(México)

Estrategia Digital Nacional – http://www.presidencia.gob.mx/edn/en/, http://es.wikipedia.org/wiki/Estrategia_Digital_Nacional_(México)

OER Legislation Se publica en el Diario Oficial de la Federación: 20/05/2014 http://www.dof.gob.mx/nota_detalle.php?codigo=5345503&fecha=20%2F05%2F2014

OECD *Education Policy Outlook: Mexico 2013-4* - http://www.oecd.org/edu/EDUCATION%20POLICY%20OUTLOOK%20MEXICO_EN.pdf

Secretaría de Educación Pública – http://www.sep.gob.mx

3. Higher Education

3.1 Structure and Provision

The first university in México was founded in the capital by the Spanish in 1551, (thereby pre-dating Harvard, the first North American university, by almost a century), with decrees from the Spanish crown and pontifical support. Growth thereafter was relatively slow (a university was not established in Guadalajara, México's second largest city until 1791) but accelerated following self governance and national independence from Spain in 1821, which was accompanied by the development of universities, more especially the creation of the national university whose main raison d'être was the fulfillment of national economic and social development. In 1910 the old university in the capital was re-designated as the Universidad Nacional Autónoma de México (UNAM), which is autonomous but, like all universities at the time, was state funded.However, in 1935, in order to protect academic freedom in the face of the government's desire for "socialist education", a group of students and staff at the University of Guadalajara, fought to establish an autonomous university in the city. The Autonomous University of Guadalajara is México's oldest and largest private non-for-profit university. The development of autonomous and private universities has been a dominant feature of higher education in México ever since.

Higher education in México usually follows the US education model with an at least 4-year Bachelor's degree undergraduate level (Licenciatura), and two degrees at the postgraduate level, a 2-year Master's degree (Maestría), and a 3-year Doctoral degree (Doctorado). Each of the 31 states of México has a state university, many of which are autonomous, while the Universidad Nacional Autónoma de México (UNAM) and the Instituto Politécnico Nacional lie within the Federal Capital. Currently, the higher education system in México has over 2,000 institutions, with over 5,000 campuses located throughout the country, serving more the 2,500,000 students.

The higher education system in México is very diverse. Hence, a small group of higher education institutions, because of their very specialized training characteristics, have not been included in this analysis. These comprise the following: army military education institutions (2); naval military education institutions (2); judiciary, security and justice system education (14); fine arts education (16); health education (11); library and archive education (1); anthropology and history education (2); sports education (2); merchant navy education (1). Additionally there are also 34 very small higher education institutions that could not be catalogued because they failed to provide data for the annual h.e. survey.

The publicly funded institutions comprise the following:
- Public Colleges – there are 273 public colleges in the country, which offer degree programmes in a variety of subjects.
- Technological Institutes have a priority to train competent professionals and promote national development through plans and programmes of study relevant to the business and industrial needs of each states and region. The National System of Technological Institutes (El Sistema Nacional de Institutos Tecnológicos S.N.I.T.) consists of 262 schools and specialized centers at federal and state levels (132 Institutos Tecnológicos Federales, 130 Institutos Tecnológicos Descentralizados), located throughout the country, coordinated by the Directorate General of Higher Education Technology, in the Ministry of Education. With a presence in 32 states of the Republic, the Technological Institutes provide almost 500,000 students with a range of undergraduate, postgraduate and professional courses which includes 41 career, 61 master's programs, 14 majors and 21 doctoral programs, as well as the functions of teaching and research, the TI have a mission centred on partnerships and the dissemination of culture.

- Intercultural universities – have programmes providing education and training at professional associate, bachelor, specialist, master's and doctoral levels. These twelve institutions are designed to train professionals committed to economic, social and cultural development at community, regional, state and national, levels whose activities promote the consolidation, development, and revitalization of indigenous languages and cultures.
- Federal Public Universities – the nine institutions in this group, as well as providing teaching, across a broad spectrum of subject programmes and research projects, are also of national and international importance in the generation and innovative application of knowledge via research, and extension programmes and include UNAM and the IPN.
- Public State Universities – are higher education institutions created by the local congresses, by law, under the public authority of descentralised public bodies. There are 34 state universities that perform the functions of teaching, research and knowledge generation, as well as offering extension programmes and promoting the dissemination of national culture.
- Public State Universities with Solidary Support (Apoyo Solidario) (23 institutions) Just like the Public State Universities, these institutions provide teaching, as well as extension programmes and the dissemination of culture. These universities receive support from the budgetary program and funding from State Governments but get additional Federal Government financial support on a basis agreed with the respective state governments.
- Polytechnic Universities – were created in 2001 to offer degrees in engineering, licenciate and postgraduate studies at a speciality level, via a competencies development pedagogical model, and are oriented to applied research into technological development, as well as being highly linked to productive, public and social sector institutions. There are 50polytechnic universities that are committed to the social and economic development of the nation, with international collaboration via the generation, application and dissemination of knowledge and culture through research and quality teaching.
- Technological Universities – the technological university system was set up in 1992 and offered intensive training for students completing upper secondary education, that allows them to join in a short time (after two years), to enter the job market or pursue other undergraduate training. A student can get a degree after covering five semesters over training. Enrollment at technological universities nearly doubled between 2006 and 2010, going from 66,000 to 130,000 students. There currently are 61 technological universities in 26 states of the Republic.

In addition to state funded universities, there are around 1450 private universities in México. The Private Mexican Institutions of Higher Education Federation (Federación de Instituciones Mexicanas Particulares de Educación Superior, FIMPES) was constituted 32 years ago, in 1982 and is a non-profit non-affiliated civil society with voluntary membership that credits private institutions of higher education that have achieved high quality standards. The first accreditation was awarded in 1996. The purpose of FIMPES is to enhance communication and collaboration among its members as well as with the rest of educational institutions in the country, respecting each one's objectives in order for its members to accomplish their responsibility of serving the country. The nearly 170 requirements are grouped into eleven criteria for accreditation: institutional philosophy, planning and effectiveness; regulations, governance and administration, academic programmes, faculty, physical resources, financial resources and distance education. (http://www.fimpes.org.mx).If anything the variety of private provision is even greater than that of state provision; moreover, it is difficult to determine the quality and status of some of these institutions.

The FIMPES member institutions provide education for 15% of all México's undergraduate and postgraduate students. The 114 FIMPES institutions and their 500,000 students are very heterogeneous, and include religious (Adventist, Catholic, Methodist, and others) and non-denominational institutions.37 FIMPES institutions are located in México's central area, 23 in the

northeast area, 22 in the northwest and west and 32 in the southern area. Some FIMPES members, like the Instituto Tecnológico y de Estudios Superiores de Monterrey, ITESM (commonly shortened to Monterrey Institute of Technology or Monterrey Tech) are of national significance, by dint of their research, and national and international reach. ITESM has 31 campuses across the nation and is the largest private, multi-campus university in Latin America. Additionally, ITESM has been a pioneer in the use of new information and communication technologies, especially television, for distance education in México

Examination of higher educational provision in México reveals the following generic trends in the last two decades:

A) **Growth in demand**. In 1990, 13.5% of the population aged 18–23 attended higher education in México. By the end of 2000, the figure had risen to 20% of this age group.

B) **Change in composition** of enrolment in the public higher educational system. In public sector higher education, expansion was derived almost exclusively from growth in the number of technological universities. With the creation of almost 100 such institutions, the technological subsystem grew by over 60%, increasing from 20% to 36% of public higher educational supply. By contrast, the growth in the university sector was almost stationary.

C) **Greater private sector presence**. During the 1990s, the provision in private sector in higher education reached remarkable dimensions. In 1990, private higher education institutions absorbed 17.4% of the demand for first degrees. In 2003, participation rose to 32%.To reach this level, the private system grew two and a half times, increasing at a rate of almost 10% a year during the period. The expansion of private higher education was extraordinary at postgraduate level, where enrolment rose by 4.5 times in barely 10 years.

D) **Greater decentralization of supply**, and corresponding growth in provision in the lesser developed states. Towards 1990, 23% of the first degree level student population was concentrated in the Federal District of México City. By 2000, this concentration had decreased to 21.5%. In all the states (apart from Jalisco and Puebla where university student numbers fell), positive growth rates were recorded. The states with greatest growth were Aguascalientes, Baja California Sur, Campeche, Chiapas, Hidalgo, Morelos, Oaxaca, Quintana Roo, Tabasco, Tlaxcala and Yucatan; in all these states, enrolments grew two-fold or more.

E) **Switch in demand** towards professional courses associated with the service sector. Enrolment in higher education decreased in agricultural sciences, natural sciences and the exact sciences areas. The health sciences, education and humanities areas have remained constant as proportions of supply. The social and administrative sciences continued their expansion to cover practically one-half of total first degree enrolments – at present, one-third of total enrolments is concentrated in just three options: law (12.2%), accounting (11.1%) and administration (10.2%).

F) **Growth in postgraduate demand.** In 1990, national postgraduate enrolment was little over 40,000 students. By 2003, the corresponding statistic was 138,287 students enrolled in specialties, master degrees and Ph.D. This three-fold growth in enrolment was a result of progressive increases in the schooling requirements of the modern sector of the labour market and an explicit policy to strengthen the academic programmes of the higher education institutions.

G) **Gender equilibrium** in the proportion of men and women studying for first degrees. Towards the end of the 1990s, the proportion of women in higher education in México became virtually the same as that of men.

For further information see:

Secretaría de Educación Pública, (http://www.sep.gob.mx)

Subsecretaría de Educación Superior (http://www.ses.sep.gob.mx/index.jsp)

Rodríguez-Gómez, R., Casanova-Cardielo, H., (2005) "Higher Education Policies in México in the 1990s: A Critical Balance", *Higher Education Policy*, 18(1): 51-65. (http://works.bepress.com/cgi/viewcontent.cgi?article=1005&context=roberto_rodriguez)

3.2 Distance Education and E-learning in México

The development of distance education in México has a long heritage. In March 1932, the Secretary of Public Education (SEP) began the bi-weekly publication of the *El maestro rural*, magazine which provided the first correspondence courses for teachers in the rural areas of México. This was followed in 1947 by the creation of the Federal Institute for Teacher Training (Instituto Federal de Capacitación del Magisterio), which utilised printed materials sent by mail, supplemented by radio broadcasts, and evaluations in forty six regional centres in across México.

Hence, since the 1930s some elements of distance education have existed, but provision of open and distance learning was not co-ordinated nationally or mainstream, but was focused on provision to particular groups, for example, adult education, night schools, and education in rural areas. This early rudimentary open and distance education system was extended and updated by the introduction of new information, communication, and distribution tools, such as the use of new media, like radio and television, which impacted on the content and the way in which distance instruction was organised. Later provision has been enriched with the introduction of new communication resources such as the internet, which made possible virtual and online education, e-learning or blended learning.

In the modern era, the Telesecundaria project was piloted in 1966, firstly, for students from grades 7 to 9 in rural areas, but it was then developed for national coverage. Telesecundaria uses TV programmes, supplemented by printed materials and a local facilitator; currently Telesecundaria is used in more than 14,000 schools totalling approximately 1,200,000 students.

Following this success, the government funded the development of a series of similar schools based technology projects including:

- **Red Escolar** – a computerized system of information and communication based on the Internet for México's student community, which has 4,000 units installed in more than 1,000 educational units
- **Edusat** – Educational Satellite Television Network –a closed-circuit system based on the most advanced digital technology. Its 12 video and 24 audio channels broadcast all over México and it reaches over 30,000 educational centres in the country, through receivers in secondary and technical schools and public and private universities.
- **Enciclomedia** – which has enabled the digitalization of primary education textbooks in CD-ROM format. Along with the material from the textbooks themselves, a plethora of resources, including videos, complementary information and the use of the Microsoft Encarta student encyclopaedia, are available to teachers and students.

These (and other) different initiatives were consolidated under the e-learning strand of the national "e-México" project introduced in 2000, which was designed to integrate ICT in all educational levels within México (see below).

Within universities, as early as 1955 UNAM had started producing educational television programmes (now broadcast via TeveUNAM).However distance education courses really started in earnest in 1972, when the UNAM created the Open University System (Coordinacíon de

Universidad Abierta y Educación a Distancia CUAED http://www.cuaed.unam.mx).Currently the system provides distance education including high school, undergraduate majors and postgraduate awards. CUAED supports both internal UNAM and external institutions in the implementation of distance academic programmes, as well as consulting in technologies applied to education, and it has several services such as the virtual classrooms for academic staff and a library specialised in open and distance education.

With the growth of the use of ICT in the 1990s many universities started to offer internet based instruction. According to a survey among members of the National Association of Universities and Higher Education in 2003, 41% of Mexican colleges and universities have a distance education programme and another 50% are planning to start distance education programmes. However, the extent and type of use of ICT in higher education in México are very varied, and few universities utilise internet technologies in an integrated fashion. By 2004, only five universities were running programmes that took full advantage of ICTs in teaching. Students taking e-learning packages at these five leading e-learning universities (UNAM, University of Guadalajara, Instituto Polytechnic Nacional, ITESM (Monterrey Tech) and Universidad TecMilenio) accounted for 17.57% of the distance education cohort.

Recent years have seen a consolidation of the networks used to provide distance education via the National Network of Higher Education Innovation (Red Nacional de Innovación de la Educación Superior RIESA), established by the ANUIES which has its origins in the Distance Education National Network (Red Nacional de Educación a Distancia – RENAED); the Mexican Higher Education Innovation Observatory (Observatorio Mexicano de Innovación en Educación Superior – OMIES) and the National Commission of Curricular Innovation (Comisión Nacional de Innovación Curricular – COMINAIC). These are now consolidated in one single network, to provide follow up to projects in which the participating institutions are interested; they also bring continuity and enrichment to the works related to distance education, curricular and educational innovation topics.

Three state-funded projects have helped to give new impetus to distance education in México in recent years:
- the Common Area Consortium of Distance Education (Espacio Común de Educación Superior a Distancia – ECOESAD– http://www.ecoesad.org.mx), research, coordinated by the UNAM;
- the National Distance Education System (Sistema Nacional de Educación a Distancia – SINED– https://www.sined.mx/sinedac.html), headed by ANUIES and supported by the SEP;
- and the Program for Open and Distance Higher Education (Programa de Educación Superior Abierta y a Distancia– ESADhttp://www.unadmexico.mx) of the SEP.

Started in 2007 by eight founding universities (later joined by a further 31 institutions), the ECOESAD initiative aims to create a consortium of public universities in order to develop distance higher education by integrating each institution's training offer and sharing it nationally. To work properly ECOESAD requires the implementation of common academic standards, quality criteria, and standards for evaluation, alongside common institutional strategies to promote ICT for interactivity, and reusability and sharing of content. Today, ECOESAD institutions offer programmes in seventy different disciplines, including, business administration, computing, economics, engineering, languages, history, information technology, law, marketing and finance , nursing, public administration, social work.

Within ECOESAD, there is now a research branch: the Network for Innovation and Research in Education Systems and Environments (Red de Innovación e Investigación en Sistemas y Ambientes Educativos – RIISAE) was set up in June 2008. RIISAE's function is to develop research that will foster the understanding and innovation of technology mediated education. Its main objective is to

undertake inter-institutional, interdisciplinary and transdisciplinary research in topics related to technology supported education from a systematic perspective, encompassing all the different ITC environments in which the learning process can take place, in order to improve the quality, pertinence and reach of technologically delivered education. RIISAE has eight participating universities, drawn from across México: Universidad de Guadalajara, Benemérita Universidad Autónoma de Puebla, Universidad Nacional Autónoma de México, Instituto Politécnico Nacional, Universidad Veracruzana, Universidad Autónoma de Chapingo, Universidad Autónoma de Nuevo León, Universidad Autónoma del Estado de México. Research is concentrated in three thematic areas: knowledge and learning networks, learning models and ITC mediated learning environments; management and quality of systems and programmes in ITC mediated educational environments.

The SINED project, which commenced a year after ECOESAD, is a nation-wide non-profit civil association with the general purpose of coordinating actions for the establishment and development of a system through educational social networks which use technology, methodologies, innovative products and services, in order to promote quality, coverage and equity in education in México. SINED had the goal of coordinating and managing processes to strengthen distance education by implementing common guidelines, regulatory mechanisms and evaluation tools to certify the quality of different educational programmes. Nationally, SINED has an ambitious agenda working with higher education institutions to clarify and disseminate state policy; establish IT standards to support education; produce standards to guide educational managers in identifying and promoting the essential conditions for the effective use of technology; establish national standards for educational uses of technology that facilitate the development of education nationally; create standards for evaluating the educational use of technology via the evaluation both of student progress and the use of technology in the educational process; generate professional development standards, systems, access, and basic support services to support the effective use of technology; set standards for the accreditation of training programmes and expertise in educational technology. Hence SINED's rationale is to foster agreements between education institutions, research centres, institutional and professional networks, organisations, consortia, and individuals or businesses, who will sponsor, fund, support, undertake, develop or offer projects or distance education services; encouraging collaboration and coordination among them in order to properly develop distance education.

The ESAD project was established in August 2009, with the objective of creating opportunities that ensure quality flexible education, via the use of Information Technology and Communication (ICT) applied to education. ESAD aimed to achieve greater coverage across the country and take advantage of technological convergence to provide students, through a Virtual Campus, with all the content, media and tools necessary for their education. ESAD had a powerful technological platform with 135 access centres and local university support provided nationwide – 72,000 applicants signed up after the first and second calls. In the longer term, ESAD's vision was to position itself as one of the best open and distance learning higher education providers in the world, at the top level, with reputation for high quality, innovative, flexible, open to change and well able to meet the challenges and opportunities of the greater use of technology in education. The ESAD project provided the basis for the Mexican Open and Distance University (Universidad Abierta y a Distancia de México UnADM). In February 2009, the Mexican government of Felipe Calderónannounced a joint venture with the UNED, (the National University of Distance Education of Spain) to establish the Universidad Abierta y a Distancia de México (the Open and Distance University of México – UnADM, http://www.unadmexico.mx/). The UnADM was formally created by presidential decree on January 20th 2012. The UnADM was established with the mission of offering higher education to all Mexicans, with the most flexible and widest possible delivery, to become the largest open and distance university in Latin America; with an educational and operational model that is defined by reference to international quality benchmarks, and focuses on

three critical development areas for knowledge societies: equal opportunities; environmental sustainability; universal education; internationalisation.

UnADM is the most important national initiative, with respect to the development and delivery of high quality open and distance technologically enhanced learning and training in México, of the last decade. UnADM's broadly defined mission is to: provide professional training and qualifications of the highest level and in different knowledge areas; operate ethically, and with a solid social commitment towards the local and regional community; be nationally and internationally competitive, with an entrepreneurial spirit; harness knowledge to respond to advances in science and technology, as well as the enabling the country's economic development, and meeting political, social and cultural needs. Hence the UnADM's vision is to position itself as one of the best universities in the world of open and distance learning: innovative, flexible, open to change and able to exploit opportunities of technological progress, to meet social needs, and address the challenges of the globalization of knowledge and internationalization of the economy and professions. The aims of UnADM articulate an innovative educational system that contributes to the educational development of the population via lifelong learning, upholding the principles of equity, and providing relevant programmes to enable successful international competition, via the intensive and extensive use of ICTs, backed by well-trained networks of technological and administrative staff, to provide academic programmes consistent with strengthening higher education and enhancing national economic progress. Unusually, the UnADM is planned to address the needs of groups previously excluded from higher education, such as the disabled population, vulnerable groups in society, or people in prison. By 2012, the UnADM had circa 53,000 students, and the first degrees were awarded to UnADM students in May 2014. By the end of 2014, it was anticipated that UnADM will have 70,000 students, with the expectation of 250,000 students by the end of 2018.

Not surprisingly, perhaps, many of the larger state public funded universities have some form of educational provision via virtual education, the following table summarises the situation in 2009.

Subject	*Universities offering virtual tuition*
Accountancy	BUAP, IPN, UAEMOR, UAQ, UJAT, UJED, UMICH, UNAM
Administration	UAEMOR, UAQ, UJAT, UJED, UMICH, UNAM
Administrative Computing	UAEMEX
Agronomy	UJED
Arts Education	UV
Business Administration	BUAP, UACH
Business Studies	IPN, UJAT
Communication Sciences	BUAP
Computing	UNAM
Cultural Tourism Management	UDG
Economics	UNAM
Education	UDG
History	UACH
Information Technology	UDG
International Business	IPN
International Relations	UNAM
International Trade	IPN
Journalism	UNAM
Law	BUAP, UMICH, UNAM
Librarianship	UDG
Library And Information Studies	UNAM
Management Of Organizations	UDG
Multimodal Computing	UV

Nursing	UACH, UANL
Nursing(Professionalization)	UAEH, UDG, UJED, UNAM
Nursing And Midwifery	UGTO
Pedagogy	UNAM
Philosophy	UACH
Public Administration	UNAM
Political Science	UNAM
Psychology	UJED, UNAM
Security Disaster Management	UNACH
Social Work	UJED, UNAM
Social Work(Professional)	UDG
Sociology	UNAM
Sports Science	UANL
Teaching English As A Foreign Language	UNAM
Teaching French As A Foreign Language	UNAM
Teaching Italian As A Foreign Language	UNAM
Teaching Spanish As A Foreign Language	UNAM
Tourism	IPN

Key: Benemérita **U**niversidad **A**utónoma de **P**uebla; **I**nstituto **P**olitécnico **N**acional, **U**niversidad **A**utónoma **D**el **E**stado de **MOR**elos, **U**niversidad **A**utónoma de **Q**uerétaro, **U**niversidad **J**uárez **A**utónoma de **T**abasco, **U**niversidad **J**uárez del **E**stado de **D**urango, **U**niversidad **MICH**oacana, **U**niversidad **A**utónoma de **Méx**ico, **U**niversidad **A**utónoma de **CH**ihuahua, **U**niversidad **D**e **G**uadalajara, **U**niversidad **A**utónoma de **N**uevo **L**eón, **U**niversidad **V**eracruzana, **U**niversidad **A**utónoma del **E**stado de **H**idalgo, **U**niversidad **D**e**G**uanajua**TO,** **U**niversidad **A**utónoma del **E**stado de **MEX**ico, **U**niversidad **A**utónoma de **CH**iapas

It was anticipated that the expansion of higher educational opportunities with appropriate quality standards in public institutions, through projects such as ECOESAD and SINED, will help to absorb some of the demand that was previously served by recent entrants into the higher education market in the form of low-quality private institutions. However, private universities, more especially ITESM, have also been undertaking innovative projects involving the greater use of ICT in education.

The Virtual University of the ITESM was founded in 1989 with a vision of using modern technology to extend quality higher education throughout México. To date, with more than 125 thousand students, the Virtual University is Spanish-speaking Latin America's largest online university. The current provision includes graduate programs and professional development courses, and also continuing education aimed at different sectors of society and social development programmes. The ITESM's Virtual University has become a leader in developing the new Student-Centered Collaborative Learning model for online education. This pedagogic model places the student at the centre of the educational process, which involves a path of self-guided learning. Hence the faculty member is more like a coach ("the guide at your side") who is there to help students acquire the knowledge they by operating within an intensely supportive learning environment. This learning model relies heavily on tutors maintaining communication with geographically dispersed virtual students, answering questions and encouraging collaborative learning among students. Research has shown that, with this learning model, the online students are more interested, more proactive, and achieve a better result in terms of the actual knowledge they receive.

Hence the VU offers quality education via use of innovative educational models and through the design of innovative learning environments that incorporate essential elements such as: expert staff (subject experts, but also instructional designers, graphics and multimedia experts); multiple media learning resources (library and Digital Video Library, discussion forums, the ITESM Knowledge

Hub) and cutting edge technology (satellite, videoconferencing, Internet, multimedia, radio-chat, mobile learning technology platforms).Throughout its history, the VU has maintained its commitment to promote research and implementation of technological innovations in order to maximize the benefits of its educational model. To fulfil this task, two development centres were established:

- Graduate School of Education (EGE) – its objective is to develop academic programmes and research focused on the use of models and innovative educational technologies to help in reducing the educational and digital divide in Spanish-speaking communities.
- Centre for Innovation in Technology and Education (Innov@TE) – established to be an international space for the development and transfer of knowledge, innovations and educational models for universities, institutes and governments in Latin America.

To distribute educational resources across the Americas, the Virtual University uses a sophisticated technological infrastructure which is based on four-channel satellite transmission and a video conferencing system that links the campus network and locations of the ITESM, as well as four additional channels that are available online, anytime, anywhere, on the Internet portal of the VU. In addition, courses are designed for modern Internet-based technology platforms that incorporate a variety of educational resources in multimedia format. The innovative methods used by the VU arise from previous internationally renowned research into the use of educational technology and instructional multimedia, which is then subsequently incorporated into the development and delivery of courses. The development and evolution of the educational model of the Virtual University, has generated interest from various prestigious institutions seeking strategic alliances in order to enrich their educational and training processes. Some of the organizations with which the VU has worked include:

- the World Bank.
- the Organization of American States.
- UESCO (United Nations Educational, Scientific and Cultural Organization).
- Thunderbird School of Global Management.
- Carnegie Mellon University.
- Arizona State University.
- Massachusetts Institute of Technology.
- Tshingua University.
- Boston College.

The Virtual University started using satellite transmission of educational content in order to achieve greater opportunities for education throughout México. The rationale was to utilise ITESM's multi-campus system as satellite reception centres covering most of the country. With the arrival of the Internet during the 1990's, ITESM started working with online education through satellite transmission, reaching areas whose infrastructure made it possible. However, for the very remote geographical areas, a lack of such infrastructure became a daunting problem. Eventually, to overcome this challenging situation, ITESM established remote learning centres in previously marginalized and underserved areas of the country. More recently, in 2002 ITESM established a nation-wide system of Centros Virtual de Aprendizaje (Community Learning Centers- CLC), in partnership with other institutions: the federal government, through the Ministry of Social Development; state and local governments, businesses, universities and civil society organizations, in order to open up opportunities for the development of communities. Its main objective is the development of skills to enable access to better employment opportunities thereby promoting social mobility, a rise in the index of the quality of life and inclusion in society. Generally, the physical spaces are provided by local partners along with the computers, through which the internet and the technological system of ITESM offers the knowledge, content, technology and the educational model of the virtual space that enhance the talent of citizens. The centres are physical spaces

located in rural, semi-rural and urban areas, where participants, through computer technology, access educational programs and interact with students from the ITESM and subject specialists (who serve as online tutors), and support staff to gain knowledge, skills and abilities useful in today's world. The CLC are also spaces to communicate and participate in social networks, and access relevant information. The educational programs offered on the website of the Community Learning Centres are designed to promote lifelong learning for all community members: children, youth and adults, without restrictions of gender, age or occupation. The CLC started operation in México but have spread to Central and South America –in Colombia, the Dominican Republic, Ecuador, México, Panama, and Paraguay. Additionally, CLC has spread to the USA, and there are now 142present in the United States –in Arizona, Illinois, Indiana, Nebraska, New York, North Carolina, Texas, Utah, and Wisconsin. The3,574 Community Learning Centers provide education for more than 250,000 individuals.

The objectives of the CLC are:
- Provide quality education, knowledge and tools relevant to contemporary society for anyone who wants to learn through distance education, so that nobody is left without the ability to learn and participate in the knowledge economy.
- Promote community development in three dimensions: human, social and economic.
- Encourage personal skills of citizens in the areas of basic computing, and entrepreneurship. Strengthen the capacity of change agents, such as teachers and administrators, public officials and participants in civil society, in order to positively impact on their work environments.
- Build communication skills and participation in social networks to strengthen the social fabric.
- Provide spaces, not only for training, but access to information, and contact with other organizations and individuals, and links to the economic, social and cultural world.
- Participate in the training of the social consciousness of the leaders of tomorrow, through the integration of young people via the higher education system.

Since 2012, many universities in Canada, México, Europe and Asia have announced partnerships with the large American massive open online course (MOOC) providers. Within México, uptake has been slower than other nations, which is probably a reflection of the relatively underdeveloped ITC structure and the consequent high costs of using mobile technologies, both in the home and the office. Within México, not surprisingly, the largest and most innovative universities in the public and private sectors – UNAM and ITESM – have taken the lead in MOOC collaborative development, and both are working with the same company – Coursera.

Coursera is a for-profit educational technology company offering massive open online courses (MOOCs) founded by computer science professors Andrew Ng and Daphne Koller from Stanford University. It is an education platform that partners with top universities and organizations worldwide, to offer courses online for anyone to take, for free. It envisions access to world-class education for everyone, to empower people with education that will improve their lives, those around them and their communities. Coursera uses a platform based on proven teaching methods, verified by top researchers. It is based on 4 key ideas:
- Effectiveness of online learning
- Mastery learning
- Peer assessments
- Blended learning

As of April 2014, Coursera has 7.1 million users in 641 courses from 108 institutions. In February 2013, UNAM announced that it would be offering MOOC courses developed by its Coordinación de Universidad Abierta y Educación a Distancia (CUAED), on the Coursera platform; making it the only higher education institution in the Iberoamerican region to offer MOOC provision completely

in Spanish. UNAM has 3 courses on the Coursera platform, aimed at the general public, with a duration of 20 hours over 6 weeks:
1) Information and Communication Technologies in education
2) Being more creative
3) Scientific Thinking

ITESM has developed a set of 10 MOOC courses with Coursera to date. They are focused on the following areas: written expression, mathematics, management and administration, education and Latin American culture. ITESM's 10 MOOC courses in Coursera are as follows:
1) Fundamentals of writing in Spanish.
2) Algorithmic thinking.
3) Mathematics and movement.
4) Concepts and tools for college physics.
5) ABCs of slim entrepreneurship.
6) Continuity and development of the family business.
7) Rapid development of innovative products for emerging markets.
8) Educational innovation with open resources.
9) Latin-American Culture.
10) Leadership in Strategic educational management through the use of technology.

For further information see:

Centros Virtual de Aprendizaje (CLC) – http://www.centroscomunitariosdeaprendizaje.org.mx

Coordinación de Universidad Abierta y Educación a Distancia (CUAED) – http://www.cuaed.unam.mx/portal/index.php

Coursera – https://www.coursera.org/about/

Espacio Común de Educación Superior a Distancia (ECOESAD) – http://www.ecoesad.org.mx

Federación de Instituciones Mexicanas Particulares de Educación Superior (FIMPES) – http://www.fimpes.org.mx

ITESM Cursos en Línea Abiertos y Masivos – http://www.mieducacionenlinea.net/2014/04/conoce-los-cursos-abiertos-mooc-que.html

Programa de Educación Superior Abierta y a Distancia (ESAD) http://www.unadmexico.mx

Red de Innovación e Investigación en Sistemas y Ambientes Educativos (RIISAE) – http://riesa.anuies.mx/web/, https://sites.google.com/site/riisae/

Secretaría de Educación Pública – http://www.sep.gob.mx, http://www.sep.gob.mx/wb/sep1/bol0430209

Sistema Nacional de Educación a Distancia (SINED) – https://www.sined.mx/sinedac.html.

Subsecretaría de Educación Superior – http://www.ses.sep.gob.mx/index.jsp

Universidad Abierta y a Distancia de México (UnADM) – http://www.unadmexico.mx/, http://www.ses.sep.gob.mx/component/k2/item/247-la-educacion-universitaria-a-distancia-en-mexico-es-una-opcion-de-gran-calidad-sep, http://es.wikipedia.org/wiki/Educación_Superior_Abierta_y_a_Distancia

Universidad TEC Virtual – http://www.tecvirtual.mx/

4.   The Internet in México

México is a major global manufacturer of ICT and consumer electronics. Data from the OECD reveals that the growth of the ICT Sector in the Mexican economy has been substantial. Consumer electronics trade is the fourth largest and second fastest growing sector of ICT trade. In 2011, with $16413 million México was the third largest exporter of communication equipment after the USA and South Korea. In terms of global trade in all ICT goods, México was the tenth largest exporters in 2011. However, owing to the turndown in world trade, between 2008 and 2011 employment in manufacturing of computer, electronic and optical products fell significantly. Over the period, México and the United States had job losses in the information industries of about 8% and 6%, respectively. Additionally, the collapse in general exports, in gross and value added terms between 2008 and 2009 in México was circa 20%, which was substantial, but below comparable figures for Norway, Sweden, Russia, Canada, Italy and Japan.

Not only has ICT manufacturing increased in México over the last decade, so has the purchase and use of ICT equipment. Data from the OECD shows that the number of cellular mobile phone subscribers in México is below average by international standards, but it is growing very fast. In 1994 there were 386,100 cellular phone subscribers in México; by 2007 the figure was 68,241,096 – which represents a compound annual growth rate by 1993 of 44.7%. By 2010, 70% of Mexican households had access to a mobile phone and the proportion of users with smartphones had exceeded 20%, with more than 75% of smartphone users use their phones to access the internet on a daily basis. However, in 2011, México had 86.6 mobile subscriptions per 100 inhabitants which was below the OECD average of 109, and nearly half that of countries like Finland, which had over 150 mobile subscriptions per 100 inhabitants. Despite this, in the decade from 2001-2011 cellular mobile voice traffic in México grew by 1692%, and over the same period cellular mobile usage per subscriber grew by 339%. The popularity of smartphones has stimulated greater use of mobile broadband access in México. Consequently, the average mobile broadband growth rate in the OECD states in 2011 was 29.10%, while in México the comparable figure was 156.8%.

Similarly, the proportion of households with access to a home computer is low, by European standards, but rising very fast. In 2001 11.8% of households had access to a computer; by 2011 this figure had risen to 30%.This trend is mirrored by a large increase in broadband access. In 2001 there were only 111,070 broadband subscriptions in México, a decade later in 2011 the figure was 12,108,478 – a compound annual growth rate of 92.69%, nearly three times that of the OECD average of 33.1% . In addition, more people are accessing the Internet – in 2001, 6.2% of households had internet access; by 2012, this figure had more than quadrupled to 26.0, but was still the lowest of all the OECD states, and well below the OECD average of 75.6%. By contrast, the number of internet hosts registered under the .mx domain, grew annually between 2002 and 2012 by 22.6%, a faster rate than that in such countries as the Netherlands, Germany, Austria and Japan.

These growth patterns have been nurtured by the National Development Plan 2007-2012, which had the objective of enhancing the productivity and competitiveness of the Mexican economy to achieve and accelerate sustained economic growth and job creation that allow improve the quality of life of Mexicans. One of the key components in the rapid growth of the IT industry in México has been joint promotion by the private sector, the government and academia. For example, in 2008, CANIETI (Cámara Nacionalde la Industria Electrónica de Telecomunicaciones y Tecnologías de la Información), AMITI (Asociación Mexicana de la Industria de Tecnologías de Información) and ANIEI (Asociación Nacional de Instituciones de Educación en Informática), backed by the Ministry of Economy and the World Bank, launched the México Federal Institute for Remote Services and Technology (MexicoFIRST), initiative with the aim of creating human capital to strengthen labour supply in México's IT sector. Working in partnership with the Oracle University, MexicoFIRST's

goal is to use web-based instructional packages to train Mexican professionals to carry out activities with mid- and advanced-level complexity. The objective is to train and certify, to international standards, at least 60,000 Mexican professionals between 2008 and 2013: an average of 12,000 people per year. With this measure, the Mexican ICT industry expects to remain as one of the five most competitive in the world.

For further information see:

OECD *Communications Outlook 2009* (http://www.oecd.org/sti/broadbandandtelecom/oecdcommunicationsoutlook2009.htm)

OECD *Communications Outlook 2013* (http://www.oecd-ilibrary.org/science-and-technology/oecd-communications-outlook-2013_comms_outlook-2013-en)

OECD *Information Technology Outlook 2010* (http://www.oecd.org/internet/interneteconomy/oecdinformationtechnologyoutlook2010.htm)

OECD *Internet Economy Outlook 2012* (http://www.oecd-ilibrary.org/science-and-technology/oecd-internet-economy-outlook-2012_9789264086463-en)

OECD *Science, Technology and Industry Outlook 2010* (http://www.oecd.org/sti/innovationinsciencetechnologyandindustry/oecdsciencetechnologyandindustryoutlook2010.htm)

OECD *Science, Technology and Industry Scoreboard 2013* (http://www.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-industry-scoreboard-2013_sti_scoreboard-2013-en)

4.1   Internet in México: *e-México*

The Internet in México has developed in four distinct phases: the introductory phase; the developmental phase; the duopoly phase; and the competitive phase. During the introductory phase, from 1989 through 1993, the first Internet connections were established along with the regional backbones. Unusually, perhaps, the growth of the Internet during this period was spurred primarily by academia – ITESM established the first direct connection to the Internet in 1989. In subsequent years, regional networks were established which connected the nations' major universities. At this time, no national backbone existed, so the regional networks could not share information and many services were duplicated. The developmental phase, from 1994-95, was lead by the combined efforts of government and academia. In 1994, the Mexican government agreed to finance the development of the first national backbone, which linked the regional academic networks, with direct connections to the USA.

The duopoly phase, from 1996-98, was marked by the efforts of industry, academia and government to develop commercial applications for the Internet. The National Technology Network was established and marketed the academic backbone for commercial applications. México's national telephone company, Telmex, began marketing backbone ISP services, and quickly dominated the industry. The competitive phase, from 1999-to date, was brought about by the desire for increased market efficiencies and the primary drivers were growing market demand, allied to industry and governmental deregulation. The first step towards this phase occurred in 1997 when Telmex lost its monopoly as a telephone company and its duopoly position with RTN as Internet providers.

Although legal barriers to competition were removed, the development of competition in México was impeded by the fact that both Telmex and the RTN had national backbones, which potential competitors lacked. However, with the help of foreign investment, competing backbones developed quickly. By 1999, Alestra and Avantel had established themselves as strong competitors in the larger markets and smaller competitors were beginning to enter the market. The amount of bandwidth offered in México has grown tremendously, and the cost of access has gone down, while

the quality of service has increased. México is now well established as one of the industry leaders in Latin America.

Hence, as the figures detailed in the section above on ICT infrastructure demonstrates, México has widely adopted the use of the Internet, with a resultant rise in Mexican websites and internet access. One important factor in the development was the inauguration of the North America Free Trade Agreement in 1994 with the USA and Canada, which has had a huge economic impact. Since 1993, the value of two-way U.S. trade with México has almost tripled, from $81 billion to $232 billion, growing twice as fast as U.S. trade with the rest of the world. Canada and México are now America's No. 1 and No. 2 trading partners, respectively, with Japan a distant third. The widespread use of the Internet in social media (e.g. Facebook) and economic life (e-business) by México's northern neighbour has had a catalytic impact in México, forcing it to use ICT in every sphere of activity and become more integrated in the global knowledge economy. The effects of the NAFTA agreement have been enough to propel México into the N-11 (Next 11) cohort of nations, with the expectation of economic growth rates paralleling those of Brazil and China in the coming decade.

Although much of the growth in internet activity has been organic, and as a result of external global pressures, the Mexican government under President Vincente Fox also made strenuous efforts to increase the use of the internet throughout the country by a series of interlinked policy initiatives under the heading of "E-México". The $400 million National e-México System was an integrating project which brought together the interests of several levels of government, of various public entities and divisions, of the telecommunications network operators, of the chambers and associations linked to information and communications technology (ICT), as well as other organizations, with the purpose of expanding the coverage of basic services in education, health, economy, government, science, technology and industry, as well as other services for the community.

Although a third of households have access to computers, and 25% access the internet, the digital divide is still evident in México. This digital divide is a problem that becomes more severe in the less-developed areas of the country. For example, whereas in the North-eastern region over 40% of towns and cities have access to dial-up internet with a local call, in the South and Southeast portions of the country, the figure is less than 10%, which is totally consistent with the social and economic differences which pervade in the entire nation. The objective of e-México was to combat this problem via a technological system that will offer the all socio-economic and educational tools and opportunities that can be reached today through the use of ICT, in order to increase the quality of life for all Mexicans. The purposes of the National e-México System were basically social in character, since they had as their main objectives:

1. the promotion of connectivity and the production of digital content (data, sounds and images) by internet, at reasonable prices, among those individuals and families of lesser incomes, who live in rural and city communities of more than 400 inhabitants, within the country, and to foster their incorporation into the economic and social development of México, thus reducing the digital divide that, unfortunately, prevails today in México.
2. the training of the families of such communities in the use of these new information and knowledge-sharing technologies, emphasizing self-sufficiency in consulting and creating content by means of the internet to support their particular needs for education, culture, health and economic development.
3. to make available to every citizen general information regarding services provided by federal, state and city governments, in order to allow transparency and equity to exist in these services, and to reduce the time taken up in paperwork, as well as to make these processes more efficient.

The main strands of the e-México initiative were:

1) ***e-Learning*** – the increased provision of new options of education and training via ICT in order to stimulate learning as a means of integral development for Mexicans, promoting education for all, while respecting identity and cultural environment.

2) ***e-Health*** – improved standards of health and well-being of society through the integration of a technological system with social content. The system was designed to place within the reach of the entire Mexican population, general medical information that will promote human development and the development of the health institutions eliminating barriers to the access of information and the health and social security services.

3) ***e-Economy*** –designed to accelerate the process of development of digital economy within businesses, especially micro, small and medium size businesses (MSMBs) to increase the competitive position of the Mexican economy; as well as to develop a computer culture within society, particularly amongst consumers.

4) ***e-Science, Technology and Industry*** –created to integrate an information society and a knowledge economy in México, able to reach a greater level of (inter)national development through its own models and methods that will focus on the needs of Mexicans to strengthen their industry, and completely linked with the research sector in order to reach highly competitive quality standards as measured in the world markets.

5) ***e-Government*** –created to ensure that all Mexicans at Federal, Regional, State or City level can exercise their right to be fully informed and to have access to Government services through the Mega-network provided by the National e-México System. Likewise, the Government, through its different branches, assumes its obligation to guarantee all citizens access to information about the Government and the use of all of the various public services it offers. A major aspect of this strand of policy was to try to improve the openness of government, and thereby fight corruption.

As mentioned above in the section on recent policy initiatives, the recently elected President inaugurated a national digital strategy in 2013. The operational lines of this new strategy both parallel and build on those of President Fox's e-México initiative and include the following five major policy initiatives: 1) Government Transformation, 2) Digital Economy, 3) Quality Education, 4) Effective Universal Health, and 5) Public Safety.

1) ***Government Transformation (previously e-Government)***
   - Generate and coordinate actions aimed at achieving an Open Government.
   - Implement the National Single Window for procedures and services.
   - Create a sustainable ICT policy for Federal Public Administration.
   - Implement a national digital land management policy.
   - Use data for the development and improvement of public policy.
   - Adopt digital communication focusing on the citizen.
2) ***Digital Economy(previously e-Economy)***
   - Develop a market of digital goods and services.
   - Promote the development of e-trade.
   - Ensure financial inclusion through mobile banking schemes.
   - Encourage the implementation of digital services through the democratisation of public spending.
3) ***Quality Education(previously e-Learning)***
   - Develop a national policy for the adoption and use of ITCs in the learning-teaching process of the National Education System.
   - Expand the range of educational services by digital means.
   - Develop a digital cultural agenda.
   - Improve educational management through the use of ITCs.

4) ***Effective Universal Health (previously e-Health)***
   ▪ Incorporate the use of ITCs to facilitate the convergence of health systems and expand coverage of health services.
   ▪ Establish a single health register through an overall health list.
   ▪ Implement Electronic Health Records (HER), Electronic Birth Certificates (EBC) and Electronic Vaccination Certificates (EVC).
   ▪ Implement information systems for Electronic Health Records.
   ▪ Implement Telehealth and Telemedicine mechanisms.

5) ***Public Safety (new initiative)***
   ▪ Create tools and applications on multiple platforms for citizens' complaints.
   ▪ Develop digital tools for the social prevention of violence.
   ▪ Promote civic innovation through ICTs.
   ▪ Prevent and mitigate damage caused by natural disasters by using ICTs.

4.2   ICT Infrastructure and Services Provision

The national telephone system Teléfonos de México (Telmex), started off as a private concern in 1947, but was then nationalised by the government in 1972, only to be converted back to a private monopoly in 1990.Consequently it has a position of market dominance, the few other providers (Alestra, Axtel, Cablecom, Megacable and Maxcom) between them accounting for less than 8% of the market. Similarly, Telco (a subsidiary formed by Telmex to provide mobile communications) is the largest mobile operator in México, with a market share of 80% of cellular service. In the mid-1990s Telmex started operations as an Internet Service Provider and thanks to their national coverage of land lines and mobile communications, Telmex rapidly became the leading national ISP. As of 2005, Telmex holds more than 80% of the market as ISP, and is also the leader in broadband access with its brand Prodigy Infinitum.

The absence of competition in the Mexican market probably acts a brake on innovation, increased efficiency and lower costs. OECD figures show that in 2012, the average advertised broadband download speed (in Mbits per second) of 4.8 for México was the lowest of all the OECD Countries (by contrast, the corresponding figure for Denmark was 59.7). Similarly, the OECD's analysis of offers of fixed broadband basket of services (33 GB, 15Mbit/s and over) for 2012 revealed the average price in México to be $132.5 (US $ purchasing power parities), more than three times the OECD average of $38.1

For further information see:

E-México (http://www.e-mexico.gob.mx/)

Marchant, Iván (2010) *The State of the Internet in México* (http://www.comscore.com/Insights/Presentations_and_Whitepapers/2010/State_of_the_Internet_with_a_Focus_on_Mexico_and_Latin_America)

OECD *Communications Outlook 2013* (http://www.oecd-ilibrary.org/science-and-technology/oecd-communications-outlook-2013_comms_outlook-2013-en)

OECD *Internet Economy Outlook 2012* (http://www.oecd-ilibrary.org/science-and-technology/oecd-internet-economy-outlook-2012_9789264086463-en)

OECD *Science, Technology and Industry Scoreboard 2013* (http://www.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-industry-scoreboard-2013_sti_scoreboard-2013-en)

5.   Copyright law in México

In principle, México has adequate provision in law for the protection of copyright. Hence copyright and related intellectual and author property rights are protected by the Federal Copyright Law 1996, amended May 1997 and July 2003; the Federal Copyright Law Regulations, amended May 1998 and September 2005 and the Federal Criminal Code, August 1934.Additionally there is a National Institute of Copyright (http://www.indautor.gob.mx/ingles/?navegador2='1'&valor=) with the task of strengthening and enforcing the federal framework of copyright and associated regulations. The purpose of the Federal Copyright Law is the safeguarding and promoting the cultural heritage of the Nation and the protecting the rights of authors and performers, and also those of publishers, producers and broadcasting organizations in relation of their literary or artistic works in all their forms, their performances, their publications, their phonograms or videograms or their broadcasts and also other intellectual property rights.

Article 13 of the Federal Law of Copyrights lists classes of works that are protected, as follows: literary; musical, with or without words; dramatic; dance; pictorial or drawing; sculptural and plastic character; cartoon and comic; architectural; cinematographic and other audiovisual works; radio and television programmes; computer software; photographic. Moreover the criminal law establishes punitive measures for the breach of copyright – under the Federal Criminal Code imprisonment for up to ten years and a fine of 2,000 to 20,000 days of the general minimum wage is possible.

Additionally, México is a signatory of the following International Conventions and Treaties on Copyright and Related Rights:

- Inter-American Convention on the Rights of the Author in Literary, Scientific and Artistic Works, (http://www.sep.gob.mx/work/models/sep1/Resource/cd8a1ec5-17f4-4370-b535-9d080d6fbfe1/decreto1947_1.pdf)
- Berne Convention for the Protection of Literary and Artistic Works (http://www.wipo.int/treaties/es/ip/berne/trtdocs_wo001.html)
- Universal Copyright Convention (http://portal.unesco.org/es/ev.php-URL_ID=15381&URL_DO=DO_TOPIC&URL_SECTION=201.html)
- Convention Relating to the Distribution of Programme-Carrying Signals Transmitted by Satellite, Brussels1974 (http://www.wipo.int/treaties/es/ip/brussels/trtdocs_wo025.html)
- The Rome Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organisations (http://www.wipo.int/meetings/es/details.jsp?meeting_id=17584)
- Treaty on the International Registration of Audiovisual Works (http://www.wipo.int/treaties/es/ip/frt/trtdocs_wo004.html)
- The Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) (http://www.wto.org/spanish/docs_s/legal_s/27-trips.pdf)
- WIPO Copyright Treaty (http://www.wipo.int/treaties/es/ip/wct/trtdocs_wo033.html)
- WIPO Performances and Phonograms Treaty (WPPT) (http://www.wipo.int/treaties/es/ip/wppt/trtdocs_wo034.html)
- Convention for the Protection of Producers of Phonograms Against Unauthorized Duplication of Their Phonograms (http://www.wipo.int/treaties/en/ip/phonograms/trtdocs_wo023.html)

However, despite such legislation, according to estimates by the International Federation of the Phonographic Industry (http://www.ifpi.org/content/library/piracy-report2006.pdf), 110 million pirated products were sold in México in 2006, with a legal market retail value of $410 million. These products included popular music and mainstream films, but also, increasingly, computer software. Additionally, internet piracy is also beginning to gaining ground – 570 million songs are

downloaded illegally every year in México. More than 60 per cent of illegal downloaders accessed their music at internet cafes and at least 40 per cent of them said they downloaded music to burn onto a CD-R. Thus, México is emerging as the third largest market worldwide in the sale of music and pirate movies, behind China and Russia. Trade in pirated CDs and DVDs has become an attractive option for sellers in the markets and streets of México.

Widespread infringement of copyright law is ingrained within Mexican society, where purchasers of pirated goods (quite frequently, wealthy middle-class citizens, like doctors or lawyers) make a distinction between what the state would consider to be legitimate(i.e. "legal") and what people involved in transnational networks of goods, people and services consider as legitimate ("licit").Many such transnational movements are deemed illegal because they contradict the formal laws and norms of political authority, but are nevertheless widely accepted as "legitimate" in the eyes of those involved in these small scale transactions and flows. This is more especially the case when, as in México, there are quantitative and qualitative differences of scale and intent between the activities of numerous small and medium sized family enterprises producing and selling pirated movies and music, which although illegal in a formal sense, lack the systematic logic and unified purpose demonstrated by organized criminal gangs involved, for example, in the wholesale production and international distribution of illegal drugs.

The impact of this mismatch between the formal legal requirements enacted to protect copyright, and the tacit acceptance of their widespread abuse in the black and informal economies in México, on the development and use of OERs is difficult to assess. However, there is little doubt that the fact that the more the state tries to produce evidence of their efficiency against piracy, the less they appear able to do, acts to undermine the faith that participants from other states have that any agreements that they signed will be fully honoured and upheld by law in México.

5.1   Copyright law in Education

The laws of copyright in México also apply to artefacts that may be utilised in an educational context, such as books. Moreover, as has been seen, the Open Educational Resources movement is relatively new in Mexico. However, some formal efforts have been made to recognise the need to apply flexibility to the application of copyright law, in order to make the open access of educational material possible. At the close of the meeting of the Fifth International Conference on University Libraries "Open access: an alternative of access to scientific information" held in México City in October2006, the following Declaration of México was issued and signed by parties from México, Canada and the USA:

> Informed and aware that "guaranteeing that research results may be freely available for everyone is the best way of maximizing their usefulness" and that "open access is good for science, for the research community, and for humanity" we who sign permit ourselves to recommend to all Latin American institutions, and especially to our national governments, the adoption of Open Access policies and the inclusion of Open Access resources in the mechanisms of institutional evaluation of academic and scientific performance, as a means of stimulating the free generation of knowledge.
>
> This group promises to create and maintain a network of research, exchange, promotion, diffusion, digital preservation and formation of personnel in the technological tools required to carry out the stated mission as well as the creation of a union catalog of contributions. We invite and open the doors so that all institutions may join this effort signing this declaration.

This represents a small, but nevertheless promising, step towards greater acceptance of the need for, and development of, open educational resources in México and beyond. With competing demands for government expenditure that are not present in most other developing nations, more especially the need to address the problems of narcotics crime (which is having a corrosive effect across society), and illegal emigration to the USA, whether México will able to devote sufficient resources to benefit from the development and use of OERs remains to be seen.

For further information see:

Aguiar, José Carlos G. (2009), "Nuevas ilegalidades en el orden global. Piratería y la escenificación del Estado de Derecho en México", *Foro Internacional*, XLIX (2): 403-424 (http://www.redalyc.org/src/inicio/ArtPdfRed.jsp?iCve=59921004006)

International Federation of the Phonographic Industry, (2006) *The Recording Industry 2006 Piracy Report*, (http://www.ifpi.org/content/library/piracy-report2006.pdf)

Rangel Ortiz, H., (2012) "El Derecho de Autor y el ciberespacio en la jurisprudencia de América Latina en la primera década del siglo XXI", *Revista Mexicana Del Derecho De Autor*, I (1): 22-35, (http://www.consultasindautor.sep.gob.mx/revistadigitalindautor/RevMexDerechoAutor.pdf)

6.   OER (REA) Initiatives in México

Generally, the development of open educational resources (in Spanish "recursos educativos abiertos" or REA) in México has been slow. The 2012 *Survey on Governments' Open Educational Resources Policies* commissioned by UNESCO and the Commonwealth of Learning noted (p.10) that "México has developed several ICT-related projects, including the production of digital learning resources. However, it is not clear whether these resources are shared under open licences". Moreover, México did not send a representative to the UNESCO Regional Policy Forum for Latin America in Rio, *Fostering Governmental Support for Open Educational Resources (FGSOERI)*. Previously, in 2006, the OECD undertook two cases studies of REA at two leading Mexican universities, ITESM and the Universidad Autónoma de Guadalajara (UAG).The OECD reported that "ITESM has not developed any particular institutional policy aimed at either fostering or limiting the use of open digital content in teaching so far. And there are no expectations for change in the near future" but intimated that "A number of indications suggest that ITESM might reconsider its OER policy in the near future". Similarly, the OECD found that UAG "does not have a particular institutional policy regarding the use of open digital content in general. It seems that open resources are not used broadly within the academic community."

However it is possible that the OECD visits and case study reports, by raising the profile of OERs, had a catalytic effect on the two universities concerned, as both have been involved in REA projects in Mexico since. Indeed it is evident that, through a series of comprehensive initiatives and projects, the ITESM has been leading the REA movement in México. Since 2008, ITESM has led or participated in a series of projects designed to develop, distribute and promote the use of REA materials, both within its own institution, and elsewhere in México. Initially, ITESM re-engineered high quality digital materials for its undergraduate and graduate programmes and courses that were produced by (inter alia) Carnegie Mellon University (Open Learning Initiative, OLI), Massachusetts Institute of Technology (OpenCourseWare, OCW), and Yale University (Open Yale Courses), and then started to share its own course materials via the OpenCourseWare Consortium. Following from this, ITESM led a project to develop an initiative called the "Knowledge Hub" (since re-named "temoa"–http://www.temoa.info) which is a specialized and collaborative search engine that enables the educational community to search a public bilingual catalogue of Open Educational Resources, to find those educational resources and materials that best meet their needs for teaching and learning.

The "Knowledge Hub for K12 Education Project" was state funded via theCorporación de Universidades para el Desarrollo del Internet (CUDI) and by theConsejo Nacional de Ciencia y Tecnología (CONACYT) of México and involved ITESM, theUniversidad Regiomontana, theComité Regional Norte de la Comisión Mexicana de Cooperación con la UNESCO, theUniversidad de Montemorelos, Instituto de Investigación, Innovación y Estudios de Posgrado para Educación, (IIIEPE) and the Escuela Normal Miguel F. Martínez.The project's primary goal was to establish and enrich a catalogue of Open Educational Resources for Educación Básica (i.e. K12) for México and hispanophone nations in Latin America, and the rest of the world; within the field of innovative educational technology, operating through the work and communities of practice of K12 teachers and university faculty participants. Secondary project goals included the improvement of educational processes, university and school staff development, and improved equity of access to high quality educational resources within school atEducación Básicalevel. The Khub project team identified the primary barriers to access for the use of OER in México by teachers atEducación Básica level, more especially: technological infrastructure (lack of internet access, projectors and computers); legal and copyright issues (accessibility of OER in terms of licensing);content relevance of OER materials available on the Internet to the Mexican context (most OER are from other, mainly English speaking, nations); lack of OER in Spanish (language issues); computer literacy gap inEducación Básicaschools; and lack of awareness, and inability to use OER at institutional level (lack of information and skills among school managers).

The success of the TEMOA initiative has led government to fund a series of inter-related collaborative projects to promote the development and use of OERs across Mexico. These include the "Metaconector" project, promoting best practices in the use of learning objects and open educational resources from educational repositories. Led by the ITESM, this project involved staff from Universidad de Montemorelos, the Universidad de Guadalajara and the Technological Institute of Chihuahua, and aimed to enhance the visibility of the academic and scientific production by Mexican higher education institutions through digital media, helping dissemination efforts in the market for open access educational knowledge. By this means, the project aimed to support and promote social and economic development of México and Spanish-speaking countries, by providing free access to the scientific and academic institutions of higher education and other sources of intellectual production. Software developed in the "metaconector" project enables the interconnection of different digital repositories of educational resources and materials that can be used by catalogues (infomediaries) on the Internet, in order to facilitate the task of finding, evaluating and sharing open educational resources and learning objects (OA) within the community of educational institutions. A major tangible output of this project has been the production of a freely downloadable *Reference Guide for the Use of Open Educational Resources and Learning Objects* (http://www.cudi.mx/convocatorias/2010_abril/proyecto_04/Guia_Final.pdf).

Similarly in 2010 CUDI and CONACYT funded a project looking at the use of open and mobile educational in the training of educational researchers. The research team comprised staff fromITESM, Instituto Tecnológico de Sonora, Universidad de Guadalajara, Universidad Autónoma de Guadalajara, Universidad Autónoma de Yucatán, and theUniversidad de Montemorelos.The project's objective was to create a pool of open educational resources and resources for mobile learning, for educational research and the training of researchers, which is freely available via a web-site, where these resources are free and licenses exist for use, reuse and distribution, throughout México, Latin America and the rest of the world. The project's operational objectives, supported by Internet 2, were to integrate the use of technology in the training of teachers and researchers, build applications for educational innovations and form academic networks and knowledge sharing national and international networks that uses the Internet 2, as a means of communication and advanced services.

In addition to these national OER projects, there have been a growing series of institution developments by individual universities, more especially information repositories that allow open access to publications that facilitate the research process. For example ITESM has created *Develop, Learn, Reuse* (http://catedra.ruv.itesm.mx); Universidad de Guadalajara has developed the *Resource Center for Teaching and Learning* (http://www.crea.udg.mx/index.jsp);and UNAM has a*Podcast* website (http://podcast.unam.mx)and has several online journals with open access, such as: Boletín de la Sociedad Botánica de México, Revista de Economía Mexicana, Revista de la Sociedad Química de México, Revista Técnica Pecuaria en México, and Revista Veterinaria México.Similarly, IPN has an important online journal *Revista Morfismos*, which focuses on mathematical issues. Additionally, the Latin American Institute for Educational Communication (ILCE) has created a Documentation Centre for Latin America (CEDAL – see at: http://cedal.ilce.edu.mx/stx.asp?id=2203), which offers more than 37,000 materials for consultation, use and reuse.

In 2012, a very useful summary of the development and use of OER in México over the last decade was published The authors undertook a literature review of publications in the period 2002-2012 in México focusing first, on the micro state of knowledge of OER, via four indicators: generation, dissemination, strategic recognition and production of OER, and second at the macro level looking at the national open access movement in México, with reference to four indicators: production, sharing, dissemination and mobilization of knowledge.

Taking these parameters in turn, the study found as follows with respect to the micro (institutional) level:

Knowledge generation – generating information about the open education movement has been limited, largely due to ignorance on the part of teachers, institutions and organizations on the issue
Dissemination of knowledge – currently the spread of open educational movement in México is small compared to the situation in other countries. A main challenge has been access to information to transform the educational context and gain a better perspective of the diversity of information.
Recognition of knowledge – using OER is a new topic in México, and so there have been few initiatives and programmes, which means that recognition of the knowledge that has been generated so far is a difficult undertaking, as there is little information about the numbers and content of papers on OER presented at national and international conferences
Strategies to produce knowledge – in México, few institutions have created portals, databases and information repositories for open access to publications that facilitate the research process, with ITESM, the Universidad de Guadalajara and the UNAM, the most active institutions

Examining the Open Educational Movement at macro national level the study found:

Production of Knowledge – in recent years, México has given impetus to the creation of OER to share with the general public which has led to the creation of books, papers, journal articles and theses about open education movement, both nationally and internationally Share.
Sharing of Knowledge – the Open Source Initiative has established a series of requirements to share knowledge without violating the rights of authors, so sharing knowledge creates the potential to reduce errors in future research, reduce the time to reach potential outcomes and set new paradigms on form of research. To benefit from this, México needs to create a new vision on the creation and use of existing educational materials to improve educational practices.
Dissemination of Knowledge – in México, the creation of laws to spread the open education movement is a limiting factor for the production of OER.
Mobilization of Knowledge – the lack of information on the part of teachers and researchers in the country limited the mobilization information regarding the open education movement, and this has

been reflected in the low production of materials that have been developed concerning OER, such as journal articles

The overarching conclusion was that the production of academic outputs on the subject of the Open Educational Movement, between 2002 and 2012, has been low: 73 academic productions, spread over 12 graduate theses, 3 books, 16 journal articles, 32 papers and 10 databases. This compares poorly with the volume of outputs produced in other advanced countries identified in the field, such as the United States, Spain and England, where they exceed 2000 items. In essence, although México has now become a member of the Open Educational Movement, and has actively started to develop OER, it is still far behind other nations, and needs to catch up.

6.2   Mexico's New OER initiative

In May 2014, the Mexican Government undertook a major legislative amendment to establish national legal grounds for the regulation of Open Access in the country and empowers the National Council for Science and Technology, CONACYT, as the agency responsible for planning and promoting the national strategy on the use of institutional repositories to enable complete access to the results of publicly funded research. The eight point initiative, determines to establish a legal framework that makes scientific knowledge available to society, through the use of technological platforms. It empowers CONACYT to design and execute the strategy; establishes in Law, the concepts of "Open Access" and "Access to quality scientific and technological information resources".

It also aims to create and establish the basis for the operation of the national repository; enable researchers whose works are state funded or have operate on public infrastructure, to deposit a copy in the national repository; and set the promotion of Open Access to research, in the Education Act as a concurrent duty for all federal and local education authorities. The initiative establishes a legal principle for public policy in this area, to promote the dissemination of scientific, educational, research and innovation content through the use of open access platforms.

The bill defines the provisions for Open Access (AA Acceso Abierto) and Access to Quality Scientific and Technological Information Resources (ARICYTC Acceso a Recursos de Información Científica y Tecnológica de Calidad). It also empowers CONACYT to design and implement the AA strategy, as well as to create and establish a National Open Access Repository and the coordination of the existing repositories. Regarding ARICYTC, the proposed reform in Mexico clarifies that it refers to "the set of techniques used to unequivocally search, categorize and access, the full text of publications recognized by the sectors of science, technology and innovation, and that are the result of peer review "(Article 66), but it also includes databases containing quotes, bibliographic information from journals, theses, protocols, conference proceedings and patents, among others.

The reforms will promote access to information, dissemination of scientific, educational, research and innovation content through the use of content open access platforms. State funded generated knowledge will be publicly accessible and all results of state-funded research will be open access. It is hoped to make available to all, the scientific and academic production, considering the right of access to information and ICT, hence moving towards the democratization of access to scientific knowledge.

This national OER initiative is designed to:
- facilitate consultation of scientific knowledge.
- provide greater international visibility for the research conducted in the country, via the National Repository.
- Promote and increase the use and management of information and communication technologies.
- enable interoperability guidelines, through structured and open quality information systems.
- Generate open access to all research carried out in Mexico, respecting copyrights, but making it possible for information to be shared and thereby generate more knowledge.
- Ensure that open disclosure of all the scientific research funded by the state.
- integrate knowledge generating institutions and libraries, enabling far more people to access, use and handle information derived from international scientific research.
- promote more economic and infrastructure resources dedicated to research in Mexico.
- regulate and enhance the quality of scientific content and its dissemination, while generating competitiveness.
- allow citizens, students and other researchers to learn more about what the national researchers are doing and the knowledge that is being created in the scientific field.

For further information see:

http://lareferencia.redclara.net/rfr/noticias/mexico-anuncia-legislacion-nacional-sobre-acceso-abierto-y-repositorios
http://www.campusmilenio.com.mx/index.php/template/opinion/item/1394-acceso-abierto-y-repositorio-nacional
http://www.cronica.com.mx/notas/2014/821579.html
http://www.dof.gob.mx/nota_detalle.php?codigo=5345503&fecha=20%2F05%2F2014
http://www.infotecarios.com/acceso-abierto-en-mexico-reformas-y-adiciones-la-ley/

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