

Dental Education in Mexico

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Abstract

The aim of this article is to provide information about dental education in Mexico, including its history, the dental school system, curriculum and dental licensure. In 1977, there were only 59 Mexican dental schools; however, there were 83 schools registered in the last official national count in 2007. Forty-one dental schools are public, and the other 42 are private. Every year the number of private dental schools increases. Admission to dental schools in Mexico requires a high school diploma. All classes are conducted in Spanish. To obtain licensure in Mexico, dental students must complete a 3 to 5-year program plus a year of community service. No formal nationwide standard clinical/didactic curriculum exists in Mexico. There are approximately 153,000 dentists in Mexico, a number that increases each year. The dentist–patient ratio is approximately 1:700. However, the high percentage of inactive licensed dentists in Mexico points to a serious problem.

Key words: Dental education, Dental school curriculum, Dental license, Mexico

Background

The history of the modern medical and dental era in Mexico dates back to 1841, with the advent of professional regulatory law. Despite great achievements, dental education continued to be rather disorganized from 1841 to 1880; this situation lasted until the end of the 19th century when Americans who had graduated from U.S. dental schools began arriving in Mexico. Many of them worked on organizing an educational system mimicking that in the U.S. In 1880 Eduard Clay Wise and Tobias Nuñez asserted the necessity for a formal dental school in Mexico. At about the same time, the first dental journal appeared; *El Bazar Mexicano y la Odontologia*, which set the standard for other dental publications in that era. In 1887, Alfonso M. Brito established the first dental society, the Sociedad Odontologica; in the following years, a committee was created to organize dental study programs and new dental societies. The formation of new dental schools resulted in the need for laws to regulate dental education and the profession in general. In 1901, the Sociedad Odontologica made a formal request to formulate such laws. The regulatory law of the first national dental education program was approved in 1903 by the Chamber of Deputies, and, in 1904, the first national dental school, Consultorio Nacional de Enseñanza Dental, was founded [1,2].

Overall Educational System in Mexico and Dental School Admission

Mexico's educational system is divided into three levels: basic (preschool, primary and secondary education), mid-level (high school or undergraduate education leading to a bachelor's degree or technical degree), and advanced (postgraduate education). In 2004, an estimated 2,323,000 students were registered in advanced education programs.

Eligible applicants for dental schools must have graduated from high school and have had 12 years of education. High

school students who want to enter an advanced education dental program should have a solid background in biology, chemistry, and physics. In Mexico, the EXANI II examination measures the proficiency of high school graduates; it is similar to the standardized exams required for American students to graduate from high school. Each university has its own admissions requirements and procedures, and the admissions process to enter public universities is extremely competitive and demanding.

The annual cost of public advanced education varies according to the university. For example, the public Universidad Autonoma de Aguascalientes cost approximately US \$800 in 2010. In contrast, the annual cost of a dental education program at a private university was US \$8000. This difference is one of the main reasons why entrance into public universities is in such high demand.

Dental School Curriculum

In 1977, there were 59 dental schools in Mexico, 37 of which were public and 22 of which were private [3]. Of the 26,177 students enrolled in dental education programs, 89.9% were in public schools (22,999 students), and only 12.1% were in private schools (3,178 students). Population growth and the demand for higher education programs led to an increase in the number of dental schools; there was a total of 83 in 2007 (*Table 1*); 41 of these were public and 42 were private. This increase translates to a growth ratio of 40.7% in 30 years. Each year, the number of new dental schools increases, as do the numbers of students and licensed dentists.

All dental schools must register with and be accredited by the Minister of Education (SEP) and its National Association of Universities and Institutions of Higher Education (ANUIES). ANUIES was established in 1950 to develop and regulate higher (advanced) education in Mexico. Interest in developing and improving the quality of higher education in Mexico has

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Table 1. Dental Schools in Mexico.

Private Dental Schools			
Institution	State	City	Length
Centro Cultural Universitario Justo Sierra, A.C.	Mexico City	Federal District	4 years
Centro de Estudios Odontológicos de Guerrero, A.C.	Acapulco	Guerrero	N/A
Centro de Estudios Superiores de Tepeaca, A.C.	Tepeaca	Puebla	N/A
Centro de Estudios Universitarios Superior, S.C.	Culiacan	Sinaloa	4 years
Centro de Estudios Universitarios Xochicalco	Tijuana	Baja California	4.5 years
Centro de Investigación y Estudios Superiores en Estomatología	Puebla	Puebla	4 years
Centro Universitario Aurora Meza Andraca	Chilapa	Guerrero	N/A
Centro Universitario Interamericano	Puebla	Puebla	N/A
Instituto de Ciencias y Estudios Superiores de Tamaulipas	Matamoros	Tamaulipas	4 years
Instituto Latinoamericano de Ciencias y Humanidades	Leon	Guanajuato	5 years
Instituto para el Desarrollo y Actualización de Profesionales, S.C.	Mexico City	Federal District	5 years
Instituto Odontológico de Matamoros	Matamoros	Tamaulipas	N/A
Instituto Universitario Franco Inglés de México, S.C.	Metepc	Mexico	N/A
Universidad Autónoma de Guadalajara	Guadalajara	Jalisco	4 years
Universidad Cuauhtémoc, A.C.	Puebla	Puebla	4 years
Universidad Cuauhtémoc, A.C. - Aguascalientes	Aguascalientes	Aguascalientes	4 years
Universidad Cuauhtémoc, A.C. - Guadalajara	Guadalajara	Jalisco	4 years
Universidad Cuauhtémoc, A.C. - Querétaro	Queretaro	Queretaro	4 years
Universidad Cuauhtémoc, A.C. - San Luis Potosí	San Luis Potosi	San Luis Potosi	4 years
Universidad de Cuautitlán Izcalli	Cuautitlan Izcalli	Mexico	4 years
Universidad de la Salle Bajío, A.C.	Leon	Guanajuato	5 years
Universidad de los Mochis	Mochis	Sinaloa	4 years
Universidad de Matamoros, A.C.	Matamoros	Tamaulipas	4 years
Universidad de Morelos	Morelos	Nuevo Leon	5 years
Universidad del Mayab	Merida	Yucatan	4.5 years
Universidad del Norte de México	Durango	Durango	4 years
Universidad del Valle de México - Queretaro	Queretaro	Queretaro	4.5 years
Universidad Intercontinental	Mexico City	Federal District	4 years
Universidad Latinoamericana, S.C.	Mexico City	Federal District	4 years
Universidad Latinoamericana, S.C. - Cuernavaca	Cuernavaca	Morelos	4 years
Universidad Latina de México	Celaya	Guanajuato	4.5 years
Universidad México Americana del Norte	Reynosa	Tamaulipas	5 years
Universidad Popular Autónoma del Estado de Puebla	Puebla	Puebla	4.5 years
Universidad Quetzalcoatl, S.C.	Irapuato	Guanajuato	4.5 years
Universidad Realística de México	Puebla	Puebla	4 years
Universidad Regional del Sureste	Oaxaca	Oaxaca	4 years
Universidad Rosaritense	Rosarito	Baja California	4 years
Universidad Tecnológica de México	Mexico City	Federal District	5 years
Universidad Valle Bravo	Reynosa	Tamaulipas	4 years
Universidad Valle Bravo - Nuevo Laredo	Nuevo Laredo	Tamaulipas	4 years
Universidad Valle Bravo - Victoria	Victoria	Tamaulipas	4 years
Universidad Westhill	Mexico City	Federal District	5 years
Public Dental Schools			
Institution	State	City	Length
Benemérita Universidad Autónoma de Puebla	Puebla	Puebla	3-7 years
Benemérita Universidad Autónoma de Puebla	Tehuacan	Puebla	3-7 years
Instituto Politécnico Nacional - Milpa Alta	Mexico City	Federal District	5 years
Instituto Politécnico Nacional- Lázaro Cárdenas-Santo Tomás	Mexico City	Federal District	4.5 years
Universidad Autónoma Benito Juárez de Oaxaca	Oaxaca	Oaxaca	5 years
Universidad Autónoma de Aguascalientes	Aguascalientes	Aguascalientes	5 years
Universidad Autónoma de Baja California	Mexicalli	Baja California	N/A
Universidad Autónoma de Baja California	Tijuana	Baja California	N/A

Universidad Autónoma de Campeche	Campeche	Campeche	5 years
Universidad Autónoma de Chihuahua	Chihuahua	Chihuahua	5 years
Universidad Autónoma de Ciudad Juárez	Ciudad Juárez	Chihuahua	5 years
Universidad Autónoma de Coahuila	Saltillo	Coahuila	5 years
Universidad Autónoma de Coahuila	Torreon	Coahuila	5 years
Universidad Autónoma de Guerrero	Acapulco	Guerrero	5 years
Universidad Autónoma de Querétaro	Querétaro	Querétaro	5 years
Universidad Autónoma de Nayarit	Tepic	Nayarit	5 years
Universidad Autónoma de Nuevo León	Monterrey	Nuevo Leon	5 years
Universidad Autónoma de San Luis Potosí	San Luis Potosí	San Luis Potosí	6 years
Universidad Autónoma de Sinaloa	Culiacan	Sinaloa	4.5 years
Universidad Autónoma de Tamaulipas	Tampico	Tamaulipas	4.5 years
Universidad Autónoma de Tlaxcala	Tlaxcala	Tlaxcala	4.5 years
Universidad Autónoma de Zacatecas	Zacatecas	Zacatecas	5 years
Universidad autónoma de Yucatán	Merida	Yucatan	5 years
Universidad Autónoma del Estado de Hidalgo	Tlaxiaca	Hidalgo	5 years
Universidad Autónoma del Estado de México	Toluca	Mexico	4.5 - 6 years
Universidad Autónoma Metropolitana	Mexico City	Federal District	6 years
Universidad de Ciencias y Artes de Chiapas	Tuxtla Gutierrez	Chiapas	5 years
Universidad de Guadalajara	Guadalajara	Jalisco	4 years
Universidad de Guadalajara- Los Altos	Tepatitlan	Jalisco	4 years
Universidad del Ejército y Fuerza Aérea	Mexico City	Federal District	4 years
Universidad Juárez Autónoma de Tabasco	Villahermosa	Tabasco	3-7 years
Universidad Juárez del Estado de Durango	Durango	Durango	4 years
Universidad Nacional Autónoma de México	Mexico City	Federal District	5 years
Universidad Nacional Autónoma de México - F.E.S. Iztacala	Iztacala de Baz	Mexico	4 years
Universidad Nacional Autónoma de México - F.E.S.Zaragoza	Iztapalapa	Federal District	4 years
Universidad Michoacana de San Nicolás de Hidalgo	Morelia	Michoacan	4 years
Universidad Veracruzana	Boca de Rio	Veracruz	5 years
Universidad Veracruzana	Minatitlan	Veracruz	5 years
Universidad Veracruzana	Poza Rica	Veracruz	5 years
Universidad Veracruzana	Rio Blanco	Veracruz	5 years
Universidad Veracruzana	Xalapa	Veracruz	5 years

Source: ANUIES Mexico, 2007.

*N/A Not available information

resulted in attempts by the Ministry of Education to improve the quality of teachers (PROMEP) in collaboration with the National Council of Science and Technology (CONACYT). The Ministry has been working to promote scientifically-based advanced education with federally-supported programs to improve the academic institutions and support related to scientific research.

The public advanced education schools in Mexico are autonomous; each has the power to develop their own curriculum. Many private dental schools adopt the public dental school programs as important guides to creating their own programs. In recent years, interest in a standardized curriculum for higher education in both private and public schools has resulted in the creation of the Council for the Accreditation of Higher Education (COPAES), which has the task of creating specific councils in each area. In 2004, COPAES officially recognized the National Council of Dental Education (CONAEDO), which accredits and recognizes dental education programs in Mexico with the aim of standardizing the dental schools.

In 1992, Mexico began a new educational initiative with the establishment of the North American Free Trade Agreement

(NAFTA). Shortcomings and delays in dental education, a lack of comprehensive training, the necessity of forming partnerships between education programs in Mexico and the U.S., and the need for global standardization and regulation were very clear. Since then, the country has been working on improving its educational systems and programs. However, after 19 years, no action has been taken on integrating dental education programs in Mexico into the North American community, as is the case between Canada and the U.S. In 1997, graduates of accredited undergraduate American and Canadian dental programs were recognized as “accredited graduates” in both countries. A 5-year program emerged in Mexico in 1994 as a result of the NAFTA process, and an example of the Universidad Autonoma de Aguascalientes is shown in *Table 2*.

All schools conduct their classes primarily in Spanish, but new teaching methodology includes classes in English literature because they will help students with reading up-to-date scientific information published in English. For this reason, English is necessary for the students to be able to read and understand dental literature as well.

Dental education in Mexico essentially involves a 4-5 year

Table 2. Dental curriculum at Universidad Autonoma de Aguascalientes.

Year 1	
<i>1st Semester</i>	<i>2nd Semester</i>
Anatomy	Molecular Biology
Biochemistry	Neuroanatomy
Personal Development Workshop	Physiology
Histology and Embryology Orofacial	Research Methodology in Health
Computing	Nutrition
Year 2	
<i>3rd Semester</i>	<i>4th Semester</i>
Topographic Anatomy of Head and Neck	Anesthesiology
Dental Anatomy	Pharmacology
Dental Propedeutics	Microbiology
Oral Radiology I	Oral Pathology I
Emergency Medical Techniques	Oral Radiology II
General Pathology	Dental Materials
Statistics	Preventive Dentistry
Public Health Dentistry	
Year 3	
<i>5th Semester</i>	<i>6th Semester</i>
Anesthesiology Clinic	Endodontics
Applied Psychology	Operative Dentistry Clinic I
Operative Dentistry	Periodontics Clinic I
Oral Pathology II	Dental Extraction Clinic I
Dental Extraction	Occlusion
Periodontics	Fixed Prosthodontics
Medical Surgical Techniques	Bioethics
Field Work in Public Health	
Ethics	
Year 4	
<i>7th Semester</i>	<i>8th Semester</i>
Endodontics Clinic I	Endodontics Clinic II
Operative Dentistry Clinic II	Fixed Prosthodontics Clinic II
Periodontics Clinic II	Denture Prosthodontics Clinic I
Dental Extraction Clinic II	Removable Partial Prosthodontics Clinic I
Fixed Prosthodontics Clinic II	Pediatric Dentistry
Denture Prosthodontics	Oral Surgery
Removable Partial Prosthodontics	Orthodontics and Orthopedics
Prevention and Diagnosis Clinic I	Prevention and Diagnosis Clinic II
Year 5	
<i>9th Semester</i>	<i>10th Semester</i>
Denture Prosthodontics Clinic II	Pediatric Dentistry Clinic II
Removable Partial Prosthodontics Clinic II	Orthodontics and Orthopedics Clinic II
Pediatric Dentistry Clinic I	Oral Surgery Clinic II
Oral Surgery Clinic I	Emergency Clinic II
Orthodontics and Orthopedics Clinic I	Consulting and health legislation management
Emergency Clinic I	Integral Dentistry Clinic II
Integral Dentistry Clinic I	Dental Geriatrics
University Outservice Clinic I	Forensic Dentistry
	University Outservice Clinic II

Source: Study plan 2006. Universidad Autonoma de Aguascalientes.

program; each academic year is 32 weeks long. The academic schedule is set according to one of the following: in the semester program, the academic year is divided into two 18-week semesters. The trimester program divides the year into four trimesters (each about 10 weeks long). For the quarterly semester program, the academic year is divided into four quarters (each about 8 weeks). One university (Universidad Juarez Autonoma de Tabasco) adopted a system that is not based on a specific calendar; instead their program consists of a specific number of credits and a minimum length of 3 years of study (considering the total number of credits and an additional year slated for social service), and a maximum total length of 7 years. However, the Mexican dental school curriculum generally lasts 4 or 5 years.

The Mexican grading system, ranging from 0 to 10 (minimum to maximum), is used for examinations on theoretical and clinical subjects. Depending on the school, '6' or '5' or less are considered failing grades.

There is a final examination or a written assignment in each study subject; the examination guidelines for theory classes stipulate a written examination. Currently, the clinical proficiencies of students, such as number of cases and quality of treatment, are evaluated during the clinical phase of the curriculum.

The first two years of dental education in Mexico consist primarily of theory, preclinical didactic and laboratory courses. There are 2-3 years of clinical training supervised by faculty members, although the students essentially treat patients by themselves. The students must gain experience in a wide range of treatments prior to graduation.

The national health insurance system covers a large number of medical treatments in public hospitals and clinics. Most dental treatments are not covered. Private health insurance is not common in Mexico because of the cost, and it does not cover dental treatment; for this reason, professional dental care is offered at the universities to cover the necessities of the society at low cost. The clinical training of the dental education programs fills a very important need in Mexican society because the universities cover the dental health services at low cost of a large percentage of the population that cannot afford the services of private practitioners.

Dental License and Practice

Mexico does not require national or state licensure examinations such as the U.S. National & State Board Dental Examinations [4]; however, the National Center of Evaluation for High Education (CENEVAL) administers an examination known as the Undergraduate General Examination (EGEL) to measure the knowledge level of the students who complete a dental program (9-14-15). This examination is a requirement for graduation.

The students graduate after fulfilling 1 year of government social service, during which they are assigned to work in public hospitals, clinics, and rural areas by the Ministry of Health, although individual preferences are also taken into account. They then receive a D.D.S. degree and dental license number (professional number). All dentists in Mexico must be registered with the Ministry of Health to be able to officially

practice dentistry after graduation. They receive a certificate, a diploma, and a professional number.

Continuing education courses are not currently compulsory; however, there is a suggestion that dentists need to take a certain number of continuing education courses every three years and submit annual HBV and TB immunization records. The Ministry of Health does not strictly enforce these requirements, and enforcement thus depends on each state and province.

Postgraduate education

There are many dental specialties recognized by the Ministry of Education. The length of specialist training is two years, except for maxillofacial surgery, which can last from four to six years. The best way of training students in these specialties has been thoroughly discussed. In recent years, a better understanding of the educational system's needs has translated into more efforts to integrate and understand the aim of the Master's and Ph.D. courses as a way to increase professionalism and international standardization. The two-year Master's degree program is both clinical and research-oriented, while the Ph.D. degree program is research-oriented and varies from 2 to 4 years following the Master's degree. In 2004, there were 153,100 licensed dentists, of whom 13,470 (8.8%) dentists were registered as having specialist or postgraduate training.

Dentists in Mexico in relation with dental profession

In 1990, the Mexican population was calculated to be 83,971,000, and by 2004, the population had grown to 105,300,000. In comparison, the total number of Mexican dentists in 1990 was 58,348, and the last official count in 2004 was 153,102.

The Pan American Health Organization's (PAHO's) Basic Indicators 2004 (based on figures recorded in 2001) showed a dentist-to-10,000 inhabitants ratio of 1 in Mexico. The World Health Organization also calculated that in 2004, there were 9.63 dentists in Mexico per 100,000 people, which is an important indicator of the lack of dental care in the country. The persistent deficiency in dental care has been confused with the necessity for more dental schools and licensed dentists.

In 2000, 55,288 of the 94,998 licensed dentists (58.2%) were working in the dental profession, and 39,709 licensed dentists (equivalent to 41.8%) were inactive or in another activity outside of dentistry. Four years later, 83,746 of the 153,102 licensed dentists (54.7%) were working in the dental profession while 69,355 licensed dentists (45.3%) were inactive or in another activity outside of dentistry, which means there was an increase in the inactive licensed dentist growth rate in 4 years [5].

The dental profession in Mexico focuses primarily on

private practice; there are not many work opportunities in the public sector, such as in hospitals, clinics, or institutions because special dental care is still not included in the national public health system. In 2004, it was reported that 29,089 licensed dentists (19%) were working in the public sector [5-9]. The distribution of dentists around the country is another serious problem: most dentists are concentrated in metropolitan areas, and few practice in rural areas and small towns, creating a necessity for more community oral health prevention and promotion [7-9].

Challenges to the Dental Profession in Mexico

In the last 100 years, Mexico has created formal dental schools and dental education programs; however dental education and public health policies continue to be wrought with setbacks that complicate the development of an efficient dental education system.

The high percentage of inactive licensed dentists in Mexico points to a serious problem. The information given to prospective students should place more emphasis on vocational education prior to their acceptance into advanced education programs so that they clearly understand the goals and requirements of dental education and the life of a dental professional following graduation. Dental schools require a more efficient system to avoid accepting students who do not meet the program's expectations from the start. In addition, there is a large inconsistency between the standard level of student's proficiency, socio-economic status, and the perspective of professional goals. Academics in dental schools require great effort and constant emphasis on continuing education and English proficiency.

The increase in the number of dental schools and licensed dentists in the last few years as a solution for covering the lack of advanced education students and the demands of the national dental care system cannot rectify the shortcomings of the current dental education system. It will be necessary to rigorously standardize the dental educational programs and dental schools in order to create and regulate a standardized licensed profile for all dentists trained in Mexico.

Conclusion

This review provides information that can facilitate the assessment of the competency level of Mexican-trained dentists who are applying for international dental/graduate programs; it also raises issues about the dental profession that should be considered when creating reform in national health policies and dental education as well. The authors hope that the information presented contributes to a better understanding of international dental education.

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