Educational Consultant's Guide to effective use of Educational Technology in Mexico:

The use of Educational Technology in Mexico

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Introduction

Educational technology is a term that has various definitions and meanings. Depending on who you ask, educational technology can also mean Instructional Technology (Educational Technology, 2015). Many consider educational technology as the use or indoctrination of computers and other electronics into education which is how education technology is defined in the Oxford Dictionary. However, the best definition I found to define educational technology, and agree with, is that "Educational Technology is the field of study that investigates the process of analyzing, designing, developing, implementing, and evaluating the instructional environment, learning materials, learners, and the learning process to improve teaching and learning" (Loyola, 2021). As such, when referring to educational technology, this book will use the definition as defined by the school of education at Loyola University.

Context

El Paso, Texas, is referred to as the "Borderland." Why? Because El Paso shares the border with its neighbor, Juarez, Mexico. Every day, hundreds of children from Juarez trek across the border to attend El Paso schools. To some, that may sound all so simple. However, crossing the border is no easy feat, especially twice daily. When crossing the border, parents and children are stuck in long lines at the entry port (s), something more than two to three hours a day. Why would anyone want to cross the border twice daily to take their kids to school? Juarez has schools, right? But the answer might be a little clearer if you look at Juarez, Mexico, from an educational technology perspective.

This book chapter will explore the education system in Mexico and, when doing so, serve as a guide that educational consultants can use to develop and implement educational technology projects with tremendous success. This consultant's guide will discuss several barriers and

nuances to consider, from a global perspective, concerning Mexico, and it could determine the success or failure of educational technology projects. Further, this guide explores Mexico's education system and various topics to assist educators in planning or considering educational technology projects in Mexico. This guide will begin with a general overview of contextual factors which describe Mexico and its people.

Geographic

Mexico is a country in South America located on the southern border with North America and is the third-largest country in Latin America (Britannica, 2022). Mexico has varying terrain, including Plateaus, Mountain Ranges, Volcanos, and a tropical north and south (Britannica, 2022).

Demographics

Mexico has a large indigenous population living in rural and densely populated areas. Because of Mexico's sizeable geographical landscape, population locality, and indigenous people, poverty is a widespread and significant issue. According to the "Programme for International Student Assessment," the poorest children in Vietnam outperform the wealthiest children in Mexico in terms of education (International Community Foundation, 2019).

Social and Culture

Indigenous children in Mexico are further disadvantaged than other children in the region. Mexico's Indigenous children experience illiteracy, lack of schools, language barriers, low graduation rates, and high dropout rates from school compared to others (The Borgen Project, 2019). Mexico is working towards implementing bilingual and bicultural education and

has significantly improved but is still falling short of its goal. Because of the language barrier in indigenous communities, Mexico has a shortage of teachers that speak the native languages of the respective district. As such, Mexico's indigenous communities experience lower-quality teachers who are burnt out and achieve lower academic performance than the rest of the country (The Borgen Project, 2019).

Culture plays an insignificant role in education in Mexico, and Mexico suffers greatly from gender inequality. According to the ICF, "Mexican girls are more likely than boys to drop out of school by 12 years of age" (International Community Foundation, 2019). As part of Mexican culture, girls have "domestic chores" that either prevent them from attending school or require them to quit. As a result, as Mexican girls get older, they are less likely to restart school and graduate high school (International Community Foundation, 2019).

Economic

Mexico suffers from widespread poverty. According to the OECD Better Life Index, the average resident in Mexico has a net-adjusted disposable income per capita of \$16,269 compared to the OECD average of & 30,490 (OECD, n.d.). Mexico's economy is one of the most influential in Latin America, and its economy is dependent on services which include trade, transportation, finance, and government (Britannica, 2022).

Political

Mexico is a federal republic consisting of 31 states and a federal district (Britannica, 2022). Like the United States (U.S.), Mexico's government and governmental powers consist of an Executive, Legislative, and Judicial Branch (Britannica, 2022). Mexico's federal constitution affords and relegates certain powers to its 31 states (Britannica, 2022). Per the constitution, Mexico's 31 states can raise local taxes but rely on federally allocated funds to subsidize their

state and local budgets (Britannica, 2022). Mexico's primary schools are federally funded, with "three-fourths of all primary schools located in rural areas" (Britannica, 2022). Mexico has more than 50 universities, with one-fifth of the total universities located in Mexico City (Britannica, 2022).

Education

Primary education in Mexico became mandatory in 2004 (Britannica, 2004). However, in 2012 Mexico signed a law that made intermediate education compulsory (Gomez, Libia, Mendez & Aleida, 2017). Under this new law, Mexico started phasing in these new mandatory education requirements beginning with the 2012/2013 academic year and is expected to achieve full compliance by the 2021/2022 school years (Gomez, Libia, Mendez & Aleida, 2017). With this new law, Mexico established three options for intermediate education for residents to choose from Career Technical, General High School, or Technological High School (Gomez, Libia, Mendez & Aleida, 2017). This new law requires residents to complete 15 years of education. Why did Mexico create and adopt this new law?

As of 2016, statistics revealed that only one out of every ten children entering elementary school continues their education and obtains a university degree; less than 0.01% of the population holds a doctoral degree (Gomez, Libia, Mendez & Aleida, 2017). Although Mexico has an unemployment rate of less than five percent, its citizen lacks the knowledge and skills required in its industrial complex and industries that fuel the country's Gross Domestic Product (GDP).

Type of education	Educational level Type of services or Educational model		Duration in years	
		General		
	Preschool	Community courses	3	
		Indigenous		
	Primary	General		
Basic education		Community courses	6	
		Indigenous		
	Junior secondary	General	3	
		Technical		
		Telesecundaria		
Intermediate education	Career technical	CET, Cecyte, Conalep and others		
	High school	General	3	
		Technological		
Higher education	Higher technical	Professional technical		
		Others	3 to 5	
	Bachelor's degree	Teacher training		
		Technological		
		University		
		Specialty	_	
	Postgraduate	Master's degree	1 to 5	
		Ph.D.	-	

Figure 1: National Educational System in Mexico

History

Constantly caught in wars and revolutions, Mexico's education system fell victim to the country's political status (Foreign Policy, 2019). Before the Spanish Conquest, Mexico's earliest schools belonged to the Aztecs and served to train priests and warriors (Foreign Policy, 2019). In 1868 the first educational reform was made, which included a separation of church and stand and the creation of the first secondary school (Foreign Policy, 2019). In 1920 after the Mexican Revolution ended, the first public school system and administration were created (Foreign Policy, 2019).

Major Reforms

Mexico has experienced several educational reforms in its long history. Still, the greatest began in 1990 when the National Pedagogic University implemented a four-year program for preschool and primary education requirements for its indigenous population. In 1991 the National Union Workers of Education created and submitted a proposal to create a standard core curriculum with different options and career paths to include a career path for teachers (Navarro & Cazales, 2013). In 1992 the National Agreement for the Modernization of Basic Education (ANMEB) was adopted (Navarro & Cazales, 2013). With the adoption of this new law, the duties and responsibilities to administer education derived with the states with the oversight and enforcement belonging to the federal government (Navarro & Cazales, 2013). In 1997 Mexico's education system experienced another reform to correct the disparity between teacher(s) knowledge and the curriculum teachers learn in regular school (Navarro & Cazales, 2013). Mexico's last major educational reform was initiated in 2012 and then implemented from 2012-2018 with a focus on academic quality and assurance when creating the National System of Educational Evaluation to oversee the National Institute for the Evaluation of Education (Navarro & Cazales, 2013). With Mexico's last educational reform, the professional teaching service was born, and academic certificates were created (Navarro & Cazales, 2013).

Current Situation

According to the International Community Foundation (ICF), Mexico has several barriers affecting education. At the national level, Mexico continues to experience a shrinking budget for education. In 2014, compared to the OECD average, Mexico was well below educational spending (International Community Foundation, 2019). Mexico has a shortage of textbooks in its schools, and due to its shrinking educational budget, its textbook budget has decreased by 33%

(International Community Foundation, 2019). Further, combined with a weak and decreasing educational budget, Mexico is also faced with the challenge of internet and internet availability (Google.org, 2020) across the entire country.

Educational Technology in Mexico

During the COVID-19 pandemic, schools and school-age children around the globe were greatly affected – some more than others. When forced to close, most schools experienced challenges but were primarily able to transition to an online, blended approach to learning (synchronous & asynchronous). However, that approach was reliant on learners' access and availability to the internet and whether they possess a laptop or tablet. Less advanced countries with large geographical circumferences and a distanced population presented more significant challenges in that learners rarely had access to the internet or owned a laptop or tablet – as is the case with Mexico.

COVID-19 was a "call for action" for Mexico. Like other countries, Mexico was forced to close its schools during the COVID-19 pandemic. Again, like other countries, Mexico transitioned to an online, blended approach to learning (María Cristina Osorio Vázquez, 2020). However, this transition was not easy as learners in isolated parts of the country lacked internet connectivity in their homes (María Cristina Osorio Vázquez, 2020). Internet cafés were closed during the pandemic, and most locations lacked this resource. If available, internet cafés charged for internet use, which was not affordable for a large portion of the indigenous population. It soon became apparent to Mexico that they desperately needed distant education programs (María Cristina & Osorio Vázquez, 2020).

The authors believe that before proceeding any further with this book chapter, it is necessary to restate the definition of educational technology used as the basis of this guide and

discussion. Loyola University defines educational technology as "the field of study that investigates the process of analyzing, designing, developing, implementing, and evaluating the instructional environment, learning materials, learners, and the learning process to improve teaching and learning" (Loyola, 2021). Therefore, as this chapter discusses Mexico's use of educational technology, it will further align with this definition.

Brief History

In 2010 the Mexican National System of Distance Education (SINED) was created (Ontiveros & Canay, 2013). The SINED is an initiative by Mexican universities to strengthen education through information and communication technologies (Ontiveros & Canay, 2013). According to Ontiveros & Canay, the mission of the SINED is "to help raise the quality, coverage, and equity of education in Mexico through the [institutionalization] of educational, social networks, and also to work towards using, integrating, developing, and disseminating innovative educational technologies, products and services that promote knowledge generation and management for economic growth and social wellbeing" (2013). With the creation of SINED, Mexico's quest to institute education technologies into its education system began. In doing so, SINED has encountered many challenges consistent with those listed in this chapter but remains dedicated, focused, and driven toward accomplishing its mission (Ontiveros & Canay, 2013).

National Educational Technology Standards

Dedicated to educational reform and technology, Mexico created several different programs and processes to standardize, evaluate, and advance its educational technology standards. First, Mexico started the National System of the Professional Teaching Service (Servicio Profesional Docente), which established the requirements for teacher selection,

promotion, incentives, and tenure (OECD, 2018). Next, Mexico created The Law of the National Institute for Education Evaluation, thus creating a national evaluation system responsible for evaluating the compulsory education system in Mexico (OECD, 2018). Finally, Mexico began and implemented The National Plan for Learning Assessments, establishing formative evaluation criteria and metrics used for evaluation (OECD, 2018). As such, Mexico combines three distinct standardized student assessments to monitor student learning outcomes at different levels of the educational system, including the national and sub-national levels, while comparing school and individual student performance (OECD, 2018).

Reforms

In 2000, Mexico began a series of reforms to strengthen their quality of education – educational technology (Echávarri & Peraza 2017). These reforms focused on the education policy agenda, and the government implemented initiatives which include school autonomy initiatives, a reform of the primary education curriculum, an update to the Teachers Career Service (CM), and the creation of the National Institute for Education Assessment (INEE) (Echávarri & Peraza 2017).

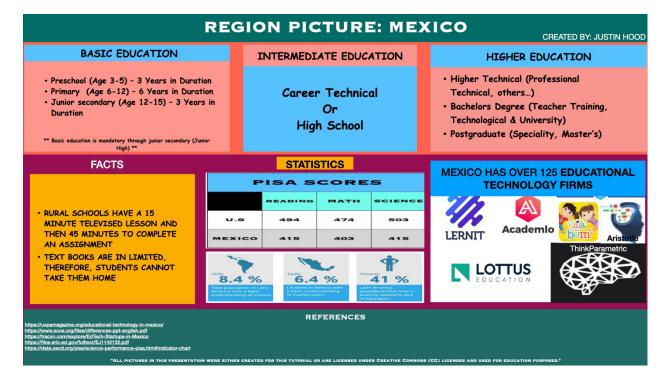
This reform was a phased approach to educational reform that began with reviewing the Program for International Student Assessment (PISA) evaluation of Mexico and the Trends in International Mathematics and Science Study (TIMMS), both of which highlighted Mexico's poor educational performance and a renewed focus on quality education (Echávarri & Peraza 2017). With a renewed focus on educational reform and the quality of education, Mexico created The Quality Schools Program (PEC) and the establishment of The Basic Level Education Reform, which required schools to submit a Strategic School Transformation Plan and Annual

Work Plan that outlined the actions each school will take to improve in the next five years (Echávarri & Peraza 2017).

Major Projects

Mexico is currently undertaking four significant projects regarding educational technology. The first major project educational technology project being spearheaded at the central government level is the "Oportunidades" program that provides cash grants to low-income families to allow their children to attend school and provide essential health services (Rand, 2005). The next major project in Mexico is called "Enciclomedia." The project aims to digitalize the school curriculum on CD-ROMs to allow students to learn interactively and use computers (Rand, 2005). Mexico's third major educational technology project is called "Programa Escuelas de Calidad," or quality schools program. The quality schools program targets low-performing schools that agree to implement a comprehensive school reform in exchange for grants of up to \$10,000 to improve infrastructure (Rand, 2005). The final major educational technology project in Mexico is a \$200-300 million per year investment in isolated rural schools and schools located in poor areas or regions of the country (Rand, 2005). This investment aims to improve infrastructure, equipment, materials, and teacher incentives to decrease teachers' absenteeism and increase school supervision (Rand, 2005).

Current Situation & Regional Perspective



Future Trends

An emerging trend that has already proved successful in several other Latin American countries includes using digital technology and satellite communications to provide access to education in austere locations while expanding the use of technology in education (Rand, 2005). The most significant initiatives included in this trend are Telesecundaria, the Satellite Television Network (EDUSAT), the School Network of Educational Computer Science (Red Escolar), and Enciclomedia (Rand, 2015). Telesecundaria operates using the EDUSTAT network and provides isolated town and austere locations with the ability to pursue secondary education (Rand, 2005). Edustat is a TV network that offers educational programming for students and teachers (Rand, 2005). Red Escolar is a collaboration tool that students and teachers can use for projects and project collaboration (Rand, 2005). And Enciclomedia is an initiative that digitizes textbooks.

learning materials, and resources for learners to access themselves without using the internet (Rand, 2005).

Strengths & Challenges

Mexico has made significant improvements in its efforts to advance its educational technology. The strengths of Mexico's educational technology programs and policies include them establishing academic standards, focusing on teacher selection, development, and retainment, and their efforts to ensure indigenous and disadvantaged learners are provided access to quality education. Although Mexico has made significant improvements with its educational technology programs, they still face many challenges affecting continued advancement.

Mexico's education technology is underfunded and is a limiting factor towards their continued improvement. Without increased funding for education, Mexico will continue to decline in educational proficiency on a global scale and comparison. Mexico has limited internet connectivity and availability to indigenous and rural populations, and providing internet access to these areas will take years. Therefore, Mexico must find other solutions to provide quality education to everyone, regardless of location and status. Finally, Mexico needs to increase educational resources and ensure equity in resource distribution to focus on inequalities in its educational system.

Educational Technology Resources

The following list of resources serves to aid educational professionals with educational technology projects in Mexico. This list provides information about key personnel, organizations and associations, points of contact, university educational technology departments and Information Technology (IT), and current and ongoing international organizations or projects facilitating educational technology in Mexico.

Key People in Educational Technology & Points of Contact

Secretary of Education Website: https://www.gob.mx/sep

Secretary of Public Education: Delfina Gomez Alvarez

Secretary of Basic Education: Martha Velda Hernández Moreno

Undersecretary of Higher Secondary Education: Juan Pablo Arroyo Ortiz

Undersecretary of Higher Education: Luciano Concheiro Bórquez

Title of the AEFCM: Luis Humberto Fernández Fuentes

SEP Contacts

Lic. Ana María Aceves (52) 57-05-70-01

Mtra. Elisa Bonilla Rius

Director of Education Materials and Methods

(This is the most important department in the undersecretariat for basic education, in charge of textbooks and curricula)

Mexico City

(55) 9183 4040

Ing. José María Fraustro Siller Oficial Mayor

(This office is in charge of planning and budgeting for SEP) Mexico City

(55) 5329 6921, 5329 6919

Mtro. Lorenzo Gómez Morín

Undersecretary of Basic and Normal Education

(In charge of everything related to the provision of basic education services)

(55) 9183 4040

Lic. Daniel González Spencer Director of International Relations

Mexico City (55) 5329 6940

Mtra. Alba Martínez Olivé

Coordinator of PRONAP and all in-service teacher training programs

Mexico City (55) 52-31-17-40

Lic. Felipe Martínez Rizo Director of INEE (national evaluation institute)

Mexico City (52)(55) 5482.0904

Source: Rand Corporation

Mtra. Silvia Schmelkes

Director of the Department of Intercultural and Bilingual Education at SEP (involved in most national education reform committees; has consulted for most major

international organizations working in Mexico, such as UNESCO and OECD)

Mexico City

(55) 54-80-81-63

Dr. Reyes Tamez Guerra

Secretary of Education

(55) 5328 1097, 5328 1000

Source: Rand Corporation

Key Organizations and Associations

Parent Organizations

Ing. Guillermo Bustamante Manilla Presidente de la Unión Nacional de Padres de Familia, A.C. (Parental organization representing private schools, conservative orientation) (55) 5687 7363, 5536 2228, 5687 0935

Lic. José Luis Pérez Bautista Presidente Nacional de la Asociación Nacional de Padres de Familia (Organization representing public schools) (55) 5586 3863, 5586 3123, 5586 1451, 5586 4896, 5586 6934

Source: Rand Corporation

Business Organizations and Individual Contacts

Ing. Alfonso Romo President Grupo Pulsar Monterrey, N.L.

Ing. Carlos Slim CEO and founder of Grupo CARSO Head of Fundación TELMEX (large foundation that grants scholarships for upper secondary and higher education) Mexico City

Ing. Lorenzo Zambrano
CEO and President of CEMEX
President of the Board of Trustees of the Instituto Tecnológico y de Estudios Superiores de
Monterrey (ITESM)
Monterrey, N.L.

Ing. Alberto Bailleres President of Grupo Peñoles, GNP, BAL. Board of Trustees (and founding member) of the Instituto Tecnológico Autónomo de México (ITAM) Mexico City

Ing. Carlos Noriega
Presidente del Grupo Noriega Editores
(Business representative on the board of several public education entities)
Mexico City

Source: Rand Corporation

Universities Ed Technology & IT Programs

Mtra. Margarita Zorrilla

Academic and Research Contacts

Dra. Teresa Bracho

Professor of Public Administration

CIDE

(Conducted evaluations of PEC; member of the Observatorio Ciudadano de la Educación) (55) 57-27-98-23

Dra. María De Ibarrola

Professor of Education

CINVESTAV

(Formerly the head of the Fundación SNTE para la Cultura del Maestro; member of the Observatorio Ciudadano de la Educación)

(55) 50 61 28 00

Dr. Luis Morfin

Director of the Centro de Estudios Educativos (CEE)

(CEE is an independent organization devoted to education research. Has important linkages to current SEP administration)

(55) 5593 5653, 5593 5847

Dr. Mario Rueda Beltrán

Professor of Education at UNAM and President of the Mexican Education Research Director of Consejo Mexicano de Investigación Educativa (COMIE) (55) 56-22-69-86 ext. 2302

Dr. Eduardo Weiss

Professor of Education

CINVESTAV

(Recently led the OECD study on Education in Mexico)

(55) 50 61 28 00

International Organizations or Projects

SPONSOR	PROJECT	MISSION AND OBJECTIVES	MAIN ACTIVITIES
A group of private and public organizations	Unete	To achieve equal opportunities and to enhance the education level of Mexican society through new technologies	Provide schools with a media classroom (computers, software and teacher training)
Televisión Azteca (Mexican)	Fundación Azteca		Provide scholarships to 2,300 lower and higher secondary students enrolled at Azteca schools.
Fundación Televisa (Mexican)	Media classrooms School libraries	To provide computers and Internet for schools and fund school libraries	235 schools were equipped in 2003, 3525 computers were given out and 141,663 young people have access to computers. 129 schools and 13 libraries were equipped: 43,200 books for 60,000 children. 53 actors and actresses from Televisa conducted 129 reading sessions for students during 2003 33,781 children received glasses in various states. The entire needs of the state of Oaxaca were met.
Vamos Mexico (headed by the President's wife) (Mexican)	School buses as classrooms. Education Technology. School for Parents. Guides for Parents.	To equip buses to operate as mobile classrooms in places where there is limited access to school. To establish joint ventures with firms to bring computers and Internet to primary and secondary schools. To give advice to parents on how to better educate their children.	50 mobile units were handed over to authorities in 14 states. Potentially, this can benefit 3,000 students. In collaboration with WalMart, 600 computers were given to SEP for primary and secondary schools. The Mexican Institute for Educational Excellence received 2.3 million pesos for the development of radio programs. 15 million pesos were invested to develop: a written document for distribution among parents, a TV program, and a web page.
Ford Motor Co. (Mexican)	Ford Schools	To support the localities where they operate through job opportunities; to contribute actively to the welfare and development of their communities	Around 200 Ford Schools operate in Mexico. Program has been active for more than 37 years. More than 150,000 children currently attend primary schools sponsored and run by Ford. 1.5 million children have finished primary education in a Ford school in Mexico.
Mexico Unido Foundation (Mexican)	Lazos	To foster primary education among poor Mexican children through achieving three objectives: foster values education, improve quality, and reduce dropout rates.	Lazos godfathers children in need, through a Mx \$198 monthly contribution. It operates in 21 states. Almost 14,000 children are assisted. There are 123 Lazos sponsored schools, attended by more than 40,000 children.

Source: Rand Corporation

Centro Mexicano para la Filantropía	Several projects	To promote philanthropy in Mexico and organized participation in social-oriented projects.	Various, mostly very small projects.
Ford Foundation in Mexico City (U.S.)	Grants to several institutions	To respond to the dramatic changes in the country, enhance the welfare of the poorest, and assist in consolidating democratic developments.	Some of the organizations which receive grants include: Education and change: workshops and action research to promote teachers' participation in educational debate, policy innovation and internal capacity building. Social development and education: Disseminate its community model for improving rural secondary schooling through enriched television-based education systems. Fomento Cultural y Educativo, A.C.: Increase Fomento's capacity building services in order to expand professional development opportunities for teachers' union leaders in Mexico City. Citizens' Educational Observatory: To strengthen dialogue on education between government and civil society through public opinion formation and public participation in educational affairs. Mexico-North Research and Education Network: To help the Tarahumara people of northern Mexico establish an intercultural educational program. National Pedagogic University: To launch an education program that integrates indigenous mathematics in primary school curriculum. College of the Southern Border: Core support for Casa de la Ciencia, an intercultural model of teacher training in marginalized indigenous regions of southeast Mexico.

Source: Rand Corporation

Key Factors and/or Considerations Working in Mexico

Planning to work in Mexico requires careful planning. Because Mexico is a foreign country, it has unique entry/exit, visa, work permit, and social security requirements. Those traveling to Mexico must understand prohibited items not authorized in Mexico, crime and safety, etiquette (culture), and access to health insurance. Those traveling to Mexico are encouraged to visit the Department of State Website (https://www.state.gov/countries-areas/mexico/) to review and comply with the most up-to-date requirements and the Mexico World Fact Book.

Pacific Prime Latin American Insurance Company lists a guide on their website highlighting Mexico's business culture and tips about things to bear in mind (https://www.pacificprime.lat/blog/your-guide-to-working-in-mexico-as-a-foreigner/). In their article Pacific Prime Latin America offers the following tips titled "Business culture: Things to bear in mind:

Tips:

- Respect hierarchy, as this is part of the business culture. Important decisions are
 usually made by senior members, who expect to deal with those on the same
 level.
- Avoid using first names, unless you're specifically told to do so. You can use
 Señor (Mr.), Señora (Mrs.) or Señorita (Miss), followed by their family name.
- Personal relationships play an essential role. It's common to invest time and effort getting to know work colleagues and business contacts.
- Be warm and friendly, as well as ask about personal aspects. For instance, people at the workplace often talk about family, friends, customs, hobbies, and more.

- Learn the basics of Spanish to show that you're willing to integrate, even if your colleagues may be able to speak English.
- Note that Mexicans tend to have a looser sense of time compared to what you
 may be used to. Aim to arrive on time for a meeting, but be prepared for delays.

Conclusion

In conclusion, Mexico has made towards educational advancement and educational technology. Mexico's geography is significant, and its indigenous population is spread throughout the country. Mexico's infrastructure does not support online or hybrid learning, and most people do not possess the hardware to support this learning method. Mexico's investment in teachers is a crucial step toward advancing their education. Their establishing of educational standards and learning outcomes and formative evaluation used for evaluating their education will define the continued advancement or decline.

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