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Online learning's potential to improve access and quality in higher education in Mexico: Perspectives of higher education stakeholders

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Abstract

Mexico, one of the largest countries in the world, has seen more growth in online education than in-person instruction between 2013 and 2023. This study investigates the potential of online learning to increase access and quality of higher education in Mexico against this backdrop of growth. The study uses semi-structured interviews with 32 university leaders, academic staff, and students from six institutions in Mexico. Interviews explore their perceptions of online learning to identify barriers to access quality and understand future potential. Results reveal significant barriers to developing high-quality online education and making it widely accessible. The online education market favors students in urban areas and those with the resources necessary to study online while the flexibility and convenience of online learning are highly valued. Additionally, many universities serving non-traditional students and those in rural areas lack the resources and infrastructure to provide high-quality online education. Results are discussed within the Community of Inquiry (CoI) framework as well as within the broader context of online education research. These challenges once addressed will allow Mexico to develop high-quality online education widely accessible to under-resourced and rural populations.

Keywords: Education access, Education quality, Higher education, Mexico, Online learning, Online teaching.

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Contents

Contribution of this paper to the literature

This study is original because it uses qualitative methods to explore perspectives of Mexican higher education stakeholders, filling a gap in research on how online learning impacts both access and quality. Unlike prior studies, it applies the community of inquiry framework to Mexico's unique socio-economic and infrastructural challenges.

1. Introduction

Mexico is the tenth largest country in the world by population with 130 million people increasing by one-third in the last 20 years (World Bank, 2023a). The population is expected to crest at about 166 million in 2060. In 2015, the number of 15–19 year-olds peaked at about 11.9 million and is now falling, hitting 11.75 million in 2020 and expected to be 11.5 million by 2025. By contrast, people aged 20-44 will jump from under 50 million to over 54 million in that time (World Bank, 2023b).

This demographic shift will help Mexico boost higher education participation but raises new challenges, namely the role of colleges and universities in helping non-traditional students pursue degrees and develop new skills. According to the World Bank (2023b), Mexico has urbanized steadily in recent decades from 50% urban in 1960 to more than 80% today, almost the same ratio as its neighbor, the United States (US).

In 2023, Mexico's higher education system enrolled over 5.2 million students across more than 3100 institutions. Most institutions are private but the majority (71%) of students are enrolled in the public sector. Enrolment has more than doubled over the last 25 years, substantially exceeding population growth at the traditional age for starting higher education. However, only a minority of students completing secondary education go on to college or university. The Gross Enrollment Rate (GER) for Mexico jumped from about 18% in 1999 to over 46% in 2021 but still lags behind the regional average (56%) and that of other upper-middle-income countries (63%) (World Bank, 2023b).

The education system in Mexico is governed either by the federal government, specifically through the offices of the Secretary of Public Education (SEP) or by Mexico's 31 states. Private institutions that lack degree-awarding powers are generally supervised by public universities. Quality varies widely, including documented cases of some approved private higher education providers functioning as diploma mills or disappearing overnight. A voluntary accreditation system called the Recognition of Official Validity of Studies (RVOE) often distinguishes higher-quality providers from those that are unaccredited. Universities that are accredited have access to government funds and receive recognition from the SEP. Nevertheless, most private institutions are unaccredited and low pay and under qualified faculty are widespread concerns.

Some of the challenges faced by Mexican higher education are present in other countries in Latin America (Latam), including ensuring quality, expanding access and equity, and meeting the needs of the ever-changing labor market. While Latam, as in the rest of the world saw a large increase in online enrollments during the COVID-19 pandemic, the growth was more substantial in some countries than in others in particular Brazil, Argentina, and Chile. For example, according to the 2022 Higher Education Census Brazil's distance learning enrollments have grown over 700% over the past decade (Valadares, 2023).

The SEP has long collected data on distance or informal modality referring to tertiary education that does not take place in person at an institution, the vast majority of which is composed of open and distance learning. The SEP defines the "distance or informal modality" as "intended for students who do not attend training in the institutional field. This lack of presence is replaced by the institution through elements that allow distance training to be used, so the degree of openness and flexibility of the model depends on the resources, self-access teaching materials, computer and telecommunications equipment, and teaching staff.

In 2022-23, the SEP reported that of the 5.2 million tertiary students in Mexico, 22% are distance learners of some kind. Distance or informal student numbers have grown faster than face-to-face and mixed-mode total since 2013-14 when the SEP first began publishing reports. Distance learning has increased 150% compared to a growth of only 18% in face-to-face learning. In absolute terms, distance or informal learning has added nearly 700,000 students since 2013 compared to around 615,000 students in face-to-face learning. While the highest rate of growth comes from distance enrollments, in-person learning remains the larger modality (see Figure 1).

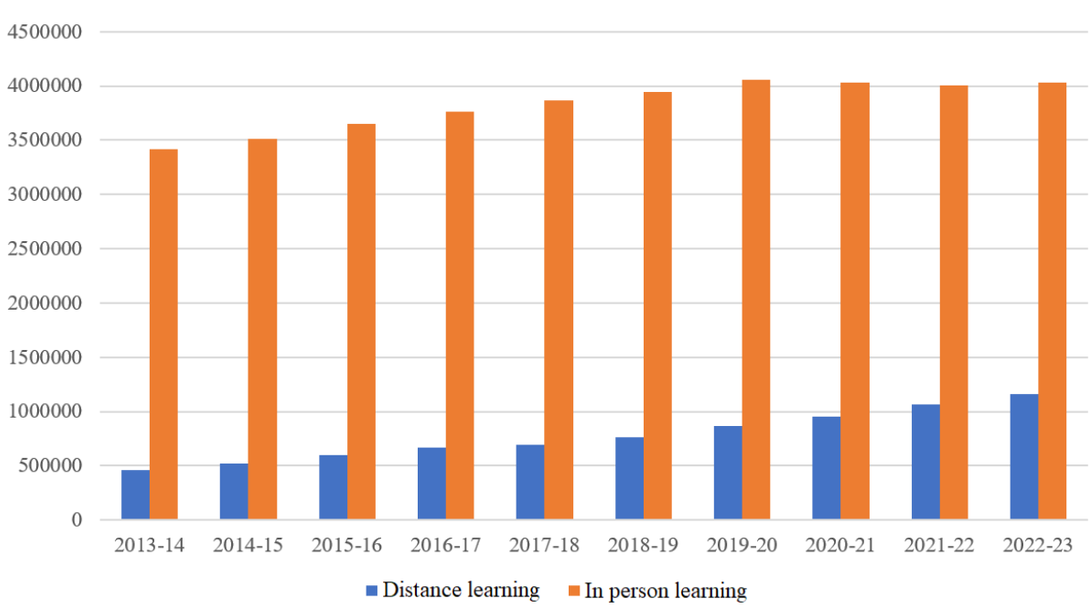

Figure 1. Higher education enrollments by modality in Mexico.

In 2022-23, data shows private institutions account for 37% of students at the tertiary level overall but 69% of distance or informal students. This aligns with the more entrepreneurial character of many private providers and the role of the private sector in serving students seen as underserved by public universities. The vast majority of informal or distance students are undergraduates (83%) but the most recent data from 2022-23 shows that private colleges report about 23% of their distance or mixed enrollments are at the postgraduate level (versus only 7% in the public sector).

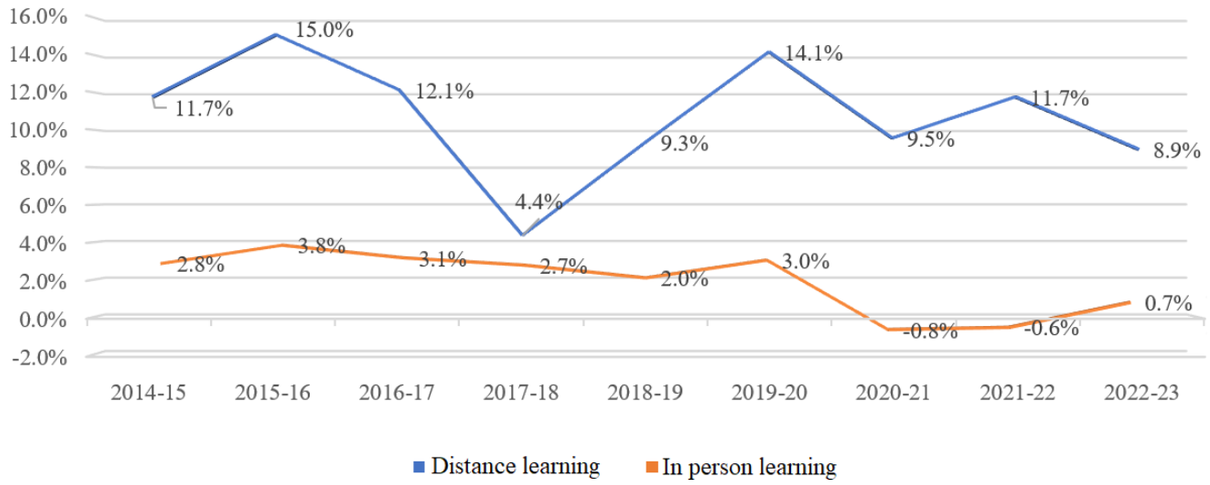

Figure 2. Growth in higher education enrollments by modality in Mexico.

Figure 2 illustrates that enrollments in online learning have grown steadily since the SEP began gathering data in 2013-14. The largest annual growth was in 2019-20 when the COVID-19 pandemic made online programs an attractive option and enrollments grew by 14%. Meanwhile, in- person learning enrollments have grown at a much slower rate and even decreased between 2020-2022.

Many Mexican higher education institutions are engaged in distance and online learning. Of public and private institutions, private has the largest share (64%). Of the students enrolled in online and distance programs at public universities, 17% are enrolled at state public universities and the other 83% are distributed between polytechnic, technological, federal, intercultural or other forms of public institutions. Table 1 in the appendices reflects the distribution of online and distance learning students across the wide spectrum of public and private universities.

Table 1. Distribution of students across HEIs in Mexico (2022-23).

Higher education institutions	In- person			Not in- person		
	Total	Bachelor's	Graduate	Total	Bachelor's	Graduate
Public universities	1,241,108	1,181,330	59,778	81,931	79,579	2,352
Public state universities with solidarity support	66,950	65,981	969	1,533	1,224	309
Intercultural universities	15,255	15,065	190	6,185	6,063	122
Polytechnic universities	103,571	102,498	1,075	371	218	153
Technological universities	227,259	226,864	395	641	603	38
Decentralized technological institutes	219,500	218,264	1,236	9,768	9,768	-
Federal technological institutes	327,764	323,386	4,342	13,805	13,805	-
Public federal universities	468,455	425,208	43,247	183,505	176,926	6,579
Subtotal	2,669,862	2,558,596	111,266	297,822	288,167	9,655
Normal public education	116,862	116,231	-	1,332	-	1,332
Normal public education (Postgraduate)	1,662	-	-	-	-	-
Subtotal	117,893	116,231	-	1,332	-	1,332
Public research centers	9,744	8,313	1,562	950	670	280
Other public institutions	65,041	56,597	8,444	121,605	108,188	13,417
Subtotal	74,785	60,410	14,375	122,555	108,858	13,697
Total public	2,862,540	2,735,237	127,303	421,709	397,025	24,684
Private normal education	14,489	14,489	-	-	-	-
Private normal education (Postgraduate)	193	-	-	187	187	-
Private universities	1,155,709	1,048,055	107,654	737,791	559,847	177,944
Total private	1,170,391	1,062,544	107,847	737,978	559,847	178,131
Total	4,032,931	3,797,781	235,150	1,159,687	956,872	202,815

Note: This table shows enrollments across the different types of HEIs in Mexico by modality, using data from the SEP.

There are no studies examining the potential of online learning to increase quality and accessibility in higher education in the nation despite consistent growth in online learning enrollments in Mexico. This study endeavors to shed light on this topic by investigating the below research questions:

1. What is the perceived relationship between online learning and access to higher education in Mexico?
2. What is the perceived relationship between online learning and the quality of higher education in Mexico?
3. How do higher education stakeholders (leaders, academic staff, and students) in Mexico view online learning in terms of the potential to enhance quality and expand access?

2. Literature Review

Online learning has been a longstanding component of Mexican higher education, although ongoing debates regarding its effectiveness. Implementation remains disparate across institutions, lacking a unified national strategy despite the prominence of online education in discussions by politicians and teachers on enhancing the accessibility and quality of higher education. Though nearly all higher education institutions were forced to adopt online learning during the COVID-19 pandemic, research calls into question the efficacy of this modality (Johnson, Veletsianos, & Seaman, 2020) at times showing a negative impact on students' academic experience (Means & Neisler, 2020; Salas-Pilco, Yang, & Zhang, 2022).

A study by Tuncay (2021) cited gaps in online education, including Internet gaps, age gaps, digital gaps, knowledge gaps, access gaps, economic gaps, and performance gaps (p. 2), and these weaknesses impact the ability of instructors to teach effectively and students to learn effectively online. Research on the characteristics and behaviors of award-winning instructors of online courses found that their success could be partially attributed to their ability to address these and other gaps (Martin, Budhrani, Kumar, & Ritzhaupt, 2019).

Bliss (2023) noted that online learning does not fulfill the human need for interaction in her landmark research on the human intellect. She states that human intelligence depends on interaction that "there is nothing better than collaboration in real life—connected, reciprocal learning between a student and their peers or teachers to spark the brain's natural drive to develop and grow." The social-emotional piece is missing in online learning without which "information is merely tallied and later lost to other pursuits. Ultimately, if you want students to learn, they need to shore up their neural networks and use their neuroplasticity to develop their intelligence" (Bliss, 2023). Similarly, research on the effects of the switch to online learning during the COVID-19 pandemic shows a negative impact on students' well-being (Debowska, Horeczy, Boduszek, & Dolinski, 2022; Dodd, Dadaczynski, Okan, McCaffery, & Pickles, 2021). Although some research details the barriers to developing high-quality online education, many studies point to its benefits and possibilities. This study uses the seminal work conducted by Garrison, Anderson, and Archer (1999) in their development of the community of inquiry framework. The CoI posits that it is possible to improve access and quality of higher education through online learning. It outlines three major areas that are required for effective online learning: teaching presence, a cognitive attribute, and social presence. Teaching presence refers to the design, facilitation and direction of cognitive and social processes for the purpose of realizing personally meaningful learning outcomes. Cognitive presence refers to the degree to which learners can construct and confirm through sustained reflection on a task. Social presence is defined as the ability to project oneself into a community of inquiry, thereby fostering engagement and interaction (Garrison et al., 1999). Research conducted with the CoI framework has demonstrated that powerful online education can dramatically increase student engagement and improve learning results. For example, Garrison and Arbaugh (2007) found that courses emphasizing clearly all three elements of the CoI resulted in higher levels of learner satisfaction or learner perception outcomes. The framework has been demonstrated to increase critical thinking and promote collaboration when executed effectively (Garrison, Cleveland-Innes, & Fung, 2010).

Additionally, research by Akyol and Garrison (2011) has confirmed that the CoI framework can enable an increase in higher education attendance for non-traditional students who are managing work-family responsibilities. The combination of cognitive, social, and teaching presence not only increases the quality of online learning but also addresses issues of access to higher education for diverse populations (Shea & Bidjerano, 2009). This study seeks to shed light on the presence of CoI elements in online learning environments in Mexico. This area has not been investigated in the past despite its growth and prominent place in the national higher education system. This study focuses on the perspectives of Mexican university leaders, professors, and students on the potential of online higher education to expand access and improve quality in Mexico. It defines online learning as a modality that "uses electronic technologies through the Internet to engage learners and facilitate their learning" (Sunal & Wright, 2012). It adds to the existing academic research by using a qualitative approach to examine growth and potential in Mexico and by incorporating international perspectives to contextualize the findings.

3. Methodology

3.1. Research Design

This study uses a qualitative research design based on semi-structured interviews with academic leaders, professors, and students from six universities in Mexico. Appendix A contains a copy of the instrument used to conduct the interviews. Universities were selected to give a representation of different types (public and private), sizes (number of enrolled students) and geographic locations in Mexico. University characteristics are available in Table 2. In total, six universities were included located in five different Mexican states. The universities selected were the Center for Research and Teaching in Economics, CETYS University, the Iberoamerican University of Mexico City, the Iberoamerican University of Puebla, Chapingo Autonomous University, and the Intercultural Institute of Ayuuk.

Table 2. University sample characteristics.

Institution	Classification (Public and private)	Size (Small= <5,000; midsize= 5,000-10,000; large= >10,000 enrollments)	State of Mexico
1	Public	Small	Mexico D.F.
2	Private	Large	Mexico D.F.
3	Private	Midsize	Puebla
4	Public	Large	Texcoco
5	Private	Small	Oaxaca
6	Private	Midsize	Baja California

Note: This table shows the characteristics of the higher education institutions included in the study. Sixty-six percent are private, and there is an equal distribution among size.

The interview protocol was designed to solicit empirical, opinion-based answers and to facilitate an understanding of the interviewees' perspectives, experiences, and thought processes with online learning (Creswell, 2009). The number of interviews conducted was determined by saturation which is a frequently used criterion for qualitative rigor referring to the point in data collection at which no additional data are being found that allow the researcher to develop properties of the category (Fusch & Ness, 2015; Guest, Bunce, & Johnson, 2006). Researchers recorded and transcribed the audio of the interviews using NVIVO software. The identities and other identifying information of the participants and their affiliated institutions were anonymized or pseudonymized. The study received approval from the university's Research Ethics Committee.

Researchers coded the interviews to identify themes and sub-themes relevant to the research questions. Interviews were perused iteratively to allow codes to be applied and refined. The resulting set of codes was then applied to all interviews (Saldana, 2015). After the transcripts were coded, the researchers identified themes comprised of related groups of codes that shed light on the research questions (Fraenkel, Hyun, & Wallen, 2011).

3.2. Research Population

Semi-structured interviews were conducted virtually or in-person with 32 leaders, academic staff, and undergraduate and graduate students at the campuses of universities involved with online learning in Mexico. Semi-structured interviews were used to minimize bias and allow for greater response flexibility (Cohen, Manion, & Morrison, 2011). Of the 32-person sample, 34% were female, 25% were academic leaders, 38% were professors, and 38% were students. Table 3 shows the interview schedule and characteristics of academic leaders and professors. Table 4 shows the interview schedule and characteristics of students.

Table 3. Interview schedule: Leaders and academics (N=20).

Interview #	Gender	Position type	Faculty/ Discipline affiliation
1	M	Academic leader	Economics
2	M	Professor	Public administration
3	F	Academic leader	Education
4	M	Professor	Public policy
5	F	Academic leader	Economics
6	M	Professor	Agricultural economics
7	M	Academic leader	Business
8	M	Professor	Accounting
9	M	Professor	Engineering
10	M	Professor	Economics
11	M	Professor	Economics
12	M	Professor	Finance
13	M	Professor	Economics
14	F	Professor	Agriculture
15	M	Academic leader	Communication
16	M	Academic leader	History
17	F	Professor	Education
18	M	Academic leader	Education
19	M	Professor	Political science
20	M	Academic leader	Law

Note: This table shows the gender, role, and subject area of the leaders and academics interviewed for this study. Twenty percent of the sample was female and 40% were academic leaders while 60% were professors.

Table 4. Interview schedule: Students (N=12).

Interview #	Gender	Level	Program/ Field
1	F	Postgraduate	Masters in political science
2	M	Postgraduate	Doctoral candidate in political science
3	F	Undergraduate	Political science and international relations
4	F	Postgraduate	Master's in public policy
5	M	Postgraduate	Master's in public policy
6	F	Postgraduate	Doctoral candidate in communication
7	M	Postgraduate	Doctoral candidate in agricultural economics
8	F	Postgraduate	Masters in economics
9	M	Undergraduate	International relations
10	M	Undergraduate	Sustainable development
11	F	Undergraduate	Administration and sustainable development
12	F	Undergraduate	Child psychology

Note: This table describes the gender, study stage, and subject area of the students interviewed for this study. Fifty-eight percent of the students were female, and 58% were studying at postgraduate level.

3.3. Instrument

The interview instrument contained questions organized by categories relevant to the research questions. The categories included were challenges and opportunities, pedagogical strategies, student engagement, infrastructure and support and future potential for online learning. The instrument was designed based on expert knowledge and information from the literature review. Individuals were selected using snowball sampling, leveraging existing university networks and publicly available credentials to identify and invite participation (Cohen et al., 2011). These initial interviewees were asked to recommend others to be approached to participate in the study.

3.4. Validity and Reliability Tests

To test the validity of the instrument, it was first piloted with one leader, two professors and two students. The reliability of the codes was checked by independently coding three interviews and comparing the resulting codes for accuracy. Once satisfied with the results, the interviews were coded and themes were identified from the codes.

4. Findings

Findings are presented below organized by research questions and the resulting themes and subthemes.

RQ1: What is the perceived relationship between online learning and access to higher education?

Interview data suggest that the adoption of online learning modalities has widened the reach of higher education, particularly to non-traditional students balancing work or family commitments. Nonetheless, this increased accessibility has been tempered by infrastructural deficiencies and unequal access.

Table 5. Interview themes related to the relationship between online learning and access to higher education.

Theme	Finding
Economic barriers	Successful engagement with online learning is impacted by students' economic means. Many lack the necessary personal technology to study online.
Infrastructural barriers	Many students from rural areas face challenges with internet connectivity and its infrastructure.
Resource divide	Universities with more extensive resources can deliver online education more effectively than under-resourced institutions.
Rural/urban divide	Rurally located institutions often lack digital infrastructure for online provision.
Unequal access among non-traditional students	Online learning provides opportunities for non-traditional urban students who are employed or have family obligations.
Challenges for some non-traditional groups	Neurodivergent students and those with extra support need to face challenges in studying online.

Table 5 presents interview themes related to perceptions of the long-term potential of online learning in Mexico. The first column lists the theme that emerged from interviews and the second column describes the associated finding.

Responses indicate much variation in institutional capacity to support online learning. Universities with more resources report more success in implementing online programs and providing necessary technological support to students. In contrast, under-resourced institutions struggle to deliver online education effectively. As one leader of a university in the state of Puebla pointed out, "What the literature in Mexico says is that online education allows you to reach places where the university cannot reach. Universities are normally based in cities. Today, there are many universities in Puebla and Mexico City, but if you go to a rural town in Oaxaca, you will not find a university because it is very difficult to build and maintain it."

While online learning has become more accessible, interviews highlight that successful participation depends on the economics of students' lives. Such a digital divide has wider implications for the continuity of these gaps in an educational system. According to a private university student from Mexico City, the increase in online options might create even larger divides between students with enough resources who can take advantage of those offerings "who are able to take advantage of the increased availability of online options, versus those who do not have the resources to do so."

Online learning has been best accommodated by universities that already have the infrastructure in place. However, access to this modality was not universal and stakeholders from both urban and rural institutions reported a range of challenges that resources helped resolve. For instance, students from less affluent backgrounds often face difficulties due to inadequate internet connectivity and a lack of personal computing devices. Some universities with the available resources attempted to mitigate these issues by lending equipment and giving a stipend to students intended for technological support.

The experiences of students at a well-resourced private urban university contrasted with the experiences of students at a public university where the student are largely from rural and indigenous backgrounds. According to a professor from the latter university, "communication with the students is difficult because the vast majority is located in rural areas, where internet access is very limited". For that reason, the university offers dormitories for undergraduate students so that they may access the infrastructure and resources needed to study.

The leader of a university in a rural area in the state of Oaxaca questioned, "How do you develop an online program if [the university does not] have Internet access?" He noted that some students have to travel to the closest village and then connect to the public internet on their smartphones in the town plaza to access their coursework virtually. The public Wi-Fi signal was weak and did not work during rainstorms—a daily occurrence during certain times of the year. Another university leader shared that during the COVID-19 pandemic the government provided funds that the university used to "buy and lend around 10,000 laptops to students who did not have them" upon realizing that many low-income students use the laboratories and computers at the university because they didn't have their own.

Some interviewees pointed out that certain groups such as neurodivergent or students with mental health issues struggle to take advantage of online learning. A neurodivergent student at a small public university expressed her opinion: "The [online] learning experience is strange because you are tied to the computer. If the class is planned for a time in the middle of the afternoon, it breaks your day apart. I am on the autism spectrum, and boy, if I have a commitment at four p.m., then I can't do anything else but wait for the damn time to arrive."

RQ2: What is the perceived relationship between online learning and the quality of higher education?

While online education provided a necessary alternative during the pandemic, it has underscored existing inequalities and presented new challenges in educational quality, student engagement, and academic integrity.

Interview findings suggest the need for a strategic approach to training teachers, developing online curricula, and providing equitable access to technology for students.

Table 6. Interview themes related to the relationship between online learning and quality of higher education.

Theme	Finding
Varied proficiency with digital platforms	The transition to online modality has been particularly challenging for faculty without preexisting online teaching practices.
Need for ongoing teacher training	Teaching online requires structured support in didactics and pedagogy that many institutions lack.
Lower student engagement	Professors perceived lower student engagement in online modality due to both technological issues and limitations of remote interactions.
Collaboration and communication difficulties	Online modality presents unique challenges in collaborating and communicating.
Subject matter translatability	Some subjects are easier to teach in an online modality than others.
Academic integrity	Professors perceived that instances of academic dishonesty are more prevalent in the online modality.

Table 6 presents interview themes related to perceptions of the long-term potential of online learning in Mexico. The first column lists the theme that emerged from interviews and the second column describes the associated finding. The transition to online education raised significant concerns regarding instructional quality. Faculty proficiency with digital platforms emerged as a critical factor. The development of online education models at some universities reportedly lacked adequate preparation exacerbating the challenges of transitioning to online instruction, especially for professors with long-standing in-person teaching practices. A professor of economics at a public university cited his frustration with online learning saying, "It's good that we're back in- person. I don't want to know anything more about distance education. The majority of professors said, 'No, no, no, I won't get involved in that again'. If the situation arises again, I'm retiring."

Interviews underscored the need for foundational training for teachers in online pedagogy, reflecting the sentiment that the nuances of teaching online cannot be improvised and require structured development. Many professors emphasized this with one professor from a large public university noting the need "to establish a basic training for teachers to teach online, just as we do for training in-person. Online and in-person teaching techniques are different."Lower student engagement was a common theme in interviews. Some professors attributed this to both technological issues and the inherent limitations of remote interactions. A professor at a large public university noted that "I could see when the student lost their internet connection, and realized that although the student wants to attend, they can't. For me that was very disappointing." Another professor mirrored this sentiment, saying, "It's frustrating because students have their monitors on and are not there. Meanwhile, I'm talking like a crazy person to their photographs." Anecdotal evidence suggested that instances of academic dishonesty, such as sharing answers during exams, were more prevalent in online learning. For example, a professor at a public university noted that during the COVID-19 pandemic, most students passed their exams online, and once learning returned to in-person, over a third of that student cohort failed. "During online learning," he said, "there were no averages below nine (out of ten)." Some students highlighted the challenges of collaborative work in a virtual environment including issues with communication and the coordination of group work. A student in a large private university in Mexico City reported the existence of unclear or unstated rules during online sessions: "Professors suddenly suggest keeping the camera on, for example, they say that if you want to participate, you have to raise your hand with an emoticon. These rules have to be made more explicit to have successful collaboration." Another student pointed out that "the issue of technological distance caused problems when collaborating. For example, someone suddenly deleted what another person wrote online without warning or having a discussion of 'hey, I don't like what you're writing, I'm going to change it'. This caused friction in the group." Additionally, she asserted that it is harder to forge connections in the online modality: "It's difficult to interact with people online. I was able to interact with my colleagues on WhatsApp, but there was no emotional connection. We could only see each other through the camera, and though we like each other, we can't delve deeper into what kind of people we are."

RQ3: How do university stakeholders view online learning in terms of its potential to enhance quality and expand access?

Interviewees consistently highlighted the notion that online learning should augment rather than replace in-person education. Certain student demographics such as those from indigenous, rural or low-resource backgrounds as well as students with mental health or learning challenges, particularly benefit from in-person support.

Table 7. Interview themes related to perceptions of the long-term potential of online learning in Mexico.

Themes	Findings
Online modality has value.	The flexibility of the online modality is appealing to all stakeholders.
International collaboration	Online options facilitate international collaborations. Meetings are seen as more inclusive and convenient when online.
Complement to in-person learning.	Interviewees felt that online education should not replace in-person education and that hybrid and mixed options should be explored.
Improve internet infrastructure to expand access.	Expanding access requires improving internet connectivity nationally, particularly in rural areas.
Increase resources for non-traditional students.	Students from neurodiverse and under resourced groups need ongoing support and resources.
Increase resources for universities to teach online.	Universities must have the resources and technological infrastructure to offer online education.
Pedagogical support for teachers.	Need for universities to offer ongoing support to teachers to teach online.
Learning and mental health support for students	Need for both learning support and mental health support for students, especially those from neurodiverse and under resourced groups.

Table 7 presents interview themes related to perceptions of the long-term potential of online learning in Mexico. The first column lists the theme that emerged from interviews and the second column describes the associated finding.

A preference for in-person educational experiences emerged with online learning favored as a supplementary approach rather than a standalone solution despite the recognized utility of online learning. The efficacy of online learning was perceived to vary depending on the subject matter and pedagogical dynamics. Demonstrating this, one professor noted that his laboratory work with students in the field of zootechnics is not possible to impart online. “How do you teach a student to milk a cow on Zoom? Or teach insemination techniques through a PowerPoint slide?” Another professor mirrored this sentiment saying, "I think it depends on the contents to be taught or the learning dynamics. There are things that work much better in person. I think it also depends on the level being taught."

Several teachers stressed that while online education can be an excellent complement to in-person learning, it is not seen as a substitute. One professor noted that "I think online and in-person learning complement each other very well. They are not competitors." Another professor at that university noted, “online education is an alternative when in-person is not an option, and not always with the results one wants. That is my personal conclusion.”

Students valued the flexibility afforded by online learning, allowing for the integration of education into diverse lifestyles, particularly for working individuals. However, opinions varied with some students expressing dissatisfaction with purely online formats compared to hybrid or in-person experiences. Students from a small public university pointed out some students thrive online more readily than others. “I have close friends who have succeeded online because they are disciplined and organized but those characteristics are not shared by all humans. So online shouldn't be the only option.” Another student asserted that it is harder to focus in the online modality: “If I am at home, I start doing a thousand things.”

There was agreement around the utility of online as a modality for international collaborations and remote participation in academic activities, a trend accelerated by the pandemic but expected to last. This modality has enabled connections with distant teachers and scholars, augmenting the traditional academic exchange. A professor from a large public university noted, “What I have noticed is that it is very difficult for some professors and students to come to conferences or attend events because of the distance, but there are many people who watch them remotely.”

5. Discussion

These findings align with the literature on online learning within the community of learning framework. For example, Garrison and Arbaugh (2007) argue for the critical role of teaching presence in supporting successful online course management and facilitation—an element reported to be missing in many online class contexts in Mexico. Additional research that is bolstered by the study finds that educators may also fail to provide the required cognitive and social presence necessary for a productive online learning environment if they are not properly trained or supported (Garrison et al., 1999). Experienced online instructors often stress their ability to solve challenges of online pedagogy, e.g., dealing with technological disconnections and student engagement issues (Hennessy, Smith, Greener, & Ferns, 2019). This was cited by some interviewees as an area of weakness that hinders the quality of online education.

The institutions included in this study are working towards effective online education in the context of delivering better processes. However, interviews demonstrated that there was room for development in learning from one another and using best practices while teaching different subjects. In Mexico, technological resources and capabilities are limited both for educational institutions as well as for the students who are excluded from quality online learning due to systemic issues. Some universities do not receive sufficient institutional support or collaboration, both of which are essential factors for the successful implementation of online learning (Means & Neisler, 2020).

Paradoxically, this study shows that online education can actually increase student or resource disparities as students lacking access to, and familiarity with, technological devices are left behind as their peers leverage the potential of online learning rather than creating more equal access. In Mexico, this digital divide is particularly stark due to systemic disparities along rural or urban lines and socioeconomic status. The lack of digitalization in rural and isolated regions makes extending an online educational offer equitably even more challenging (Tuncay, 2021).

Furthermore, interviews highlight that neurodiverse students have struggled with online education. This finding is backed by research suggesting that the online modality has not been an effective means for some students to learn, as a large portion report having problems learning online and prefer traditional face-to-face environments (Debowska et al., 2022; Dodd et al., 2021). This underscores the importance of addressing both technological and pedagogical challenges to enhance the quality and accessibility of online education (Garrison et al., 2010; Shea & Bidjerano, 2009).

Looking at the potential for online learning, findings from interviews highlight recognition of the difficult to replicate attributes of in-person learning, a view of online learning as a complementary tool rather than a replacement for in-person learning, and the importance of appropriate and ongoing training for teachers in online education. Collectively, they underscore a consensus among stakeholders that online higher education can serve as a viable extension of educational opportunities. The overall sentiment favors a balanced approach, integrating online learning to complement traditional methods rather than replacing them outright. Effective online education is conditioned on student motivation and the capability of professors to adapt their teaching methods to digital formats.

6. Conclusion

The Mexican reality of online learning in higher education depicts a complex panorama. While it has certainly been a boon for some, the system is also at times compounding disparities related to access to and experience of

services. This study draws attention to the necessity of substantial infrastructure and support to make access equitable. It also shows that quality online education has been achieved in certain disciplined communities. Online learning in Mexico has the potential to democratize higher education. However, the lack of interventions for combating the existing digital divide makes this goal harder than it needs to be. In designing and delivering online education, decision-makers should consider these disparities to ensure that the modality is an equalizer not a divider.

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Appendix

Appendix A presents the instrument used to conduct the semi-structured interviews.

Appendix A. Semi-structured interview guide.

Perceptions and experiences of online learning in Mexico

1. What is your current role and participation in teaching or educational research?
2. Can you describe your previous experience with online teaching or learning? Could you describe your experience and the challenges or successes you encountered?
3. In these collaborations, how do you think online education could improve learning outcomes?
4. Do you think there are differences in learning results between online education and face-to-face education? If so, what are they?
5. What data is used to evaluate the effectiveness of online versus in-person learning?

Opportunities and challenges of online learning

6. In your opinion, what are the potential benefits of online learning in higher education in Mexico?
7. Do you think online education could play a role in expanding access to higher education for indigenous groups and rural groups in Mexico?
8. Are there any specific challenges or concerns that you foresee in the implementation of online learning at the higher education level in Mexico?
9. How do you think online learning could improve or complement traditional face-to-face teaching in higher education in Mexico?

Pedagogical approaches and student engagement

10. What pedagogical approaches or teaching strategies do you think work best in an online learning environment?
11. How can online learning promote student engagement and interaction and what strategies can be used to ensure active participation?
12. How can student learning be effectively assessed in an online learning environment? Are there specific assessment strategies or tools that you find particularly effective?

Infrastructure and support resources

13. What limitations does Mexico face in expanding online teaching?
14. How can institutions ensure that faculty members have the training and support necessary to design and deliver online courses effectively?
15. Now that it's largely behind us, how do you see the arrival of the COVID-19 pandemic? To what extent do you think it drove online transformations that were already on your university's radar?
16. Many institutions were forced to innovate and adapt quickly to deliver education and meet student needs during the COVID pandemic. To what extent would you say your institution has maintained these changes in the face of returning to its previous way of operating (or in between)?

Future perspectives

17. In your opinion, how do you think online learning in higher education in Mexico will evolve in the future?
18. Are there specific areas or disciplines where online learning may have unique advantages or challenges?
19. Are there any changes or innovations in online teaching that you hope your institution will implement in the future?
20. Would you like to add anything else?