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The Rise of Educational Technologies in Latin America: An Analysis of Brazilian and Mexican Ecosystems

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Abstract
This paper aims to analyze the perception and impact of educational technologies (EdTechs) in Latin America through the case studies of Brazil and Mexico, the two largest markets for EdTechs in Latin America. The main methodology of data collection used throughout this paper is qualitative interviews with entrepreneurs, foundations, and investors in the field. Additionally, the research is supported by literature reviews that provide a more holistic, macro-level perspective about the topic of interest. Based on the information collected, it can be deduced that entrepreneurs had a very critical opinion of the current state of education in their respective countries. That being said, they believe that technological solutions will pave the way for a better education by completely disrupting the traditional model of education. Some common themes explored in the paper revolve around the ideas of the most effective EdTech models, the difficulties with the measurement of impact, and the barriers that still exist in making these technologies scalable.

The Rise of Educational Technologies in Latin America:
An Analysis of Brazilian and Mexican Ecosystems

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I.   INTRODUCTION

Education

Education is a key component for the economic advancement of developing countries. In Latin America, education needs improvement in order for the countries to progress. The market for education, however, is limited, since reform and investment are needed to catalyze growth.

While education is universally considered to be a necessity for advancing society, people do not necessarily desire to pay for education. In Latin America, and Brazil and Mexico in particular, parents not only have a very low *ability* to pay but also a low *willingness* to pay for their children's education. When education is paid for, there's the question of how much additional perceived value they feel their child is gaining. As a result, in most developing countries, a large part of the population receives public education. Private education is generally regarded as a value-add that can typically only be afforded by higher strata in society.

Some key terminology that will be relevant through the study is that of the distinct levels of education. *Primary education* will consist of the 6-11 year old age group; *secondary education* will consist of the 12-17 year old age group; and *tertiary education* will consist of the 18-22 year old age group. Furthermore, for the purposes of this study, primary and secondary education will be interchangeably referred to as "K-12," while tertiary education will be referred to as "higher education." This last category of higher education will also extend beyond the age of 22 years old, as it will focus more generally on schooling beyond primary and secondary.

Technology

In terms of the number of internet users, Brazil is the largest internet market in Latin America and the fourth largest internet market in the world, with nearly 140 million users

(Gordon). Furthermore internet penetration is expected to reach 61% by 2021 (Gordon). In terms of mobile phone usage, nearly 40% of the population were reported as users in 2016, a number that is expected to rise to 52% by 2021.

In Mexico, the number of internet users is forecasted to grow to nearly 92 million by 2021 (Gordon) while 50% of the population currently possesses access to the internet. Additionally, 58.5 million people are reported as mobile phone users (Gordon).

These statistics show that technology is widely available in both countries, with internet usage expected to grow continually. This data proves that conditions are ideal for technological innovations, such as EdTech solutions.

Background on Educational Technology

As the EdTech field is so broad, the definition must be narrowed for the purpose of this research. In this study, EdTechs take on many forms. For example, Yogome is a gamification platform that delivers academic content through video games, while Collective Academy takes a blended learning approach to higher education, where digital lessons supplement the traditional classroom setting. Therefore, for the purposes of this study, the term "educational technology" or "EdTech" will refer to digital or technological innovations that aim to improve education.

The technological reform in education began around ten years ago with the introduction of MOOCs (HBS, 2018). As the first truly supplementary solution for education, MOOCs aimed "to exploit the possibility for interactions between a wide variety of participants made possible by online tools so as to provide a richer learning environment than traditional tools would allow" (McGill, 2015). Since then, the reform in education is increasingly moving towards the nucleus of traditional education through the introduction of more innovative, digital technologies.

II.   MARKET CONTEXT

Navitas Ventures, an organization that provides capital and support to education startups, mapped the EdTech landscape in 2018 and recognized 15,000 companies across 26 categories [Appendix A], ranging from courseware and curriculum to testing prep and career planning. The same year, a research conducted by Tecnológicio de Monterrey, one of the leading technology-focused universities in Latin America, mapped nearly 150-180 EdTech companies in Latin America, the majority originating in Brazil. This paper analyzes two markets, Brazil and Mexico, as they have the greatest concentration of EdTechs in Latin America.

Brazil

Brazil is a country with 207.7 million people, with adolescents younger than 24 years old comprising nearly 40% of the population (UNESCO Brazil, 2017). In 2016, the World Bank reported that the primary school enrollment rate was at 92.7% (2016). Of those, the percentage that finish primary school falls around 87% (UNICEF Brazil). The enrollment rate for secondary school drops to 81.35%, while the enrollment rate for tertiary education is even lower, at 50.6% (UNESCO Brazil, 2017).

For the last twenty years, there has been a push by the government to improve national education. In 1995, the administration announced education as a priority, thus leading to the drafting of the first national guidelines for schools and a guarantee of financial resources for primary education (Burton, 2012). In 2002, under President Luis 'Lula' da Silva, education continued to be a priority for the agenda. By the end of his term, some of the improvements included increased funds to primary and secondary schools, a national teacher's salary, and grants to incentivize students of lower economic status to attend private universities (Burton, 2012). In 2014, President Dilma Rousseff took over in spearheading the country's new National

Education Plan (Plano Nacional), which President Lula created in 2010. Some of the key goals outlined in the National Education plan were to universalize primary education for children 6-14 years old; universalize education for adolescents 15-17 years old; achieve an 85% matriculation rate by 2020; and increase GDP investment in education to at least 7%, from the previous 5.7% as reported by the World Bank in 2010.

While the issue of access is relevant, certainly, there is also an issue concerning quality for those that do receive the curriculum. Today, 85% of the students who graduate do not do so with an adequate level of math, science, and Portuguese. Furthermore, as of 2014, statistics indicated that Brazil's illiterate population exceeded 13 million people. While work is being done to improve the current state of education, there continues to be a gap between the systems in place and the outcome of prepared students.

Mexico

Mexico has the 12th largest population in the world with approximately 127.5 million people (UNESCO Mexico, 2017). In 2016, UNESCO reported that the primary school enrollment rate was at 95.4%, 77.2% for secondary school and 36.9% for tertiary school (2016). With nearly 45% of the population under 25, there is a huge source of current demand for educational services.

Historically, Mexico has struggled to meet the demands of its growing population, particularly in terms of educational needs. In 2006, when President Felipe Calderón took office, education became one of his agenda's main priorities. Since then, Mexico has seen the creation of more than 75 higher education public institutions and the growth of campuses at state universities (Endeavor).

While the government spends 23% of the federal budget on education, the vast majority of this money goes towards teachers' salaries. Less than 3% is spent on school maintenance and construction, curricula and technology for the classroom (Endeavor). It is evident that the budget reserved for education is not sufficient, and should be increased accordingly to provide better infrastructure and materials.

Moreover, in Mexico State, where the majority of the population is concentrated, 50% of students do not have the option of attending high school because of a lack of schools (Endeavor). These statistics indicate that there remains a large unmet demand within the Mexican education system.

Stakeholders

Stakeholders must be taken into account when considering the educational landscape and the educational technologies that hope to tackle the main issues found in the environment. The main stakeholders considered for the purposes of this research are the following: students, parents, teachers and professors, school directors/principals, universities, employers and governments.

During their interviews, entrepreneurs were well aware of the various stakeholders involved in their final product and took into consideration the main pain-points and needs of each in creating their solutions.

III. STUDY AND METHODOLOGY

In order to garner a holistic understanding of the EdTech landscape in Brazil and Mexico, several interviews were conducted with players in this space. The interviewees fall into three broad categories:

1. Founders/CEOs and employees of educational technology companies focused on **K-12 education.**

2. Founders/CEOs and employees of educational technology companies focused on **higher education.**

3. Organizations, foundations, and investors supporting EdTech companies.

Founders/CEOs and Employees

Given that this study aims to provide insight into the perception and impact of educational technologies in Latin America, the majority of interviewees fall into the first two categories of founders/CEOs and employees. The following tables outline the name of the employee, their company, the country in which they are based, and their mission, as broken up by area of focus (K-12a versus higher education).

Table 1. Summary of companies focusing on K-12 education

Company	Name	Title	Mission / Goal	Country
n/a	n/a	n/a	To decrease dropout rates and improve proficiency in education by building technologies that empower teachers, principals, parents and students.	Brazil
Nova Escola	Maria Martinez Rodrigues	Product Manager	Publication that aims to provide digital tools for educators.	Brazil
EvoBooks	Carlos Grieco	Co-founder	Recreate educational content to be more engaging for students.	Brazil

Company	Name	Title	Mission / Goal	Country
QMagico	Thiago Feijão	Founder and CEO	Online education platform which aims to increase technology usage in the classroom.	Brazil
Geekie	Claudio Sassaki	Co-founder	To personalize education globally and inspire students to unlock their full potential.	Brazil
Yogome	Daniela Moreno	Senior Learning Designer	To help kids learn in a fun way with the assistance of mobile technology.	Mexico

Table 2. Summary of companies focusing on higher education

Company	Name	Title	Mission / Goal	Country
Estudar Com Você	Alexandre Maluli	CEO	Propose the best study experience for university students.	Brazil
Quero Educação	Lucas Gomes	Co-founder	To help students find and compare college programs online that meet their financial and scheduling needs.	Brazil
Responde Aí	Paulo Monterio	Co-founder	Online platform that offers resources to help students with their homework.	Brazil
Veduca	Alexandre Teixera	Summer Consultant	Positively impact people's lives through high quality content, created and distributed in a sustainable and collaborative way.	Brazil
Collective Academy	Patricio Bichara	Co-founder and CEO	Educational platform designed to empower professionals and entrepreneurs to solve their daily challenges through the disciplines of greatest impact in the world.	Mexico
Reto Educación	Carlos Roca Alcaron	CEO	Digital study platform that enables people to prepare for their academic goals, continuous education, or particular certifications.	Mexico
Bedu	Mois Cherem	CEO	Platform that connects students, teachers, online content and spaces in order to create meaningful blended learning experiences.	Mexico

Organizations, Foundations and Investors

The second group in this study is that of EdTech companies that do not focus specifically on primary or higher education; foundations supporting EdTechs; EdTech accelerators; and relevant investors.

Table 3. Summary of other players

Organization	Name	Title	Mission / Goal	Country
Enova	Raul Maldonado / Jorge Camil	Co-founders	To bring educational technology to help lower-income people succeed in the knowledge society.	Mexico
Kinedu	Luis Garza Sada	CEO	Platform that provides parents with a personalized developmental roadmap tool to record the progress of their children through early phases of growth and learning.	Mexico
Tecnológico de Monterrey	Leon Fernando Velasquez	Head of EdTech Accelerator	Aims to encourage entrepreneurs interested in transforming the world of education through new methods for teaching and learning.	Mexico
Fundação Lemann	Tamires Vilela	People and Performance	To collaborate on innovative and scalable initiatives that ensure effective learning for all students and the development of high-impact leaders that create value for society, enabling Brazil to advance its development with equity.	Brazil
Endeavor	Maria Tinoco	Manager Education Vertical	n/a	Mexico
n/a	Fernando Valenzuela	Venture Capitalist, Latin America, EdTech expert	n/a	Mexico
Pacific Investments	Veronica Serra	Venture Capitalist	n/a	Brazil
MBA Student, MIT	Elisa Mansour	Researcher	n/a	Brazil

The following organizations were also contacted but were not able to be reached:

- GENTE (Brazil)
- CIEB (Brazil)
- Descomplica (Brazil)
- Aulalivre (Brazil)

- MeSalva (Brazil)
- Tamboro (Brazil)
- Eleva Educação (Brazil)

IV.   KEY FINDINGS

The Role of EdTechs

Supplemental (K-12)

One key finding from the research conducted across both Brazilian and Mexican entrepreneurs focusing on K-12 education was that EdTech offerings are meant to serve as supplements to traditional education, rather than replacements. More specifically, many of the EdTechs in this sector aim to be resources for teachers, rather than students.

Many of the entrepreneurs focusing on K-12, rather than choosing to tailor their solutions to students, found that the main pain-points actually lay among the teachers. When asked about the history of their companies, many entrepreneurs mentioned that they originally intended to offer tablets as their EdTech solution. For example, Carlos Grieco of EvoBooks spoke about their original business model of providing classrooms with tablets loaded with interactive academic content.

> *"After introducing these into several schools, we learned that the key component for all*
>
> *these tools to work was the teacher -- teachers were the most important piece for these*
>
> *games. If they don't know how to use technology, if they are not trained to use the*

technology, they just won't use it. And if they decide not to use it, it just won't matter whatever it is that you provide, because it's not going to be used."

The interviews unearthed the reason that one of the most important stakeholders for these EdTech offerings are teachers. Thiago Feijão of QMagico was adamant that their first focus is on the teacher. Their technology is specifically tailored to help the teacher in their pedagogical routines, and the student can only use the platform if the teacher invites them onto it.

Maria Martinez Rodrigues from Nova Escola spoke about how some schools do have the digital resources, but due to a lack of training, teachers do not know how to make pedological use of the resources. In contrast, Nova Escola aims to have a solid training and feedback system designed for their digital product. Nova hosts focus groups in which teachers go onto their website, register, and go to the lesson plan area in order to browse the offerings. She went on with an anecdote, about how Nova's pilot was implemented in seven districts, some without computers, where even elderly teachers were able to understand how to use the product offering.

One entrepreneur that works in public education emphasized that oftentimes, teachers also have the same level of socioeconomic disadvantage as their students. Due to this, the services provided to them need to have a level of simplicity that requires minimal training. Similarly, Claudio Sassaki of Geekie put it simply: "The material is ineffective if teachers don't know how to make use of it."

Despite the level of training that should accompany these EdTech solutions, the unanimous opinion was that the goal of these solutions was to reinforce what students have learned, rather than to develop new teachings.

Another key stakeholder in EdTech solutions are future employers, however, there is little evidence that they have been consulted in the tailoring of these solutions. It is important to

keep in mind that employers determine the final success of these solutions as they will be the ones employing students based on their education and skill levels. The need for this involvement will be discussed in greater detail in later sections.

Replacement (Higher Education)

In contrast, when looking at the EdTechs tailored to higher education, the solutions aim to serve more as a replacement to the current education system, rather than as a supplement. As emphasized by the entrepreneurs, the reason for this, across both Brazil and Mexico, is due to the lack of support and preparation that students receive in universities, even those that are considered the most prestigious in each respective countries. To contextualize this analysis, it is important to understand that in Brazil, the top universities are those that are public, whereas in Mexico top universities are private.

The following data (ARWU) reveals the world's universities as ranked in the top 500, by county. Brazil is the first Latin American country to appear in the list, coming in at number 22, with Mexico taking spot 32.
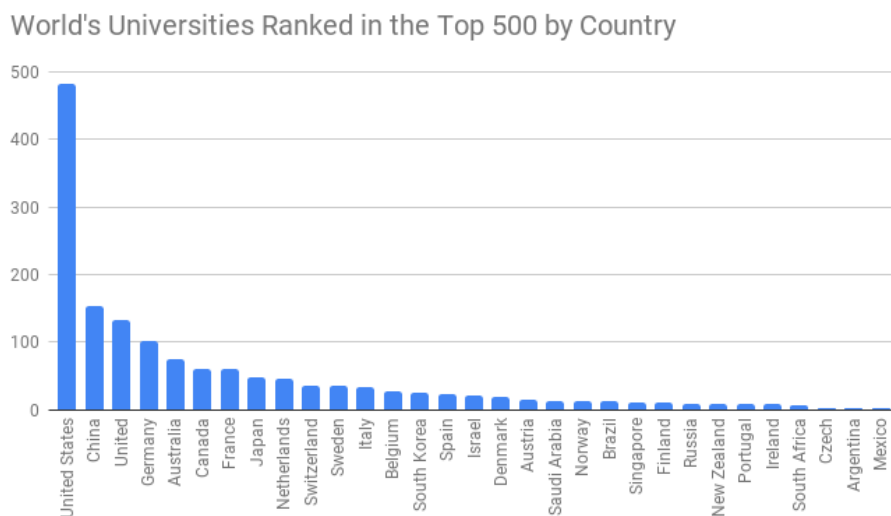
Source: Academic Ranking of World Universities, 2018 Survey

Interviewees highlighted that the main issue with Brazil's higher education is that universities are not well managed. In addition to universities in Brazil lacking a cohesive management structure, professors are hired to conduct research rather than teach. The incentive system for being a professor is completely detached from the need to teach students and prepare them for the workforce, which in practice translates to little to no support for students, a sentiment expressed by various entrepreneurs.

Paulo Monterio of Respondi Aí identified three main factors leading to the helplessness of students:

1. Inadequate basic education: *"85% of high school students who finish high school do not have the adequate level of math that they should have. Most students in K-12, maybe 80% or so, are from public schools, and public schools are very bad. So when they finish high school, they don't have the necessary math and even Portuguese levels to finish. We have this raw material that is not prepared to follow up with higher education."*

2. Lack of support in public universities: *"When you look to higher education in Brazil there are two sides; one side is public universities. Public universities in Brazil are very difficult to join, it is very difficult to be accepted, they have this very big competition. The students that get into public university are usually those who could pay for a good university, which is ridiculous. Of course, nowadays you have 'cultas' [scholarships] for students that cannot pay. There is a feeling of helplessness because universities are not well managed, they don't have the structure, the professor doesn't even know if you go or don't, or if you fail your exam. You feel no support at all, you feel alone."*

3. Mass private universities: *"Mass private universities, like Kroton, are conglomerates that have like one million students. In the last 20 years there were a lot of incentives to motivate people to join universities, so they gave a lot of incentives to private universities to grow. So their acceptance exams are really low, you just have to know how to read to get in. They are really profit focused, so they try to be as efficient as possible, putting a lot of students in class, teachers are not necessarily well prepared, they give you the minimum service necessary. They just give you a diploma. It's market driven. It's worse because the students that go to these universities are the students who cannot pay."*

Due to these issues, a few Brazilian EdTech solutions actually strive to become the professor. Since professors are not doing their jobs well, even at the best institutions, and since textbooks are not good enough resources, solutions like Respondi Aí and Estudar com Você have stepped in to become the providers of the content. By putting themselves in the shoes of the students, both of these platforms were able to identify the need of university students: more efficient, clear, and engaging ways to learn and study. With the continual development of solutions that support students better than professors, these EdTechs are going to reach a point of completely disrupting the current landscape. While the timeline is unclear, it may get to the point where these platforms become the institutions themselves.

Target Market

K-12

Commonly, the main improvements needed to be made in education are in public institutions that do not have the resources and capacity to meet current demands of students.

One finding of interest, however, was that the majority of the current EdTech solutions are actually tailored to the private market.

When speaking about K-12 in Brazil, the market for public education is 80%, whereas 20% is comprised of private institutions. Yet, multiple entrepreneurs admitted that while the public school market was greater in terms of scale and need, the money lies in private schools. When asking one entrepreneur in Brazil's K-12 space why their company works with public schools they admit,

"Because nobody was doing it before us, at least in Brazil. It's a very bad business model, that's why. It's complicated because, for example, you have different priorities in every kind of school. If you are building a product for private schools, it's going to need to have visual reality and gamification and so on. When talking about public schools, they even don't know the number of students in each classroom or parents' phone numbers. It's a totally different problem… that they need help with."

An inconsistency that entrepreneurs must frequently deal with are the changing ruling parties and their differing agendas. Many of the entrepreneurs in the K-12 space admitted that they would prefer to work with the private education systems in order to limit their interaction with the government. One key EdTech player who focuses on Brazil's public education mentions:

"Public schools depend on two sources: foundations or the government itself. With the government you have three problems. First, is the turnover among government personnel, it's huge. When you start to negotiate with the Secretary of Education you pilot [your product] for 6 months to a year, then you start the bidding process which is going to take another 6 months to a year. Then, they [government officials] only stay in office for an

average of one year and a half. They leave in the middle of the process, and you're left to restart everything. Then you have the issue of corruption at two points. The first is the bidding process which has corruption around it, and then after when you need to receive the money. The third thing is that even personnel are not well prepared to run the bidding process."

The issue of instability due to government turnover compounded with corruption is just as prevalent in Mexico. Maria Tinoco of Endeavor describes Mexico's public education as one of the most obsolete and least actualized systems, with little desire to improve. Education falls into the trap of bureaucracy, where there are stringent methods of doing things and little room for innovation. Again, the main issue is when the government in power changes, as whatever deals were made by EdTech companies will likely be lost. When working with private schools, there are many less bureaucratic hurdles that must be surmounted, there is more money, and typically more flexibility and support.

<u>*Higher Education*</u>

According to research conducted by Quero Educação, 80-90% of students aspire to continue with their education. Yet, only 15% of the population goes on into higher education. Moreover, colleges in Brazil have astronomical dropout rates, nearing 40% (Feijão, 2018). According to Fejão, the "gap between aspiration and reality mainly comes from being able to afford and fit education into their [peoples'] lifestyles."

The competition for public universities is stiff, and the students who are accepted are oftentimes those that could afford to pay to continue their education. In Mexico, while the main universities are private and therefore, paid for, the drop-off in quality and caliber when looking at public universities is just as drastic as in Brazil.

León Fernando Velasquez of Tecnológico de Monterrey (Tec), spoke about the top two universities in Mexico: Tec, the top private university, and UNAM, the top public university (both of which rank in the top five universities of Latin America). Beyond these two universities and a handful of others, the rest of the institutions in Mexico do not even meet basic standards due to their poor quality. Entrance to these top universities is extremely selective, not only because of the admittance exams, but because of the cost.

Tec, however, is trying to close the clear socioeconomic gap that clearly exists due to this structure. The project "Distrito Tec" aims to incorporate the extended community (a poor community) that surrounds the university. Furthermore, through the program "Lideres de Mañana," Tec supports a group of 100-200 first generation students by providing them with full scholarships to the university. It would be interesting to continue to harness technology in order to work on initiatives that bridge the socioeconomic gap. Technology in this case could provide solutions that are both cheaper and more effective if implemented correctly.

Overall, it was unsurprising to see that many EdTech solutions are tailored to the markets that can best afford these solutions. The interesting finding was more so that these are not the markets where the greatest need lies. Yet, barriers to these high need markets are oftentimes too great.

Impediments to Growth

The challenge most commonly acknowledged by the EdTechs interviewed was their ability to scale. This section outlines the main roadblocks impeding growth.

Personalization

One key finding from the research is the belief that, ultimately, these technological solutions will only be effective if they can be personalized. Yogome, for example, is able to

personalize its content for students. As the teacher sees data on student performance in a certain subject, they can increase or decrease the time the student spends on that subject accordingly. Additionally, QMagico, for example, is able to personalize learning plans for each pedological routine (e.g. homework, tutoring).

The issue with personalization, however, is that it is more expensive and much more difficult to do at scale. EdTechs need to understand how to best collect data and feedback from stakeholders in order to internally tailor their solutions. In the future, all EdTechs hope to implement personalized learning content where students will be able to focus their learnings on the areas in which they are lacking.

Reception of Learning Outcomes

Another consideration, as aforementioned, is how EdTech solutions will be received by the job market. It will be important to acknowledge whether the learning outcomes students receive from EdTech solutions will satisfy the demands of employers.

Furthermore, as education continues to become increasingly digital, there will be a greater number of offerings that allow students to fully acquire their education online. That being said, there will need to be shift of perception on degrees acquired exclusively online, rather than through more traditional methods. It will be interesting to conduct further research in the coming years on the credibility of online degrees and certifications when applying to jobs.

Acidity of Environment

More than once, entrepreneurs admitted to the acidity of the sector. At multiple points of the ecosystem, there are barriers that seem insurmountable. Among these barriers is the actual knowledge of technology that stakeholders have, compounded with their desire to learn.

Grieco of EvoBooks admits to being a skeptic of EdTech's role: "One of the key things for an EdTech to survive are the teachers, and the teachers still send to market with very little knowledge on how the digital world works."

A possible solution to this issue would be a public-private sector partnership between teachers / schools and employers. These partnerships would aim to increase the capabilities of teachers and update their current knowledge, in order to make them "tech champions" for EdTech solutions.

Implementation & Regulation

Another main issue in the adoption of EdTechs is the lack of universal connectivity. In Latin America, particularly Brazil and Mexico, there remain many communities that do not have the proper infrastructure to support technologies.

The next major roadblock in regard to EdTechs is the lack of proper implementation. Since aforementioned regulations limit the amount of innovation that can take place in the sector, once there is an innovation, the knowledge of how to use it and thus, implement it, is lacking. There is currently a gap, however, between knowledge the intentions in introducing regulations. Therefore, there is a need for "smart regulation," meaning regulation that actually achieved its initial objective once implemented.

Limited Investment

The market for education is very slow moving and is typically considered an environment not wholly receptive to innovation. One of the reasons for this inefficient market, as explored above, is due to the gap between providers and consumers of education. Changes in education often require the approval of many external parties, whether school boards, state governments, or

federal governments. Additionally, having tangible evidence of impact takes many years, which further limits immediate investment.

Investing in the non-segmented public sector, and in education in general, continues to be considered high risk. The buy-in is large, whereas the payoff is slow to come, which discourages many players from entering the market.

Scalability

From the research conducted, the conclusion can be drawn that no one model of an educational technology has been proven to be the most effective. A recurring issue faced by all of the entrepreneurs interviewed is the difficulty of scaling. On one hand, partnering with the government, either directly or indirectly, seems to be the most effective way to achieve scale. The analysis above, however, summarizes the inefficiencies and limitations in doing so. Thus, moving forward, it will be valuable to continue researching which models are most effective in achieving growth. One potential model to explore will be that of partnerships with private companies. A good example of this is the current case study of Amazon as it opens new headquarters in Washington D.C. Currently, Amazon is working to partner with the local government in order to increase tech knowledge in schools to better prepare students for the workforce. Similarly, this model can be adopted in Latin America, particularly Brazil and Mexico, in order to increase the rate of scalability and impact.

Furthermore, many of these EdTechs hope to expand to new markets. All entrepreneurs, however, agreed that it was necessary to have a strong hold in their current market before expanding internationally. With international expansion comes the need to understand the education system in different countries. A common theme among the interviewees was the idea that expanding into other developing countries would allow for the greatest integration of their

product to the new environment. One reason for this is commonly, in developing countries, governments are not good at providing education so there is a great need for EdTech solutions. Yet, due to the sheer size and need in Brazil and Mexico there is currently less emphasis placed on international expansion. Rather, for many entrepreneurs it is more important to continue strengthening the market in their respective countries.

V. ADDITIONAL FINDINGS

Blended Versus Online Learning

One question this research aimed to answer was which model of EdTech is the most effective. While the research showed that this varies depending on the type of customer base the EdTech is created for, one valuable point of discussion that arose was that of the blended learning model versus online learning.

More specifically, in both Mexico and Brazil, the research found that the need for personal connection still outweighs fully-online education. Three organizations that adopted this model are Enova, Bedu, and Collective Academy. Jorge Camil of Enova insisted that due to the nature of Latin Americans, the need for personal interaction with professors and other students continues to be a large component of education.

Some issues, however, were identified with the blended learning model, the main one being the increased difficulty to measure impact. With online courses, teachings are more consistent and it is easier to ensure that all students are receiving the exact same content and education. Due to the traditional element component of blended learning, that is the physical presence of the student and teacher, learning outcomes cannot be as easily attributed to the solution. As of now,

however, blended learning is shaping out to be one of the main, if not the key, models in EdTech. That being said, it will be critical to continue to strengthen this model, for example in how to best measure impact.

Tightly Controlled Distribution Channels in Brazil

In Brazil, the main stopgap to the distribution of EdTechs is the large publishing houses that have relationships with the government. Grieco of EvoBooks mentioned that to grow in this market, "it's a game of who controls the distribution." Furthermore, according to Lucas Gomes from Quero Educação, "The reality today is that they are big groups that own distribution channels and suffocate smaller institutions." Publishers have monopolized the market by partnering with the government to be the main providers of textbooks for schools. Schools are given a very limited budget from the state government to purchase specific didactic materials, as outlined by the national PNLD - Brazilian Textbook Program (Nogueira, Silva, and Colombo, 2017). As aforementioned in earlier sections, federal laws in Brazil ensure that every public school has the same standard of curricula and books. The procurement process, as summarized by Maria Martinez of Nova Escola is the following:

> *"Publishing houses can send them [the schools] the books. The Minister of Education makes a list of approved curricula and sends out the list to every school in Brazil. Then, the school can choose from that list. Schools, therefore, do have curricula, but cannot make decisions to use other lesson plans. If there is no digital resource in the PNLD then there's nothing they can do."*

There has been discussion, however, of a change in PNLD regulations that would allocate for the hiring of technology for schools. According to Martinez, this would change the game: "If public schools, 80-85% of the market, could hire EdTechs there would be a boom in demand."

Furthermore, these changes would also be connected to increased connectivity in the classroom. Martinez mentions that today, about 60% of schools have internet, but if the government manages to increase classroom connectivity, this would also change the landscape for EdTechs.

The key will be increased transparency, better governance, and reduced corruption in these distribution channels. It is important to note that due to the aforementioned barriers it will be difficult to enter into schools with new solutions unless there is increased transparency around methods, effectiveness, and impact.

Need Versus Luxury

One factor identified as a limitation to the adoption of EdTechs at scale is the idea of need versus luxury. Jorge Camil of Enova mentioned that in Mexico, people are not used to paying for education. Those that do pay, for example for private schools, pay the minimum (i.e. tuition) but do not want to pay more than necessary. It will be difficult to continue scaling these solutions if the demand for the service is limited due to price.

Moving forward, it would be interesting to better understand the perceived value this type of education is creating for students, which will thus impact the willingness to pay among different segments of consumers.

VI.   MEASURING IMPACT

A key question of this study revolved around the measurement of impact. Entrepreneurs were asked the following questions:

    a.   How would you evaluate the success of your organization in attaining its goals?

    b.   Do you currently measure impact? If so, what methods do you go about to do so?

The questions were open-ended with the intent of further understanding each of the entrepreneur's methods of measuring impact. While all entrepreneurs had a system in place, they agreed that measuring impact was one of the greatest challenges faced by their respective organizations.

In order to contextualize the findings it is important to first understand the difference between *outputs*, *outcomes* and *impact*. The following are definitions developed by the OECD DAC in 2002 (OECD, 2010):

- *Outputs:* The products, capital goods and services which result from a development intervention; may also include changes resulting from the intervention which are relevant to the achievement of outcomes.

- *Outcomes:* The likely or achieved short-term and medium-term effects of an intervention's outputs.

- *Impact:* Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended.

It is evident that *impact* is the most complex measurement and requires the greatest investment of time and resources. Thus, as observed, most entrepreneurs have more robust methods of measuring *outputs* and *outcomes*, with the hopes that these findings will guide their final *impact*. The most common methods of measuring *outputs* and *outcomes* were as follows:

1. Measuring immediate metrics
    a. E.g. Number of active users, number of unique users, frequency of use, efficiency (how much time was saved by using solution).

b. One barrier to this type of measurement is that oftentimes, the outcome that needs to be measured is not disclosed. For example, for the solutions that aim to better prepare students for national exams or university exams, such as Geekie or Reto Education, disclosure of scores is not mandatory. That being said, users can self-report, but data can therefore, be skewed.

2. Client feedback

a. One common way to measure customer satisfaction is through net promoter scores (NPS). More specifically, the NPS looks at how users (i.e. students, teachers) perceive the service and whether they would recommend it.

b. Other common feedback systems are also used, such as focus groups or client call centers/online feedback portals. These allow clients to provide feedback on the solutions provided by the platforms and their ease of use.

3. Long term tracking of learning outcomes

a. EvoBooks, for example, partnered with Yale to conduct a detailed statistical analysis on students using their product over time. Comparing to a control group who did not use their product, they were able to verify that there was a 15% improvement of student grades when EvoBooks was utilized.

Despite these common practices, entrepreneurs still find that measuring impact is a difficult processes. In fact, one entrepreneur had an interesting perspective on measuring impact. He mentioned:

> *"When looking at developing countries, the need is so huge that almost anything will have an impact. ..... More important than impact is engagement. If you don't*

have engagement, you will not have impact. You need people engaged in the solution."

Overall, there have been no concrete findings verifying the best methods for collecting impact data at a large scale. Perhaps in solving this issue, it will be important to consider who currently controls the inputs [Appendix B]. As of now, it seems that the main stakeholders controlling the activities that are being input into the education system are teachers. EdTech entrepreneurs are increasingly disrupting this with their technological interventions. Yet, another key player that could start taking a larger role in the input side is the employer. If employers are ultimately the ones determining the effect of the outputs, outcomes, and impact, then they should be more actively shaping the inputs early on in the cycle.

VII. CONCLUSION

Despite the fact that there has been a boom in EdTech in the last years, there are severe limitations that do and will continue to pose as substantial barriers to these solutions being effective at scale.

While this research aims to shed light on the EdTech ecosystem in Latin America, it only provides the limited case studies of Brazil and Mexico, which are currently the most robust EdTech landscapes. Furthermore, the data is heavily skewed towards Brazil, where there was a greater sample of entrepreneurs interviewed. That being said, the overall sample size of entrepreneurs, foundations, and other key players is limited. Furthermore, the findings presented do not include a representative sample from the stakeholders that use the products and services.

Nonetheless, this data ultimately proves that EdTechs are a promising solution to improving the state of education in Brazil and Mexico. It is worth further analysis to see whether these findings are applicable across the rest of Latin America and beyond.
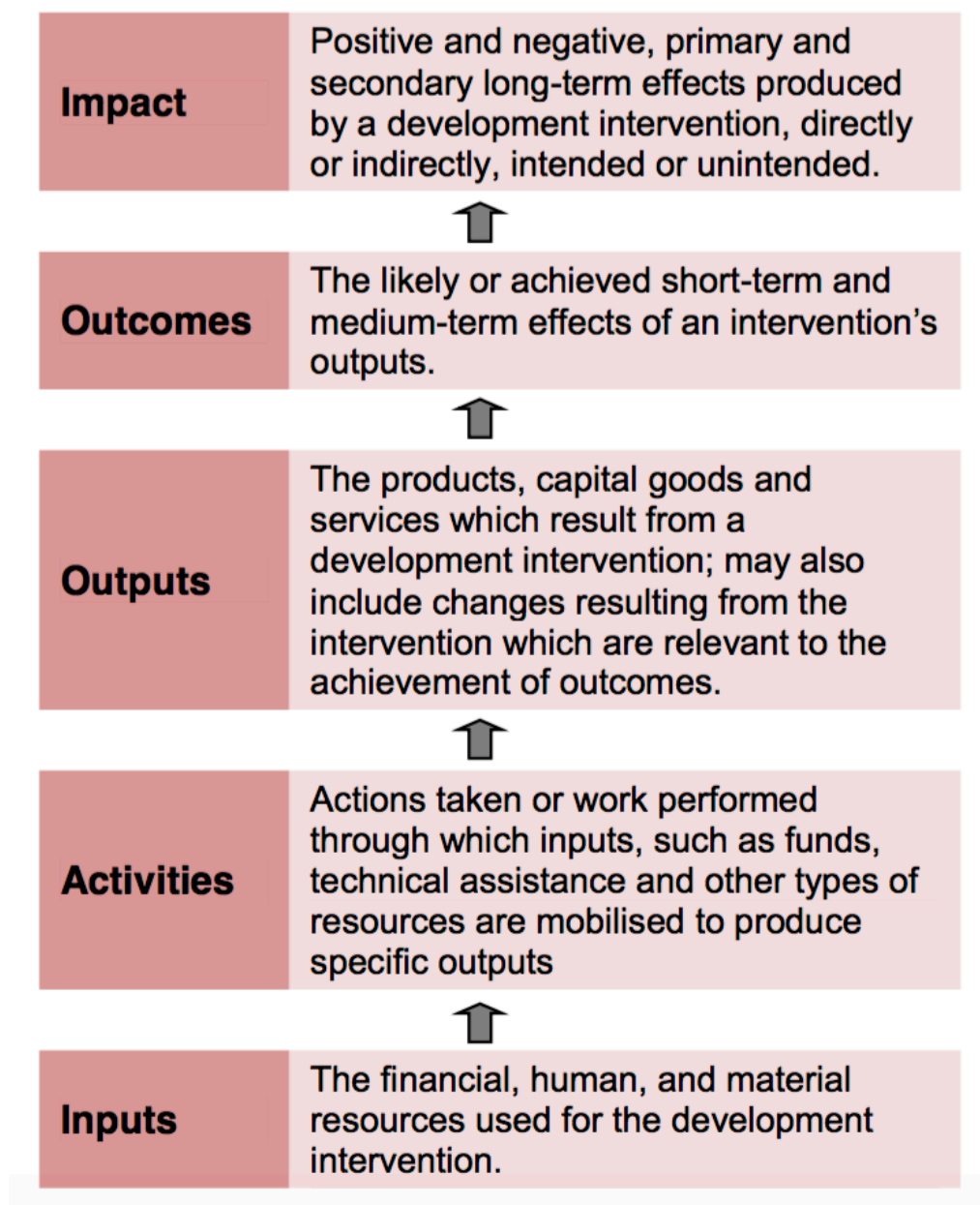
While the disruption of traditional education is inevitable, the question of by *who* and *when* remains unanswered. As technology continues to progressively penetrate society, it will become increasingly easier and more cost effective to apply and implement innovative solutions to education.

Appendix A: Navitas Ecosystem Map

Appendix B : Impact Chain

Impact	Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended.
Outcomes	The likely or achieved short-term and medium-term effects of an intervention's outputs.
Outputs	The products, capital goods and services which result from a development intervention; may also include changes resulting from the intervention which are relevant to the achievement of outcomes.
Activities	Actions taken or work performed through which inputs, such as funds, technical assistance and other types of resources are mobilised to produce specific outputs
Inputs	The financial, human, and material resources used for the development intervention.

Appendix C: Guiding Questions

Background
1. How did you first become aware about EdTech?
2. When did you start your organization?
3. With what purpose was it founded?
4. Why are you based in [country]?
5. What is your title or position?
6. What is your vision for education in the next 5 years? 10 years?
    1. How do you hope that your company will contribute to this vision?

On Business Model
1. What is your business model?
2. Who is your target customer/audience?
    1. Children? College students? Workers?
    2. Demographics?
3. Are the courses that your platform offered taught in English or Spanish? Why?
4. Marketing efforts
5. Competitor landscape, value proposition?
6. Plans to expand?

On Impact
1. Do you currently measure impact? If so, what methods do you go about to do so?
    1. Retention rate from one course to the next?
    2. [Depending on type of model] Retention rate for completion of program?
    3. Measure whether "graduated" students who completed courses find jobs?
2. How would you evaluate the success of your organization in attaining its goals?
3. How do your impact measurements play into scalability and growth?

Perception of EdTechs
1. What are some benefits to having EdTech in LatAm (more specifically Brazil and Mexico)
2. What are the issues with education in [country], how does your EdTech solution meet the unmet needs / work to solve those issues?
3. What are the perceptions of EdTech in LatAm?
    1. Is it a service for people of a higher/lower socioeconomic status?
4. In your opinion, when did this industry start to pick up? Why?
5. Are there any incentives to having online learning platforms?
6. How has EdTech developed in the last decade? How would having an organization of this type be different 5, 10 years ago?
    1. How do you believe it will be different in the coming years?
7. What is the role of EdTechs in replacing traditional education?

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