

# Scaling Access & Impact

Realizing the Power of EdTech

## Table of Contents

<b>Acknowledgements</b>	<b>iv</b>
About Omidyar Network .....	iv
<b>Executive Summary</b>	<b>1</b>
About this Series: Realizing the Power of EdTech .....	1
Chile Country Study .....	2
<b>Country Background</b>	<b>5</b>
Society.....	5
Education System .....	5
School structure and management .....	5
Quality of education .....	6
Funding .....	6
Standards and assessment .....	7
Infrastructure .....	7
<b>EdTech in Chile</b>	<b>8</b>
Scaling Access .....	9
The Enlaces network .....	9
Home access to technology .....	10
Impact of the SEP law .....	12
Scaling Use .....	13
Models of use.....	13
Teacher training.....	14
Technology for administration and governance .....	15
Content focus.....	15
Scaling Impact.....	16
EdTech product selection and evaluation .....	16
Alignment with standards.....	18
<b>The EdTech Scaling Ecosystem</b>	<b>19</b>
EdTech supply.....	19
EdTech industry needs.....	20
Conclusions.....	23
<b>Other References</b>	<b>25</b>
<b>Annex 1. The EdTech Scaling Ecosystem Model</b>	<b>27</b>
<b>Endnotes</b>	<b>29</b>

## Exhibits

Exhibit 1: Key Takeaways .....	3
Exhibit 2: Chile EdTech Country Snapshot .....	4
Exhibit 3: Chile's Demographics.....	5
Exhibit 4: Education in Chile.....	7
Exhibit 5: Ecosystem Change Model.....	9
Exhibit 6: MoE's Centralized Investment in ICT for Education Policies.....	12
Exhibit 7: The Role of Existing Ecosystem Elements in EdTech Scaling in Chile.....	19

## Acknowledgements

This series of reports was produced by Omidyar Network's Education initiative, whose mission is to unlock human potential through learning by catalyzing people, ideas, and systems – so every individual thrives and contributes in a changing and interdependent world. The Omidyar Network team included Eliza Erikson, Erin Simmons, Rebecca Hankin, and Eshanthi Ranasinghe.

This report was prepared by RTI International with Omidyar Network. The lead author was Sarah Pouezevara (RTI), and case study authors were RTI consultants Ignacio Jara Valdivia (Chile), Mike Michalec (China), Talitha Amalia (Indonesia), and Sybille Fleischmann (USA). Additional technical writing and analysis were contributed by Carmen Strigel, Kang Chang, and Luis Crouch.

The data underpinning this report come from interviews, surveys, site visits, and desk research by a team of researchers and EdTech practitioners led by RTI International, drawing on local expertise in each of the case study countries. The team conducted more than 100 interviews with teachers, school principals, education administrators, policymakers, and EdTech experts and entrepreneurs throughout September–December 2018. A separately available country report for each case study country provides further detail on the findings and data sources for each country snapshot below, in addition to the comprehensive descriptions found in the executive summary and full global synthesis report.

To receive the executive summary and detailed global and country reports, please email [EdTech@omidyar.com](mailto:EdTech@omidyar.com).

## About Omidyar Network

Omidyar Network is a philanthropic investment firm that invests in and helps scale innovative organizations to catalyze economic and social change. Established in 2004 by eBay founder Pierre Omidyar and his wife Pam, the organization has committed more than \$1.3 billion to for-profit companies and nonprofit organizations across multiple initiatives, including: Digital Identity, Education, Emerging Tech, Financial Inclusion, Governance & Citizen Engagement, and Property Rights.

To learn more, visit [www.omidyar.com](http://www.omidyar.com), and follow on Twitter [@omidyarnetwork](https://twitter.com/omidyarnetwork) #PositiveReturns.

## Acronyms and Abbreviations

<b>ATE</b>	Educational Technical Assistance (Asistencia Técnica Educativa)
<b>AGETECH</b>	Association of Educational Technology Companies of Chile (Asociación Gremial de Empresas de Tecnologías en Educación de Chile, [AGETECH])
<b>B2G</b>	business to government
<b>CEPAL</b>	Comisión Económica para América Latina y el Caribe
<b>CORFO</b>	Production Development Corporation (Corporación de Fomento de la Producción de Chile)
<b>DIPRES</b>	Government Budget Office of Chile (Dirección de Presupuestos Gobierno de Chile)
<b>ECLAC</b>	United Nations Economic Commission for Latin America and the Caribbean
<b>EdTech</b>	education technology
<b>FDT</b>	Telecommunications Development Fund (Fondo de Desarrollo de las Telecomunicaciones)
<b>GDP</b>	gross domestic product
<b>ICT</b>	information and communication technology
<b>IDB</b>	Inter-American Development Bank
<b>ISP</b>	Internet Service Provider
<b>ITU</b>	International Telecommunication Union
<b>JUNAEB</b>	National Board of School Aid and Scholarships (Junta Nacional de Auxilio Escolar y Becas)
<b>MoE</b>	Ministry of Education
<b>MP</b>	Mercado Público
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>PISA</b>	Programme for International Student Assessment
<b>PME</b>	Educational Improvement Plan (Plan de Mejoramiento Educativo)
<b>RATE</b>	Educational Technical Assistance Network (La Red de Asistencia Técnica de Enlaces)
<b>RELPE</b>	Latin American Network of Educational Portals (Red Latinoamericana Portales Educativos)
<b>SEP</b>	Preferential School Subsidy (Subvención Escolar Preferencial)

**SIMCE**

Measurement System for the Quality of Education (Sistema Medición de la Calidad de la Educación)

**TEC**

Technologies for Quality Education (Tecnologías para una Educación de Calidad)

**UNESCO**

United Nations Educational, Scientific and Cultural Organization

**USD**

United States dollars

## Executive Summary

### About this Series: Scaling Access & Impact: Realizing the Power of EdTech

**There are 250 million learners around the world who have finished their schooling – yet aren't able to read or write well and lack the skills they will need to succeed in the 21<sup>st</sup> century. Additionally, around the globe are classrooms with tens of thousands of teachers struggling to close that educational gap – but lacking the access to tools and resources that will enable *them* to succeed.**

The Brookings Institute described a 100-year gap,<sup>i</sup> the century it will take for the world's poor children to achieve educational parity with the wealthy at today's pace. Neither our world nor those learners can wait that long: We must find ways to close that gap quickly and efficiently, to allow all learners, educators, and educational systems to realize their full potential.

In pursuit of this goal, Omidyar Network's Education initiative began in 2009 to invest in innovations in education with such "leapfrog" potential and in 2014, specifically focused some of our investments on innovations powered by technology. Omidyar Network has since invested more than USD 150 million in promising global innovations in education across four continents.

Our efforts have been inspired by bold entrepreneurs as well as public, private, and social sector education leaders who are unleashing the human potential of a generation of learners through "Equitable EdTech." Omidyar Network defines Equitable EdTech as the promise of technology to be a great equalizer in improving quality education for learners in need. We have witnessed that Equitable EdTech models can bring students from several years behind to on grade level, while also shifting the norm from teacher-centered instruction to student-centered learning. We are therefore hopeful that the power of technology, when thoughtfully employed, can serve as a great equalizer in delivering quality education.

By enabling ubiquitous access and personalization, Equitable EdTech can close the gap for students while also empowering teachers to be more effective, especially when there is lack of access to high-quality schools, high-quality teacher training, rigorous curriculum, or appropriate interventions. Additionally, recent evidence demonstrates that these models can be both highly impactful and cost-effective.<sup>ii</sup>

However, our experience has also taught us that scaling and sustaining Equitable EdTech requires much more than eager learners and motivated educators. It demands the alignment of multiple actors across sectors in local ecosystems. This report examines such ecosystems and how they combine the efforts of government and education leaders, investors and philanthropists, and innovators and entrepreneurs.

Specifically, we sought to:

- > **Identify the events, actions, and initiatives across public, private, and social sectors that have contributed to the equitable scaling of EdTech in these countries; and**
- > **Inform a public policy and investing agenda by identifying the highest-impact interventions that might contribute to EdTech scaling in other countries.**

Our hope is that the country-system examples we examined, including Chile, China, Indonesia, and the United States, will inspire these interdependent actors to collaborate on creating the enabling conditions for equitable impact of technology at scale in their regions. We also hope that the ecosystem model presented in this report will spark debate as well as attract new partners.

There are six reports in the *Scaling Access & Impact: Realizing the Power of EdTech* series, including:

- > **Executive Summary**
- > **Global Report**
- > **Country Report: Chile**
- > **Country Report: China**
- > **Country Report: Indonesia**
- > **Country Report: United States**

**This report is the case study report for Chile.** A separately available country report for each other case study country and a full global synthesis report are also being published

## Chile Country Report

Over the last 25 years in Chile, the Ministry of Education's (MoE's) Enlaces policy has integrated technology into schools' educational practices. The education technology (EdTech) model observed at scale in Chile consists of relatively traditional, school-based access to digital resources in school computer laboratories facilitated by teachers. However, innovations are emerging through a small, local EdTech market. Scaling primarily resulted from a combination of public policies that enabled the gradual development of infrastructure and human capacity to utilize EdTech in schools.

The spread of digital technology in Chilean society has been enabled by sustained economic growth, increasing the entire population's purchasing power, combined with a gradual reduction in the prices of digital devices, mobile data, and telecommunications services. Currently, all schools have digital infrastructure that supports students' learning across the curriculum and their development of digital skills. However, the frequency and quality of EdTech use are uneven, and its impacts are elusive because of the challenges of isolating EdTech impact given the complex environments in which it is deployed. The MoE monitors learning achievement through the national curriculum and learning assessments, putting pressure on schools to show results. The MoE provides schools with funding to implement plans to improve learning outcomes, and schools invest a portion of these resources in EdTech to support educational improvement.

The EdTech market is approximately United States dollars (USD) 50 million per year, similar in magnitude to the MoE's annual investment in textbooks for all children in all subjects. Public school EdTech purchases are facilitated by an online government-maintained marketplace where approximately 500 Chilean and international EdTech products are offered by 100 local companies. For consumers, objective and robust information on product effectiveness is lacking, and there are few independent evaluations or peer recommendation networks. When using EdTech, schools ask for

long-term support, which makes products more expensive to deliver effectively and drives companies to price after-sales services into their offerings.

Apart from EdTech companies, the main actors in the EdTech ecosystem are the MoE, schools, and the Ministry of Economy. The Ministry of Economy’s Production Development Corporation (*Corporación de Fomento de la Producción de Chile* [CORFO]) has supported EdTech innovations and ventures in the early stages of gestation and internationalization. In Chile, very little private risk capital is available for new technology businesses, making it difficult for companies to grow. Thus, EdTech entrepreneurs must bootstrap for growth, relying on the gradual increase of their direct sales to schools and occasional sales to the MoE.

This case study is the result of more than 20 interviews and site visits and a document review conducted in Chile over a 2-month period in 2018. This work contributed to the development of the Global EdTech Scaling Ecosystem Model (see **Annex 1**).

**Exhibit 1** summarizes the key takeaways from the Chile country study, and **Exhibit 2** presents a snapshot of Chile’s EdTech ecosystem.

## Exhibit 1: Key Takeaways

Inspiring Proofpoint	Practice for Replication	Practice for Further Exploration
EdTech can scale through careful programs that deliberately combine hardware with implementation support and teacher training.	Long-term, top-down vision implemented in partnership with university networks or other NGOs who specialize in adaptive management, active learning and knowledge sharing.	How can Chile move more rapidly from technology for information and communication technology (ICT) literacy and basic productivity tasks to EdTech for transformative, personalized learning?

## Exhibit 2: Chile EdTech Country Snapshot

### Ecosystem Profile

#### EDTECH SUPPLY AND BUSINESS MODEL

EdTech market similar in size to the textbook market. Some efforts to incubate innovation, yet little private capital for new business ventures.

#### ENABLING INFRASTRUCTURE

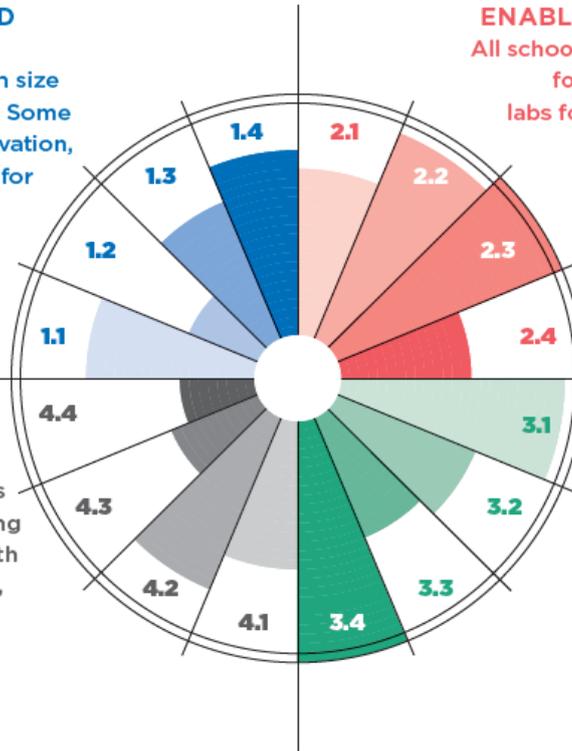
All schools have digital infrastructure for learning, mostly computer labs for digital learning resources. Administrative platforms are widespread.

#### HUMAN CAPACITY

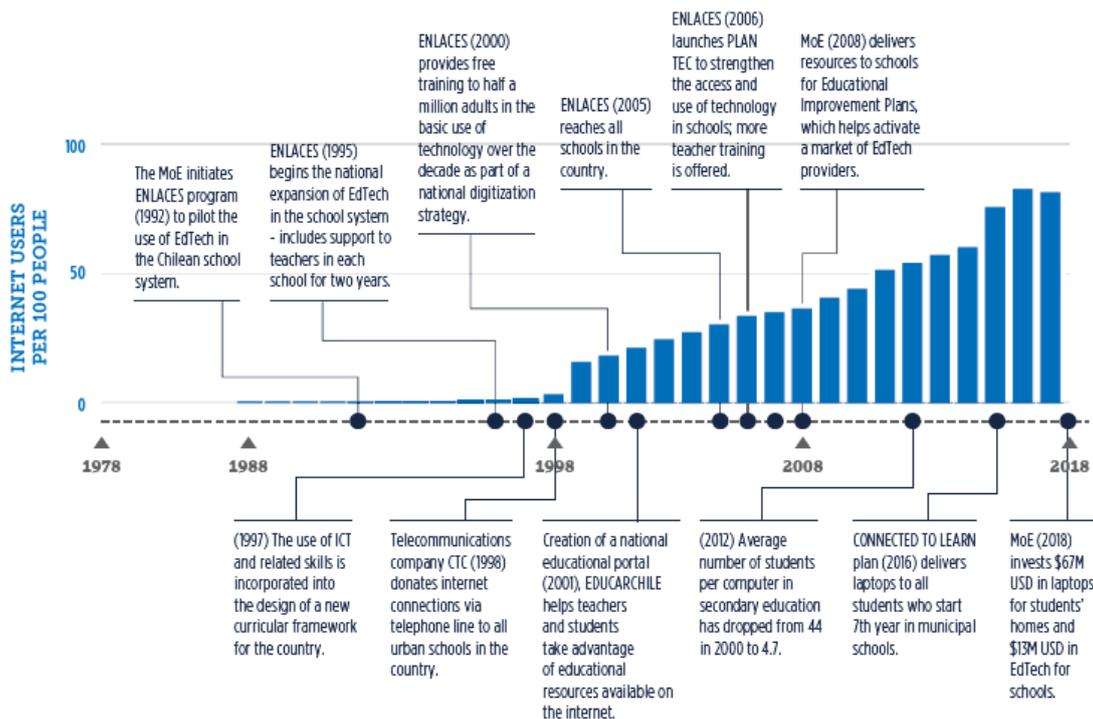
Although attention has been paid to developing teacher skills along with hardware connectivity, transformative pedagogical use remains limited.

#### EDUCATION POLICY AND STRATEGY

Growth of EdTech largely driven by central government, introduced in a gradual planned manner. Education standards and value placed on basic digital literacy.



### Timeline



## Country Background

### Society

With a population of just over 18 million inhabitants and a life expectancy of 80 years (**Exhibit 3**),<sup>3</sup> Chile is one of Latin America's fastest-growing economies. In 2017, the per capita gross domestic product (GDP) was USD 15,059, and the proportion of the population living in poverty (on USD 4 per day) was 8.6%, down from 26% in 2000.<sup>4</sup> Chile's free-market economy is open to the world, and the country has both superior social indicators relative to the rest of the region and a high degree of socioeconomic inequality. It is ranked first in the region, but 44<sup>th</sup> globally out of 189, on the Human Development Index, a composite index of quality of life indicators such as health, education, and standard of living.<sup>5</sup>

Over the last three decades, Chile's political stability and economic growth have enabled it to respond to growing pressure to provide a quality education with increases in public spending. This pressure stems from both a society that aspires to greater equality of opportunities and Chile's elites, who understand that education is an important lever for economic development.

Geographically, the country stretches along the Andean mountain range, spanning nearly the entire South American continent from north to south. Significant distances between cities, in addition to extreme differences in elevation, especially between the east and west of the country, affect access to schools, particularly in rural areas.

### Exhibit 3: Chile's Demographics

World's 44th largest economy <sup>6</sup>	480,000 square miles of territory
2010 GDP: USD 272 billion	8.6% of population living in poverty
Population: 18 million	Adult literacy rate: 96%

### Education System

#### School Structure and Management

Free, compulsory education lasts 13 years, from approximately 6 to 18 years old. Chile has gross enrollment ratios of 99.8% in primary education and 99.6% in secondary education.<sup>7</sup> Public spending on education comprises 5.3% of GDP.<sup>8</sup> The educational system—primary and secondary—includes approximately 2.8 million students, 156,000 teachers, and 12,680 schools;<sup>9</sup> 8% of students attend rural schools. Public schools, catering to 92% of students, are either municipal schools (owned by the city) or state-subsidized but privately owned schools (i.e., charter schools). To achieve the equitable improvement of educational results, the MoE sets high expectations for student learning and teacher performance.

Related to student learning, the MOE encourages schools to focus on improving outcomes in three ways: (1) periodically evaluating their educational results through the **Measurement System for the**

**Quality of Education** (Sistema Medición de la Calidad de la Educación [SIMCE]); (2) supporting, and even intervening, in schools according to a classification based on SIMCE results: better results, more autonomy; worse results, more intervention; and (3) providing additional resources to families and schools according to students' socioeconomic levels to help schools implement their Educational Improvement Plans (Plan de Mejoramiento Educativo [PMEs]). Funds in the form of a **Preferential School Subsidy** (Subvencion Escolar Preferencial [SEP]) reach the families directly through vouchers or schools through disbursements, but PMEs are created by each school. It should be noted, however, that although the system's emphasis on standardized tests may serve an important accountability function, especially related to SEP disbursements, it tends to discourage educational innovation in schools.

Regarding teacher performance, the MoE sets high expectations for teaching quality by (1) holding teachers accountable using an external teacher evaluation that occurs every 4 years and evaluates pedagogy and content knowledge and (2) incentivizing performance improvement through a career ladder that enables teachers to progress and increase their salaries by achieving good evaluation results. Note that these evaluations do not explicitly consider EdTech use or student achievement (test scores).

The Chilean educational system is highly stratified: students from more vulnerable contexts tend to be in municipal schools, whereas those from the middle class tend to enroll in private subsidized schools. This situation is mainly the consequence of a policy that allowed private subsidized schools to charge an extra fee. Since 2015, a new law requires all state-subsidized, privately owned schools to be non-profit, but to date, no detectable shift in demographics has occurred. As a result, 86% of municipal schools serve students at the lowest socioeconomic levels; this figure is reduced by half among private subsidized schools and to zero among private paid schools. Much has been written about the Chilean experience with education vouchers and school choice; details are beyond the scope of this study, but see, for example, an overview by Steven Ambrus of the Inter-American Development Bank (IDB).<sup>10</sup>

### Funding

Public spending on education increased dramatically over the last 4 years, from approximately USD 1 billion in 1990 to USD 17 billion in 2018 (from 2.4% to 5.3% of GDP).<sup>11</sup> The state subsidy per student for basic operation is equal for both municipal and private schools, but an additional subsidy is provided to schools with large populations of low-income students—the SEP.

In 2008, the **Law on Preferential School Subsidies** (SEP) was enacted, which established the delivery of additional financial resources to schools for each student from the lowest socioeconomic sectors; in some cases, these additional resources can amount to a 50% increase in a school's budget. In total, these additional resources represent 18% of total education spending in Chile. As described earlier, the provision of SEP funds is tied to the execution of school improvement plans designed and implemented by the schools themselves, and the funds can be used to improve curriculum management, school leadership, school environment, or educational resources.

This law sought to target funding to and prioritize intervention for schools needing the most support. In addition to budget support, SEP categorized schools according to their educational outcomes and

required those with the worst results to seek support from the MoE to implement their school improvement plan, while those with better results could do so with complete autonomy. Likewise, the SEP Law established that external support to schools financed with SEP resources could only be contracted to approved entities registered in a national database of Educational Technical Assistance (*Asistencia Técnica Educativa* [ATE]) institutions.

### Standards and Assessment

Since the late 1980s, Chile has used a national assessment system, called SIMCE, which regularly measures students' achievement in grades 4, 8, and 10. The results of these evaluations, which have not improved significantly over time, are strongly associated with students' socioeconomic status. As a result, municipal schools generally have the lowest results, and private paid schools have the highest. The 1990s saw the beginning of broad educational reforms seeking to modernize Chile's curriculum and evaluation systems, provide more and better educational resources, significantly lengthen the school day, strengthen teachers' initial training, and more.<sup>12</sup> More recently, social movements led by secondary and university students (in 2006 and 2011, respectively) influenced structural reforms aimed at improving equal opportunities at all levels.

In the most recent Programme for International Student Assessment (PISA) tests (2015), Chile ranked 42<sup>nd</sup> in reading, 44<sup>th</sup> in science, and 48<sup>th</sup> in math globally out of 70 participating countries; however, it ranked 1<sup>st</sup> among participating Latin American countries (**Exhibit 4**).

### Exhibit 4: Education in Chile

156,000 teachers	12,680 schools
2.8 million students	Ranked 44 <sup>th</sup> in science (PISA 2015)
USD 4,996 per student expenditure	5.3% of GDP spent on education

### Infrastructure

The 2017 International Telecommunication Union (ITU) ICT Development Index ranks Chile 3<sup>rd</sup> in Latin America after Uruguay (42<sup>nd</sup> globally) and Argentina (51<sup>st</sup> globally). In Chile, 66% of the population uses Internet, 64% of households have a computer, 61% have Internet access in their homes, and 69% have Internet access via their mobile devices.<sup>13</sup>

In Chile, the telecommunication market was privatized in the late 1980s and is very competitive, especially in urban areas. In contrast, it is not well developed in rural areas where investments in telecommunications infrastructure are less profitable. In the early 2000s, the government launched a policy to accelerate digital development, promoting the digitization of public services and businesses and the training of the entire population. However, technology integration had already begun in the education sector as early as 1992, when the MoE launched the **Enlaces initiative** to promote the educational use of technologies in schools. (See more about Enlaces in the following section, *Scaling Access*).

Enlaces has operated the digital education policy for more than 25 years, facilitating the maturation of the use of technology in schools through the provision of infrastructure, digital resources, and training and support for teachers. As a result, all Chilean schools have digital infrastructure for educational use, and although the number of computers available per student is similar to the Organisation for Economic Co-operation and Development (OECD) average, 20% of schools do not have access to Internet, most of which are rural, and the Internet speed, even in urban areas, is often inadequate.<sup>14</sup>

Conversely, at home, students do not tend to use digital educational resources but do perform school tasks with computer support, using mainly Internet and productivity tools.<sup>15</sup> Interestingly, with an average of more than 3 hours per day, students in Chile currently spend more time at home on the Internet than most other countries worldwide.<sup>16</sup> Furthermore, although this time is spent on entertainment, students' tendency toward using the Internet at home indicates digital literacy, fluency, and preferences that could be leveraged for educational purposes.

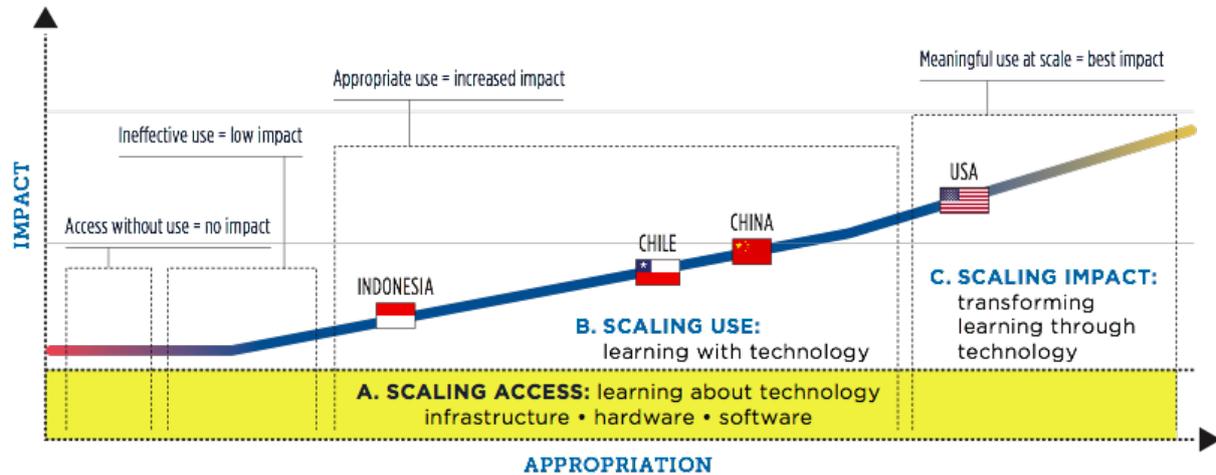
## EdTech in Chile

Technology has played an important role in multiple educational reform initiatives because of the high domestic value placed on technology skills as a source of opportunity and competitiveness. As the education system is operated by states and municipalities but regulated by the federal government, education policies develop through top-down and bottom-up pathways simultaneously, pushing and empowering schools and facilitating the growth of EdTech entrepreneurs.

This section looks at the evolution of EdTech scaling in across three main phases of change—access, use, and impact—as illustrated in **Exhibit 5** (for a more comprehensive discussion of the **Ecosystem Change Model**, see the Global Report). One common error in EdTech is assuming that scaling a product will naturally result in its appropriate use. Scaling access (or even 'opportunity to access') does not equal use, nor does opportunity to use mean that the product will be used in a way that results in impact on learning outcomes at scale. The outcome of a strong EdTech ecosystem should be a steeper slope, indicating a more rapid transition to transformative use of technology.

This section describes several Chilean examples of EdTech with a measure of success in scaling and identifies the factors that enabled this success.

## Exhibit 5: Ecosystem Change Model



### Scaling Access

Scaling access means there are EdTech products in the market, and users have the ability to adopt them because they have the technology (e.g., hardware, connectivity) to do so.

Among the public policies that have promoted the wide adoption of EdTech, the MoE's **Enlaces** and **SEP** stand out. Enlaces promoted the educational use of technology centrally, within the framework of policies to improve educational quality and equity, and SEP empowered schools to implement their own school improvement plans, which include the use of EdTech. In addition, another initiative was recently introduced to expand Internet access in homes. (See the *Home access to technology* section, below).

#### The Enlaces Network

Enlaces means, literally, 'links' or 'connections' in Spanish. The initiative emerged in 1992 as a pilot project, relatively small in the education policy agenda, and gradually expanded to national scale, becoming one of the most massive and lasting initiatives of its kind globally (see text box below). The term 'Enlaces' is now associated with the networks created between schools and universities in service of technology-enhanced learning. Between 1992 and 1995, Enlaces invested USD 5 million to test an EdTech model in 100 schools in the Temuco region, 700 km from Chile's capital. This pilot was implemented by the University of the Frontier. After 1995, Enlaces began to expand the model in the rest of the country, building on lessons learned from the pilot. The model that was scaled nationally in 1995 involved technological infrastructure, digital educational resources, and training and support for teachers and promoted the use of ICT to improve subject knowledge and develop digital skills to function in the knowledge economy and society.

Thanks to Enlaces, nearly all Chilean schools have a basic technology model consisting of one or more computer laboratories where subject-area teachers can go with their students and conduct lessons with the support of digital resources, often pairing students to work on one computer. Many schools also have Mobile Laboratories, which consist of carts with portable computers or tablets that

can be brought to classrooms for teachers to carry out pedagogical activities with the support of digital resources. Increasingly, school classrooms also have projectors (occasionally interactive whiteboards) that teachers can use with a classroom laptop. Schools usually have computers in their library to facilitate research, in the teachers' office for personal use or curricular planning, and in administrative offices. In general, all these devices are part of a local network that is connected to the Internet, and schools increasingly have Wi-Fi in their classrooms.

By the end of the 1990s, nearly all urban schools had been incorporated into Enlaces, reaching approximately 90% of non-private school enrollment, and tens of thousands of teachers had been trained. Connecting the remaining approximately four thousand multi-grade rural schools was completed in the first half of the 2000s. The model for rural schools was different from that used in urban schools to better respond to the smaller, more isolated nature and pedagogical needs of rural schools' multi-grade classrooms. For example, the rural model provided a pair of computers in the classroom instead of a separate laboratory and instituted a strategy of longer teacher training (3 years instead of 2 years), with less frequent (once a month instead of every week) but more intense support, including support during classroom work. This differentiation is an important lesson of the Chilean model, demonstrating that scaling access does not mean providing a boilerplate solution.

Connecting rural schools to sufficient and reliable Internet bandwidth is, however, an issue that has not been resolved. Since the late 1990s, various strategies have been tested with the support of the government telecommunications agency (SUBTEL) to expand and strengthen the Internet access across the school system. In particular, SUBTEL has a special fund—the **Telecommunications Development Fund** (*Fondo de Desarrollo de las Telecomunicaciones* [FDT])—to subsidize the delivery of these services in rural areas. Unlike other Universal Service Fund models, FDT funding comes from general taxes and not as a percentage of telecom revenues. However, this policy has, to date, been inadequate to permanently deliver and maintain quality connections for the most isolated rural schools.

### Home Access to Technology

In the late 2000s, Chile also joined the one-to-one (1:1) movement becoming popular around the world and in Latin America. In 2008, the government launched a plan to provide laptops to 7<sup>th</sup> grade students from the poorest 40% of families, on condition of good academic achievement. This initiative, known as “**Choose my PC**”, was complemented in 2016 with another plan, “**I Connect to Learn**” (*Me Conecto para Aprender*), that delivered laptops and a year of Internet access to all students who start 7<sup>th</sup> grade in municipal schools. Both initiatives were funded by the MoE but managed by the National Board of School Aid and Scholarships (*Junta Nacional de Auxilio Escolar y Becas* [JUNAEB]) rather than the agency responsible for Enlaces. JUNAEB is a division of the MoE that is responsible for delivering support to students in vulnerable situations and was the only unit legally able to provide the computers at home because the mandate of Enlaces extended only to schools. These programs aimed to improve technology access in students' homes, but unlike other 1:1 programs, they did not intend that laptops be taken to schools. This example illustrates an important aspect of the required implementation coherence across the government, which can be aided by a strong, overarching vision for EdTech.

**ENLACES: The Origins of Enlaces** can be traced back to 1990, in the first months of the first post-Pinochet democratic government when the Ministry of Education (MoE) began the design of a World Bank-supported program for primary schools (Program for the Improvement of the Quality and Equity of Basic Education, or “MECE”). Stakeholders disputed a component to incorporate the use of technology in schools, which ultimately had to be settled by the Minister of Education of the time. Two alternatives were discussed. First, according to the World Bank consultants, the ICT component of the program had to expand computer laboratories in schools following the example of Costa Rica, a country that had begun a few years earlier a program led by the Omar Dengo Foundation, focusing on programming of computers in Logo language with the purpose of developing superior cognitive abilities in students.

On the other hand, the technical teams of the Ministry, advised by experts from Chilean universities informed by the latest research in this field, knew that the processes of integrating ICT into school practices were more complex and slower than what was promised and that it was necessary to think more carefully about the way in which ICT could be used in the reality of Chilean schools. They concluded that, instead of a large project deploying ICT to all schools immediately, it was more reasonable to carry out a limited pilot designed to lay the foundations for a larger future project. Additionally, they insisted upon using technology across the curriculum, as a way to support learning in the different subjects, rather than just a separate computer programming activity. This pedagogical use was more suited to the focus on quality in the MECE project.

Consequently, the academic advisors of the Ministry proposed a pilot project that connected school computers to each other and to schools in other countries to carry out collaborative projects guided by teachers. The proposal was based on socio-constructivist learning theories rooted in the ideas of Vygotsky in vogue since the 1970s in the west, and that provided a theoretical basis for using digital networks to support project-based learning. To operationalize this vision, the engineers designed a special software, called La Plaza (The Town Square). This program was very easy to use at the time and represented a common social gathering space in Chilean towns. Although the Internet, as it was known later, did not yet exist, the networking technology needed to connect schools with each other and emerging global networks was well known and used in the universities. It was thanks to this university collaboration that networking was made possible in schools. In addition, the metaphor of La Plaza helped communicate to teachers a concept in which technology could reduce professional isolation and create communities of learning. Additionally, the town square represented the space of encounter that Chileans yearned for after 17 years of dictatorship.

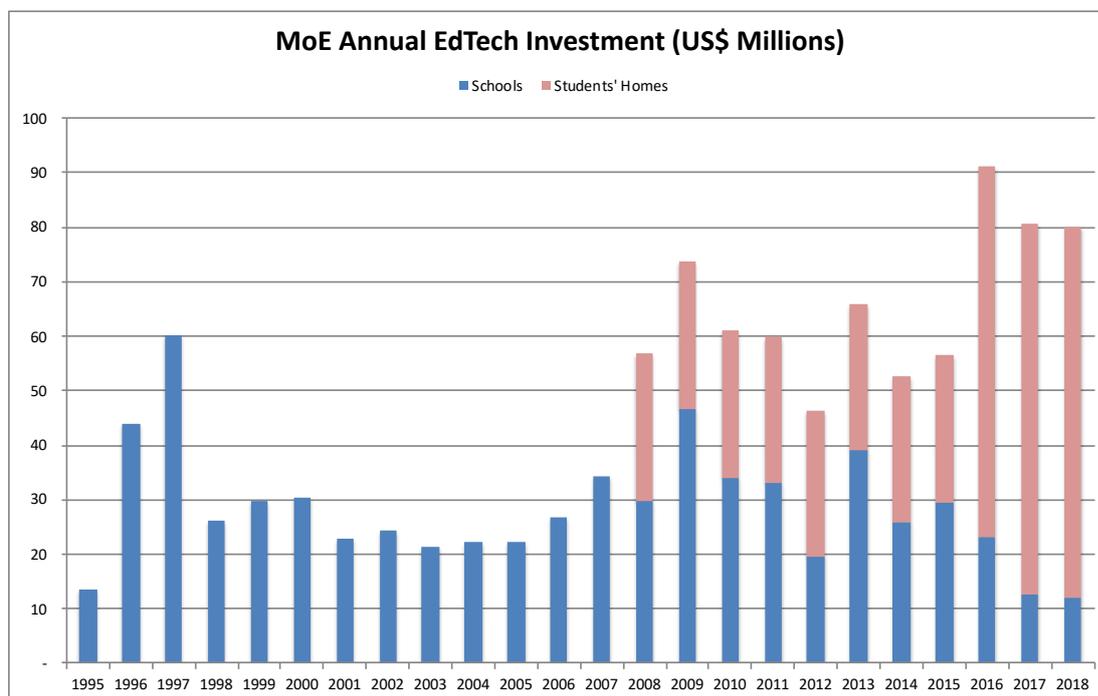
This mixture of ideas convinced the Minister of Education that second of the two above-mentioned proposals was more prudent than the rapid scale-up proposed by the World Bank consultants. It took a lot of additional work, however, to make the ideas discussed with the Minister a reality. In 1991, engineers managed to connect the first two schools near a university campus of the Catholic University in Santiago, where educators explored ways of using this technology to support learning. In 1992, when the Ministry signed the USD 243 million agreement with the World Bank MECE, the nascent network reached 10 schools in Santiago. That same year, the Ministry awarded a tender to the university to complete the pilot phase of Enlaces in a region of Chile outside of Santiago. It was intended to test the ideas of Enlaces in a less-favored reality than that available in the country’s capital, in such a way that the pilot would enable fine-tuning an expansion strategy appropriate to the challenges of the rest of the country. Finally, at the beginning of 1993, the university group that had started with Enlaces at the Catholic University in Santiago moved to the Universidad de la Frontera, in Temuco.

[Extract adapted from Jara, I. (2013). Las políticas TIC en los sistemas educativos de América Latina: Caso Chile. Buenos Aires: United Nations Children’s Fund.]

Over time, Chile’s investments to put laptops in students’ households have far exceeded the MoE’s centralized investment allocated to schools for infrastructure, digital resources, and training. In 2018, USD 67 million was invested in laptops for households, whereas only USD 13 million was invested in

EdTech for schools. **Exhibit 6** provides an overview of the MoE's investments between 1995 and 2018, the main increases, and the long-term evolution. Considering only investments directed to schools in 1995–2018, the MoE has invested an average of approximately USD 15 per student per year. **Exhibit 6** also shows that in recent years, there has been a tendency to decrease centralized investments for schools, which is the consequence of a broader MoE policy established through the SEP Law.

## Exhibit 6: MoE's Centralized Investment in ICT for Education Policies (1995–2018)



Source: Elaboration of the author based on data from Donoso, 2010; Government Budget Office of Chile (*Dirección de Presupuestos Gobierno de Chile* [DIPRES]), 2010; and other sources.

### Impact of the SEP Law

At the end of the 2000s, Enlaces began adapting its strategies to strengthen schools' capacity to integrate technology into their school improvement plans associated with the SEP Law (see the *Education System—Funding* section above). As described above, the SEP Law established that external support to schools financed with SEP resources could only be contracted to approved entities registered in a national database of ATE institutions. At the beginning of the century, the MoE's decentralization policy was gradually reducing centralized investments for Enlaces and discontinuing direct contracts with Enlaces partner universities; instead, they expected the universities to be reconverted into ATE institutions able to be contracted directly by schools. However, only some of them achieved this aim. Furthermore, investments in an *EdTech Catalog* and *Models* (see the *Scaling Impact* section) were cut, among others, with the hope that schools would incorporate EdTech into their school improvement plans financed by the subsidy and that this would be enough to sustain the country's EdTech market.

Fortunately, EdTech's direct purchase volume from schools grew as new SEP resources arrived; in 2018, the direct purchase volume was estimated at approximately USD 50 million per year (USD 4,000 per school or USD 17 per student per year).<sup>17</sup> Although this amount may seem relatively small compared to those of other countries (and just 3.3% of the total SEP budget), it is in fact considerable compared to the MoE's annual centralized EdTech investment for schools, which reached USD 60 million, including infrastructure, digital resources, and training in the year of greatest expansion (1997), and even compared to the 2016 peak of USD 90 million, which included laptops for students' homes (**Exhibit 6**). In addition, schools' investment in EdTech is significant compared to the USD 50 million invested by the MoE annually in textbooks for all children in all subjects at all levels. With the SEP, more resources for educational improvement were transferred to schools with greater needs. At the same time, these schools were given more power to decide on how to use these resources, and an industry of educational service providers was created that could respond to their support demands.

More recently, Enlaces has proposed more variety in technology models for schools, beginning to include carts with laptops as part of the 1:1 model, plus interactive whiteboards and tablets. Notably, these strategies have reached many schools; for example, 1,500 schools (12%) received carts with resources to support Language, Mathematics, and Science in elementary school, and 700 received tablets with applications as part of a plan to support mathematics in Kindergarten and grade 1. However, these strategies have not reached the massive scale of computer laboratories.<sup>18</sup> It is estimated that, through its various strategies and initiatives, Enlaces trained three out of four classroom teachers in the country during its first two decades of implementation,<sup>19</sup> with the average number of students per computer in secondary education dropping from 44 in 2000 to 4.7 in 2012.<sup>20</sup>

## Scaling Use

'Scaling use' is distinguished from 'scaling access' by emphasizing that just because one *can* access a product does not mean that one *will* do so. Progress toward EdTech use is considered observable when products show evidence of an active user base (e.g., subscriptions) and are facilitated for use in classrooms by trained educators, among others. There are also different levels of use, from basic to transformative, which depend on effective capacity building for EdTech integration.

Enlaces was ultimately successful because equal priority and resources were directed toward hardware, networking, training, and capacity building.

### Models of Use

The educational uses of technology across schools are very diverse, although technology typically supports the teaching of curricular subjects and the development of students' digital skills (understood in a broad sense, as those skills linked to the technology required in the 21<sup>st</sup> century, such as the search, selection, and management of information with the Internet and other digital tools). Consequently, it is common to find a broad spectrum of digital resources being used in schools.

Classroom projectors are very commonly used to support teacher presentations and student presentations. Furthermore, 75% of teachers report using the Internet for research activities, 63% use productivity tools in class work, 40% use educational software, and 30% use technology to administer assessments.<sup>21</sup> According to data from the 2015 PISA study, 50% of students say they use the

Internet at their school at least once a week, suggesting that free digital resources available on the Internet may be a source of support for teachers.<sup>22</sup>

Interestingly, the Enlaces initiative predated any explicit ICT skills curriculum. Until the mid-1990s, the Chilean curriculum did not include any mention of ICT skills. The first time this dimension was incorporated was in 1997 in the context of the design of a completely new curricular framework for the country. Since then, and in a progressive manner, Enlaces has incorporated into the curricular framework descriptions of what the school experience is expected to offer to Chilean students in relation to ICT, specifically referring to the fluid handling of these tools in the context of inquiry tasks, information management, and problem solving, among others.

As a result, there is no uniform set of digital educational resources in Chilean schools. Platforms to support the practice of mathematics, content to promote reading and writing, simulations and animations for sciences, and systems to conduct evaluations are all examples of EdTech in use. There are many providers of these applications, but none is universally used, with the exception of those resources distributed by Enlaces as either open educational resources or licensed ones. This diversity of uses and resources has been promoted since the launch of the MoE's digital policies and has been further reinforced by the decentralization of purchase decisions by schools facing a market that offers a wide range of products.

Platforms for school management (see the *Technology for administration and governance* section), which are quite popular in Chilean schools, are the only exception. It is estimated that only small schools with fewer than 200 students or rural schools without Internet access lack such a platform (20% of schools). These platforms support administrative tasks that are the responsibility of the school owner (e.g., accounting, human resources, purchases, inventory) and the processes of academic registration that are the responsibility of the directive team and teachers (e.g., student information, such as attendance and notes). Normally, these platforms offer additional modules, though not all schools adopt them, to facilitate communication with parents, support curriculum planning and monitoring, perform evaluations, and analyze their results, among others. Data from these administrative platforms also feed into the national education management systems used to calculate school subsidies, among other things.

### Teacher Training

One of the main lessons of the Enlaces pilot was the importance of providing ongoing and long-term support to teachers to encourage use. During expansion, the MoE designed a 2-year training strategy for a group of 20 teachers from each school, which was implemented via weekly 2-hour sessions held in the computer laboratories recently delivered to schools. To implement this strategy nationally, the Ministry partnered with universities, assigning each university to manage the project in an area of the country, support the schools in that area, and train their teachers. This implementation strategy was the same as that used by the University of the Frontier in the pilot stage of Enlaces. A partnership was structured with a network of more than 20 universities throughout the country (*La Red de Asistencia Técnica de Enlaces*, [RATE]), each of which was responsible for meeting schools' varied technical support needs related to installation, functioning, and email. School computers were connected to servers in the universities to exchange email because at that time, prior to the spread of the Web, private Internet Service Providers (ISPs) did not exist in Chile.<sup>23</sup> This email service through the

universities was necessary until the schools connected to the Internet via ISPs, which occurred at scale in 1998 when Enlaces received a donation of this type of connection from CTC-Chile (now Movistar) for all urban schools in the country. Until the beginning of the following decade, when broadband connections began to proliferate, these Internet connections were mostly via land line.

### **Technology for Administration and Governance**

In 2000, the government launched a digital strategy to accelerate the digitization of public and private services. As part of this agenda, Enlaces organized a national digital literacy campaign using the schools' computer laboratories as centers open to the community and paying existing teachers to deliver specific courses to parents and the general public, outside of class schedules. This complementary function of Enlaces extended throughout the following decade, training half a million adults in the basic use of technology.<sup>24</sup> Regarding school management, the Ministry gives full administrative autonomy to schools but requires them to account for the resources delivered and to regularly feed a national online information system with all students' demographic and educational data. As a result, most school administrators seek platforms for the administration of their resources and the management of student data to submit to the MoE.

The local EdTech market includes approximately 10 companies that provide platforms for school administration (e.g., accounting, human resources, purchases, inventory) or curricular planning processes and student records (e.g., evaluations, grading, assistance). The market for management platforms is dominated by Napsis, which resulted from a university project and then consolidated as a company serving municipal and subsidized schools. After Napsis, Colegium is the next largest player in this market and primarily serves private schools.<sup>1</sup>

In general, although most of these companies started with management systems offerings, over time, they have added educational resources to respond to school and teacher needs and upsell for increased revenue. School administrators value the fact that they can rely on one provider for both management and learning solutions, leading to the rapid growth of companies such as WebClass.

### **Content Focus**

In 2001, Enlaces partnered with Fundación Chile to establish a national education portal, Educarchile,<sup>25</sup> to help teachers and students take advantage of the open educational resources available on the Internet. In 2004, Chile participated in the creation of the Latin American Network of Educational Portals (Red Latinoamericana Portales Educativos [RELPE]) to strengthen the exchange of content and joint learning across similar initiatives in the region.

### *Product Marketplace*

The growing *Educarchile* initiative is leading to the use of a broad spectrum of digital resources by schools. For example, 200 municipalities purchased 325 different digital educational resources from 75 companies registered in the *Mercado Público* (MP) in 2018.<sup>26</sup> The MP is a digital marketplace organized by the Ministry of Economy to facilitate the procurement of products and services that the

---

<sup>1</sup> Specific products and companies mentioned are neither exhaustive nor an endorsement by the authors; they are only meant to be illustrative of the types of products on the market.

850 public agencies, including the 345 municipalities, require to operate. The MP offers more than 100 thousand products, including 500 cataloged as digital educational resources.<sup>27</sup>

Although this system helps municipalities to buy EdTech relatively quickly, it does not completely solve the internal bureaucracy surrounding municipal schools and the slow pace of decision-making, which can take between 2 and 6 months from first contact with the school buyer to purchase. MP does not educate school directors and teachers on products' the features or impact; this information is typically conveyed during EdTech companies' sales pitches.

The MP is undoubtedly a high-impact sales channel by which EdTech products can reach municipal schools. If a company does not offer its products via MP, it is challenging to sell to municipal schools. However, the MP has limitations from the EdTech point of view. For example, it cannot be used by privately owned subsidized schools. In addition, the platform is only updated every 2–4 years, meaning that new EdTech companies may need to wait years to be included. For products to be included in the MP, a basic review is completed, confirming that the offered products correspond with their descriptions and function correctly. However, this review not validate or attest to their impact on learning or relevance.

## Scaling Impact

In general terms, the Chilean education system, with some disparity across schools, has access to digital technology that enables improved learning. However, while the use of this technology is widespread, the frequency and quality of its use and impact vary widely. In a study conducted by Enlaces in 2012, in which all the country's schools were categorized at one of three levels of maturity for infrastructure and the pedagogical use of computer resources, although 30% of the schools achieved level 3 (the highest level) for infrastructure, only 1% had reached level 3 for pedagogical use (more frequent use and more powerful pedagogical modalities). The vast majority of schools (87%) had only reached the intermediate level of pedagogical use of digital resources.<sup>28</sup>

The maturity of EdTech in Chile across the phases of scale—access, use and impact—is really a story of the evolution of the Enlaces program. Although it started small, Enlaces eventually evolved into an institution implemented by a specific office within the MoE—the Center for Education and Technology—but always retained the 'Enlaces' brand and identity. In mid-2018, the responsibilities previously borne by the Enlaces program were transitioned into the MoE's new Center for Innovation. As the Center matured, more resources were dedicated to evaluation and to adjusting implementation based on lessons learned while embracing technological innovations. Several specific initiatives demonstrate these efforts.

### EdTech Product Selection and Evaluation

At the end of 2006, Enlaces launched *Plan TEC*, (Technologies for Quality Education, Plan Tecnologías para una Educación de Calidad [TEC]) to ensure a new infrastructure standard in schools (one or more laboratory of 20 computers, depending on enrollment; more computers for teachers and libraries; and equipment for projection in classrooms) and a new agreement with school owners for the maintenance and use of this technology. Additionally, to support the use of this infrastructure, Enlaces began to offer blended learning teacher training courses focused on the use of

technology across curricular subjects and created two initiatives to generate and disseminate quality digital educational resources: the *EdTech Catalog* and *EdTech Models*.

**EdTech Catalog** is a website that presents technical, curricular, and methodological information about digital educational resources. EdTech Catalog's main difference from the MP is that the MP does not include expert evaluation or curricular and methodological information and also does not aggregate demand and benefit from the resulting economies of scale in pricing. The EdTech Catalog resources were selected by experts from the MoE after a broad call to the EdTech market. Once a year, schools could make their choices based on their allocated virtual budgets, which were higher for lower-resource schools. Then, Enlaces purchased the requested products, taking advantage of the economies of scale facilitated by this aggregation of demand. Through this initiative, schools purchased hundreds of educational digital resources. Additionally, schools were able to take advantage of catalog information to make direct purchases from suppliers using their own resources.

The second initiative, called **EdTech Models**, allowed companies and universities to request that Enlaces evaluate their proposals for pedagogical models that include the use of technology to improve curricular learning. Enlaces funded the evaluation of the models through a pilot in which evaluations were implemented by either the EdTech company or a university. These evaluations sought to determine the impact of the proposed model and then support the development of an intervention and support strategy for schools to adopt the model. After the pilot, the various EdTech models could be gradually offered and adopted by more schools with financial support from Enlaces. Approximately a dozen models were tested and disseminated through this initiative.

**EFFECTO EDUCATIVO** has been in the market for more than 10 years and offers more than 60 blended-format products for initial, primary, and secondary education in mathematics, science, communication, and technology. Each of these products involves specific lesson plans supported with materials (e.g., booklets, guides, cards, texts) and digital resources (for, e.g., exercises, simulations, presentations) to be used by students. All these resources are packaged in boxes or suitcases so that they can be easily delivered to classrooms.

**IMACTIVA** was founded more than 15 years ago and is focused on the development of digital contents to be distributed through the Internet and used by students studying language, mathematics, natural sciences, and social sciences in early and primary education.

**COMPUMAT** has been operating for more than a decade and delivers a platform to support student learning in mathematics. Their platform guides students through a series of exercises, assessments, and contents.

**LAB4U** is a 5-year-old startup that develops applications for cell phones to make them experimental devices for teaching science in secondary education. Lab4u also proposes methodologies to work with students using these devices.

### Alignment with Standards

Because of the quality and performance standards articulated by the MoE (see the *Education System—School structure and management* section above), school stakeholders are pressured to develop educational improvement initiatives. Many choose to embed digital resources to support change in learning outcomes and use the preferential subsidy (SEP) to carry out their improvement plans.

Usually, schools select EdTech that can contribute to the improvement objectives outlined in their plans, either because a teacher discovered and advocated for that product or because a company presented it to them as part of their sales efforts. Although school stakeholders would value having evaluation information and data about impact of the identified products, this information is essentially nonexistent, with the exception of *EdTech Models* (described above). Indeed, there are no independent organizations that validate or certify the available products, and no sites exist where users can comment on their experience with different resources, although such sites would be of great help to future buyers. In practice, schools must trust the marketing information provided by companies or occasional press reviews.

One demand expressed frequently by school stakeholders during the interviews performed for this study and recognized by EdTech companies is the need for these products to have long-term support, including an important face-to-face component (in contrast to casual and distance schemes). This embedded, long-term support is seen by schools as essential to transition from access to implementation of new methodologies and to use new digital resources impactfully. From the companies' point of view, delivering such support is an additional challenge as doing so means adding to their products a layer of services that can be spread throughout the country without losing quality. Indeed, this layer is based on a contingent of professionals who are costly and whose quality is difficult to maintain when it is scaled throughout the system. EdTech entrepreneurs must also understand Chile's education standards and ensure that they offer products and services tailored to the curriculum and standards.

An example of the type of service EdTech entrepreneurs deliver is *Efecto Educativo's* approach, which provides face-to-face training for 10 teachers (2–3 hours) plus distance assistance (phone or virtual) for a total of 2 hours during the first months of use. The company also offers a separate follow-up package with three visits for co-teaching, observation, and feedback and three visits for follow-up meetings with the director (or school principal) and teachers. Finally, in their after-sales service, *Efecto Educativo's* salespeople regularly monitor the use of resources purchased by their customers through passive data capture (e.g., how many teachers are using it and how often); these data are analyzed and can lead to specific school support and interventions.

## Summary

**Exhibit 7** summarizes specific characteristics of the ecosystem that are associated with advancing along the Ecosystem Change Model in Chile.

## Exhibit 7: The Role of Existing Ecosystem Elements in EdTech Scaling in Chile

Category	Scaling Access	Scaling Use	Scaling Impact
<b>Education System</b>	A strong central vision—the Enlaces program—was expanded from pilot to scale, reaching all schools in the country.	With the SEP, more resources for educational improvement were transferred to schools with more needs. Additionally, schools were given more power to decide what EdTech to use and how to do so.	Decentralized purchase decisions allow schools to match technology (hardware and software) with the needs of their school community. Performance standards from the central level pressure schools to achieve continued improvement.
<b>Enabling Infrastructure</b>	Piloting at a small scale allowed appropriate models to be spread to schools, avoiding the pitfalls of scaling a one-size-fits-all model. Engineering expertise sourced from the university level supported within- and between-school networking. FDT subsidized service delivery in rural areas, and a government program provided access to laptops in homes. A private sector partner helped connect urban schools to the Internet.	Custom software—La Plaza—functionally and conceptually supported the adoption of online collaborative learning. The MoE's gradual exit from Enlaces led to a network of educational service providers able to respond to schools' support demands. Established online portals for accessing digital resources (open and licensed) are available.	EdTech Models and university efforts have been directed toward evaluating the impact of different models and supporting schools to adopt promising ones. High-quality connectivity remains a challenge in rural areas.
<b>Human Capacity</b>	The Enlaces model included plans for capacity building from the outset. University partnerships enabled the rollout of hardware, software, and training.	Platforms for administration, communication with parents, curriculum planning and monitoring, and evaluation, among other tasks, promote the use and maintenance of equipment.	EdTech entrepreneurs embed sales and support services, making adoption of their products more likely while building teacher capacity for use.
<b>EdTech Supply and Business Models</b>	Enlaces and other centralized government purchases, though infrequent, are opportunities for large sales. CORFO provides financial resources for local product development.	Developers of administrative platforms have capitalized on widespread sales and school relationships to also produce learning solutions.	

## The EdTech Scaling Ecosystem

### EdTech Supply

There is no inventory of companies that offer EdTech products for schools in Chile, but according to interviews and a review of the MP, approximately 100 companies may be operating in Chile. The vast majority of these companies sell subject-specific digital resources, serve students with special educational needs, and facilitate learning assessment. Approximately one-third of EdTech products

are offered by Chilean companies, with most (if not all) of these companies being small or medium-size companies, led by professionals dedicated to education but not necessarily technology innovators. As one entrepreneur interviewed said, “In general, we are people coming from the educational field, and we are not very business savvy; this is one of our main challenges.” Other companies only market EdTech in Chile and do not develop it. Some of these are specialized in educational resources or even in digital educational resources. Others offer them as part of a much broader and more diverse portfolio of products that they import from other countries.

Most companies that develop EdTech in Chile and specialize in education offer a blended service model that is vital for customer satisfaction and improves the likelihood that their products will be adopted. Although this strategy makes their products more expensive and adds complexity to company management, it is considered essential to have an impact and remain in business; otherwise, some schools may stop using their product, causing reputational and financial damage to the company. Word of mouth remains a powerful driver of EdTech adoption among Chilean educators.

**SUSTAINABLE BUSINESS MODELS:** EdTech entrepreneurs in Chile’s mostly business-to-government (B2G) market must create a careful balance among supply, demand, and purchasing power. Although Enlaces’ large but infrequent centralized purchases are important, EdTech companies’ sustainability is also dependent upon growth in sales directly to schools. Because the process of adopting EdTech in the school system is slow, companies must make limited investments, focused on specific and somewhat simpler products, which can be financed by these direct sales to schools. In contrast, broader or more complex EdTech products that require large investments depend on either large centralized purchases or more rapid expansion of direct school sales; both are uncertain and risky prospects. This difficult balancing act explains, in part, the recent bankruptcy of the Chilean company Galyleo, which made considerable investments in a complex platform for teaching mathematics for grades 2–12. Direct sales to schools were modest (around 60 schools in Chile), and although it managed to sell to some regional MoEs (Colombia), Galyleo could not survive the delay of an expected large sale to another MoE in the region.

The principal clients of EdTech companies are schools, but the MoE is also relevant, not so much because of the amounts involved—approximately USD 2 million in 2018—but because its purchases are limited to a few products that achieve significant visibility at scale. For example, *Efecto Educativo* reports that its products are present in more than 3,000 schools thanks to the MoE’s purchases, while direct sales to schools involve approximately 300 schools per year. Similarly, *Imactiva* claims to be present in 3,000 schools thanks to the MoE and roughly 400 schools through direct sales. Large centralized purchases do not occur every year because they are usually associated with specific Enlaces initiatives (e.g., the large purchase of early reading instructional software in the early 2000s). However, when such purchases are made, they occur through the MP or competitive tenders involving a committee to evaluate the products.

### EdTech Industry Needs

The **Association of Educational Technology Companies of Chile** (*Asociación Gremial de Empresas de Tecnologías en Educación de Chile*, [AGETECH]) was created at the end of 2017.

According to its current president, who was interviewed for this study, AGETECH seeks to coordinate active EdTech companies to promote internationalization and dialogue with the government. For this association, which currently includes approximately 20 companies that develop digital educational resources in Chile, this dialogue is important to ensure alignment of industry needs with the MoE's future investments and policies. For example, AGETECH aims to meet with government officials regularly to learn about and influence future policies. Another activity has been to manage an exhibit displaying Chilean EdTech products at the vendor fair *Bett Latin America* with the financial support of the Ministry of Economy through CORFO.

Collaboration between the government and entrepreneurs is important in Chile as other sources of product development funding are limited. In fact, many EdTech companies include CORFO's logo on their websites because, at some point in their history, they received support from CORFO to promote the development of Chile's productive sectors. Since 2000, CORFO has deployed a variety of instruments to provide financial resources to support innovations and new entrepreneurship. CORFO provides seed money in the form of grants to co-finance EdTech ventures in the early stages of development, creates incubators and accelerators of new businesses, and supports adaptation for international markets.

**EDTECH IN URUGUAY:** Another country that is well known for its efforts to scale EdTech is Uruguay, which implemented a 1:1 program at scale. Several contrasts with Chile are relevant to any discussion of equitable EdTech scaling. (For a larger analysis, see the Global Report.) For example, unlike Chile, Uruguay does not have to contend with limited Internet access in schools because all schools are connected, but in general, the frequency and quality of the educational use of the Internet does not seem to differ substantially between the two countries. However, in areas of Uruguay where Ceibal has deployed platforms at scale together with solid methodological support, such as in mathematics and English, positive impacts have been demonstrated, especially in low-income students.

CORFO contributes between USD 10,000 and USD 1 million to each venture, and its total investment budget is USD 100 million per year. Although these investments place Chile among the top five countries in terms of public investment in new ventures (in relation to its GDP), low private investment in technological innovation leaves Chile far behind in this field. There is no developed risk capital industry that finances technology companies from their initial stages to expansion, making it difficult for such companies to grow. In Chile, capital tends to avoid the riskiest investments. Thus, earlier-stage companies often need to raise risk capital outside of Chile, primarily in the United States. However, to do so, they must first demonstrate that their ventures can be sustained in markets larger than Chile, such as Mexico. *Lab4u* is one example. After having difficulties growing in Chile, *Lab4u* is now working in Mexico, and its founder is living in Los Angeles (USA) to seek capital support to consolidate its regional growth.

## Key Ecosystem Elements

The study revealed several elements of the ecosystem in Chile that enable EdTech scaling; these elements have been integrated into the overall EdTech Scaling Ecosystem Model (see **Annex 1**). Below, these elements are presented in the context of the relevant components of the overall model.

<p><b>3.2</b> <i>Performance standards set high expectations that incentivize improved performance and legitimize EdTech content development.</i></p> <p><b>3.3</b> <i>Education curriculum and policy include expectations for basic technology literacy for all teachers and students.</i></p> <p><b>3.4</b> <i>Equitable opportunity sources of funding exist for EdTech purchases and implementation support.</i></p>	<ul style="list-style-type: none"> <li>&gt; The educational use of technology in schools is facilitated by the presence of a national curriculum that makes ICT skills development an explicit goal.</li> <li>&gt; A national evaluation system puts pressure on school actors to improve learning outcomes.</li> <li>&gt; School improvement plans tied to special funding opportunities provide an opportunity for schools with a high population of children in need to access funding for EdTech investments.</li> </ul>
<p><b>3.1</b> <i>A clear vision and strategy for EdTech from the highest level of the education system serves as a collective roadmap.</i></p> <p><b>1.4</b> <i>Mutually beneficial, cross-industry, public and private sector partnerships support access to, use of, and impact of EdTech products and services.</i></p> <p><b>4.3</b> <i>Non-government coalitions and advocacy groups support quality EdTech scale up.</i></p>	<ul style="list-style-type: none"> <li>&gt; The Enlaces program set a long-term vision for EdTech in schools, and from the outset, it also addressed the need to embed that vision with quality improvement standards and consider related dimensions, such as infrastructure, digital resources, and capacity building of schools and teachers.</li> <li>&gt; The ability to establish partnerships with other actors in society (e.g., universities, companies) to support EdTech development in schools across those dimensions was key to the scale and sustainability of EdTech.</li> <li>&gt; Universities were accredited as technical assistance institutions that could be contracted with SEP resources for EdTech implementation support.</li> </ul>
<p><b>1.2</b> <i>There is an objective and simple way for users to select products that meet their needs.</i></p> <p><b>4.3</b> <i>Non-government coalitions and advocacy groups support quality EdTech scale up.</i></p>	<ul style="list-style-type: none"> <li>&gt; Through collaboration with a foundation, a national education portal was established to take advantage of open educational resources.</li> <li>&gt; The MP provides a centralized procurement platform for digital educational resources. This is complimented by EdTech Catalog, which provides technical, curricular, and methodological information about digital educational resources.</li> </ul>

	<ul style="list-style-type: none"> <li>&gt; Sales to schools depend on direct marketing by EdTech entrepreneurs.</li> </ul>
<p><i>3.4 Equitable opportunity sources of funding exist for EdTech purchases and implementation support.</i></p> <p><i>1.3 EdTech entrepreneurs have access to capital through appropriate business models, allowing them to survive and thrive.</i></p>	<ul style="list-style-type: none"> <li>&gt; Government policy and funding supported equitable access to technology at home through a program that provided laptops to 7th grade students.</li> <li>&gt; The SEP law provided equitable funding opportunities for schools to purchase EdTech in line with their school improvement program.</li> <li>&gt; An MoE digital literacy strategy emphasized improving digital access and use throughout society.</li> <li>&gt; CORFO supports entrepreneurial and business innovation and has contributed to the creation of new EdTech ventures in the country.</li> </ul>

## Conclusions

Chile has made progress in equitable scaling of EdTech, mainly but not exclusively because of the existence of a well-oriented and long-term policy for this purpose (Enlaces) coupled with high value placed on education in society at large. For many years, the MoE has supported two fundamental and complementary policies pertaining to EdTech scale-up: Enlaces and SEP. Enlaces developed a foundation of infrastructure, digital resources, and human capacity to support the use of ICT in schools and also championed the contribution of ICT to learning outcomes. SEP pressures and empowers schools, especially those that serve students of lower socioeconomic status, to implement interventions for educational improvement, including EdTech. The long duration of these policies despite changes in government seems to be a fundamental reason for this progress, enabling the gradual consolidation of infrastructure conditions, support for and legitimation of the slow processes of adoption, and the learning of the various institutions and actors involved in schools, ministries, universities, and companies.

Digital infrastructure in schools and in society at large facilitates but does not ensure the adoption of ICT in education. First, the spread of **ICT in society** as a whole (e.g., in households, companies, government) and in the homes of teachers and students generates services, practices, and a generalized digital culture that facilitate EdTech adoption in the education sector. Second, access to **ICT in schools** allows the educational use of ICT within the framework of school activities. The spread of ICT in society is mainly the result of **economic growth** and the increased affordability of

the technologies themselves, which has been reinforced by public policies to promote the digitalization of public services and the private sector

Although Chile has made significant progress, its advancement is subject to many limitations, in terms of access and, importantly, the use and impact of EdTech. An active EdTech entrepreneurial ecosystem has supplied Enlaces and schools with a variety of offerings to meet their educational needs. However, the dissemination of these products remains limited by a general lack of awareness.

Access to and use of EdTech in Chile are not necessarily synonymous with increased learning among students. Several studies have attempted to establish relationships between ICT access and use and achievement on the national tests of language and mathematics implemented in grades 4, 8, and 10 (SIMCE). However, no conclusive results have been found.<sup>29</sup> Similarly, other studies have attempted to establish such a relationship with achievement on the PISA test, but again, no link has been demonstrated.<sup>30</sup>

## References

Agenda Digital. (2018). *Agenda Digital 2020*. Retrieved from <http://www.agendadigital.gob.cl/#/>

Comisión Económica para América Latina y el Caribe (CEPAL). (2011). *Un aporte del sistema educativo a la reducción de las brechas digitales: Una mirada desde las mediciones PISA*. Santiago, Chile: CEPAL.

ChileCompra. (2018b). *¿cómo venderle al estado?* Retrieved from <https://www.mercadopublico.cl/portal/mp2/secciones/como-vender/licitaciones-convenio-marco.html>

DIPRES. (2010). *Informe de Finanzas Públicas Proyecto de Ley de Presupuestos del Sector Público para el año 2011*. Santiago, Chile: Dirección de Presupuesto, Ministerio de Hacienda.

DIPRES. (2018). *Proyecto de Ley Presupuesto Año 2018, Partida Ministerio de Educación*. Retrieved from [http://www.dipres.gob.cl/597/articles-164107\\_doc\\_pdf.pdf](http://www.dipres.gob.cl/597/articles-164107_doc_pdf.pdf)

Enlaces. (2012). *Enlaces: 20 años*. Retrieved from <http://www.enlaces.cl>

Fraillon, J., & Ainley, J. (2010). The international study of computer and information literacy (ICILS). IEA. Retrieved from <http://www.iea.nl/icils.html>

Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Gebhardt, E. (2014). *Preparing for life in a digital age: The IEA International Computer and Information Literacy Study*. Retrieved from <https://www.oopen.org/download?type=document&docid=1001996>

Hepp, P. (2003). Enlaces: el programa de informática educativa de la reforma educacional chilena. In C. Cox (Ed.), *Políticas educacionales en el cambio de siglo: La reforma del sistema escolar de Chile*. Santiago, Chile: Editorial Universitaria.

Instituto de Informática Educativa (IIE). (2014). *Censo de Informática Educativa 2012: Principales resultados. Informe Final*. Temuco, Chile: IIE, Universidad de la Frontera.

ITU. (2017). *Measuring the information society report 2017*. Ginebra: ITU. Retrieved from <http://www.itu.int/net4/ITU-D/idi/2017/index.html>

Jara, I. (2003). La experiencia chilena de la Red Enlaces. In *Educación y Nuevas Tecnologías: Experiencias en América Latina*. Buenos Aires: United Nations Educational, Scientific and Cultural Organization (UNESCO).

Jara, I. (2016). *Revisión comparativa de iniciativas nacionales de aprendizaje móvil en América Latina. El caso del Plan Ceibal de Uruguay*. Paris: UNESCO.

MoE. (2011, June 3). *Desarrollo Digital Escolar: Resultados del Censo de Informática Educativa*. Presented to Enlaces, Ministerio de Educación de Chile.

MoE. (2018). Resumen Estadístico de la Educación 2016, Centro de Estudios, Ministerio de Educación. Retrieved from <https://centroestudios.mineduc.cl/wp-content/uploads/sites/100/2017/06/Resumen-Statistico-de-la-Educacion-2016.pdf>

Perera, M., & Aboal, D. (2017a). *Evaluación del Impacto de la Plataforma Adaptativa de Matemática en los resultados de los aprendizajes*. Montevideo: Centro de Investigaciones Económicas.

Perera, M., & Aboal, D. (2017b). *Diferencias por género y contexto socioeconómico del impacto de la Plataforma Adaptativa de Matemática*. Montevideo: Centro de Investigaciones Económicas.

Rivas, A. (2015). *América Latina después de PISA: Lecciones aprendidas de la educación en siete países (2000-2015)*. Buenos Aires: CIPPEC-Natura-Instituto Natura.

UNESCO. (2015). *Informe de Resultados TERCE: Logros de Aprendizaje*. Santiago: UNESCO.

## Annex 1. The EdTech Scaling Ecosystem Model

### EDTECH SUPPLY AND BUSINESS MODELS

**1.4** Mutually beneficial, cross-industry, public and private sector partnerships support access to, use of, and impact of EdTech products and services.

**1.3** EdTech entrepreneurs have access to capital through appropriate business models, allowing them to survive and thrive.

**1.2** There is an objective and simple way for users to select products that meet their needs.

**1.1** Businesses have a cost-efficient marketing, sales, and distribution mechanism for reaching customers, whether business to government (B2G) or business to consumer (B2C).

**4.4** There are multiple and varied ways of communicating product effectiveness research, evaluation, and user experience.

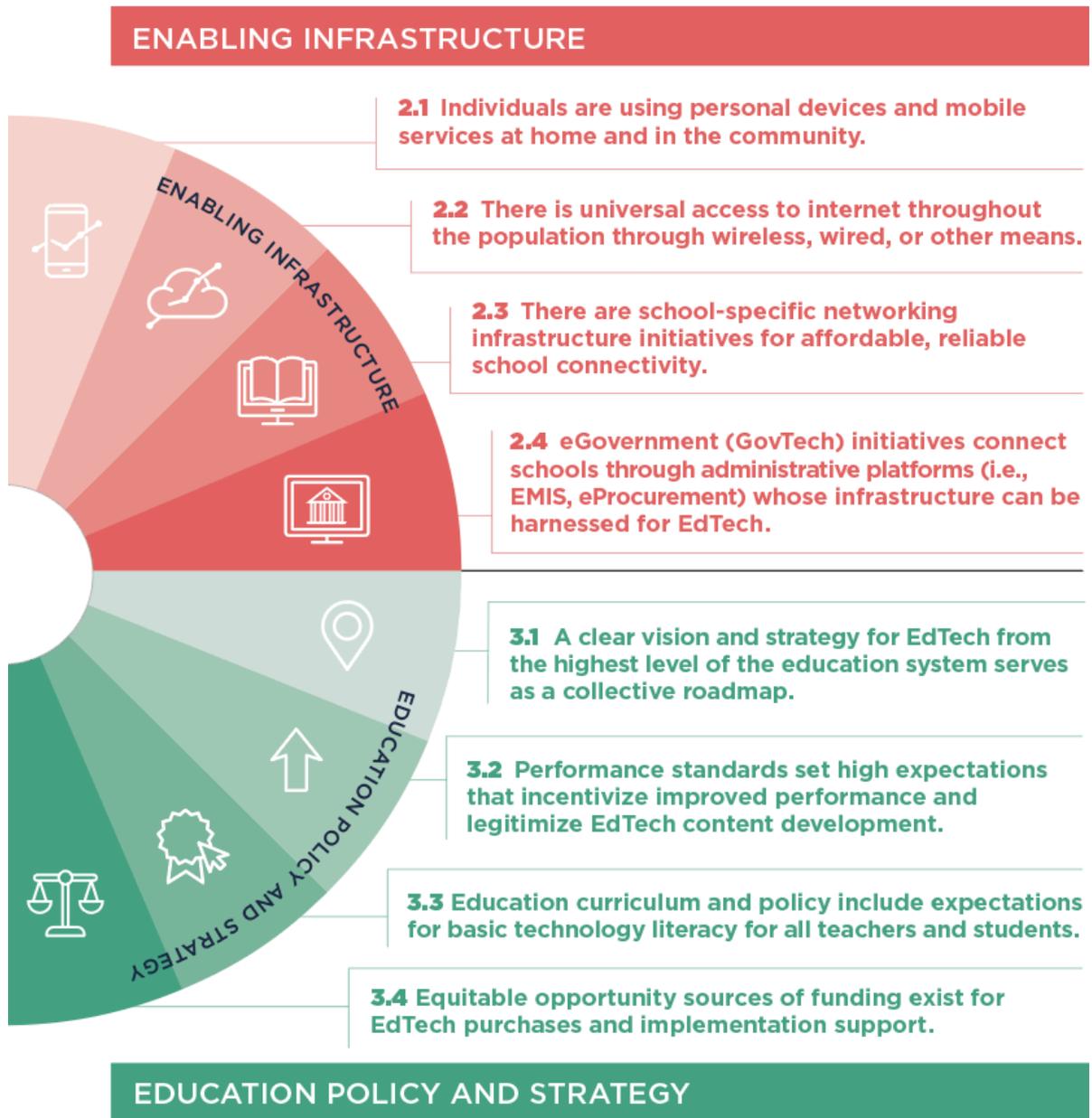
**4.3** Nongovernment coalitions and advocacy groups support quality EdTech scale-up.

**4.2** There are sufficient ongoing and equitable opportunities for stakeholder capacity building.

**4.1** Local visionary leaders emerge to coalesce stakeholders around a bold common goal.



### HUMAN CAPACITY



---

## Endnotes

- <sup>i</sup> Robinson, J. P., Winthrop, R., & McGivney, E. (2016). *Millions learning: Scaling up quality education in developing countries*. Washington, DC: Brookings Institution. <http://www.brookings.edu/wp-content/uploads/2016/04/FINAL-Millions-Learning-Report-1.pdf>
- <sup>ii</sup> J-PAL Evidence Review. (2019). *Will technology transform education for the better?* Abdul Latif Jameel Poverty Action Lab: Cambridge, MA. <http://www.povertyactionlab.org/sites/default/files/documents/education-technology-evidence-review.pdf>
- <sup>3</sup> United Nations Economic Commission for Latin America and the Caribbean (ECLAC). (2018). *Databases and statistical publications: Chile: National socio-demographic profile*. Retrieved from [http://interwp.cepal.org/cepalstat/Perfil\\_Nacional\\_Social.html?pais=CHL&idioma=english](http://interwp.cepal.org/cepalstat/Perfil_Nacional_Social.html?pais=CHL&idioma=english)
- <sup>4</sup> World Bank. (2018). *The World Bank in Chile*. Retrieved from <http://www.worldbank.org/en/country/chile>
- <sup>5</sup> United Nations Development Programme. (2018). *Human development reports: 2018 statistical update*. Retrieved from <http://hdr.undp.org/en/2018-update>
- <sup>6</sup> From data compiled using GDP and current prices (USD) from the IMF World Economic Outlook Database: <https://www.imf.org/external/pubs/ft/weo/2018/01/weodata/index.aspx>
- <sup>7</sup> UNESCO Institute for Statistics. (2018). *Chile*. Retrieved from <http://uis.unesco.org/en/country/cl>
- <sup>8</sup> ECLAC. (2018). *Databases and statistical publications: Chile: National socio-demographic profile*. Retrieved from [http://interwp.cepal.org/cepalstat/Perfil\\_Nacional\\_Social.html?pais=CHL&idioma=english](http://interwp.cepal.org/cepalstat/Perfil_Nacional_Social.html?pais=CHL&idioma=english)
- <sup>9</sup> MOE. (2018). *Resumen Estadístico de la Educación 2016*. Retrieved from <https://centroestudios.mineduc.cl/wp-content/uploads/sites/100/2017/06/Resumen-Estad%C3%ADstico-de-la-Educaci%C3%B3n-A%C3%B1o-2016.pdf>
- <sup>10</sup> Ambrus, S. (2017, February 22). *Can voucher schools improve education? Ask Chile*. Retrieved from <https://blogs.iadb.org/ideas-matter/en/can-voucher-schools-improve-education-ask-chile/>
- <sup>11</sup> DIPRES. (2010). *Informe de Finanzas Públicas Proyecto de Ley de Presupuestos del Sector Público para el año 2011*. Santiago, Chile: DISPRES, Ministerio de Hacienda; DIPRES. (2018). *Proyecto de Ley Presupuesto Año 2018. Partida Ministerio de Educación*. Retrieved from [http://www.dipres.gob.cl/597/articles-164107\\_doc\\_pdf.pdf](http://www.dipres.gob.cl/597/articles-164107_doc_pdf.pdf); Donoso, G. (2010). Enlaces en el sistema escolar chileno: evolución de sus cifras. In: *El Libro Abierto de la Informática Educativa: Lecciones y Desafíos de la Red Enlaces*. Santiago, Chile: MoE.
- <sup>12</sup> Bellei. (2012). Evolución de las Políticas Educativas en Chile (1980-2009). In: *El Libro Abierto de la Informática Educativa: Lecciones y Desafíos de la Red Enlaces*. Santiago, Chile: MoE
- <sup>13</sup> ITU. (2017). *ICT Development Index 2017: IDI 2017 Rank*. Retrieved from <http://www.itu.int/net4/ITU-D/idi/2017/index.html>
- <sup>14</sup> UNESCO. (2018). *SITEAL: Perfiles de País, República Oriental del Uruguay*. Retrieved from <http://www.publicaciones.siteal.iipe.unesco.org/perfiles-de-pais/10/republica-oriental-del-uruguay>; SITEAL. (2015). *Infraestructura Digital para Educación: Avances y Desafíos para Latinoamérica*. Buenos Aires: IPE-UNESCO.
- <sup>15</sup> ECLAC. (2018). *Databases and statistical publications: Chile: National socio-demographic profile*. Retrieved from [http://interwp.cepal.org/cepalstat/Perfil\\_Nacional\\_Social.html?pais=CHL&idioma=english](http://interwp.cepal.org/cepalstat/Perfil_Nacional_Social.html?pais=CHL&idioma=english)

<sup>16</sup> OECD. (2017). *PISA 2015 results: Students' well-being* (Vol. III). Paris: OECD.

<sup>17</sup> Estimate made by the author based on the amounts of purchases of digital educational resources in the *Mercado Público* (MP) and the assumption, based on reports from companies in the field, that schools in the subsidized private sector have a purchasing power for this type of resources at least similar to that of municipal schools.

<sup>18</sup> Donoso, G. (2010). Enlaces en el sistema escolar chileno: evolución de sus cifras. In *El Libro Abierto de la Informática Educativa: Lecciones y Desafíos de la Red Enlaces*. Santiago, Chile: MoE.

<sup>19</sup> *Ibid.*

<sup>20</sup> ECLAC. (2018). *Databases and statistical publications: Chile: National socio-demographic profile*. Retrieved from [http://interwp.cepal.org/cepalstat/Perfil\\_Nacional\\_Social.html?pais=CHL&idioma=english](http://interwp.cepal.org/cepalstat/Perfil_Nacional_Social.html?pais=CHL&idioma=english); OECD (2015). *Students, computers and learning: Making the connection*. Paris: OECD.

<sup>21</sup> MoE. (2013). *Censo de informática Educativa 2012: Principales Resultados*. Santiago, Chile: IIE de la Universidad de la Frontera y Adimak: Santiago.

<sup>22</sup> OECD. (2017). *PISA 2015 results: Students' well-being* (Vol. III). Paris: OECD.

<sup>23</sup> Jara, I. (2003). La experiencia chilena de la Red Enlaces. In *Educación y Nuevas Tecnologías: Experiencias en América Latina*. Buenos Aires: UNESCO.

<sup>24</sup> UDP. (2012). *Evaluación de Impacto, Programa TIC Ministerio de Educación*. Santiago, Chile: Universidad Diego Portales.

<sup>25</sup> Educarchile. (n.d.). *Educarchile*. Retrieved March 21, 2019, from <http://www.educarchile.cl/ech/pro/app/home>

<sup>26</sup> ChileCompra. (2018a). *Transacciones de Convenio Marco Histórica*. Retrieved from <http://datosabiertos.chilecompra.cl/Home/TransaccionConvenioMarcoHistorica>

<sup>27</sup> *Ibid.*

<sup>28</sup> MoE. (2014). *Informe de Resultados SIMCE TIC 2º Medio 2013*. Santiago, Chile: MoE.

<sup>29</sup> See Raczynski, D., & Pavéz, A. (2000). *Diseño de un modelo de evaluación de resultados de la Red Enlaces*. Santiago, Chile: Asesorías para el Desarrollo; or Contreras, D., Miranda, L., & River, J. (2008). Calidad de la Educación y Acceso a las Tecnologías de la Información. In *Telecomunicaciones: Convergencia y Nuevos Desafíos* (Capítulo 7, pp. 237–268). Santiago, Chile: SUBTEL.

<sup>30</sup> Peirano, C., Kluttig, M., & Vergara, C. (2009). Evidencia sobre el uso de tecnologías y su correlación con el desempeño en Pisa-Ciencias 2006. In *¿Qué nos dice PISA sobre la educación de los jóvenes en Chile?* Santiago, Chile: MoE.



[www.omidyar.com/education](http://www.omidyar.com/education)

Please reach out at [EdTech@omidyar.com](mailto:EdTech@omidyar.com)