



HOW NEW TECHNOLOGIES
ARE TRANSFORMING THE
EDUCATION INDUSTRY
IN LATIN AMERICA AND THE CARIBBEAN



Digital economy

Social infrastructure

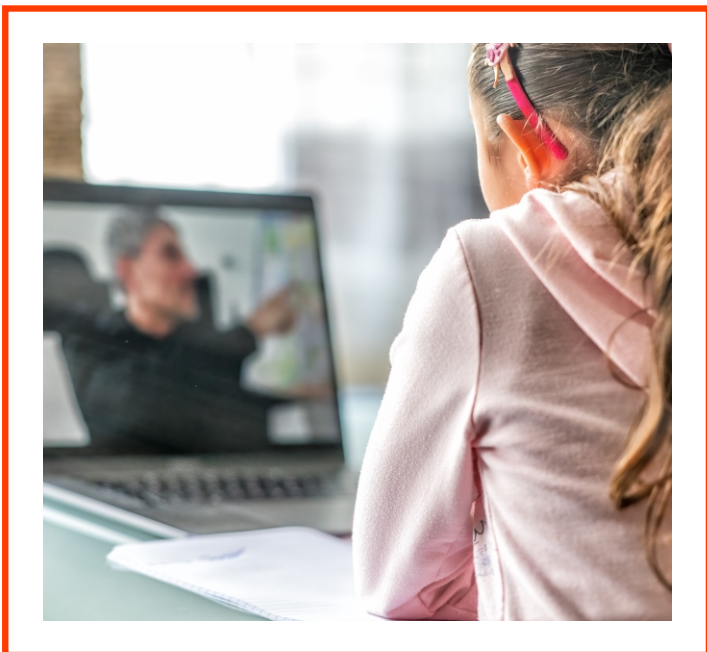


BACKGROUND

The Latin America and Caribbean (LAC) region is undergoing a digital revolution, and we are convinced that technological innovations have the potential to significantly accelerate and scale the region's development. These technologies are reshaping both traditional sectors and innovative industries. In this context, the main objective of this report is to address the disruptive technologies that are revolutionizing each of the industries in which IDB Invest operates in a structured manner. New emerging business models will be evaluated in the context of economic and social development, the foundation of the IDB Group. The selected models will prioritize inclusion, productivity, and innovation while addressing cross-cutting issues such as environmental sustainability, climate change, and gender equality.

Although new technologies have enormous potential to drive efficiency and open up new avenues of value creation, they also pose significant challenges in terms of governance, security, and equality. The rapid adoption of digital solutions has highlighted the importance of establishing a strong regulatory and investment framework that maximizes benefits while mitigating risks. As a result, the role of different economic agents and their ability to adapt and adopt these innovations becomes a critical aspect of catalyzing sustainable economic and social development.

As we examine the impact and potential of various key technologies in this report, it is important to understand that we are dealing with an interconnected ecosystem that is growing in complexity and scale. Advances in one area, such as Artificial Intelligence or Automation, are fed back and amplified in constructive collaboration with others, such as Big Data or the Internet of Things, resulting in a multiplier effect on value generation. This report aims to highlight how this technological interconnection is reshaping the economic and social context in LAC, providing an analysis that goes beyond the current situation to forecast how new technologies will continue to shape the region over the next decade.



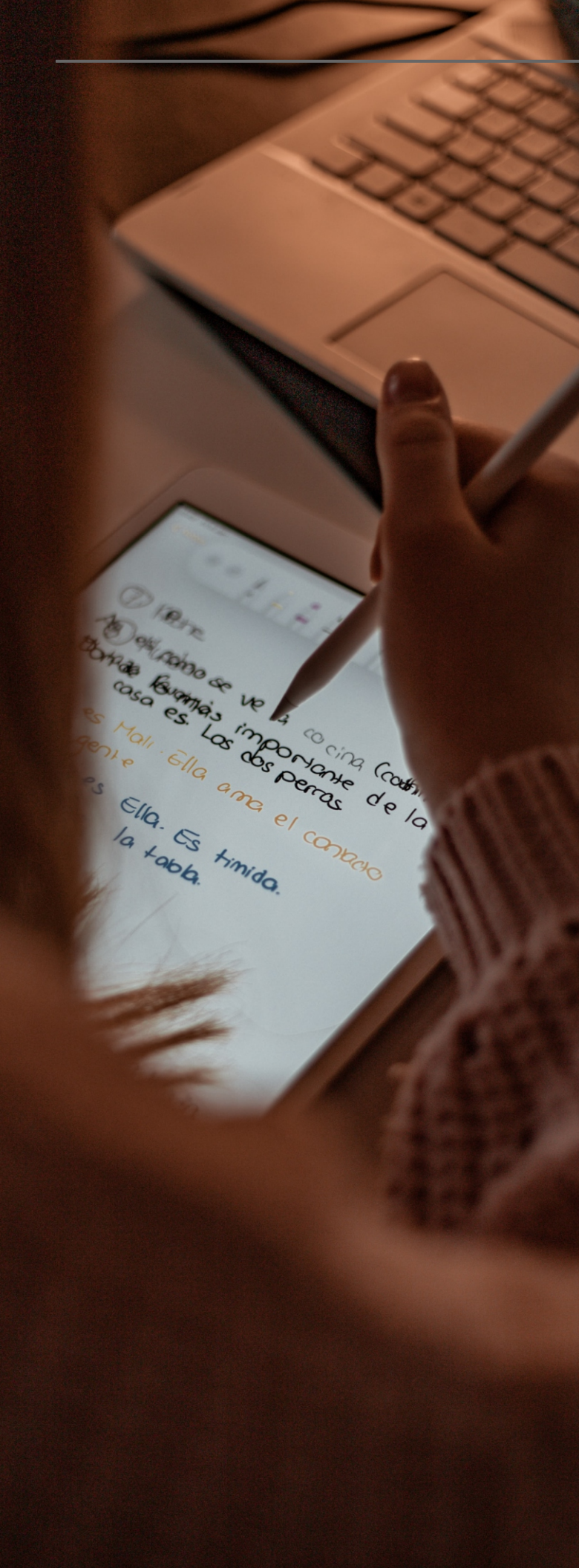
CONTEXT

Education is one of the mainstays of people's and societies' advancement and progress. In addition to being a human right, it is the cornerstone of economic development, as well as one of the engines for reducing poverty, improving health, combating inequalities, and ensuring social stability.

The COVID-19 pandemic was a turning point that had profound implications for the education system. One of the main measures taken by governments to control the spread of the disease was the closure of in-person classes at educational establishments. Furthermore, Latin America and the Caribbean was the region that kept its schools closed for the longest period, in whole or in part: 70 teaching weeks between February 2020 and March 2022, far exceeding the global average of 41 weeks.

Faced with this situation, the education industry had to rely on the implementation of technologies in order to remain operational. In this process of digitalization, authorities, educational centers, teachers, and students were confronted with the necessity of meeting through online educational platforms, which would enable the teaching of classes and ensure the continuation of learning activities.





This revolution added a new challenge to the region's already existing ones: connectivity (or digital divide). Along with the structural challenges to education system quality and democratization, there is unequal access to connectivity and poor digitalization at three levels: devices, trained teachers, and content. This fact impedes educational equality, harming the most vulnerable populations: rural families, low-income households, indigenous peoples, and women.

At the moment, the use of new technologies favors the digitalization of education. On the one hand, the advances in user connectivity in recent years, such as the promotion of 5G and cloud access, have enabled hybrid learning (face-to-face and online) and facilitated information transmission. In turn, artificial intelligence is a useful tool for personalizing education based on skills and improving institutional efficiency. In more developed regions, such as Europe, tools like gamification and immersive reality (Augmented Reality and Virtual Reality) are gaining traction in efforts to improve student and teacher engagement, whereas LAC is lagging in the massification of such technologies.

However, technology alone will not solve the region's educational problems. Deep reflection is required to transform education from a cost to a worthwhile investment in the future. To take one step further, this investment in the digital transformation of education should be viewed not only as a catalyst for economic returns but also as a major driver of diversity, inclusiveness, and equity within educational systems.

INDUSTRY'S IMPORTANCE IN THE REGION AND IDB INVEST'S OUTLOOK

Over the last decade, there has been progress in expanding educational access and enrollment rates in schools at all levels. Nevertheless, around 260 million children were still out of school in 2018 (about a fifth of the world's population in that age group), an issue that has been exacerbated two years later by temporary school closures due to the pandemic.

Within the region, the pandemic caused an unprecedented disruption in ongoing educational processes, resulting in a drop in school attendance rates and deepening inequalities due to limited access to non-physical technologies. However, data from 2021 show that most cases have recovered. The IDB Group's report "Educational perspectives in Latin America at the End of the Pandemic" ("Perspectivas educativas en América Latina a la salida de la pandemia"), which includes data by country and by educational segment, contains more granular details on this data.



In these terms, given Education's significant potential for growth as one of the Sustainable Development Goals (SDG 4, Quality Education), our goal is "to ensure that all children complete primary and secondary education, which should be free, equitable, and of high quality, in addition to producing relevant and effective learning results" by 2030.

The reasons why this is such an important sector are numerous. To highlight the most important, we would like to divide them into three categories: personal, social, and economic development.



The fundamental reason for the importance of education is human development because knowledge and understanding promote freedom in all aspects of our lives, including better health, financial planning, and preserving the environment. Furthermore, it is well known that education and income have a direct proportional relationship, allowing for class mobility (social elevator).

At the social level, access to education for all citizens promotes equity by expanding equal opportunities and closing existing socioeconomic gaps. Furthermore, it promotes civic engagement and collaboration, as well as active participation in public issues that ensure democratic systems and prevent manipulation or populism.



All of the preceding has an impact on the country's economic development. Better qualifications increase the chances of getting higher-paying jobs, which increases families' disposable income and typically encourages consumption in businesses, triggering a virtuous cycle of economic growth. Better qualification also encourages innovation and business creation, contributing to long-term economic development and poverty reduction.

In simple terms, the education industry is the cornerstone of the region's prosperity. When we stop to think about it, a country's wealth does

not reside in the amount of oil reserves or the currencies stored in its central banks. A country is rich when it has a good education system.

IDB Invest's Outlook

Public education systems in Latin America and the Caribbean have infrastructure and technology that could be improved significantly. By streamlining schools and their equipment, as well as improving the quality and accessibility of services, the private sector can help close the region's investment gap.



IDB Invest collaborates with public and private businesses to increase funding and make educational services more accessible. Among its primary investment objectives are:

- Expanding access to labor markets.
- Reducing educational inequality.
- Improving the quality of educational services, among others, through digitalization.
- Improving the industry's efficiency by investing in technology that improves quality and lowers education costs.

Due to the size of the loans, it primarily invests in corporate loans or project finance in physical infrastructure, with a special emphasis on universities and campuses. It also invests in the equity of new solutions, primarily to promote digital education. Finally, loans are used to finance Public-Private Partnerships (PPPs) aimed at developing educational infrastructure and service provision.

INDUSTRY CHALLENGES & OPPORTUNITIES

The region's education systems should be modernized to accelerate transformation and bring them up to the same level as those of developed countries. One of the most significant opportunities presented by technology is in its applications that allow efficiency and quality gains within the industry, allowing for both the reduction of the educational gap to pre-pandemic levels and the capture of advances resulting from the pandemic itself.

To do this, the industry's challenges and opportunities, as well as the benefits offered by new technologies to overcome these challenges, must be considered. Among the most important are:



Accessibility

Educational opportunities in Latin America and the Caribbean remain unequally distributed.

This is why approximately **63%** of young people complete secondary school, despite the fact that in 20 countries in the region, **students from the richest 20% have five times the chance from the poorest 20%.**

The adoption of new technologies combined with increased connectivity penetration will favor equitable and inclusive education, with benefits for rural areas, low-income families, and vulnerable populations. This is due to lower entry barriers, which eliminate logistical issues and lower teaching costs.

Quality

International knowledge assessment tests reveal that the acquired learning is insufficient for students gaining access to the education system. According to the 2018 PISA results, 15-year-old students in the region are three years behind their OECD counterparts in reading, math, and science.

Having digital tools in the classroom allows for innovation in teaching, moving it away from textbooks toward the possibility of showing images and videos, which improves student retention. Furthermore, the implementation of analytics models such as big data allows schools and teachers to measure and monitor student performance and knowledge, allowing for quick changes in educational content.



Dropout Rate Reduction

Another major issue in the region is the high dropout rate. While men typically drop out of school for economic reasons (work), many women are forced to drop out due to premature pregnancies or maternal care. As a result, they end up working in low-wage jobs or the informal sector, resulting in lower income and a downward spiral into poverty.

New digital solutions are being implemented to prevent school dropouts. One example is the use of Artificial Intelligence to assist teachers in detecting each student's natural abilities and guiding them toward subjects where they can maximize their potential. Gamification is another example, which is used to make learning exercises more interactive and improve the student's experience and attention retention.

Collaborative Ecosystems

The impact of digital transformation in many industries has created new job opportunities. Analysts and data scientists, cybersecurity experts, programmers, and cloud architects are in high demand.

It is clear how new technologies are altering the demands of job profiles. This fact emphasizes the importance of adapting knowledge and skills to meet the needs of businesses. For this, it is critical to create space for communication within the educational ecosystem, where students, teachers, centers, universities, academies, and companies can share their concerns with educational systems. Only then will an efficient and practical education be possible, with labor demand matching student supply.

Financing

Between **2000 and 2017**, regional educational financing increased from **3.9 to 4.5% of GDP** and from **14.9 to 17% of public spending**.

This implies that SDG's financing commitment is within the target margins of 4 and 6% of GDP and 15 and 20% of public spending.



This data is revealing because it shifts the problem's perspective: we no longer need to ask how much is being invested (quantitative variable) but rather what is being invested in (qualitative variable). Public Private Partnerships (PPPs) provide an answer to this challenge by allowing the private sector to participate by incorporating its talent, operational efficiency, and technological and innovation capabilities.

In this regard, IDB Invest is supporting this type of industry initiative. A loan of 25 million dollars

was granted to Consorcio PPP Infraestructura Educativa de Uruguay to increase both the overall educational offer (initial, elementary, and technical levels) and the public educational sports offered in the country.

Most likely, the implementation of new technologies has the potential to contribute to overcoming or minimizing the risks posed to the region's education industry. However, the following are the primary barriers to the sector's digital transformation:



- **Digital Divide:** Connectivity is a major barrier to technology-enabled learning. Unfortunately, there are disparities in the region, with rural areas being the most affected. Hardware devices (computers, tablets, or smartphones) are also required to be able to utilize the connection and digital use. This fact exacerbates the situation for lower-income households.

- **Talent:** Teachers are the primary knowledge transmitters to students in their classrooms. As a result of the increasing speed of technological innovation, they may lack the knowledge, skills, or resources required to provide teaching based on digital solutions.

- **Use of New Technologies:** Authorities should consider the ethical and moral implications of implementing new digital tools. Although they increase productivity, they can be a contentious topic in learning. The clearest example is found with ChatGPT, a tool that, while it can be used to speed up information searches, can also be used in ways that encourage laziness. As a result, many schools are restricting its use, and in European countries such as Italy, it is beginning to be banned on the grounds that the platform violates data protection law.

- **Digital Content:** There is currently no content that is tailored to the various realities of LAC. Many of the digital educational content and resources were created by and for first-world countries, so in many cases, they cannot be used due to cultural, linguistic, and even language differences.



KEY TRENDS

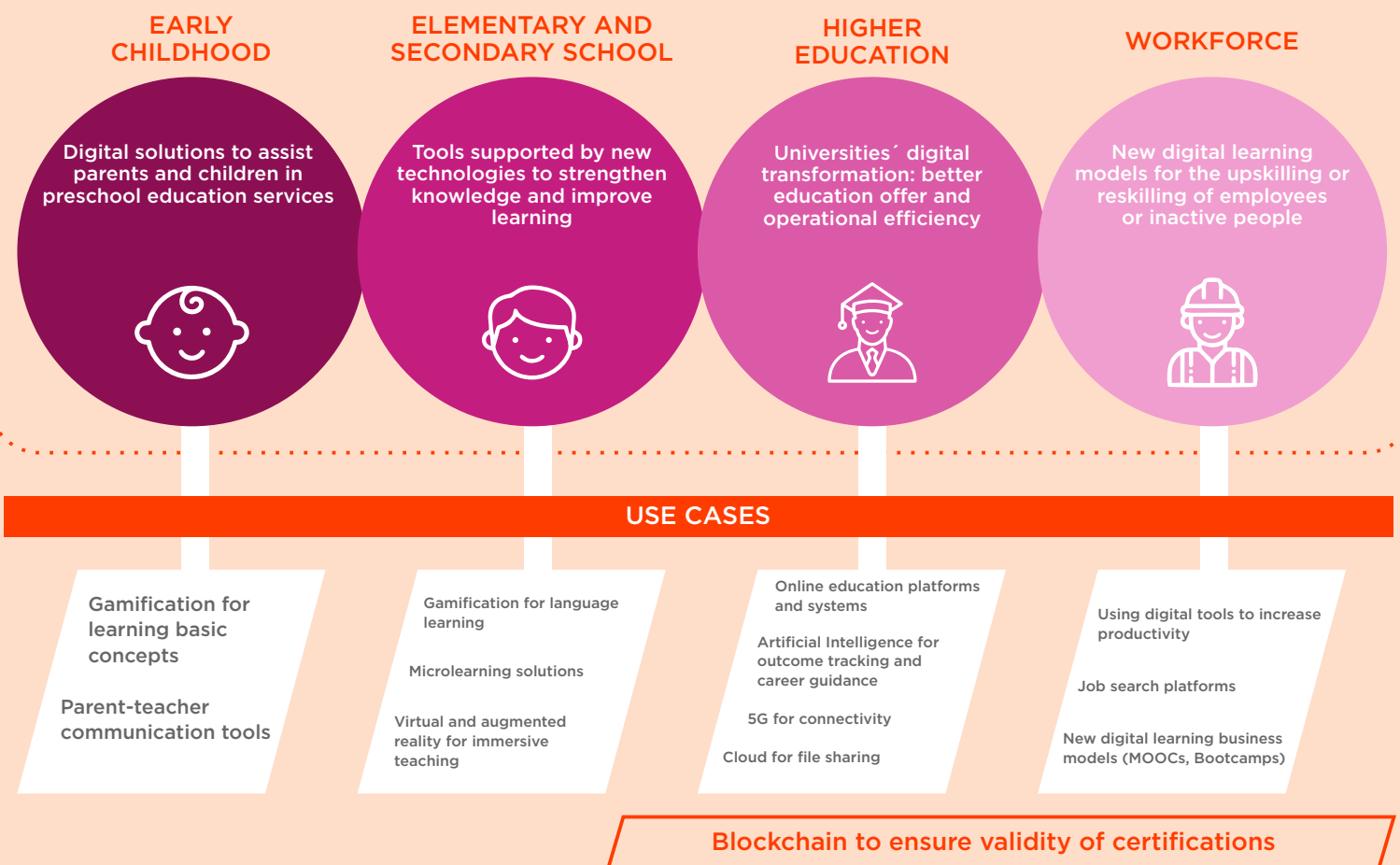
The education industry is being transformed by new technologies. As a result of the pandemic's restrictions, education underwent a digitalization process, which accelerated several trends. Applications, platforms, and new digital solutions have emerged to help improve and streamline teaching and learning processes in hybrid education.

The following are the industry's main trends:

Digitalization of Teaching

To overcome the challenges that the region's education system face, it is critical that all participants in the education chain stop working in silos. To that end, progress is being made in improving the interrelationship of all agents (parents, schools, teachers, students, universities, and companies) in order to maximize the benefits of adopting new learning technologies. Taking the simplification of the educational phases as an example, it can be seen how new digital solutions are being included to strengthen education:

Digitalization of teaching



In the first instance, it is crucial to introduce new technologies to the youngest so that they come into contact with and become acquainted with them at an early stage. This enables the development of a culture and digital literacy that subsequently reduces inequalities. As a result, to nurture and accelerate children's learning, both parents and teachers must have the necessary digital skills and tools.

In this regard, platforms like Kidenu in Mexico target parents and caregivers by offering personalized plans and activities, as well as on-demand videos and forums to encourage babies' development. Others, such as Argentina's Papumba, use gamification to provide interactive learning experiences via courses, podcasts, audiobooks, and books.



As we move into elementary and secondary education, the use of new digital solutions is primarily focused on improving the student experience and retaining their attention, thereby avoiding the disinterest that can lead to dropping out. Furthermore, the ability to capture and analyze more data allows teachers to assess more efficiently and identify learning failures, allowing them to support the most problematic cases and, as a result, enable a more equitable education in which no one is left behind.

Within the region, very interesting efforts are emerging that allow institutions to streamline their operations through digitalization, gaining time to educate and thus improving quality. Colegium is a Chilean educational superapp company that provides a set of innovative solutions (school management, corporations, libraries, communications...) to improve educational standards across the ecosystem, using technology to speed up administrative processes and creating spaces for communication between teachers, parents, and students, all from the same app.

Continuing in the educational phases, we find higher education and professional training. Students should already have basic skills and competencies at this point, and their cognitive development allows them to determine which subjects are most relevant to their interests. Teachers and schools have the professional mission of guiding students to find jobs that are aligned with their calling. However, they should be given additional tools and resources to help them delve deeper into the subject and gain the knowledge needed to enter the labor market.

In this regard, many educational institutions already have digital job boards where students upload their resumes to apply for job openings. Students can increase their chances of success by using digital platforms such as LinkedIn, the most popular social network in the business world.





Finally, we seek solutions aimed at the workforce. As a result of digital acceleration, new jobs are emerging that require knowledge and a high level of skill with current technology, which education systems do not yet cover. Furthermore, many "traditional jobs" are becoming obsolete or require more technical skills to remain competitive.

To meet these needs, new business models with both a B2B and B2C approach are emerging. They allow workers to be trained in specific topics (customization) and with a high degree of practicality, costing less than a master's degree and focusing on the teaching of digital skills such as data analytics, artificial

intelligence, and code development, to name a few. These models, which include MOOCs (Massive Open Online Courses) and boot camps, will be thoroughly discussed in the following chapter of the document.

In conclusion, for the industry's digital transformation to have a structural effect instead of a merely temporary one (derived from the pandemic), all ecosystem actors should include in their strategic plans the inclusion of new technologies to improve the quality of learning and further digital skills. With this, a more productive economy can be achieved, with better jobs and salaries, boosting the region's long-term economic growth.

From Face-to-face Education to Hybrid Models

The closure of schools due to the pandemic compelled educational institutions to take immediate action to ensure the continuity of remote teaching. With the reopening of establishments, many organizations incorporated into their strategy the provision of a hybrid model that combined online education with face-to-face education, thereby capturing the benefits of both worlds and creating an integrated and dynamic learning environment.



Hybrid education is critical in the region because it provides opportunities to improve educational access and quality. On the one hand, it reduces the need for new infrastructure, allowing investment to be made in increasing students' connectivity and providing them with devices such as computers or tablets, thereby increasing the online learning system's capabilities.

Digital tools, on the other hand, allow students to access educational resources at any time, providing greater flexibility in learning (different speeds) and a more personalized student experience.

From elementary and secondary schools to universities, hybrid education can be used in a variety of educational settings. A hybrid education use case is the ability to attend classes or do group work without having to travel, for example, using applications like Zoom. Another example is the development of educational intranets such as Moodle, which facilitates course management, digital distribution of educational materials, and teacher monitoring and assessment of results. Without a doubt, technology has played a significant role in the expansion of hybrid education in Latin America and the Caribbean.

Nonetheless, three axes should be considered for its appropriate implementation in the medium and long term: i) enhancing teachers' skills and technological knowledge; ii) ensuring connectivity to reduce the digital divide; and iii) providing schools with tools for data capture, analysis, and subsequent monitoring.



Comprehensive Education Focusing on Labor Market Needs

Most educational systems still use methodologies and practices that date back to the Industrial Revolution, when the goal was to provide mass literacy to the population. These systems were distinguished by providing fundamental knowledge, such as reading and writing, in an environment dominated by memorization.

With the advances of new technologies, the labor market has evolved, changing its demand with increasingly sophisticated and specific needs. This is why many schools, particularly universities, are facilitating collaboration among all stakeholders, including companies with a clear goal: to promote student job placement and employability by adapting educational needs to business demand. All of the preceding is aided by three strategic levers that generate synergies:

1. Comprehensive education for work: Refers to the theoretical-practical and comprehensive educational process aimed at the development of technical and technological knowledge

through which people acquire, supplement, and develop skills that allow them to access work and perform competently in professional occupations throughout their lives.

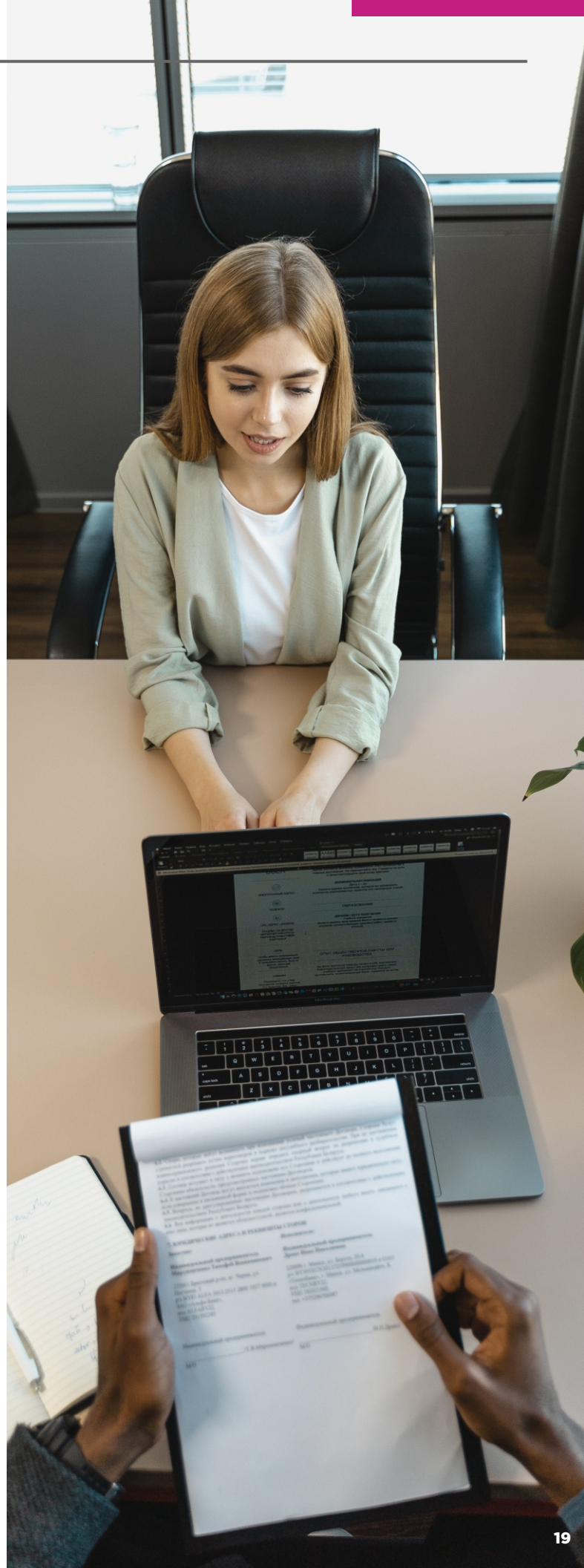
Co-creation in curriculum design is one example being used to respond to the needs of the productive sector. In Mexico, the Technological University of Querétaro and the Polytechnic University of Querétaro designed and delivered a program in concert with companies in the automotive industry. Another example is modular training, which enables the possibility of combining specialized and elective courses that all lead to the same learning outcome.

2. Employment Assistance:

Students should have the necessary tools to conduct an effective job search that matches their tastes and preferences.

By increasing student motivation, good counseling reduces dropout rates. This fact causes people to develop their capacities based on their natural skills, resulting in greater productivity and impact when entering the business.

The ability to process large volumes of data with advanced analytics assists teachers in identifying and better understanding students' innate abilities, allowing them to provide vocational guidance in their recommendations to get the most out of them. Digital solutions are also emerging, such as the Peruvian Queestudiar, which uses Artificial Intelligence to assist students in LATAM in determining the next step in their apprenticeship journey.



3. Assessment of Skills and

Knowledge: Recognizing and validating skills or knowledge through digital badges that are cumulative, homologate, and authoritative in the labor market.

In this regard, the companies Open edX and UniMOOC offer open online courses in which teachers can award badges to increase student motivation and commitment. Large corporations such as LinkedIn are now also offering the option of certifying knowledge within their platform.

In short, relying on new digital solutions increases employability by tailoring the educational offerings to business needs. As a result, many educational institutions are investing in their transformation to align their educational offerings with the new digital paradigm.

NEW BUSINESS MODELS

Technological progress favors the development of new digital solutions, which increases access and improves regional educational quality.



This industry's transformation involves players such as educational institutions and new agents that are digital natives (edtechs). Among the most important new business models are:



Online Learning Platforms

Also known as MOOC (Massive Open Online Courses), they refer to a new type of Internet education based on bringing together various courses at low prices and that are distributed through technological platforms that allow access to millions of users.

These platforms have several ways to generate revenue in their business model. The most common at the moment is the payment for validation of courses to obtain university credits. Another approach is by certifying the course completion. Furthermore, there are freemium models for users who want to delve into a topic, where a fee is paid to gain access to exclusive content or additional material. Finally, the platforms host advertising to generate revenue from the free courses.

Among the many advantages of this model, scalability stands out: once a course has been completed, it can be carried out by thousands of additional students, with no marginal cost and with a unit cost that approaches zero. Another advantage is that it allows it to reach new geographical and social segments due to its competitive prices and the elimination of logistical barriers, that is, it allows the student to take the course when, where, and from where it is most convenient for them, with the only requirement being a connected device.

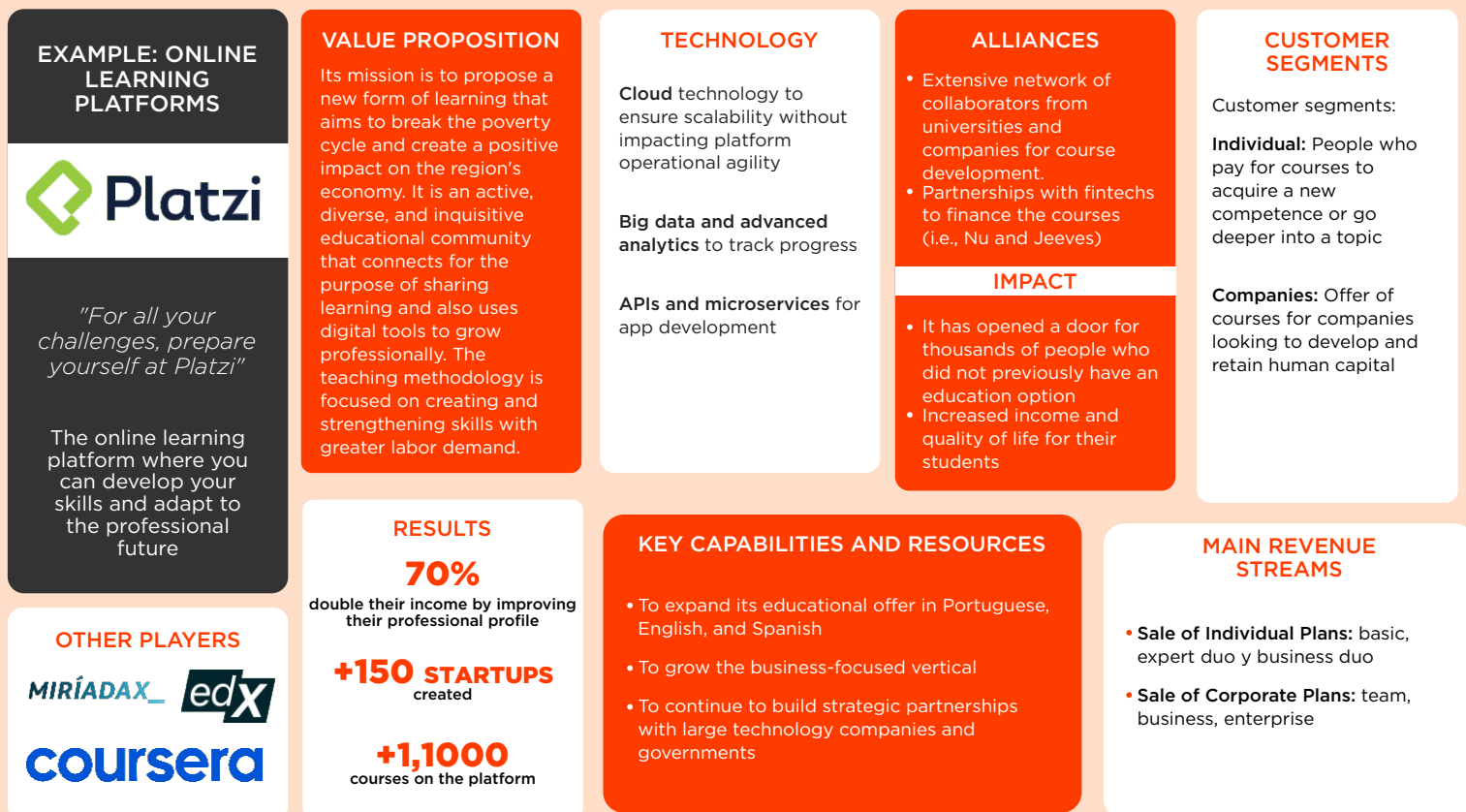
It is fascinating to see how these new technologies are leveraging these models. On the one hand, its architecture is cloud-based, allowing it to provide a scalable and cost-efficient service.

The use of 5G improves the quality of content consumption and reduces latency. Furthermore, big data is used to analyze student behavior, yielding powerful insights such as how much time they spend on average on the platform or which courses are the most popular.

Finally, platforms can provide on-demand services, allowing corporations to create their training platforms without investing in technological infrastructure, thanks to the partial consumption of systems via APIs.

Income Sharing Agreement (ISA)

These are shared income agreements in which students receive funding to cover the cost of enrolling in a qualification course in exchange for agreeing to pay a percentage of their future salary. A key feature is the establishment of a minimum salary threshold in light of financial obligations, providing students with additional protection if they are unable to find a high-paid job in the near future.



These models have had significant growth in the Anglo-Saxon markets. They currently have a strong presence in the industry of intensive technological training and the trend is for it to gradually expand to other qualification courses that offer high rates of employability.

Within this boom, the potential of the LAC market and the challenges it assists in overcoming should be considered. Unfortunately, the region has socioeconomic barriers to accessing quality education. ISAs represent a financing instrument that helps to effectively democratize teaching by allowing talented students with limited resources to access qualification opportunities that will enhance their career while also being profitable.

Without a doubt, one of these companies' strengths is their ability to leverage new technologies. Big data and artificial intelligence are at the heart of everything, allowing the scoring model to estimate the student's repayment capacity based on employability and future salary. To supply the models with the information, they rely on APIs to connect in real-time with public databases, such as tax systems. APIs also allow these companies to license the product to third parties, allowing them to manage their own ISA financing programs.




In the region, Quotanda is an example of a company that specializes in financing these programs through an innovative ISA as a Service technology that allows it to manage credit portfolios on behalf of the various boot camps or investors. IDB Lab is assisting them in contributing to the first inclusive program of this type of funding aimed at increasing access to educational opportunities in technology for women and low-income individuals.

Bootcamps

Refer to intensive courses that last between three and six months and are taught by high-performing schools. They have very practical learning methodologies, and their offer is primarily focused on providing their enrollees with digital skills and technological skills.

The global expansion of these solutions comes as no surprise: digital transformation is affecting all economic sectors and profiles with digital knowledge and skills are required. The difficulty in finding them raises demand, raising wages, and attracting the attention of a large number of workers.

EXAMPLE: INCOME SHARING AGREEMENT



"Fintech focused on education"

You study and do not pay until you get a job. Once you have a job, you share a percentage of your monthly salary until you pay for the course.

VALUE PROPOSITION

Bcas is a Fintech that democratizes access to education through flexible financing models that make it easier for talented students, regardless of their economic resources, to pursue post-compulsory studies that allow them to access quality jobs




TECHNOLOGY

Big Data Big data and artificial intelligence for the development of the scoring model and debt repayment capacity

APIs to connect to public databases and license products

ALLIANCES

Partnerships with more than 30 qualification centers, including:

IMPACT

- Democratization of access to education, eradicating socioeconomic barriers
- Increased income and quality of life for their students

CUSTOMER SEGMENTS

Customer segments:

Individuals: People who want to be qualified and require funding

Schools: For technology licensing

RESULTS

+80,000 enrolled students

+340 loans granted

24% IRR on loans




KEY CAPABILITIES AND RESOURCES

- Consolidation of business verticals and leadership position
- Expansion in the LATAM market
- Strengthening agreements and partnerships

MAIN REVENUE STREAMS

- Charging interest on loans granted
- Licensing of technologies for the granting and monitoring of ISAs for qualification centers that directly grant this financing

OTHER PLAYERS



Aside from better pay, another reason is the rapid evolution of the skills required as a result of technological advances. This has a two-fold impact on the labor market: i) workers must learn new skills to be more efficient in their activities (upskilling) and ii) many must be qualified to adapt to the new context, avoiding being replaced by a machine (reskilling).

The main advantages of this model are in the high employability rates, which assist students in finding better paying jobs, and the fact that they are intensive courses, which shorten the investment recovery period. On the other hand, the practicality of the content and the flexibility of these businesses allow for the inclusion of the most recent market trends in the qualification, as well as having didactic content that is constantly updated.

A barrier to its widespread implementation is its cost, which can reach several thousand euros. In this regard, solutions such as the Income Sharing Agreements (ISAs), discussed in the previous topic, assist in financing course enrollment, lowering the barrier to accessing education, and increasing the number of people who have access to quality digital skills education.

Finally, most boot camps are geared toward teaching technological skills, such as Artificial Intelligence, Big Data, code development, blockchain, cybersecurity, or digital entrepreneurship. As for the last example, in Jamaica, the partnership between IDB Lab and the JPS Foundation organized a boot camp aimed at identifying entrepreneurs with innovative ideas in electric mobility and assisting them in turning their ideas into profitable businesses.



PLAYER MAP

Throughout the document, new technologies are used to strengthen learning systems to democratize educational access and improve teaching quality. The digitalization of the educational experience has enabled the birth of new solutions, as well as the digital transformation of Latin American schools, institutes, universities, and companies.

To summarize, the diagram below depicts the most relevant new digital solutions from Latin American and Caribbean countries that play a critical role in the development and growth of the educational ecosystem, improving forms of learning and promoting employment in the region.



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