Fundación Ceibal

The State of Digital Transformation in Education: Where Are We and Where Are We Heading?

Report

EdTech Initiative

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The State of Digital Transformation in Education: Where Are We and Where Are We Heading?

Report

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The project had a main researcher, Carolina Duer (PhD), who made the main intellectual contribution to the data analysis underlying this report.

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Foreword

Roberto Porzecanski
Director, Ceibal Foundation

Since 2014, Uruguay's Ceibal Foundation has been promoting the transfer of knowledge from Ceibal[1] and encouraging research to contribute to sustainable and equitable digital educational transformations.

Since its creation in 2007, Ceibal has proven that it is possible to promote long-term public policies that combine inclusion, quality, and innovation, fostering the meaningful integration of digital technologies into teaching and learning processes. The path set out has helped to consolidate its strategic role as a center for educational innovation with digital technologies in Uruguay. Its mission to improve learning, expand opportunities, and enable personal development careers through the pedagogical use of technology has made it a regional and global benchmark.

Ceibal Foundation, for its part, extends and projects this leadership to the region by promoting the circulation, adaptation, and appropriation of knowledge generated in Uruguay and other countries. Through research initiatives, technical cooperation, and knowledge mobilization, Ceibal Foundation contributes to ensuring that the accumulated learning can inspire, guide, and strengthen efforts toward digital transformation of education in different contexts. Its role as a regional coordinator allows it to connect actors, promote collective thinking, and generate evidence that helps education systems make informed decisions.

Thus, Ceibal and Ceibal Foundation have established themselves as drivers of a regional agenda that understands innovation not as an end in itself, but as a tool for expanding rights, reducing inequalities, and building more resilient, relevant, and future-oriented education systems. At a time when the region faces significant challenges, this report reaffirms the importance

1 Uruguayan public agency that promotes the integration of digital technologies in the education system.

of committing to cooperation, knowledge sharing, and evidence-based planning in order to move toward an inclusive and sustainable digital transformation.

The development of this Overview of the State of Digital Transformation of Education, based on responses from government and non-governmental stakeholders in 25 countries in Latin America and the Caribbean, is an essential step in guiding public action in the region. No transformation process, particularly one of the size required to integrate technology into education systems, can be sustained without robust data that enables a clear understanding of current conditions, pressing challenges and the strategies that demonstrate the strongest results. Evidence strengthens political decision-making, providing a common ground from which to build consensus and prioritize interventions.

This overview clearly identifies the areas where the greatest progress has been made, whether in structural, political, or institutional conditions; planning for digital transformation; access to devices and connectivity; consolidation of the digital environment for educational resources and content; program development; and/or teacher training proposals. At the same time, it candidly exposes those areas in which there are significant gaps and where there is still a long way to go. Recognizing these contrasts is essential: only then can countries plan realistic, sustainable policies that are aligned with their needs and possibilities.

The richness of the process is also shaped by the diversity of voices involved. The responses reflect complementary perspectives from officials, technical teams, academics, teachers, administrators, civil society organizations, and private sector actors. Each perspective approaches education systems from a different yet complementary standpoint, allowing for a completer and more honest picture of the current situation to emerge." Integrating these perspectives is key to designing policies that not only respond to the vision of governments, but are also relevant and applicable in the field.

This collective effort demonstrates the value of generating shared knowledge in the region and reaffirms the conviction that evidence-based State planning is a prerequisite for achieving digital transformations that are truly inclusive, relevant, and sustainable over time.

Executive Summary

This report presents the results of the Assessment on the State of Digital Transformation of Education (DTE) developed within the framework of the EdTech Initiative project led by the Ceibal Foundation and funded by the International Development Research Centre (IDRC) of Canada. The assessment gathers evidence provided by several stakeholders in the education systems of Latin America and the Caribbean and aims to offer a comparative view of the current state of DTE in the region, identifying progress, gaps, and common challenges that affect its sustainability and pedagogical impact. The results show that, although countries have made progress in incorporating digital technologies into education, structural tensions persist that limit their transformative potential. Recurring issues include a gap between policy design and its implementation at the local level; difficulties in ensuring adequate connectivity for educational use; shortcomings in institutional capacities to lead digital transformation processes; and fragmented teacher training that is poorly coordinated with pedagogical practice and lacks continuity. The lack of coordination between technical decisions and pedagogical definitions contributes to the fragmentation of initiatives and reduces their transformative potential. In this context, the report provides analytical input for public policy decision-making. The evidence presented allows countries to reflect on their level of maturity in the different pillars of DTE and to guide strategic prioritization processes, recognizing the resource and capacity constraints faced by most education systems. The report also highlights the importance of strengthening the institutional framework of DTE, promoting greater coordination between technical decisions and pedagogical definitions, and adopting equity as a cross-cutting principle in order to advance in more coherent and realistic digital transformation processes that have a greater impact on learning.

Study framework: EdTech Initiative

Ceibal Foundation leads the EdTech Initiative, a project committed to strengthening local capacities to drive a sustainable and impactful Digital Transformation of Education in Latin America and the Caribbean (LAC), which is funded by Canada's International Development Research Centre (IDRC). The project, which will be implemented between 2025 and 2027, is structured around three specific objectives:

1. Generating evidence on the current state of educational technology integration in countries in the region. This objective is addressed by i. conducting a regional assessment, presented in this report, which focuses on identifying needs, weaknesses, and strengths, and ii. launching calls for research proposals centered on priority topics that integrate digital technologies into education systems in the LAC region, as derived from the regional assessment.
2. Capacity building for technical teams in the ministries involved, for the effective and sustainable implementation of educational technologies.
3. Mobilization of regional knowledge so that lessons learned are integrated into future educational decisions and strategies. To address this objective, the Latin America and the Caribbean Network for Digital Transformation of Education (LATE Network) has been launched, a platform that brings together strategic actors —governments, academia, and civil society— promoting a comprehensive vision of the incorporation of technology in education, which not only impacts infrastructure but also its use as a catalyst for pedagogical innovation, teacher training, and school management.

Throughout its implementation, the EdTech Initiative emphasizes three aspects that require urgent attention worldwide, but especially in the region. These have been identified through the implementation of initiatives focused on the integration of digital technologies into education systems and exchanges with policymakers during the Montevideo Meeting 2023 —organized by UNESCO's GEM Report, the Ceibal Foundation, and the Ministry of Education and Culture of Uruguay— at which the GEM Report

2023 on Technology in Education (UNESCO, 2023) was globally launched. They include:

- Socioeconomically vulnerable contexts: lack of proven educational approaches specific to the deeply unequal context of LAC for EdTech, urgent need for more evidence.
- Lifelong learning: lack of regional strategies to support the implementation of EdTech with a focus on providing guidance and support for diverse learning pathways.
- Artificial Intelligence (AI): lack of guidance and protocols for the integration of AI in education in LAC countries.

It is important to note that *the EdTech Initiative* is being implemented in partnership with four strategic subregional hubs, which represent the different subregions of Latin America and the Caribbean and ensure a pluralistic and decentralized approach: Movimiento STEM (Mexico and the Andean Region): a leader in educational innovation and the promotion of 21st-century skills; Fundación Zamora Terán (Central America): a pioneer in digital inclusion through massive programs providing access to devices and connectivity; University of the West Indies – UWI (Caribbean): a regional academic center that promotes research and training in digital education; MegaEdu (Southern Cone): a coordinator of public and private actors for the digital transformation of education systems.

Conceptual Framework

As a region characterized by structural inequality, Latin America and the Caribbean must ensure that digital transformation of education promotes the integration of technologies to bridge gaps rather than widen them (UNESCO, 2023). The concept of **Digital Transformation of Education** goes beyond the incorporation of technology, it implies a systemic reconfiguration of teaching, learning, management, and institutional culture through digital technologies. While the notion of digitization or computerization is limited to the incorporation of technological tools, digital transformation involves changes at the structural, pedagogical, cultural, and organizational levels. It is a systemic reform that encompasses public policy, infrastructure, teacher training, content, assessment, and digital governance (UNESCO, 2021; OECD, 2021; ECLAC, 2021).

The understanding of DTE guiding this report is based not only on conceptual developments and international frameworks, but also on the accumulated experience of public policy implementation in the region. In this sense, Ceibal's experience in Uruguay is a key input for the construction of the conceptual framework that underpins the assessment tool. Created in 2007 —initially aimed at eliminating the existing gap in access to devices and connectivity— Ceibal gradually consolidated itself as a nationwide public policy aimed at integrating digital technologies into the education system, with a clear mandate, specific institutional capacities, and continuity over time. Over the course of nearly two decades, its implementation has made it possible to identify that DTE cannot be approached as a linear or exclusively technological journey, but rather as a complex process involving strategic decisions, institutional arrangements, management capacity, pedagogical development, and governance mechanisms. Lessons learned revealed both significant advances and tensions and limitations. Among the main lessons learned, it is noteworthy that the provision of technology alone does not guarantee improvements in learning and that the lack of coordination among actors tends to fragment efforts and reduce their impact. These lessons, derived from the actual implementation of policies at the national level, inform the design of DTE adopted in this framework and the selection of the dimensions analyzed in the assessment.

Based on international conceptual developments, the following are identified as key dimensions in the processes of Digital Transformation of Education:

the expansion of infrastructure and connectivity as a necessary condition for equitable access to devices, networks, and the Internet; the availability of relevant and quality digital resources and content; the strengthening of digital skills among students, teachers, and administrators; the consolidation of digital governance that promotes the responsible use of educational data for evidence-based management; pedagogical and curricular innovation that favors the integration of technologies in teaching-learning processes; and the incorporation of content related to ethics and digital citizenship (UNESCO, 2018).

Digital inclusion should be at the center of education planning in LAC, among other concepts. If digital technologies are considered to be public goods that contribute to the development of citizenship, it is understood that unequal access to technologies is one of the most significant structural challenges in the region. The access gap —understood as a problem not only of connectivity but also of connection quality and device availability— is an obstacle to digital inclusion. However, ensuring technical access is not enough; this must be combined with strategies that guarantee technology is used for pedagogical and educational purposes. In other words, for there to be real digital inclusion, it is necessary to generate meaningful uses of technologies that consider and value the cultural and linguistic diversity that characterizes the countries of the region. This means going beyond simply providing equipment and connectivity to actively promoting the use of platforms, digital content, and pedagogical practices that foster skills relevant to the 21st century, such as critical thinking, collaboration, and problem solving (UNICEF - IIEP UNESCO; 2022; Vera & Rivas, 2023). For this purpose, it is essential to provide support from planning to classroom implementation through comprehensive strategies that integrate pedagogical guidelines, ongoing teacher training, contextually adapted resources, and monitoring mechanisms that allow for sustaining and adjusting the educational use of technology according to local realities.

Ensuring equitable access and promoting meaningful uses of technology fosters the necessary conditions for educational innovation initiatives to achieve their full transformative potential. **Pedagogical innovation** through digital technologies —recognized as one of the dimensions of TDE— can be a way to strengthen learning. Countries in the region face significant challenges in terms of effectively incorporating technology to improve teaching and learning outcomes, and they highlight the existence of common challenges in the current capacity of policymakers. In this regard, the Ceibal Foundation (2023) presented the results and analysis of regional surveys on digital education challenges and needs, emphasizing significant gaps in governments' capacities to strategically direct the integration of technology in schools,

including inadequate teacher training models and insufficient support from local agencies responsible for driving pedagogical innovation through the incorporation of technologies. Various surveys focused on professional development for teachers in EdTech have revealed multifaceted training gaps that inhibit educators' readiness for technology-enabled instruction (Fundación Ceibal, 2023). With regard to the development of innovative practices using digital technologies, Mikeladze and Nakashide-Makharadze (2024) point out that integrating technology into education systems is a complex process that encompasses three interrelated areas: pedagogy, change management, and technology. Achieving an optimal balance between these elements is essential for creating an effective educational environment. Based on a comparative analysis of experiences, the authors identify specific "digital innovation practices" and also "support mechanisms" that favor these practices. With regard to the latter, they highlight the importance of institutional management —leadership, strategic planning, governance, IT administration, and technical support as a key factor in ensuring that technology is not relegated to a mere infrastructural resource, but rather integrated into the school organization (Mikeladze and Nakashide-Makharadze, 2024).

Another dimension of digital transformation in education is **digital governance**, and it is worth exploring the meaning of this concept, which encompasses a set of principles, standards, processes, institutions, and mechanisms —involving the State, the private sector, civil society, and the technical community— aimed at governing the creation, provision, access, use, and oversight of digital technologies, data infrastructure, and digital services. Its purpose is to maximize public value (efficiency and service), protect fundamental rights (privacy, freedom of expression), guarantee equity and inclusive access, and ensure transparency, accountability, and risk management in digital contexts. It involves multiple stakeholders and partnerships between government, companies, civil society, and the technical community (OECD, 2021b; World Bank, 2022; UNESCO, 2023b; Council of Europe, 2024; OECD, 2025). Digital governance and education policy are becoming increasingly strategically linked. The former provides the framework of principles, rules, stakeholders, and mechanisms necessary to guide how technologies in education are designed, implemented, and monitored: from learning management platforms and student data systems to public digital infrastructure, digital identities, and interoperability standards[2]. When these

2 Interoperability is understood as the ability of different platforms, systems, and tools to communicate with each other, share information consistently, and enable integrated use of data.

elements are integrated into education policy, they enable more coherent, transparent, and evidence-based decision-making; ensure that technology adoption protects rights; and promote innovation that is sustainable, inclusive, and aligned with pedagogical objectives. An effective education policy in the digital age depends on robust digital governance that coordinates actors, ensures institutional accountability, and maximizes the public value of technologies in the service of learning.

Finally, **digital ethics and digital citizenship** are progressively consolidating as a central dimension of DTE and a key component of the curriculum reform processes undertaken by countries. This concept refers to the set of values, standards, responsibilities, and abilities that guide the behavior of individuals and institutions in digital environments. It includes ethical principles (respect for dignity, privacy, justice, and non-discrimination), responsible practices (critical and safe use of information, awareness of what it means to have a digital presence, respect for authorship and intellectual property, civic behavior on networks), and civic capacities (critical thinking, democratic participation, and online collaboration) necessary to participate fully in social, cultural, and political life mediated by digital technologies. This notion also recognizes the collective dimension: platforms, technology companies, and States share responsibility for shaping a digital ecosystem that enables ethical and safe citizen practices (Council of Europe, 2022 and 2025; UNESCO, 2024; OECD, 2021c; UNICEF, 2021). Integrating ethics and digital citizenship into education policy means coordinating curricula, teacher training, standards, and regulatory frameworks so that schools teach not only technical skills but also critical, ethical, and civic competencies that enable students to manage risks (disinformation, privacy violations, algorithmic biases) and participate responsibly in the digital society. Education policies should promote teaching materials, digital skills assessment, safeguards for the protection of minors, and mechanisms for collaboration between ministries of education, data protection agencies, and civil society, so that the teaching of digital citizenship is linked to rights and responsibilities and is incorporated in a cross-cutting and sustained manner into education systems.

Within this framework, the Ceibal Foundation plays a fundamental role in systematizing learning and projecting Ceibal's experience to other education systems, particularly in Latin America and the Caribbean. Its work is aimed at generating evidence, promoting regional exchange, and developing tools that enable countries to reflect on their own DTE processes from a situated and context-sensitive perspective, without transferring prescriptive or closed models. The EdTech Initiative project is part of this

logic of regional cooperation and knowledge exchange. Based on lessons learned and in line with international conceptual frameworks, the assessment tool used to prepare this report was designed as an instrument to identify common opportunities and challenges among countries in the region, understand the maturity of DTE in different national and local contexts, and guide the thematic pathways that will be explored in depth in the following stages of the project.

International policy and programmatic framework

This section sets out the various instruments that structure the overall framework guiding public policy in the field of education and DTE. Some focus specifically on the processes of integrating digital technologies into education systems, while others include articles specifically related to the subject. In all cases, these are instruments that directly challenge States to ensure that the digitization of education contributes to the consolidation of more equitable, inclusive, and sustainable systems.

In practice, they are used by many countries as a reference to guide public policy planning, align national and sectoral strategic frameworks, inform internal regulatory reforms, and define indicators, monitoring systems, and accountability mechanisms.

1. 2030 Agenda for Sustainable Development Sustainable Development Goal 4 (UN, 2015)[3]

The 2030 Agenda for Sustainable Development was adopted on September 25, 2015, by the 193 Member States of the United Nations General Assembly during a special summit held at the UN headquarters in New York. This document, entitled Transforming our world: The 2030 Agenda for Sustainable Development, establishes an ambitious global action plan with 17 Sustainable Development Goals (SDGs) and 169 associated targets to eradicate poverty, protect the planet, and promote prosperity in its economic, social, and environmental dimensions, with a commitment to "leave no one behind" by 2030. Its importance lies in the fact that it serves as a framework for public action and public policy planning at the global level, guiding national, regional, and local strategies toward shared goals

3 https://www.un.org/sustainabledevelopment/en/sustainable-development-goals/

in areas such as education, gender equality, health, climate change, and social justice, as well as promoting partnerships between governments, civil society, the private sector, and international organizations to achieve sustainable and inclusive development.

The 2030 Agenda calls for partnerships and commitment from all sectors of society to work together towards achieving the 17 Sustainable Development Goals (SDGs). SDG 4 seeks to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all", and recognizes digital technologies as a key enabler in achieving this goal[4].

2. Education 2030: Incheon Declaration and Framework for Action (UNESCO, 2015)[5]

The Incheon Declaration is an international political agreement adopted in May 2015 during the World Education Forum held in Incheon, Republic of Korea, organized by UNESCO together with other international agencies. This declaration establishes the international community's commitment to the 2030 Agenda for Sustainable Development, reaffirming education as a basic human right, a public good, and a key enabler of sustainable development, equity, and inclusion. The Incheon Declaration operationalizes and develops SDG 4, defining principles, priorities, and policy guidelines that guide its implementation, monitoring, and evaluation. It explicitly points out the importance of incorporating ICT as a tool for inclusion and educational quality, and of strengthening institutional capacities for its use. Article 11 states that "ICT must be harnessed to strengthen education systems, disseminate knowledge, provide access to information, promote quality and effective learning and deliver services more efficiently." It also indicates that teaching methods and contents must be supported by appropriate information and communication technologies as one of the elements to ensure educational quality.

4 Target 4.4 states: By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs, and entrepreneurship. The indicator set to monitor and evaluate compliance is: Indicator 4.4.1 Proportion of youth and adults with information and communications technology (ICT) skills, by type of skill. More information is available in the guide *Unpacking Sustainable Development Goal 4: Education 2030*.

5 Available at https://unesdoc.unesco.org/ark:/48223/pf0000245656.locale=en

3. Qingdao Declaration. *Leveraging ICT for Achieving Education 2030.* Seize digital opportunities, lead education transformation (UNESCO, 2015)[6]

This document is the outcome of the International Conference on ICT and Post- 2015 Education, held in May 2015 in Qingdao City, People's Republic of China[7]. It provides United Nations Member States with recommendations for comprehensive national strategies to harness the potential of ICTs and integrate them at all levels of the education system, emphasizing the need to ensure digital equity, universal access to the Internet and training in digital skills, within the framework of lifelong learning and with a view to achieving the SDGs.

Article 5 establishes the commitment to guarantee all girls and boys have access to connected digital devices and a relevant and responsive digital learning environment by 2030[8] (UNESCO, 2015).

Open Educational Resources and open solutions

While open educational resources (OER) provide opportunities not only for improvement but also for access to educational content and promote creative practices in the use of digital resources and the creation of knowledge, the formulation of capacity-building strategies and programs is a central commitment to fully harnessing the potential of OER to increase access to lifelong learning opportunities and achieve quality education[9] (UNESCO, 2015).

6 Available athttps://unesdoc.unesco.org/ark:/48223/pf0000233352

7 Held from 23 to 25 May 2015 in Qingdao, People's Republic of China.

8 Article 5: "Technology offers unprecedented opportunities to reduce the long-existing learning divide. The application of ICT is essential if we are to deliver on our commitment in the Incheon Declaration to nondiscrimination in education, gender equality and women's empowerment for sustainable development. We commit to ensure that all girls and boys have access to connected digital devices and a relevant and responsive digital learning environment by 2030, irrespective of their disabilities, social or economic status, or geographic location. (UNESCO, 2015, p. 4)

9 Article 7 (UNESCO, 2015, p. 4).

Quality learning

The Qingdao Declaration also sets out strategic guidelines aimed at transforming education systems in the long term by urging States to develop sustained, well-founded policies and strategies that harness the potential of digital technologies to improve educational quality and transform ways of learning. At the same time, it acknowledges that "there is a need to redefine learning outcomes and the way in which we organize and assess learning" (UNESCO, 2015, p. 5), so that education systems prepare students of all ages to navigate in interconnected knowledge societies and increasingly technological economies[10] (UNESCO, 2015).

In line with the above, it is recognized that the ability to leverage ICT for learning is no longer a specialized skill; it is foundational to success in today's societies. Therefore, the Declaration acknowledges the need to integrate basic ICT skills and information literacy into primary and secondary education curricula, as well as the adaptation of learning assessments in order to reflect new ways of learning and the specific impacts of the pedagogical use of ICT[11] (UNESCO, 2015).

In order to successfully integrate ICT into teaching and learning practices, it is key to review the role of teachers and adapt their professional training to current times, and there is a need for teacher training institutes to be prepared to use ICT appropriately, as the objective is "to ensure that all teachers benefit from training and professional development programs, and act as the vanguard for technology-supported innovations in education" (UNESCO, 2015, p. 5). Countries commit to providing teachers with system-wide support for the pedagogical use of ICT, to incentivize teacher innovation, and to develop networks and platforms that allow teachers to share experiences and approaches that may be of use to peers[12] (UNESCO, 2015).

Lifelong learning pathways

Lifelong learning "(...) is the guiding principle to enhance individuals' knowledge, skills and competences for work and life" (UNESCO, 2015, p. 5). In this regard, the appropriate use of ICT in education and training at all educational and professional levels and in all modalities is essential for

10 Article 9 (UNESCO, 2015, p. 4).

11 Article 10 (UNESCO, 2015, p. 5).

12 Article 11 (UNESCO, 2015, p. 5).

improving, strengthening and diversifying learning, as well as reaching the most vulnerable groups more effectively (UNESCO, 2015)[13].

Monitoring and evaluation

Countries commit to developing comprehensive national monitoring and evaluation systems to generate sound evidence for policy formulation on the integration of ICT in education, in order to understand the key roles that ICT plays in the transmission of knowledge, the acquisition of new skills and competencies, and in building sustainable and peaceful societies[14].

4. ICT Competency Framework for Teachers. Version 3 (UNESCO, 2018)[15]

Its main objective is to guide the formulation of teacher training policies and programs to improve education through ICT, preparing students to be creative, collaborative and critical citizens. This framework invites consideration of the necessary adaptations to national and institutional contexts, and emphasizes the need to move from the instrumental use of ICT to its integration for pedagogical innovation and the development of 21st century skills.

The Framework consists of 18 competencies organized around the six aspects of teachers' professional practice, at three levels representing different stages in the use of ICT by teachers: 1. Education policies: Understanding ICT in Education Policy; 2. Curriculum and Assessment: Integration of ICT into the curriculum and assessment; 3. Pedagogy: Application of methodologies that use ICT to transform learning; 4. Application of digital skills: Use of digital tools and resources; 5 Organization and Administration: Management of ICT resources and classrooms; 6. Teacher Professional Learning: Use of ICT for continuous professional development.

13 Article 12 (UNESCO, 2015, p. 5).

14 Article 17 (UNESCO, 2015, p. 7).

15 Available at https://unesdoc.unesco.org/ark:/48223/pf0000265721

In addition, the three levels of development, which represent a progression in the sophistication of ICT use:

Level 1: Technology literacy: Acquisition of basic knowledge and use of technology for management and self-learning.

Level 2: Knowledge Deepening: Use of ICT to create collaborative environments, solve problems, and link policy with practice.

Level 3: Knowledge Creation: Use of ICT to design innovative learning environments, support knowledge creation among students and colleagues, and lead learning communities.

5. Paris Declaration. Recommendation on the ethics of artificial intelligence (2021)[16]

This is the first global regulatory instrument on AI ethics, established at the General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO), held in Paris in November 2021. It includes a specific chapter on education and learning ("POLICY AREA 8: EDUCATION AND RESEARCH") (UNESCO, 2021b, pp. 16-17), which promotes the responsible use of AI in educational settings, ensuring data protection, non-discrimination, and algorithmic transparency. It is worth reiterating Article 101, which states:

> "Member States should work with international organizations, educational institutions and private and non-governmental entities to provide adequate AI literacy education to the public on all levels in all countries in order to empower people and reduce the digital divides and digital access inequalities resulting from the wide adoption of AI systems." (UNESCO, 2021b, p. 17).

In turn, article 106 also states:

> "Member States should develop, in accordance with their national education programmes and traditions, AI ethics curricula for all levels, and promote cross-collaboration between AI technical skills

16 Available athttps://unesdoc.unesco.org/ark:/48223/pf0000380455

education and humanistic, ethical and social aspects of AI education." (UNESCO, 2021b, p. 17).

It is a benchmark tool for framing current digital transformation processes with AI in the digital transformation of education.

6. UNESCO Recommendation on Open Educational Resources (OER): *Supporting universal access to information through quality open learning materials* (2019)[17]

Aimed primarily at ensuring that digital learning is a tool for inclusion rather than widening educational divides, this instrument —adopted on November 25, 2019, by the UNESCO General Conference— promotes free and equitable access to digital knowledge. It is an international treaty that urges Member States to promote universal access to quality educational materials through open licenses, focusing on the creation of support policies, capacity building, the promotion of equity and inclusion, the development of sustainability models, and international cooperation, establishing a framework for open knowledge to drive inclusive digital learning and the SDGs. This non-binding international regulatory instrument is structured around five areas of action: I. building capacity to create, access, use, adapt and redistribute OER; II. developing policies and/or regulatory OER frameworks, especially for those funded with public resources; III. promoting inclusive, equitable, and high-quality OER, accessible to all, particularly vulnerable groups; IV. fostering economic and infrastructure models that ensure the long-term viability of OER; and V. international cooperation as a means of sharing best practices and resources UNESCO (2023c).

17 Available athttps://unesdoc.unesco.org/ark:/48223/pf0000383205

7. Global Digital Compact, 2024 United Nations Summit of the Future[18]

The Global Digital Compact (GDC) was adopted at the United Nations Summit of the Future in September 2024 as part of the "Pact for the Future", establishing a global framework for digital cooperation and AI governance, focused on a secure, inclusive, and people-centered digital future, seeking to universalize internet access, regulate AI ethically, and combat disinformation.

Key commitments include: Connecting billions of people, schools, and hospitals to the internet by 2030 (universal access); protecting human rights in the digital environment, especially for children, and mitigating harm; establishing ethical guidelines and creating a scientific panel for AI, promoting global dialogue (AI governance); promoting the development of open and secure digital infrastructure; facilitating access to scientific information to counter disinformation; creating a multilateral framework for cooperation on data governance and cybersecurity.

The Pact explicitly mentions in Annex I the need to establish and support national digital skills strategies, adapt teacher training programs and educational curricula, and provide training programs for adults in the digital age[19].

8. *Six pillars for the digital transformation of education: a common framework* (2025)[20]

Building on the momentum generated by the Global Digital Compact, the partners of the Digital Transformation Collaboration (DTC) —a subgroup of

18 Available at https://www.un.org/en/summit-of-the-future/global-digital-compact

19 "Establish and support national digital skills strategies, adapt teacher training and education curricula and offer adult training programmes for the digital age. Our aim is to achieve maximum coverage of basic digital skills for as many people as possible, while also promoting intermediate or advanced digital skills."

20 Available at https://unesdoc.unesco.org/ark:/48223/pf0000391299

the Global Education Coalition launched by UNESCO in March 2020[21]—agreed on a common framework for digital transformation focused on the specific needs of the education sector.

This framework breaks down the essential components of digital transformation in education from a systems perspective. The outer layer of the framework represents the vision (purpose, priorities and principles) while the inner layer comprises the six pillars: coordination and leadership; connectivity and infrastructure; cost and sustainability; capacity and culture; content and solutions; and data and evidence. The framework serves as a tool to support decision-makers in the development of a holistic vision and participatory strategies for the use of technology to advance education system goals, allowing for a more effective response to evolving educational needs

9. Statement on Inclusive and Sustainable Artificial Intelligence for People and the Planet[22]

Adopted by 61 countries during the AI Action Summit in Paris on 11 February 2025, this declaration calls for AI to be open, inclusive and ethical, and promotes the accessibility of AI to reduce the digital divide and ensure transparency and reliability.

The declaration affirmed the following main priorities:

- Promoting AI accessibility to reduce digital divides;
- Ensuring AI is open, inclusive, transparent, ethical, safe, secure and trustworthy, taking into account international frameworks for all;

21 Established in 2020 to respond to the historic disruption of global education caused by the COVID-19 pandemic, the Coalition has since evolved into a dynamic platform with 232 members bringing expertise and resources from a diverse range of sectors. Active in 112 countries, the Coalition leverages digital transformation and partner cooperation to advance Sustainable Development Goal (SDG) 4, focusing on inclusive, equitable, and quality education for all. More information at https://www.unesco.org/en/articles/five-years-impact-unescos-global-education-coalition-highlights-key-milestones

22 Available at https://onu.delegfrance.org/statement-on-inclusive-and-sustainable-artificial-intelligence-for-people-and

- Making innovation in AI thrive by enabling conditions for its development and avoiding market concentration driving industrial recovery and development.
- Encouraging AI deployment, positively shapes the future of work and labor markets and delivers opportunity for sustainable growth;
- Making AI sustainable for people and the planet;
- Reinforcing international cooperation to promote coordination in international governance.

This declaration recognizes the need to enhance shared knowledge on the impacts of AI in the job market, though the creation of a network of Observatories, to better anticipate AI implications for workplaces, training and education and to use AI to foster productivity, skill development, quality and working conditions and social dialogue. Although few countries in the region have signed this Declaration (Brazil, Chile, Mexico, and Uruguay), it remains open to future signatories, and it is hoped that this global dialogue on AI will continue at future summits.

Assessment methodology

From the conceptual framework to the assessment tool

The assessment tool developed by Ceibal Foundation aims to operationalize the principles and concepts associated with DTE through a practical instrument designed to assess the level of maturity of education systems in their digital transformation processes.

The conceptual framework that guides this tool is based on a central premise: DTE cannot be understood or addressed as the sum of isolated technological initiatives, but rather as a systemic process that articulates strategic, pedagogical, organizational, and technological dimensions. This perspective is in line with revised international frameworks, which emphasize the need to align technology, public policies, institutional capacities, and pedagogical practices to generate sustainable impacts on learning.

From this perspective, Ceibal systematizes lessons learned over more than 18 years of experience implementing public policies on education technology, integrating them with international evidence and contemporary theoretical frameworks. The result is an assessment tool that draws on both elements: I. Ceibal's experience and II. international conceptual, regulatory, and programmatic frameworks. This tool translates the principles of DTE into pillars, dimensions, and observable indicators, allowing not only to outline the current state of a system, but also to identify tensions, divides, and opportunities.

The assessment methodology presented below is therefore built as an operational extension of the conceptual framework, rather than as an independent exercise. Every methodological decision, from the selection of dimensions to the formulation of questions, responds to this comprehensive concept of digital transformation of education.

In line with this systemic view, the tool is based on a key definition: DTE cannot be understood or diagnosed from the perspective of a single stakeholder. Analyzing it solely from public sector, technology/infrastructure providers,

third sector actors or academia perspectives would mean capturing only fragments of what is, by definition, interdependent and relational.

For this reason, the assessment tool methodological design assumes from the outset the need to incorporate multiple voices, pathways, and levels of responsibility. Only by taking an integrated, comprehensive, and contextualized approach is it possible to understand the degree of maturity of an education system and the opportunities and challenges it faces.

The information used in this study was obtained from distributing a questionnaire, designed as an assessment tool, among multiple actors linked to Digital Transformation of Education in countries of the region. The assessment tool is the result of a process of systematizing Ceibal's learning over its 18-year history. It aims to capture all the aspects that need to be taken into account when planning and implementing digital transformation of education processes within a territory.

The 180 responses obtained, distributed across 25 countries, came from five stakeholder profiles: three governmental and two non-governmental[23]:

1. REPRESENTATIVE OF THE EDUCATION SYSTEM, GOVERNMENT STAKEHOLDER - (e.g. Minister of Education; Secretary of Education; Deputy Minister of Education; Under-Secretary of Education).
2. EDUCATIONAL LEADER - GOVERNMENT STAKEHOLDER - (e.g. Curriculum Director; Teacher Training Director; Education Programs Director).
3. TECHNOLOGY LEADER - GOVERNMENT STAKEHOLDER - (e.g. Director of Education Technology; Head of Information Systems in Education; Coordinator of Innovation and Digitalization in Schools).
4. SCHOOL STAKEHOLDER IN BASIC EDUCATION / EDUCATIONAL COMMUNITY - (e.g. Teachers; Representatives of teachers' associations; School management; Representatives of school management's associations).

23 Methodological note: The information collected for this assessment is based on the views, opinions, and representations of the stakeholders who responded to the questionnaire. In this sense, results reflect situated and contextual interpretations of ongoing Digital Transformation of Education processes and are not intended to constitute an exhaustive or official evaluation of national education policies or systems. Their value lies in offering an analytical approach based on the experience and knowledge of the five profiles considered.

5. THIRD SECTOR ORGANIZATIONS / CIVIL SOCIETY / RESEARCHERS / UNIVERSITIES - (e.g. Researcher in a think tank or digital education foundation; Consultant in educational innovation policies; Representative of multilateral organizations with experience in digital transformation of education; Ed-tech expert in the private sector; Representative of NGOs or foundations that promote digital education; University representative).

The questionnaire was structured around nine thematic pillars, divided intothree strategic pillars and six tactical pillars: "**Context of the Education System**", "**Identification of Problems**", "**Definition of Success**", "**Devices**", "**Connectivity**", "**Platforms**", "**Programs**", "**Teacher Training**" and "**Data**".

Each pillar included three to six dimensions, for which an assessment of the level of maturity was requested.

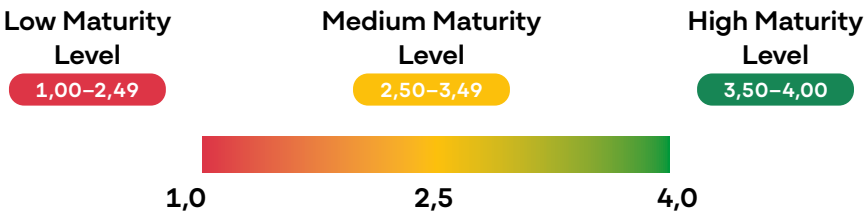
Mixed methodological approach: it integrated quantitative and qualitative strategies using a data collection instrument that included closed-ended responses (statistically analyzed ratings by dimension) and open-ended responses (narratives of the five profiles) from 25 LAC countries. Numerical and textual data are combined to diagnose the degree of progress of DTE processes in the region.

Quantitative responses were structured using a four-point ordinal scale, ranging from 1 to 4, where 1 corresponds to 'very low,' 2 to 'low,' 3 to 'high,' and 4 to 'very high.

1. very low
2. low
3. high
4. very high

Based on this four-category ordinal scale, a maturity assessment system was defined consisting of three levels, with the following cut-off points: low (1.00–2.49), medium (2.50–3.49), and high (3.50–4).

Figure 3. Maturity assessment system for Digital Transformation in Education



The colors are distributed gradually from red (low rating) to green (high rating), passing through yellow (medium rating), following the same scale as the heat map.

The cut-offs were defined by qualitative thresholds frequently used in institutional maturity models.

- A score of 2.50 indicates a shift from critical perception to emerging progress.
- A score of 3.50 indicates consolidation and maturity.

Clustering:

Following the analysis of each of the pillars, this report offers a clustering proposal that groups countries with similar characteristics in terms of their level of digital educational development. Each group or "cluster" represents a set of countries that share structural or educational policy characteristics.

The purpose of this grouping is to guide the exchange of good practices among countries in the region, recognizing the advances and critical issues that arise in different scenarios or clusters.

Given the limitations of quantitative strategies in capturing the institutional complexity of each country, a qualitative clustering approach was prioritized. This approach was based on thematic and discursive analysis of the open-ended responses corresponding to the pillar "Context of the education system". The process made it possible to identify narrative patterns, institutional structures, and levels of intersectoral coordination.

As a result, four distinct regional clusters were defined, grouping countries according to their level of institutional maturity, form of governance, strategic vision, and coordination of stakeholders.

Regional results by pillar

The table below shows the average score and key findings for each of the pillars around which the questionnaire was structured.

Table 1. Average, maturity rating and key findings by thematic pillar at regional level

Thematic Pillar	Overall Average[24]	Maturity level	Key Findings
Context of the education system	2.48	LOW	Advances in coverage and regulation coexist with territorial gaps and implementation limitations that render inequalities invisible.
Problem identification	2.71	MEDIUM	Growing capacity to identify priority challenges. Limitations in systematic and participatory diagnostic processes hinder the design of evidence-based policies, especially from a territorial and equity perspective.
Definition of success	2.45	LOW	The lack of indicators, pedagogical criteria, and monitoring weakens the translation of strategic visions into effective policies that are consistent with the territorial experience.
Devices	2.43	LOW	Significant progress in initial coverage, but fragility in sustainability and systemic coordination. A lack of planning for technological renewal, limited technical support, and territorial inequality are evident as the main challenges.
Connectivity	2.44	LOW	There are infrastructure expansion initiatives with limitations in quality, coverage, and sustainability. Connectivity is poorly aligned with pedagogical uses, which limits its educational impact.
Platforms	2.44	LOW	Progress has been made in the development and availability of platforms. However, this does not guarantee their pedagogical effectiveness. Challenges remain in terms of usability, coverage, and pedagogical integration.

24 Methodological note: The values were obtained by calculating (government average + non-government average) / 2, and then averaging across all countries. This score shows the average level of development achieved in each pillar at the regional level. A weighting strategy by type of actor was applied to preserve the balance between state and non-state points of view.

Thematic Pillar	Overall Average[24]	Maturity level	Key Findings
Programs	2.40	LOW	The lack of curricular coordination, inter-institutional continuity, and impact assessment weakens the transformative scope of programs, especially in vulnerable communities.
Teacher training	2.39	LOW	Teacher training strategies in digital technologies are being implemented. Their scope, equity, and effectiveness are limited, revealing territorial divides and a lack of impact assessment.
Data	2.39	LOW	Progress is made in developing education information systems. Challenges in interoperability and culture of use for educational decision-making.

Context of the Education System Pillar

1. Overview of the pillar

Education systems in Latin America and the Caribbean are characterized by high heterogeneity in terms of institutional capacities, levels of technological development, territorial conditions, and public policy priorities. In this context, the integration of digital technologies in education has unfolded unevenly, combining nationwide initiatives with targeted programs, pilots, and isolated experiences.

This heterogeneity also takes place within education systems that fulfil an expanded social role. In many countries in the region, schools are a central space of social support for children and adolescents, and in many cases they guarantee basic services, such as food, which go beyond the strictly educational function. These challenges are compounded by day-to-day management demands and infrastructure conditions that strain the operational capacity of educational institutions. In this context, the pedagogically meaningful integration of technology is often relegated in the face of other priorities considered more urgent, even when planning processes identify it as a priority.

At the central management level, these tensions often translate into large-scale institutional structures with high levels of organizational complexity and fragmented decision-making processes. In this context, the definition and implementation of educational digital transformation policies tends to be diluted among multiple areas, hierarchical levels, and actors, making it difficult to build a clear and sustained strategy over time.

Likewise, in many education systems in the region, technical decisions related to digital infrastructure, connectivity, or innovation are delegated to other ministries or specialized agencies. While these arrangements may respond to criteria of administrative efficiency, in practice they often position the education sector as just another demanding actor, rather than a protagonist in defining solutions aligned with educational objectives. Given that technology alone does not leverage learning, this situation is problematic, as technical decisions are disconnected from the pedagogical, curricular and institutional definitions that correspond to the education sector.

In this context, the absence of a clear institutional framework for decision-making and accountability in digital transformation of education limits the capacity of systems to prioritize, coordinate and sustain these policies. Strengthening governance and accountability mechanisms is therefore key to moving toward more coherent, comprehensive, and sustainable digital transformation of education processes.

The pillar Context of the Education System refers to the set of structural, political, institutional, and cultural conditions that influence the possibilities for advancing in digital transformation of education processes.

The analysis was based on **closed and open responses** from **government and non-governmental stakeholders** (third sector organizations, civil society, academia, school stakeholders) from **25 countries** in Latin America and the Caribbean.

Under this thematic pillar, the following dimensions were examined:

- **Experience:** The degree to which education systems have designed and implemented policies or programs that integrate technologies into it.
- **Governance:** The existence of legitimate governance, characterized by clear leadership, political commitment and institutional capacity to sustain digital transformation efforts.
- **Lifelong learning:** It encompasses the education system's role in fostering key skills (such as digital literacy, or critical thinking) for lifelong learning, in light of the challenges and opportunities posed by digital transformation.
- **Equity:** The active use of technology to support students at risk of dropping out and accompany them in their educational journey, especially in vulnerable contexts.
- **Artificial intelligence:** The existence of regulatory frameworks or national policies that promote the use of AI and guide its application in education.

A weighting strategy by type of actor was applied to preserve the balance between state and non-state points of view.

2. Quantitative results

Overall average for this pillar: 2.48 → Average rating at regional level: indicates a **moderate** perception **but with concerns** about the structural capacity of education systems.

Table 2. Average by dimension included in the Context of the education system pillar

Dimension	Average	Maturity level
Experience	2.84	Medium
Governance	2.77	Medium
Lifelong learning	2.59	Medium
Equity	2.22	Low
Artificial intelligence	2.01	Low

As shown in Table 2, the dimensions of **equity** and **AI** were rated most critically, reflecting **structural weaknesses in the use of technologies to support learning trajectories in vulnerable contexts and a lack of systematic innovation as a feature that hinders the use of AI in education**.

Table 3. Differences by type of stakeholder:

Type of stakeholder	Average of the pillar
Government stakeholders	2.69
Non-governmental stakeholders (school stakeholders and third sector organizations)	2.16

There are differences in the assessment when breaking down the responses —both closed and opened by type of stakeholder. While **government stakeholders** recognize the policies and institutional reforms that have been developed in recent years, **non-governmental stakeholders** offer a more critical view, pointing to territorial inequalities and a lack of resources. Within this group, there are also different profiles: representatives of third sector organizations, in particular, highlight the limited impact of existing policies.

3. Key perceptions and statements Qualitative analysis

When analyzing the stories presented in the open-ended responses, some issues mentioned regularly within the framework of this pillar stand out. First, references to **structural and territorial inequalities** reveal a cross-cutting concern about **inequality between rural and urban areas**, with few mentions of Indigenous Peoples, migrants, or students with disabilities.

Below is a selection of representative quotes from the responses.

[Regarding the programs developed] "Their implementation has not occurred throughout the country, since rural areas, especially in the highlands and eastern departments, face greater challenges due to poor connectivity, technological equipment, and economic resources. *The most affected groups are students from indigenous and rural communities, as they are at risk of dropping out of school due to limited access to the internet and devices.*"
School stakeholder (Teacher), Guatemala.

"Since the 1990s, isolated programs have been implemented, many of which have not been sustained over time, as they depend on successive administrations, which have changed frequently. Most efforts have been focused on rural schools."
School stakeholder (School management), Peru.

"Education technology is still in the process of becoming widespread; there are still areas where there is inadequate connectivity and greater investment in technological equipment is required. The gaps are most pronounced in rural areas of the country and in the rainforest region."
Technology leader, Peru.

"Schools in rural areas have serious problems. Sometimes they don't even have electricity."
School stakeholder (Teacher), El Salvador.

"Indigenous peoples are not considered when making the policies. Only urban areas are taken into account."
Representative of a civil society organization (CSO), Mexico.

"There are sectors where efforts should be concentrated to prevent dropouts, but these often coincide with those with vulnerabilities such as little or no connectivity or insufficient technological resources."
Representative of the education system, Ecuador.

Another aspect regularly mentioned in the context of this thematic pillar refers to the fragmentation and outdated nature of public policies. Decades of efforts to improve access to and inclusion in education are recognized, but a lack of continuity in the face of changes in government is noted. Criticism is also levelled at the lack of intersectoral coordination and the weak integration of sectoral plans with other areas central to DTE processes, such as infrastructure, connectivity and teacher training.

"These are isolated experiences at subnational level. Development is very uneven at national level."
CSO representative, Argentina.

"There is no national strategy for innovation in education. What exists is partial or limited to isolated cases."
University representative, Honduras.

The information gathered within the framework of this pillar also frequently refers to **governance and emerging innovation**. Government stakeholders highlight regulatory advances and warn of the challenges involved in implementation, which is not always effective. The integration of generative AI into education systems appears to be a critical issue, given the low level of institutional preparedness.

"We have laws and regulatory frameworks, but implementation depends on local will, and that creates a lot of inequality."
Representative of the education system, Colombia.

"There is still no regulation of AI, although seminars and workshops on the subject have been held."
Representative of the education system, Dominican Republic.

"AI is not yet an issue for the country's education policy. There are no formal strategies or teacher training in this area."
CSO representative, Bolivia.

In essence, this pillar reveals a critical view of the structural inequalities that limit the digital transformation of education in the region. While governments highlight advances in coverage and regulation, school and civil society actors point to **limitations in actual implementation and the continued existence of deep territorial gaps**, revealing inequalities hidden in national statistics.

The low scores in the areas of **artificial intelligence and equity** point to challenges that are not only technical, but also **cultural and organizational**, which have not yet been addressed by public policy.

Problem identification Pillar

1. Overview of the pillar

The main challenge for education systems is not the absence of initiatives for digital transformation of education, but rather the gap between stated ambitions and the actual capacity to implement them in a consistent and sustained manner. In many cases, systems lack structured information that would allow them to assess their institutional, technical, and pedagogical readiness to carry out these processes.

This challenge is reinforced by the intrinsic complexity of digital transformation of education processes. These are processes that span multiple levels of responsibility, from the definition of public policies to implementation in schools and classroom practices, and involve a diversity of actors with different roles, incentives, and timelines. Thus, clearly identifying the problems, their causes, and their level of criticality is a challenge in itself.

Without a comprehensive diagnosis that allows for the organization of this complexity, the identification of strengths and gaps, and an understanding of the degree of maturity of each dimension of the system, digital transformation of education policies run the risk of reproducing partial approaches, with limited impact and little capacity to adapt to changing contexts. From this perspective, the assessment is not designed as a normative evaluation exercise, but rather as a tool aimed at prioritizing, sequencing and accompanying transformation processes in an informed and realistic manner.

This pillar assesses the education system's capacity to identify the main challenges that DTE seeks to address, from a contextual and situated perspective. Both the institutional mechanisms for diagnosis and the capacity to listen to and systematize school voices are analyzed.

The dimensions included in this pillar are:

- **Target population:** The degree to which the population most affected by the problem is clearly identified, including its level of vulnerability.
- **Digital transformation focus:** The areas that have been the primary focus of digital transformation efforts to date: school management and improvements in learning outcomes.
- **Key challenges:** It points to the clear identification of the bottlenecks that digital transformation seeks to address, ensuring that they are relevant and supported by evidence. A challenge is considered relevant and urgent when it has a significant impact on the equity, quality, or efficiency of the education system, and when its resolution is regarded as a priority by key stakeholders.

The strategy of weighting by type of stakeholder was maintained, and a distinction was made internally between the perception of **school actors** and that of the **third sector organizations** within the non-governmental block.

2. Quantitative results

OVERALL AVERAGE FOR THIS PILLAR

The average regional rating was **2.71** —the highest of the nine pillars— indicating a **moderate-high** perception and placing this pillar at a medium level of maturity.

Table 4. Average by dimension included in the Problem identification pillar

Dimension	Average	Maturity level
Target population	2.82	Medium
Digital transformation focus	2.65	Medium
Key challenges	2.64	Medium

The three dimensions included within this thematic pillar have an average medium rating, although greater progress is perceived in terms of identifying the population most affected by the weaknesses of digital technology integration processes in education systems (dimension: "Target population").

Table 5. Differences by type of stakeholder:

Type of stakeholder	Average rating
Government stakeholders	2.95
Non-governmental stakeholders (school stakeholders and third sector organizations)	2.45

As shown in Table 5, the rating of government stakeholders is higher than that of non-governmental actors. While the former have referred to adequate institutional diagnostic mechanisms, the latter offer a more critical perspective. In turn, among non-governmental actors, **school stakeholders observe limitations in channeling their specific demands** and experiences, while **third sector actors point to a lack of depth in planning and poor representation of territorial diversity**.

If we examine the assessment of this pillar across countries, there is considerable disparity. In some cases, scores above 3.00 are achieved (for example, Brazil with 3.43 and Uruguay with 3.20), while in others they do not reach 2.00 (for example, Paraguay with 1.00 and Guatemala with 1.90). These results highlight **significant regional diversity:** some countries demonstrate stronger institutional diagnostic capacity, whereas others face substantial challenges in identifying needs.

3. Key perceptions and statements Qualitative analysis

The analysis of the open-ended question —aimed at investigating the reasons for ratings given to closed-ended questions, including examples and evidence— reveals three particularly significant aspects with regard to this thematic pillar. Firstly, the **lack of structured assessment systems.** With regard to this point, representatives of third sector organizations and universities complain about the **absence of systematic mechanisms for identifying and prioritizing problems.**

"Everything is based on intuition or political urgency. There is no system that uses real data to identify what is happening."
University representative, Colombia.

In addition, there have been frequent references to the **lack of involvement of school stakeholders in identifying needs and critical issues.** Both teachers and school management indicate that **their voices are not systematically taken into account** when defining priorities.

"In schools, we see the needs every day, but no one asks us or takes note of what we report."
School stakeholder (Teacher), Ecuador.

"Assessments are conducted from the capital cities, without reaching local communities."
CSO representative, Peru

A third issue regularly mentioned in the context of this pillar is the weak monitoring of structural gaps. The **monitoring of inequalities** is **fragmented, outdated or non-existent**.

"There is no data on students with disabilities, indigenous peoples or migrants. These are ignored populations."
CSO representative, Mexico.

"There is no real follow-up on how the gaps are evolving."
Academia representative, Argentina.

Overall, this pillar reveals a **certain fragility in education systems capacity to comprehensively diagnose problems affecting digital transformation of education.** Although there are attempts to listen and evaluate, these are neither sustained nor sufficiently coordinated. The voices of schools actors and organized civil society stakeholders are not always incorporated, and **the lack of continuous monitoring** limits the possibility of designing evidence-based policies.

Strengthening this pillar requires institutionalizing participatory assessment mechanisms and permanent monitoring strategies, with a focus on equity and diversity.

Definition of success Pillar

1. Overview of the pillar

In this study, digital transformation of education is understood as a dynamic and progressive process, rather than a final state to be achieved. In this sense, success is not measured in terms of compliance with single standards, but rather in education system's capacity to advance consistently, learn from experience, and adjust its strategies based on evidence.

In many cases, education technology policies are formulated with the ultimate goal of improving student learning. However, the causal link between incorporating technologies, such as the provision of devices, and learning outcomes improvements is complex and non-linear. Expecting direct, short-term impacts on standardized assessments can lead to hasty conclusions and, in some cases, to the premature abandonment of digital inclusion policies with high transformative potential.

From the perspective adopted in this study, the definition of success must be consistent with the level of maturity of the education system and the stage of the process it is currently in. In early stages, success can be linked to public policy milestones achievement, such as coverage levels, device availability, or the existence of clear operational mechanisms, for example, repair and support times, which ensure the sustainability of the initiative.

As the system advances and institutional and pedagogical capacities are strengthened, success metrics must evolve. In intermediate phases, it is more relevant to evaluate the effective use of technologies in schools and classrooms, as well as teacher participation in training and support programs. Only in more mature stages, when technology-mediated pedagogical practices are well established, is it reasonable to analyze impacts on student learning.

From this perspective, a successful process of digital transformation of education is one that allows the system to develop capacities, reduce internal divides and sustain continuous improvement aligned with its educational priorities, recognizing that different levels of progress require different evaluation criteria.

This pillar analyzes whether education systems have a clear, shared, and measurable definition of "success" in digital transformation of education processes. It assesses both the existence of strategic objectives and the capacity to establish indicators, targets, and evaluation mechanisms.

Within this framework, information was obtained on the following dimensions:

- **Planning:** The existence of a clearly defined vision for digital transformation, with goals and timelines that guide and enable progress monitoring.
- **Support:** The extent to which key actors and the education community understand and support the system's vision for digital transformation.
- **Equity:** It refers to the use of success indicators that identify gaps and measure progress in equity among different groups of students,

with gaps understood as inequalities based on gender, geographic location, socioeconomic status, disability, among others.

- **Artificial Intelligence:** Integration and promotion of the use of AI in the education system to improve student learning and education management.

The inclusion of AI as a relevant dimension within this pillar reflects its cross-cutting and transformative nature in DTE processes. AI constitutes one of the most disruptive technological shifts of recent decades, not only because of its rapid adoption, but also because it introduces new possibilities (and risks) in the way education systems conceive learning, teaching, assessment, and management. In this regard, unlike previous technologies —such as the provision of devices or connectivity— whose impact largely depends on their physical deployment, AI tools are now accessible to a significant share of the population with basic access to devices and connectivity. This has created a scenario in which AI is present in educational practices, even in the absence of explicit policies to regulate and guide its use.

In this context, the main challenge for education systems lies in their capacity to acknowledge the existence and scope of this technology; to explicitly define the purposes for which, and the criteria under which, AI should contribute to the education system and to DTE; to establish ethical, regulatory, and pedagogical frameworks to guide its use; and to set clear standards for transparency, equity, data protection, and accountability. This implies establishing clear objectives, indicators, and mechanisms to guide its use towards improving learning outcomes and education management, and, therefore, preventing its adoption from creating or deepening existing gaps if it is not mediated by appropriate policies, ethical frameworks, and equity-based criteria.

From this perspective, the inclusion of AI in DTE requires a shift from a logic of technological availability to one of pedagogical intentionality, whereby its use is guided by clear educational objectives and aligned with the principles of equity and learning improvement.

2. Quantitative results

OVERALL AVERAGE FOR THIS PILLAR

The average regional rating was **2.43**, which represents a **weak perception** of the systems' ability to establish a solid definition of success in digital transformation.

Table 6. Average by dimension included in the Definition of success pillar

Dimension	Average	Maturity level
Planning	2.64	Medium
Support	2.56	Medium
Equity	2.44	Low
Artificial Intelligence	2.07	Low

Although there are generic definitions of success, the inclusion of pedagogical criteria and, above all, specific indicators is very limited. The most critical aspects within this pillar are those related to: I. the identification and monitoring of gaps (equity) and II. the integration of AI tools for both learning enhancement and education management.

Table 7. Differences by type of stakeholder

Stakeholder subtype	Average rating
Government stakeholders	2.63
Non-governmental (school stakeholders/third sector organizations)	2.22

As shown in Table 7, once again, **government stakeholders give a higher rating** and recognize the progressive development of strategic frameworks that define DTE success. For their part, non-governmental actors focus on the remaining challenges: while **school stakeholders** point to a lack of operational clarity and pedagogical relevance, representatives of the **third sector organizations** highlight the **absence of sustained evaluation and monitoring mechanisms.**

When looking at the assessment of this pillar in each country, it can be seen that those with the lowest ratings are Saint Vincent and the Grenadines (1.75), the Bahamas (1.92), Suriname (2.00) and Barbados (2.00). Based on this, it is possible to conclude that the Caribbean subregion faces significant challenges in consolidating an operational definition of success in digital transformation processes, with clear indicators.

3. Key perceptions and statements Qualitative analysis

The following table summarizes the indicators mentioned by stakeholders consulted to measure the success of digital transformation of education. It shows the frequency with which these indicators were mentioned, providing an approximation of their prevalence and centrality in monitoring and evaluation practices in the region.

Table 8. Indicators and mention frequency

Indicator / Metric	Frequency
Number of devices delivered	Very high
Connectivity or platform coverage	High
Participation in teacher training	Medium
Use of technological tools	Medium
Improvements in learning	Low
Perceptions of education stakeholders (survey-based)	Very low

Among the most relevant aspects within the framework of this pillar are the lack of clarity and operability. School stakeholders, in particular, often indicate that **success is not defined in a practical or assessable way.**

"We don't know what is really expected with digital transformation. There are no clear goals."
School stakeholder (Teacher), Peru.

"They talk about 'transformation', but there are no concrete indicators or impact assessment."
School stakeholder (School management), Guatemala.

Another recurring theme is the limitations of success defined solely in terms of technical components, without any link to pedagogy. In this regard, third sector organizations point out that **definitions of success are focused on technological access or coverage, without any pedagogical integration.**

"Measuring success by how many devices were delivered is not an education-based definition."
CSO representative, Mexico.

"There is a lack of pedagogical vision. There is no mention of quality or learning in the frameworks for success."
University representative, Colombia.

In addition, there have been recurring reflections on the need to strengthen monitoring and evaluation mechanisms. There is consensus that it is essential to **move forward in consolidating institutional systems to measure progress toward defined success that are sustained over time as state policy.**

"There are no indicators or goals. Each program is executed without knowing if it is working."
CSO representative, Bolivia.

"The strategies are not monitored, so it is impossible to know if they are successful."
CSO representative, Ecuador.

Overall, although some countries have defined strategic visions, in most cases these **do not translate into concrete indicators, pedagogical criteria, or monitoring mechanisms.** Differences among stakeholders point to a gap between policy design and implementation realities. Consolidating this pillar requires moving toward a definition of success that is **pedagogically meaningful, operationally clear, and measurable over time**, without losing sight of the criteria of educational quality, equity, and sustainability.

Devices Pillar

1. Overview of the pillar

Comparative experience shows that device provision policies are often one of the most visible and politically attractive entry points for digital transformation of education strategies. However, when these decisions are not anchored in a clear education project, nor accompanied by a support and training strategy, they tend to have limited and unsustainable impacts over time.

The questions that structure this pillar seek to investigate not only what devices are provided, but why, for whom and under what institutional conditions. The focus is on understanding whether the device policy responds to a pedagogical purpose, whether it considers the entire life cycle of the equipment and whether the system has the necessary capabilities to sustain it over time.

Thus, the pillar does not evaluate the presence or absence of technology, but rather the degree of maturity of the system to integrate devices as a tool for learning.

This pillar evaluates the availability, access, and maintenance of technological devices as fundamental tools for the digital transformation of education. It considers both provision policies and maintenance planning, replacement, and equity in distribution.

Dimensions included in this pillar were:

- **Objective:** The purpose of introducing devices into the education system is clear and aligned with the expected pedagogical use.
- **Market and supply of education devices:** The selection of devices takes into account pedagogical objectives and needs and accessibility for vulnerable contexts. The aim is to identify whether the system has explored or compared alternatives for devices suitable for different educational levels and contexts.
- **Support and maintenance:** The existence of strategies for technical support, maintenance, and renewal of devices used in the education system.

2. Quantitative results

OVERALL AVERAGE FOR THIS PILLAR: 2.45.

Table 9. Average by dimension included in the Devices pillar

Dimension	Average	Maturity level
Objective	2.59	Medium
Market and supply of educational devices	2.57	Medium
Support and maintenance	2.20	Low

As shown in Table 9, the most critical aspect of this pillar is the support and maintenance of the devices provided to students and teachers. This is a critically important task that has so far tended to receive limited attention within public sector action.

Once again, there are differences in ratings by type of stakeholder (Government stakeholder: 2.70 and Non-Governmental stakeholders —schools and third sector organizations—: 2.20) and large disparities between countries. In this regard, it can be considered that in Uruguay (3.47) the pillar is functioning well, while in the Bahamas (1.56) and Guatemala (1.84) it requires urgent attention.

3. Key perceptions and statements Qualitative analysis

A key emerging issue within this pillar is the acknowledgment of an **effective initial distribution, but without continuity.** Several government stakeholders recognize the efforts made to deliver devices, but also mention that many plans **do not provide for renewal or maintenance.**

"Devices were delivered, but many are now obsolete and there is no replacement plan."
Technology leader, Argentina.

"Although the availability of technological devices in education centers is already a reality in the country, the equipment available in these institutions is not always adequate or properly maintained."
Educational leader, Brazil.

The **significant territorial inequality** is also often mentioned. School and third sector stakeholders agree that **rural and peripheral areas continue to be excluded** or receive equipment in poor condition.

"In rural schools, there is one computer per classroom, not per student."
School stakeholder (Teacher), Guatemala.

"Connectivity conditions and the necessary technical support are not taken into account."
CSO representative, Paraguay.

"The availability of digital devices for student use in schools continues to be one of the main challenges faced by the country. According to data collected in the latest edition of the ICT Education Survey, 62% of primary and secondary institutions had at least one computer (desktop, laptop, or tablet) for student use. In institutions located in rural areas, this proportion fell to 33%."[25]
CSO representative, Brazil.

25 The ICT Education Survey is an annual study conducted in Brazil to measure how the school community accesses, uses, and appropriates information and communication technologies (ICT) in education contexts. Further information at https://cetic.br/en/publicacoes/indice/pesquisas/tema/educacao-digital/

Another element commonly referred to in the context of this pillar points to the **lack of comprehensive planning.** There are complaints that **delivery of devices is not coordinated** with other aspects such as connectivity, teacher training or infrastructure.

"The devices arrive, but they are useless without internet, training, or support."
CSO representative, Honduras.

It is a fragmented policy, with each ministry acting on its own."
University representative, Peru

Based on the information gathered, it appears that this pillar reflects a **mixed picture**: on the one hand, **significant progress in initial** coverage; on the other, **fragility in sustainability and systemic coordination.** The lack of planning for **technological renewal**, **limited technical support,** and **territorial inequality** emerge as the main challenges. The government's perception is optimistic, but non-governmental actors highlight the aspects that limit the true impact of the devices.

Connectivity Pillar

1. Overview of the pillar

Connectivity is a fundamental enabling condition for the effective integration of digital technologies in education. However, comparative experience shows that connectivity policies are often designed in a homogeneous manner, without considering the territorial, pedagogical, and institutional particularities of education systems, which can lead to oversized, underutilized, or unsustainable solutions.

The questions that structure this pillar seek to investigate not only the availability of connectivity, but also its suitability for the intended pedagogical uses, its stability, its coverage, and its management model. The focus is on understanding whether connectivity decisions respond to a clear educational project and whether the system has the technical and organizational capacities to ensure its sustainability over time.

In this way, the pillar is not limited to measuring levels of internet access, but also allows for an analysis of the degree of alignment between connectivity, pedagogy, and institutional capacities within a strategy for the digital

transformation of education. The pillar analyzes educational connectivity from a structural and equitable access perspective, considering both policies and market conditions and territorial diagnosis.

The dimensions assessed were:

- **Market:** It refers to awareness of the supplier market for expanding or improving connectivity in schools, assessing whether the market has been characterized in terms of available suppliers, costs, and geographic constraints.
- **Objective:** The degree to which digital services offered in educational centers are clearly defined and their connectivity requirements identified.
- **Assessment:** The extent to which the current level of connectivity supports the expected digital services and is monitored with up-to-date information.

2. Quantitative results

OVERALL AVERAGE FOR THIS PILLAR: 2.48

Table 10. Average by dimension included in the Connectivity pillar

Dimension	Average	Maturity level
Market	2.59	Medium
Objective	2.58	Medium
Assessment	2.26	Low

As shown in Table 10, Assessment is the weakest dimension, indicating that, at regional level, greater progress has been made in understanding the supplier market and identifying connectivity requirements than in the current coverage of centers and their monitoring.

The divide between official positions and the views of third-sector actors persists (Government stakeholders: 2.71 and Non-governmental stakeholders – schools and third sector: 2.23).

Brazil is among the countries with the highest rating in this pillar (3.52), which is noteworthy, and particularly significative, considering its territorial extension and population size[26].

3. Key perceptions and statements Qualitative analysis

A recurring topic within this pillar has been linked to the identification of **territorial gaps and quality of access.** There were multiple mentions of rural areas where the connection is unstable, insufficient, or non-existent. Even where connectivity is available, it does not always meet the minimum requirements for the use of digital educational tools.

"Connectivity in rural areas is very poor. Although there is internet, the speed and stability do not allow for educational use."
School stakeholder (School management), Peru.

"The quality of the internet is poor. In some schools, access is limited to the computer room, and in most, there is none at all."
School stakeholder in a rural area (School management), Panama.

There were also repeated references to the **asymmetry between planning and execution,** with frequent criticism of policies that were well defined in their design but poorly executed or lacking continuity, and the failure to update assessments in order to make evidence-based decisions.

"Programs are implemented without a clear assessment, due to political pressure or circumstances, without coordination with real needs."
CSO representative, Ecuador.

Another key aspect within this pillar relates to the **role of the market**, specifically the view that the telecommunications market is not effectively regulated to ensure connectivity in vulnerable sectors.

"Most public schools have poor connectivity because they depend on providers that do not prioritize remote areas."
School stakeholder (School management), Guatemala.

26 More information on progress in this country since the launch in 2023 of the National Strategy for Connected Schools (Enec) is available at https://www.gov.br/mec/pt-br/escolas-conectadas

"The main challenge for connectivity policies in the country lies in expanding access to schools located in the North and Northeast regions. In these areas, it is still necessary to expand access infrastructure, either through cable or fiber optic coverage —which must cross protected forest areas— or through satellite solutions, which implies the additional challenge of depending on large international companies."
CSO representative, Brazil.

Overall, the Connectivity pillar reveals a **disconnect between policy design and territorial implementation.** While infrastructure expansion initiatives are noteworthy, school and third sector actors highlight **limitations in quality, coverage, and sustainability,** especially in rural and highly vulnerable areas. They also point out that connectivity is available, but in many cases it is **insufficient or unstable** to support regular educational use.

Beyond connection stability and speed, the results suggest that a central challenge lies in adapting connectivity to educational uses. The absence of policies for bandwidth management, prioritization of educational traffic, adequate filters and safeguards, as well as the lack of alignment between available connectivity and pedagogical practices, limits its educational potential. In this regard, technically adequate connectivity does not, in itself, ensure connectivity of sufficient quality for educational purposes.

Platforms Pillar

1. Overview of the pillar

Digital education platforms are often incorporated as technical solutions for content management, communication, or evaluation. However, when their selection and implementation are not integrated into a broader pedagogical and organizational vision, they tend to fragment the educational experience, generate operational overload, and limit their transformative potential.

The questions that comprise this pillar aim to understand how platforms are defined, implemented, and used within the education system. The emphasis is on analyzing whether these tools are integrated in a manner consistent with available devices, connectivity conditions, and pedagogical approaches, as well as identifying the governance, interoperability, and support models that sustain them.

From this perspective, the pillar allows for the evaluation not only of the existence of platforms, but also of the system maturity to use them as strategic pedagogical infrastructure, rather than as isolated or overlapping solutions.

In summary, this pillar analyzes the existence, characteristics, objectives, and sustainability of state-sponsored digital education platforms. It evaluates their capacity to organize the digital ecosystem, coordinate resources, provide services, and facilitate pedagogical interaction.

The dimensions considered are:

- **Objective:** The degree to which digital platforms are aligned with teaching and digital transformation objectives of the education system.
- **Lifelong learning:** The extent to which platforms promote active, self-directed learning, autonomy and "learning to learn".
- **Development model:** It refers to whether platform development or acquisition model (e.g., SaaS, open source, in-house development) is clear and feasible based on available capabilities.
- **Equity:** It shows the existence of strategies to ensure equitable access to and use of platforms by students in vulnerable contexts.

2. Quantitative results

Overall average for this pillar: The average regional rating for the Platforms pillar was **2.44**, indicating a **low** level of perception, with institutional platforms in place, but concerns about their scope, functionality, and pedagogical integration.

Table 11. Average by dimension included in the Platforms pillar

Dimension	Average	Maturity level
Objective	2.64	Medium
Lifelong learning	2.51	Medium
Development model	2.33	Low
Equity	2.30	Low

While the existence of platforms with clearly defined objectives is acknowledged, the most critical dimension of this pillar —at regional level— relates to the development of strategies to ensure equitable access to and use of these platforms by students in vulnerable contexts.

Differences by type of stakeholder remain (Government Stakeholders: 2.68 and Non-Governmental stakeholders —schools and third sector organizations—: 2.21). **Government stakeholders** recognize the strategic role played by platforms, while **school stakeholders** value the tool but point out difficulties in its effective use. **Third sector** organizations highlight **limitations in design, usability, and coordination with other components** of the ecosystem.

Country-level results —ranging from 1.82 to 3.30— indicate **significant regional disparities in the development and implementation of educational platforms**, with some experiences consolidated and others still emerging or fragmented.

3. Key perceptions and statements Qualitative analysis

Repeated references contribute to outlining a scenario in which **platforms exist but remain underutilized.**

Most countries have at least one national or widely used educational platform. Frequent references were made to:

- Content repositories.
- Virtual classroom platforms (own or adapted).
- Academic monitoring tools.

At the school level, platforms are perceived to be in place, but they are not always used intensively or in an integrated manner.

"The platform exists, but most teachers don't use it. It's not part of everyday life."
School stakeholder (teacher), Argentina.

"Training is needed to take full advantage of all its features."
School stakeholder (School management), Honduras.

Difficulties in access, usability, and coverage are also regularly identified. Third-sector actors note that many platforms **are not intuitive**, are not designed in an inclusive manner, and lack adaptations to address educational diversity.

"The platforms are designed for expert users, not for teachers or students with low digital literacy."
CSO representative, Bolivia.

"They often don't work well on cell phones, which is what most people use."
CSO representative, Guatemala.

In addition, there were frequent references to **sustainability and innovation issues.** Public-sector platforms are seen as lacking sustained evolution and as being overly dependent on specific contingencies (such as the COVID-19 pandemic).

"After the pandemic, the momentum of the platforms slowed down. There is no continuity."
University representative, Peru

"There is a lack of resources and technical equipment to maintain and update platforms."
CSO representative, Colombia.

Overall, the pillar reveals a **gap between the development of platforms and their consolidation as effective pedagogical tools.** Platforms exist in many countries, but their **usability, coverage, and pedagogical integration still present challenges.** Strengthening this pillar requires greater investment in **technical support, teacher training, inclusive design, and technological sustainability**, aligned with pedagogical criteria.

Programs Pillar

1. Overview of the pillar

Education technology programs tend to embody the political and pedagogical priorities of education systems. However, experience shows that, in many cases, these programs are designed and implemented in a siloed manner, with little coordination between them and weak monitoring, evaluation, and adjustment mechanisms.

The questions included in this pillar aim to examine how programs related to the digital transformation of education are designed, implemented, and coordinated. The focus is on analyzing their internal coherence, their alignment with clear pedagogical objectives, and their capacity to be scaled-up, adapted, and sustained themselves over time.

In this way, the pillar helps us understand whether the programs function as isolated pieces or whether they are part of a comprehensive strategy for digital transformation of education, capable of generating institutional learning and guiding future decisions.

The pillar analyzes the existence, orientation, and equity of programs for digital transformation of education, including the use of artificial intelligence in existing initiatives.

The dimensions included were:

- **Objective:** The degree to which the objectives of education programs are defined and aligned with the priorities of digital transformation.
- **Design:** It refers to whether the teaching methodologies of the programs are evidence-based and use digital resources that take into account the connectivity conditions of schools.
- **Policy coordination:** The degree of coordination between key stakeholders for the development and sustainability of education programs within digital transformation. The aim is to identify whether there are formal spaces for intersectoral coordination or strategic alliances to implement or sustain the programs. For example, agreements with universities, NGOs, the private sector, or local governments.
- **Artificial Intelligence:** The extent to which the education system promotes AI literacy, not only in the use of tools but also in the critical understanding of their logic.

2. Quantitative results

REGIONAL AVERAGE FOR THIS PILLAR: 2.40.

Table 12. Average by dimension included in the Programs Pillar

Dimension	Average	Maturity level
Objective	2.54	Medium
Policy coordination	2.49	Low
Design	2.43	Low
Artificial Intelligence	2.15	Low

As shown in Table 12, at regional level, the greatest advances in DTE programs lie in the definition of specific objectives capable of guiding pedagogical work and aligning it with the priorities of the education system. At

the same time, the incorporation of AI into education programs is still very limited. Education policy faces the task of developing strategies to train teachers and students in both logic and use of AI tools.

Differences by type of stakeholder (Government stakeholders: 2.58 and non-governmental stakeholders 2.22) remain but they are smaller than in previous pillars. Similarly, cross-country heterogeneity persists, and in no case does the score exceed 3.00.

3. Key perceptions and statements Qualitative analysis

Based on the open-ended responses included in the Programs pillar —which asked participants to reference DTE programs currently underway in their respective countries— it was possible to consolidate a typology.

Table 13. Typology of programs related to DTE and mention frequency in responses

Type of program
Learning platforms
Teacher training in ICT
Connectivity
Educational innovation / STEAM / Robotics
Curriculum reforms with digital inclusion
Student support programs
Device delivery
Post-pandemic strategies (recovery)

In addition to contributing to characterizing public sector activity, stakeholders highlight several common challenges in program implementation. First, uneven coverage, centered on urban areas. In turn, **weak inter-institutional coordination**, which limits continuity and **sustainability in the face of changes in government**, leading to the interruption of promising programs.

Another issue that repeatedly arises is the **lack of curricular alignment**, even though there are scattered efforts to achieve it. Although references to curricular reforms are scarce, there have been mentions of **digital citizenship** and **computational thinking** as content that is gaining relevance and is being incorporated into curricular updating processes.

This scenario suggests that programs still have an **instrumental** focus, more centered on the provision of resources than on pedagogical transformation.

A closer look at the dominant focus in responses by type of actor shows that Government actors provide the most detailed descriptions of official plans and coverage. For their part, non-governmental stakeholders point to a lack of coordination and comment on uneven implementation that widens existing gaps. These are specific limitations that are not visible in official discourse.

"In Peru, school programs linked to digital transformation have a maturity level of 2 (low-medium): there are valuable efforts, but they are siloed and lack continuity."
CSO representative, Peru

"Only large urban schools have computer labs [...] most schools are unfamiliar with technology."
School stakeholder (School management), Panama.

"In Mexico, school programs that integrate digital resources still lack clear objectives [...] There are isolated experiences, but they are not viable in rural contexts."
CSO representative, Mexico.

"Policies and technology programs are not yet aligned with national education goals or with a comprehensive curricular approach, which limits their pedagogical reach and sustainability."
School stakeholder (Teacher), Ecuador.

Overall, the Programs pillar reveals an ecosystem that tends to focus on resources (platforms, equipment, training). Greater curricular **coherence is needed,** as well as inter-institutional strategies that extend beyond the political cycle and program impact assessments that can analyze, in particular, their **reach in vulnerable areas** and their capacity to **generate transformative learning.**

Teacher training Pillar

1. Overview of the pillar

Teacher training is widely recognized as a critical factor for the effective integration of technologies into teaching and learning processes. However, many training initiatives focus on the development of technical skills in isolation, without linking them to actual teaching practices or career paths.

The questions that structure this pillar aim to understand how education systems conceive and organize teacher training in relation to digital transformation of education. The emphasis is on analyzing whether training responds to specific pedagogical needs, whether it is integrated into professional development policies, and whether it includes support, communities of practice, and feedback mechanisms.

From this perspective, the pillar evaluates not only the availability of training opportunities, but also the degree of maturity of the system in building teacher capacities that enable meaningful pedagogical uses of technology.

The following dimensions of analysis were included:

- **Objective:** The existence of teacher training strategies aimed at supporting digital transformation.
- **Capacity:** The degree to which the teaching staff is trained and has experience in the use of technological resources in teaching.
- **Policy coordination:** The existence of an institutional strategy to involve key stakeholders in the design and implementation of teacher training programs (e.g., committees, technical roundtables, training networks, etc.).
- **Equity:** The extent to which teachers and educators are prepared to use technology to improve learning outcomes in vulnerable contexts.
- **Lifelong learning:** The extent to which teachers apply active teaching methodologies that promote autonomous learning through the use of technology.

A differentiated weighting strategy was applied according to the type of stakeholder, and a specific analysis of **school actors**' views was conducted, given their centrality within this pillar.

2. Quantitative results

REGIONAL AVERAGE FOR THIS PILLAR: 2.39.

Table 14. Average by dimension included in the Teacher training pillar

Dimension	Average	Maturity level
Training objective	2.74	Medium
Capacity	2.29	Low
Policy coordination	2.49	Low
Equity	2.13	Low
Lifelong learning	2.27	Low

As shown in Table 14, greater progress has been made in defining teacher training objectives aimed at supporting DET, based on the diagnosis of profiles and needs. The dimensions related to current capacities in the use of technological resources in teaching (Capacity), the use of methodologies that promote autonomous lifelong learning (Lifelong Learning), and teacher training in schools in socioeconomically disadvantaged contexts, with incentives to use technology to reduce gaps (Equity), are identified as the most critical.

Table 15. Differences by type of stakeholder

Type of stakeholder	Objective	Capacity	Policy coordination	Equity	Learning	Average of the pillar
Government stakeholder	3.02	2.46	2.72	2.35	2.43	2.60
Non-governmental stakeholder	2.46	2.11	2.26	1.91	2.10	2.17

Table 16. Differences by subtype or profile of non-governmental stakeholder

Subtype of non-governmental stakeholder	Objective	Capacity	Policy coordination	Equity	Learning	Average of the pillar
School stakeholders (teachers, management)	2.46	2.11	2.26	1.91	2.10	2.17
Third sector actors / universities / CSO	2.30	1.98	2.11	1.66	1.91	1.99

As shown in Table 15, government actors express greater satisfaction with teacher training programs. In contrast, among non-governmental actors, school stakeholders point to practical limitations in access to training opportunities, while third-sector actors are the most critical.

3. Key perceptions and statements Qualitative analysis

One aspect that has been repeatedly mentioned is territorial inequality and lack of access to training opportunities. Teachers in rural areas indicate that training opportunities do not always reach their regions.

"Only virtual training is offered, but without connectivity or adequate equipment, it is impossible to participate."
School stakeholder (rural Teacher), Paraguay.

Moreover, concerns are raised about the disconnect between training and practice, noting that many training activities are theoretical or generic, with limited relevance to classroom realities.

"The courses offered to us do not take into account our actual conditions or pedagogical needs."
School stakeholder (School management), Honduras.

In addition, frequent references were made to the lack of evaluation and continuity. Both representatives of civil society organizations and academia emphasize the absence of systematic impact evaluations and sustained planning.

"There is no evaluation of whether training improves practice. Courses are repeated without measuring results."
University representative, Colombia.

"It is a policy without follow-up; individual courses are offered, but they are not coordinated with initial training or incentives."
CSO representative, Peru.

Overall, this pillar highlights the existence of ongoing programs and strategies. In some cases, it is noted that their scope, equity, and effectiveness are still limited. **Territorial gaps** and **lack of impact assessment** are the most critical issues. The **government's assessment is positive,** but **school stakeholders** reveal bottlenecks in terms of access and relevance. To consolidate this pillar, it is

essential to move towards coordinated, contextualized training with solid evaluation mechanisms that ensure its real impact on educational practice.

Data Pillar

1. Overview of the pillar

The use of data in education offers great potential for informing decision-making, guiding public policy, and improving learning. However, comparative experience shows that many education systems face difficulties in integrating, interpreting, and using data strategically, which limits its impact on improvement processes.

The questions that constitute this pillar seek to examine not only the availability of data, but also its quality, interoperability, and effective use at different levels of the education system. The focus is on understanding whether institutional capacities exist to transform data into actionable information, and whether these processes are aligned with pedagogical and education policy objectives.

In this way, the pillar allows for an assessment of the system's maturity in using data as a tool for planning, monitoring, and continuously improving the digital transformation of education. It analyzes the capacity of education systems to generate, use, and govern data relevant to decision-making, with a special focus on equity, data culture, and the use of artificial intelligence.

Dimensions considered were:

- **Information systems:** The extent to which the education system has reliable information systems for collecting, integrating, and consulting educational data.
- **Data usage culture:** Decision-making, monitoring and improvement of education policies and programs are informed by systematic use of data.
- **Capacity:** The existence of technical and institutional capacities to manage, analyze, and protect data, including ethical and cybersecurity aspects.
- **Equity:** The extent to which available data allows for characterizing, addressing the needs, and monitoring the impact of digital transformation in vulnerable communities.
- **Artificial intelligence:** The existence of actions taken to ensure transparency, ethics, and bias mitigation in the use of AI in education.

2. Quantitative results

OVERALL AVERAGE FOR THIS PILLAR: 2.39

Table 17. Average by dimension included in the Data pillar

Dimension	Average	Maturity level
Information systems	2.68	Medium
Institutional capacity	2.49	Low
Data usage culture	2.48	Low
Equity in data use	2.31	Low
Artificial intelligence	1.99	Low

As shown in Table 17, the Artificial Intelligence dimension receives the lowest score within this pillar, indicating that its integration remains at a very early stage. It is therefore essential to make progress in defining ethical principles and criteria to minimize bias and risks in algorithmic decision-making.

Meanwhile, the greatest advances related to data generation and use are in the development of information systems for real-time data storage and retrieval.

In terms of differences between countries, although the absence of clear strategies in artificial intelligence is a common pattern, scores range from 2.98 (Argentina and El Salvador), reflecting progress in the development of information systems and a culture of data use, to 1.78 (Belize). While it is important to note that information systems or education data management systems exist in all three countries, stakeholders' assessments point to uneven levels of development and implementation in terms of analytical depth, the systematic use of data for decision-making, and integration with pedagogical practices.[27]

27 For more information see:

Argentina: Sistema Integral de Información Digital Educativa (SInIDE) (Comprehensive Digital Education Information System).

SInIDE is the centralized nominal information system of the Secretariat of Education of the Ministry of Human Capital https://www.argentina.gob.ar/educacion/evaluacion-e-informacion-educativa/sistema-integral-de-informacion-digital-educativa-sinide

El Salvador: SIGES (Sistema Informático para la Gestión Educativa Salvadoreña) (El Salvador Education Management Information System)

Table 18. Differences by type of stakeholder

Type of stakeholder	Information systems	Data usage culture	Institutional capacity	Data Equity	Applied AI	Average of the pillar
Government stakeholder	2.83	2.71	2.72	2.58	2.17	2.60
Non-governmental stakeholder	2.52	2.24	2.25	2.03	1.82	2.17

As shown in Table 18, differences by type of stakeholder are recorded in all dimensions. The greatest gap is in reference to the availability and use of data to characterize and address needs, and monitor the impact of digital transformation in vulnerable communities.

3. Key perceptions and statements Qualitative analysis

The **existing systems** most frequently referred to in this pillar were:

- Digital enrollment systems.
- National observatories of educational quality.
- Visualization dashboards.

A recurring theme within this pillar has been the **lack of institutional culture for data usage.** Several stakeholders identify that, although information systems exist, they are not used effectively in planning or continuous improvement. In addition, some non-governmental stakeholders note that the culture of data analysis is limited to statistical reports, without translating into concrete measures.

"Data is collected, but not analyzed. Reports are developed, yet they are not used to inform decision-making".
School stakeholder (Teacher), El Salvador.

SIGES is a computer system that allows for the monitoring and evaluation of education in El Salvador https://siges.digital/

Belize: Belize Education Management Information System (BEMIS)

BEMIS is the Ministry's national information system that monitors and manages all educational institutions, teachers and students in Belize https://www.moecst.gov.bz/education-services/planning-and-development-services/belize-education-management-information-system-bemis/

"There is no real culture of evaluation. Data are entered into the system, but they do not lead to institutional reflection."
CSO representative, Colombia.

Another commonly cited issue concerns the existence of **siloed information systems that lack interoperability.** There is a lack of integration between data on enrollment, performance, infrastructure, and social context.

"We have one system for enrollment, another for scholarships, and another for infrastructure. There is no coordination."
Academia representative, Peru.

In addition, frequent references were made to **weak institutional capacity for data management**, associated with a shortage of technical staff dedicated to data analysis in national directorates and a lack of training for school management teams.

"The dissemination of training and upskilling initiatives for education network management teams and school communities continues to be a critical factor in fostering more effective and secure data analysis."
CSO representative, Brazil.

An often mentioned issue was **inequality in data production and access.** Non-governmental actors indicate that they do not have access to data collected by the States. In many cases, data production remains centralized and oriented toward administrative rather than pedagogical purposes.

"The system data cannot be accessed. There is no transparency, and it is not shared for research or improvement."
Academia representative, Mexico.

Artificial Intelligence emerges as a still incipient dimension. There appears to be limited understanding of the role it could play in the management of educational data, as well as a lack of inclusion strategies and governance mechanisms to guide its use.

"No one talks about AI in education management. It is not yet an issue in our country."
CSO representative, Bolivia.

"It would be useful to use AI to anticipate school dropouts or identify students at risk, but there is no installed capacity."
School stakeholder (School management), Chile.

Overall, the Data pillar highlights the **asymmetry between the existence of systems and their strategic use.** The region has various information platforms, but much remains to be done in terms of **usage culture and interoperability.** Artificial intelligence is not yet used as a tool in education systems, and data is not always available.

Clustering based on the Regional Assessment of Digital Transformation of Education

What is clustering?

In simple terms, clustering is a technique that allows **similar elements to be grouped together.** In this case, it groups countries with similar characteristics in terms of their level of digital education development. Each group or "cluster" represents a set of countries that share common patterns, differing from other groups in terms of their structural or educational policy characteristics.

This grouping methodology enabled the classification of countries into four empirical clusters.

Clustering by qualitative variables (Context of the education system pillar)

A thematic clustering[28] was conducted based on the pillar Context of the education system, given its descriptive and explanatory depth. Although the questionnaire included open-ended questions across multiple pillars, this one was selected for its capacity to capture the structural configurations of each country's digital education ecosystem.

The responses analyzed covered the following key qualitative dimensions:

- In relation to the dimensions "Experience" and "Equity" within the framework of the "Context of the education system" pillar, participants

28 Thematic clustering: qualitative grouping process based on narrative or semantic patterns detected in open-ended responses. Unlike quantitative techniques, this approach does not use numerical algorithms, but rather interpretive criteria and manual categorization to identify common profiles in the discourse of the countries.

were asked to indicate whether technology integration programs and technological tools to support students at risk of dropping out have been implemented throughout the territory or whether there are areas or groups where greater efforts should be targeted. If areas or population groups were identified, participants were asked to indicate which ones and to mention the challenges.

- Another open question asked participants to indicate the reasons for their ratings of the closed questions included in the pillar, requesting the inclusion of examples and evidence where possible (referencing institutions, strategies, policies, or programs).

In this way, a narrative summary of the general education context in terms of DTE was compiled. This information made it possible to identify discursive patterns and organize them thematically into four interpretative clusters, based on the content coding of open-ended responses from the 12 countries that were grouped into clusters.[29]

CLUSTER: CONSOLIDATED ECOSYSTEMS

Countries: Costa Rica, Uruguay

Characteristics:

- Presence of mature digital governance
- Solid institutional frameworks
- Policy continuity and intersectorality
- Sustained strategic vision

These countries describe stable ecosystems, with policies that transcend governments, high government capacity, and consolidated systemic coordination.

29 Methodological note: the criterion for including a country in the clustering has been to have at least two responses from governmental actors and two responses from non-governmental actors. This criterion was adopted with the aim of ensuring a sufficiently robust analytical basis for clustering. The inclusion of responses from governmental and non-governmental actors allows us to reflect the plurality of perspectives involved in the digital transformation of education, while the requirement for more than one response per type of stakeholder helps to reinforce the consistency of the results and mitigate possible biases derived from individual opinions.

During 2026, data collection will continue through the assessment tool. An updated version of this report is therefore expected, incorporating a larger number of countries into the clustering analysis.

CLUSTER: STRONG INSTITUTIONS WITH INTERNAL DIVIDES

Countries: Argentina, Brazil, Colombia, Mexico

Characteristics:

- Outstanding technical and regulatory capacity
- Significant advances in digital governance
- Public-private partnerships and active regulatory frameworks
- Persistent territorial inequalities

This group combines consolidated institutions with implementation and cohesion challenges in federal or diverse environments.

CLUSTER: STRUCTURAL FRAGMENTATION AND PERSISTENT CHALLENGES

Countries: Ecuador, Guatemala, Honduras, Peru

Characteristics:

- Poor institutional coordination
- High political turnover or policy instability
- Territorial or sectoral fragmentation
- Structural equity gaps

The countries in this group show that systemic capacity building is still in its early stages, marked by political instability or deep inequalities.

CLUSTER: EMERGING INITIATIVES WITH HIGH POTENTIAL

Countries: El Salvador, Dominican Republic

Characteristics:

- Developing institutional frameworks
- Reform and innovation initiatives
- Planning processes still incomplete
- Emerging digital governance strategies

This group represents initiatives under construction, with strategic potential, and structures in the process of consolidation.

Qualitative segmentation, based specifically on the pillar Context of the education system, is **particularly valuable for understanding the institutional and governance conditions** of each country from the perspective of state capacities, political continuity, and systemic coordination.

In this sense, it is extremely **useful for designing differentiated policies**, especially with regard to support strategies adapted to the institutional contexts identified.

1. Conclusions and recommendations based on clustering

The cluster analysis process reflects diverse institutional configurations, structural capacities, and strategic visions. From highly consolidated ecosystems to experiences still under construction, the analysis reveals a **profound structural heterogeneity that must be taken into account in the design of regional policies and technical cooperation.**

This approach does not seek to rank countries, but rather to identify opportunities, common challenges, and possible synergies. All in all, the results provide a solid basis for guiding differentiated interventions, articulating regional dialogues, and establishing more accurate monitoring mechanisms on the evolution of DTE. It should be noted that, given the dynamism of digital education policies, it is recommended that this typology be considered a living input that should be updated periodically, allowing for the observation of changes, advances, or regressions over time. At the same time, it is appropriate to discuss this segmentation with more detailed case studies to explore the internal dynamics of each country, especially in federal contexts or those with high territorial inequality.

Based on the results obtained, it is suggested that the identified groupings be used as a basis for **adjusting regional technical support strategies,** establishing specific priorities for each group. It is also appropriate to promote **spaces for exchange and horizontal learning,** both between countries in the same cluster —with similar structures and challenges— and between countries at different stages of DTE, in order to enhance the transfer of good practices and sustainable technological solutions, considering the necessary adaptations to each context.

Key Findings and Way Forward

Regional overview

Predominant instrumental focus: The strategies of the countries in the region are mainly focused on the provision of connectivity, devices, and platforms, positioning pedagogical coordination as a task that requires greater effort and attention.

Persistent gaps: There are marked differences between urban and rural areas, as well as limitations in access and appropriation in socioeconomically vulnerable sectors.

Limited use of data for decision-making: Although evidence-based management is recognized as a legitimate approach that can be significantly reinforced through the integration of technologies, coverage metrics still prevail over indicators of educational impact or equity.

High institutional vulnerability: Many of the policies surveyed depend heavily on government cycles, without long-term frameworks or solid intersectoral agreements. In this regard, regulatory instruments can be strategic in ensuring the sustainability of DTE policies.

Synergies between government and non-governmental stakeholders: Ministerial authorities and educational and technology leaders in the education system have made valuable contributions that reflect the efforts made in terms of planning and action for DTE. For their part, academic and civil society leaders, as well as school stakeholders, have identified persistent critical issues and highlighted the problems that arise in DTE policies implementation. Thus, multi-stakeholder partnerships and participatory mechanisms within the framework of public policies are particularly powerful, as they give voice to actors who —outside government— possess different forms of knowledge and distinct territorial reach.

Digital Transformation of Education on the Public Agenda in Latin America and the Caribbean: The region faces significant challenges, with major hurdles in terms of integrating technologies to improve learning outcomes, ensuring the interoperability of education data, maintaining and replacing devices, providing connectivity in rural areas, and training teachers to integrate digital technologies into their teaching practices. At the same time, DTE is positioned as part of the education sector's agenda, as expressed in specific institutions: National directorates of education technology, educational innovation centers with school technologies.[30] In this regard, best practices exchanges between countries in the face of shared challenges is particularly relevant.

30 Argentina: National Directorate of Innovation in Education – Ministry of Education

Chile: Center for Education and Technology – LINKS – agency of the Ministry of Education dedicated to integrating digital technologies into school education.

Uruguay: CEIBAL – public agency focused on integrating digital technologies into basic education and teacher training.

Paraguay: Directorate of ICT Resources – MEC (Ministry of Education and Sciences) / General Directorate of Science and Technology – MEC

Brasil: Coordenação-Geral de Tecnologia e Inovação da Educação Básica (CGTI/SEB – MEC)

Colombia: Office of Educational Innovation through the Use of New Technologies – MEN (Ministry of National Education)

Peru: Directorate of Technological Innovation in Education – MINEDU (Ministry of Education)

Ecuador: Integrated System of Technologies for Schools and Communities (SITEC) –

Costa Rica: Directorate of Technological Resources in Education (DRTE) – MEP (Ministry of Public Education)

Panama: National Directorate of Curriculum and Education Technology – MEDUCA (Ministry of Education)

Guatemala: Directorate of Information Technology (DINFO) – MINEDUC (Ministry of Education)

Belize: Science and Education Technology Unit – MoECST (Ministry of Education)

Dominican Republic: Educational Informatics Directorate – MINERD (Ministry of Education)

Trinidad y Tobago: Educational Technology Unit – Ministry of Education

Guyana: Innovative and Communication Technology (ICT) Unit – Ministry of Education

Saint Lucia: IT Unit – Ministry of Education

Regional findings by pillar

Strategic pillars:

Context of the education system: Most countries have national plans or strategic frameworks related to Digital Transformation of Education. However, their implementation is highly fragmented and poorly coordinated with the realities of schools. Shortcomings have been identified in terms of cross-sector coordination and continuity during changes in government.

Problem identification: This is the pillar with the highest average regional rating. Stakeholders report a growing ability to recognize priority challenges —such as unequal access, technological obsolescence, or lack of teacher training— and to identify affected populations, especially in rural or vulnerable contexts. This more nuanced diagnosis provides an opportunity to inform more targeted policy design.

Definition of success: In most countries, the criteria for defining the success of digital strategies continue to focus on access and coverage indicators (number of devices delivered, schools connected). There are only few indicators relating to teaching, technological appropriation, or impact on learning.

Tactical pillars:

Devices: Massive equipment provision programs have been implemented in almost all countries in the region. However, these efforts face problems such as lack of maintenance and low pedagogical integration. In many countries, initiatives tend to depend on political circumstances or external funding, without a sustained long-term strategy.

Connectivity: Urban-rural gaps persist in most countries, and the cost of connectivity remains a critical barrier for both schools and households. This is further exacerbated by the absence of minimum standards for service quality and stability.

Platforms: Educational platforms are widespread, but their use remains limited. Critical issues reported include a lack of curriculum alignment, insufficient training, poor connectivity, and low levels of uptake among teachers and students. In many cases, platforms are used more as repositories than as active pedagogical environments.

Programs: There is a wide variety of initiatives (STEAM, digital citizenship, robotics, computational thinking). Interruptions between administrations and the absence of national digital education transformation strategies limit its sustainability.

Teacher training: Along with "Data", this is the pillar with the lowest rating. Many training strategies focus on general proposals with poor contextualization and a lack of continuity. Reports point to insufficient on-the-ground support, limited alignment with actual classroom practices, and a lack of sustainable incentives for professional development.

Data: Information systems are not very interoperable. Data systems are primarily focused on infrastructure and resource distribution, while the capacity to use data for pedagogical and education management decision-making remains very low. There is an urgent need to move towards open data ecosystems, aligned with specific decision-making needs at classroom, school, and system levels, with disaggregation criteria and solid governance that allows for the construction of relevant and contextualized indicators.

Opportunities and strengths of the region

The region has a widespread **presence of platforms, devices, and policies linked to Digital Transformation of Education (DTE)**, which shows significant progress in incorporating technologies into education systems and an installed base on which to continue deepening the transformation processes.

Likewise, in several countries there is a clear **institutional willingness** to move toward common frameworks and sustainable strategies for digital transformation, which opens up concrete opportunities for regional coordination, alignment of approaches, and the construction of shared medium- and long-term agendas.

At the same time, the region has **valuable experience in the implementation of innovative approaches**, such as educational robotics, computational thinking, and digital citizenship, which provide relevant lessons and good practices that can be systematized, scaled up, and shared among countries.

Although **regulatory frameworks and technical capacities have been developed**, there are still opportunities for improvement that could be addressed more effectively through regional cooperation schemes, knowledge sharing, and joint actions aimed at consolidating the digital transformation of education.

Summary of results and strategic recommendations

Strategic prioritization for equitable DTE processes

Although countries have made progress in identifying the problems that they intend to address with DTE, the findings show fragmented and uneven implementation. There is a clear need to move toward more systematic processes for designing policies and strategies that integrate assessment, prioritization, and implementation capacity, acknowledging that most countries face significant resource and capacity constraints. To this end, it is key to have sustained financing mechanisms in place.

In this context, it is essential to strengthen the institutional framework of DTE, ensuring that technical decisions —related to infrastructure, connectivity, platforms or devices— are aligned with pedagogical definitions and educational objectives that guide policies. Strategic prioritization and the adoption of equity as a cross-cutting principle thus emerge as key conditions for guiding realistic, focused DTE processes with a greater impact on learning.

Connectivity as an educational right

The regional assessment shows that connectivity remains one of the most persistent structural divides, particularly in rural areas and highly vulnerable contexts, which are often shaped by significant geographic and territorial challenges, thereby limiting effective access to digital education opportunities. In this context, it is essential to guarantee stable and universal access, prioritizing rural and vulnerable areas, as well as to reinforce recognition of this right with regulatory frameworks that ensure sustainability. Effective implementation requires coordination with telecommunications sector stakeholders and subnational governments, as well as the definition of quality standards,

sustainable financing schemes, and clear responsibilities for provision and maintenance.

Comprehensive device provision model

Findings show that the provision of devices, even when reaching high levels of coverage, does not guarantee pedagogical appropriation or impact on learning. In many cases, weaknesses are not explained solely by operational management issues (lack of clear criteria for maintenance, replacement, and technical support; weak planning of equipment life cycles; and lack of precision in the definition of institutional roles), but by the absence of a comprehensive approach that coordinates pedagogical, technological, and economic decisions from the policy design stage.

In this regard, it is essential to look beyond the hardware and explicitly incorporate technological ecosystem management, including decisions about software, compatibility, licenses, and usage environments. These definitions, which are often approached from a cost savings or operational simplification perspective, have a direct impact on the appropriation of technology by teachers and students and, therefore, on its pedagogical value.

Furthermore, the pedagogical proposal associated with the devices presents at least two critical moments. On the one hand, there is the procurement stage, where economic sustainability is central: an appropriate device is not necessarily the most expensive one, but rather the one that enables efficient management of maintenance, repair, and replacement throughout its life cycle. On the other hand, there is the stage of educational use, in which the device gains meaning to the extent that it is embedded in concrete teaching proposals, with clear pedagogical objectives and institutional conditions that support its implementation. From this perspective, devices should be understood as means to serve a pedagogical strategy, and not as an end in themselves. Evidence shows that, without intentional integration into teaching and learning practices, the mere provision of technology does not produce significant transformations in education outcomes.

Contextualized and sustained teacher training

Qualitative responses from school-level actors repeatedly highlight that existing teacher training does not consistently translate into

changes in classroom practice or support the pedagogical transformations required by digital transformation of education. In this sense, it is necessary to strengthen classroom support, communities of practice, and continuous professional development. This requires aligning training with curricular priorities, strengthening regional pedagogical support teams, and ensuring dedicated institutional time for reflection and collaborative work among teachers.

Strategic use of education data

The results reveal a limited and fragmented use of educational data for decision-making, along with limited interoperability across systems, which hinders the monitoring of gaps and trajectories. In light of these findings, it is necessary to move toward interoperable and open data ecosystems, with disaggregation by territory, gender, and other variables. Their implementation requires investments in infrastructure and technical capabilities, as well as the definition of common data governance protocols that guarantee quality, security, and effective use for decision-making.

Governance with a long-term vision

The findings show that many DTE policies are heavily dependent on government cycles, which limit their sustainability over time and makes long-term planning impossible. In response to this, it is essential to establish multi-year frameworks, intersectoral agreements, and public monitoring mechanisms that promote medium-term planning and agreements on the continuity of public policy. To operationalize this vision, it is essential to institutionalize responsibilities and coordination mechanisms between agencies in cases where the mandate does not fall to a single organization, define clear indicators of progress, and ensure continuity beyond political cycles through formal and transparent commitments.

Participation and local engagement

The views expressed in the assessment process, particularly from school actors and third-sector organizations, point to limited incorporation of local voices in the design and evaluation of DTE policies. This dynamic tends to weaken the relevance of policies and create gaps between centrally defined guidelines and the realities of schools and communities. In this context, it is essential to systematically

incorporate the voices of school and community stakeholders not only in a consultative capacity but as active contributors to the adjustment, improvement and evaluation of DTE policies. This entails enabling systematic channels of participation, strengthening local capacities for project management, and providing feedback on policies based on evidence from practices in implementation contexts.

Likewise, findings show that participation at local level must be complemented by sustained support strategies during implementation. The adoption of new technologies in schools is neither automatic nor linear and requires pedagogical support that acknowledges teachers' career paths and the cultural shifts these processes entail.

From this perspective, the effectiveness of DTE policies depends not only on their strategic design but also on their capacity to support local actors throughout processes of adoption and change, integrating participation, pedagogical support, and continuous institutional learning.

Annex I: Methodological aspects

1. Methodological challenges

Three main methodological challenges were observed:

- **Heterogeneity in the volume of responses:** Some countries had more than 10 responses, while others had only one or two.
- **Overrepresentation of some profiles:** In countries like Colombia, school actors were the main respondents, while in others (e.g., Suriname, Jamaica and Guyana), only government authorities responded.
- **Risk of bias due to lack of diversity:** The interpretation of data could be distorted if a country is represented exclusively by a single institutional or educational perspective.

2. Methodological approach adopted

A two-level strategy was applied to preserve regional comparability without compromising the quality of the analysis:

A. INTRA-COUNTRY WEIGHTING BY TYPE OF STAKEHOLDER

The following proposal was defined, distinguishing two main blocks:

- **½ Government stakeholders**: including profiles linked to institutional, pedagogical, and technological leadership.
- **½ Non-governmental stakeholders:** integrating profiles of school stakeholders (teachers and management) and third sector actors (civil society, academia, CSOs).

When either of these two blocks was overrepresented, its relative weight was reduced using weighting factors to prevent one perspective from dominating the national average. If one of the blocks was missing, it was disregarded for clustering but taken into account for pillar analysis.

Justification: This structure simplifies the weighting scheme, ensures a balance between state and non-state perspectives, and ensures that no group has a disproportionate weight in the characterization of the country.

B. INCLUSION CRITERION BASED ON MINIMUM REPRESENTATIVENESS

To maintain broad regional coverage in the report, different criteria were adopted depending on the type of analysis:

- **For descriptive analysis by pillar:** all countries were included, regardless of the number of responses.
- **For multi-variable clustering:** only countries that met both criteria were included:
  - At least two responses from government stakeholders.
  - At least two responses from non-governmental stakeholders.

Countries were excluded from the cluster analysis if they:

- Have only one total response.
  - Barbados

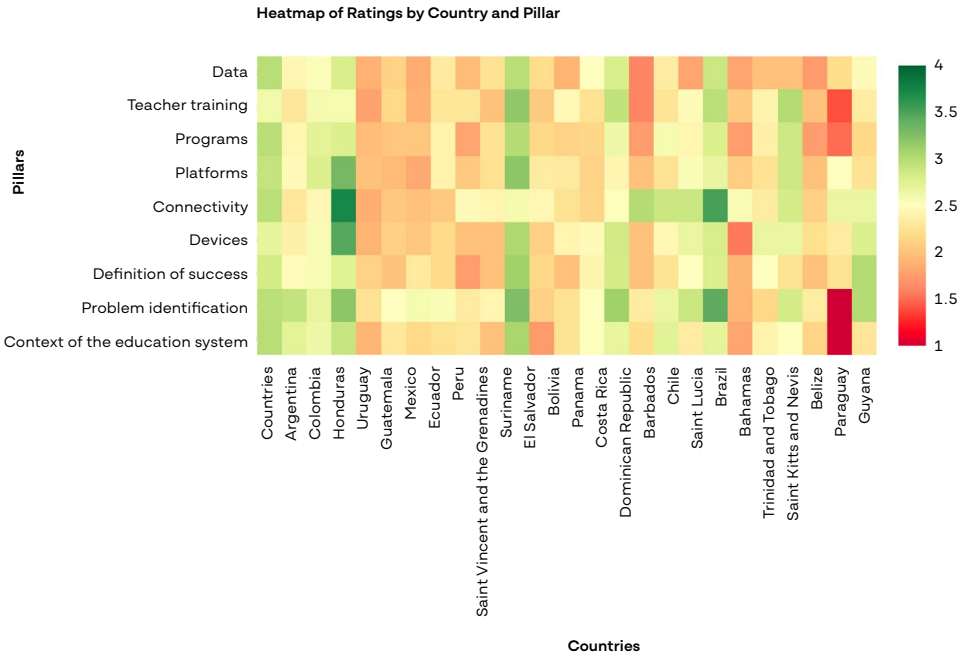
- Have responses from only one type of stakeholder (e.g., only government stakeholders).
  - Bolivia
  - Guyana
  - Jamaica
  - Paraguay
  - Saint Kitts and Nevis
  - Suriname

- They present only one government or non-governmental response.
  - Bahamas
  - Belize
  - Chile
  - Panama
  - Saint Vincent and the Grenadines
  - Saint Lucia
  - Trinidad & Tobago

- **Justification:** This minimum threshold ensures that the countries included in the clusters have a diverse and representative base, reducing the risk of bias and allowing for a more accurate reading of the digital education ecosystem.

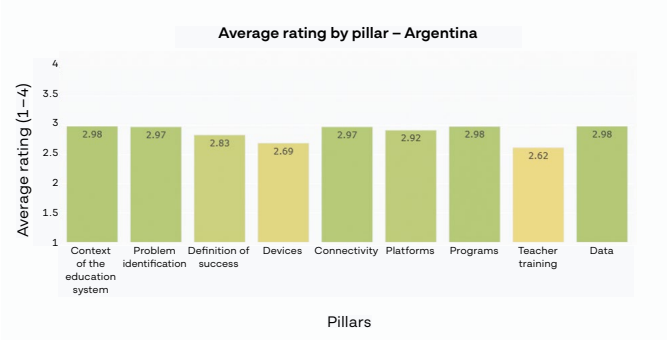
This dual approach —broad inclusion for pillar analysis and minimum criteria for clustering— allows for regional coverage to be maintained while ensuring the methodological validity of the clusters formed.

Annex II: Quantitative results by country[31]



31 Methodological note: El Salvador and the Dominican Republic were not included in this heat map in order to preserve visual comparability between countries. In both cases, the high concentration of responses from the same type of stakeholder could affect the representativeness of results in this aggregate visualization. However, these countries are included in the quantitative analysis by pillar and in the overall qualitative approach of the report.

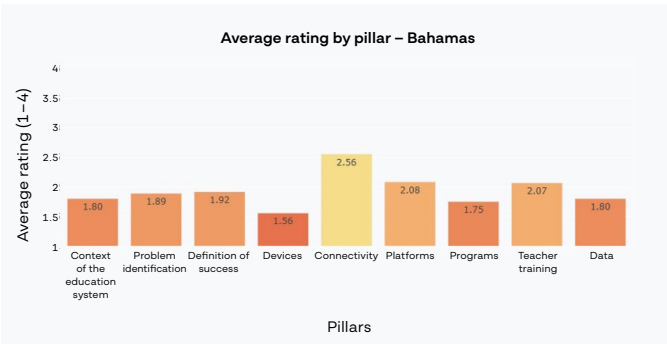
Argentina



Pillar Table by Dimensions – Dimension Analysis – Argentina

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
LEARNING	DIGITAL TRANSFORMATION FOCUS	SUPPORT	MARKET AND SUPPLY	ASSESSMENT	LEARNING	POLICY COORDINATION	LEARNING	CAPACITY
EQUITY	TARGET POPULATION	EQUITY	OBJECTIVE	MARKET	EQUITY	DESIGN	POLICY COORDINATION	DATA USAGE CULTURE
EXPERIENCE	KEY CHALLENGES	AI	SUPPORT AND MAINTENANCE	OBJECTIVE	DEVELOPMENT MODEL	AI	CAPACITY	EQUITY
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

Bahamas



Pillar Table by Dimensions – Dimension Analysis – Bahamas

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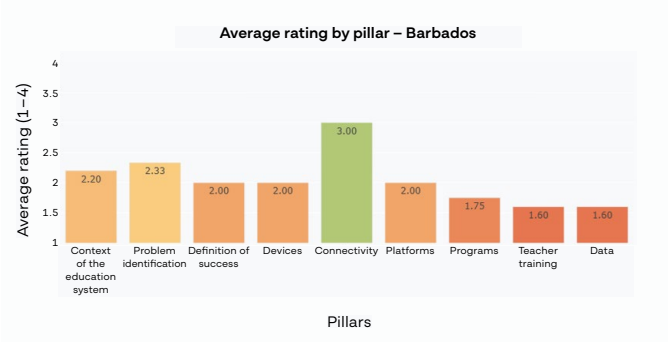
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

Barbados



Pillar Table by Dimensions – Dimension Analysis – Barbados

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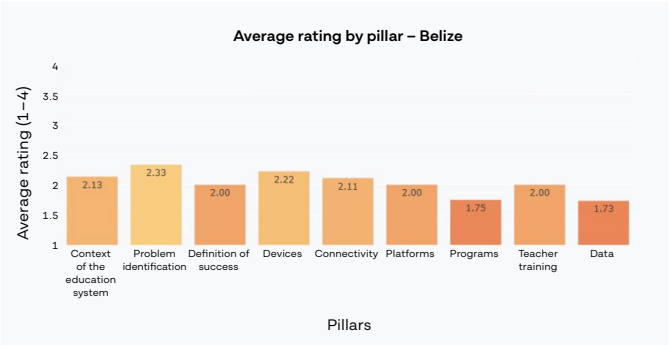
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

Belize



Pillar Table by Dimensions – Dimension Analysis – Belize

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GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
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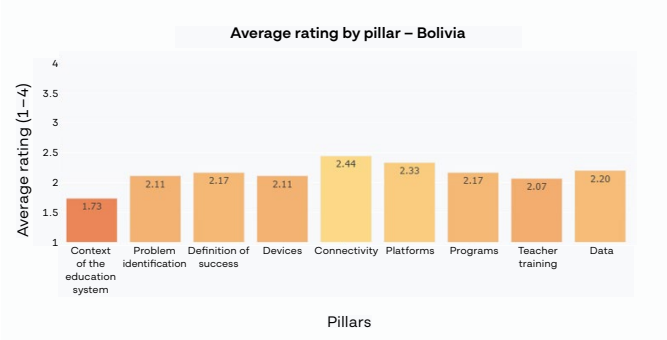
Bolivia



Pillar Table by Dimensions – Dimension Analysis – Bolivia

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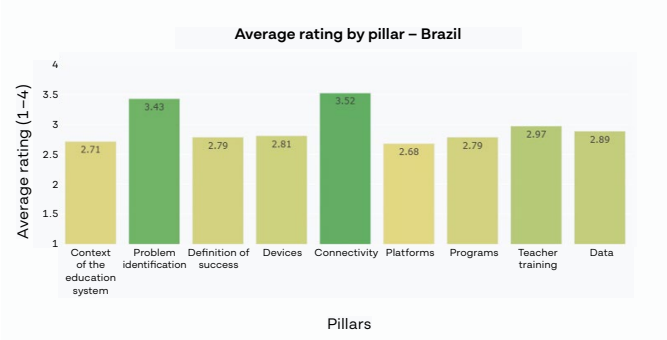
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

Brazil



Pillar Table by Dimensions – Dimension Analysis – Brazil

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GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
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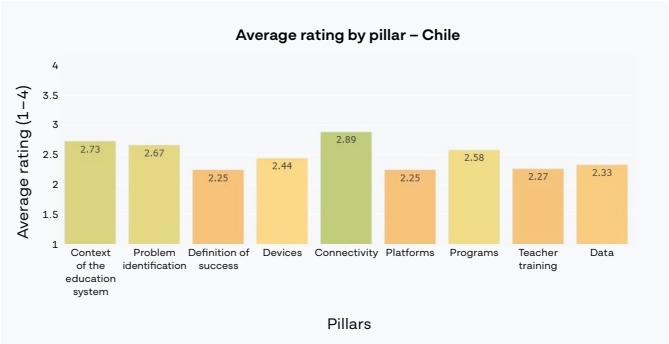
Chile



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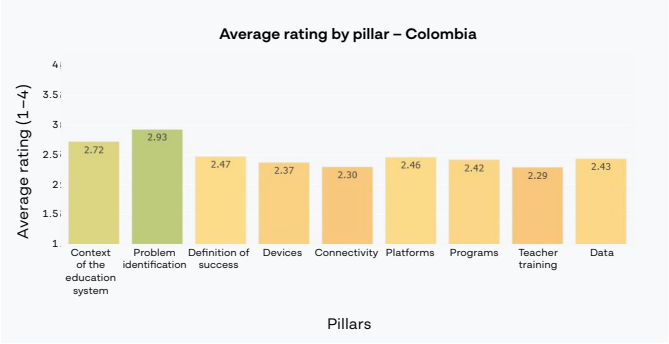
Colombia



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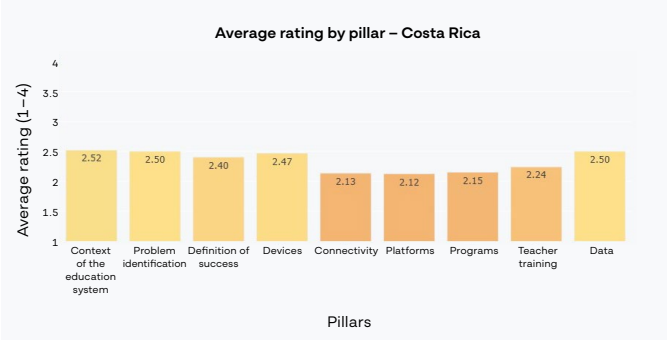
Costa Rica



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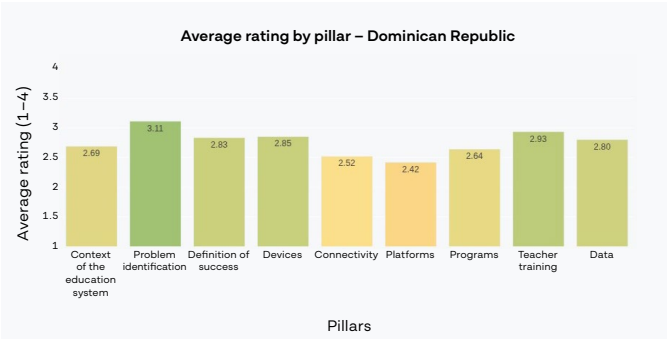
Dominican Republic



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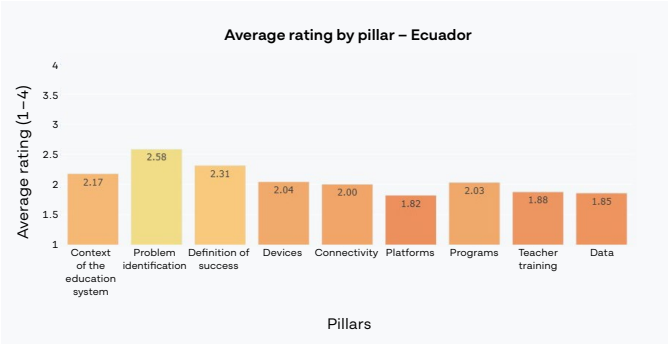
Ecuador



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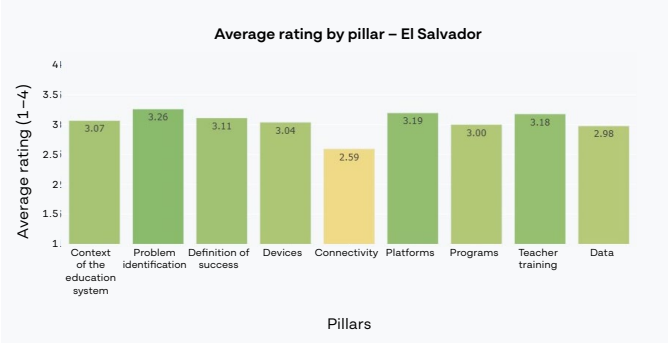
El Salvador



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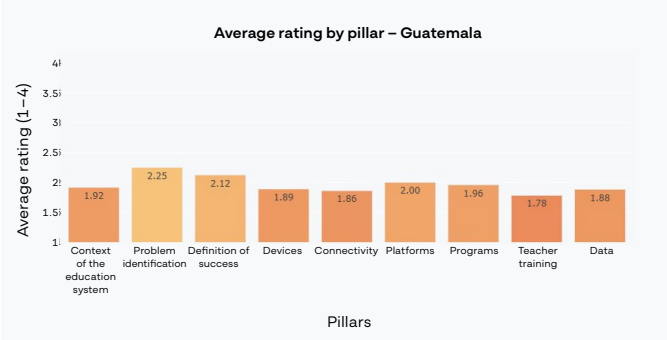
EXPERIENCE	KEY CHALLENGES	AI	SUPPORT AND MAINTENANCE	OBJECTIVE	DEVELOPMENT MODEL	AI	CAPACITY	EQUITY
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

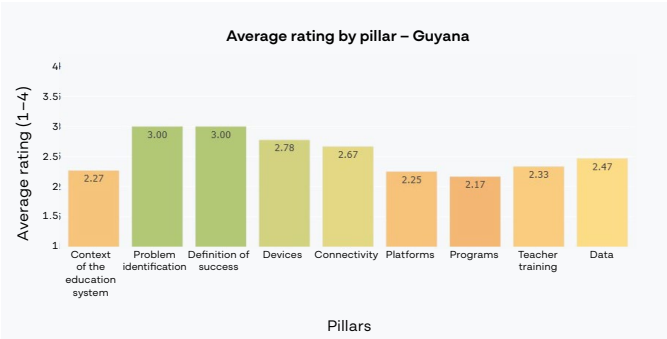
Guatemala



Pillar Table by Dimensions – Dimension Analysis – Guatemala

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
LEARNING	DIGITAL TRANSFORMATION FOCUS	SUPPORT	MARKET AND SUPPLY	ASSESSMENT	LEARNING	POLICY COORDINATION	LEARNING	CAPACITY
EQUITY	TARGET POPULATION	EQUITY	OBJECTIVE	MARKET	EQUITY	DESIGN	POLICY COORDINATION	DATA USAGE CULTURE
EXPERIENCE	KEY CHALLENGES	AI	SUPPORT AND MAINTENANCE	OBJECTIVE	DEVELOPMENT MODEL	AI	CAPACITY	EQUITY
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

Guyana



Pillar Table by Dimensions – Dimension Analysis – Guyana

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
LEARNING	DIGITAL TRANSFORMATION FOCUS	SUPPORT	MARKET AND SUPPLY	ASSESSMENT	LEARNING	POLICY COORDINATION	LEARNING	CAPACITY
EQUITY	TARGET POPULATION	EQUITY	OBJECTIVE	MARKET	EQUITY	DESIGN	POLICY COORDINATION	DATA USAGE CULTURE
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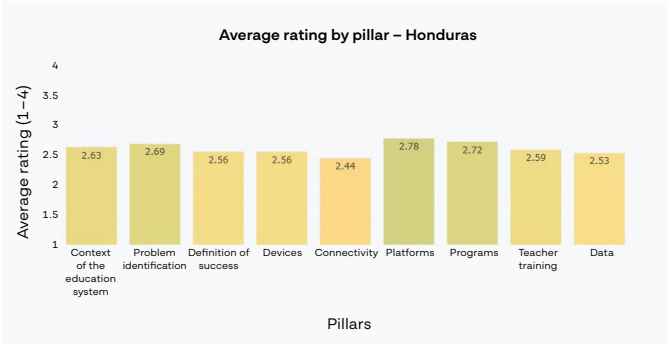
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

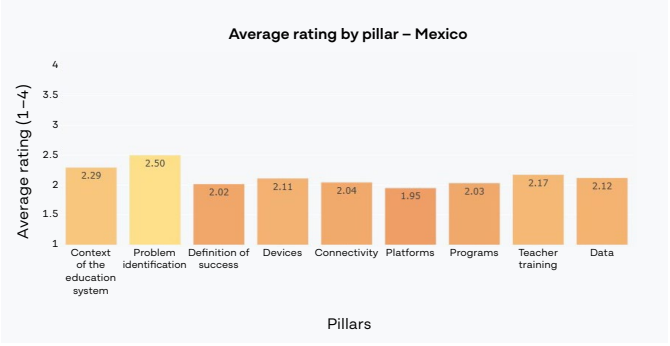
Honduras



Pillar Table by Dimensions – Dimension Analysis – Honduras

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
LEARNING	DIGITAL TRANSFORMATION FOCUS	SUPPORT	MARKET AND SUPPLY	ASSESSMENT	LEARNING	POLICY COORDINATION	LEARNING	CAPACITY
EQUITY	TARGET POPULATION	EQUITY	OBJECTIVE	MARKET	EQUITY	DESIGN	POLICY COORDINATION	DATA USAGE CULTURE
EXPERIENCE	KEY CHALLENGES	AI	SUPPORT AND MAINTENANCE	OBJECTIVE	DEVELOPMENT MODEL	AI	CAPACITY	EQUITY
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

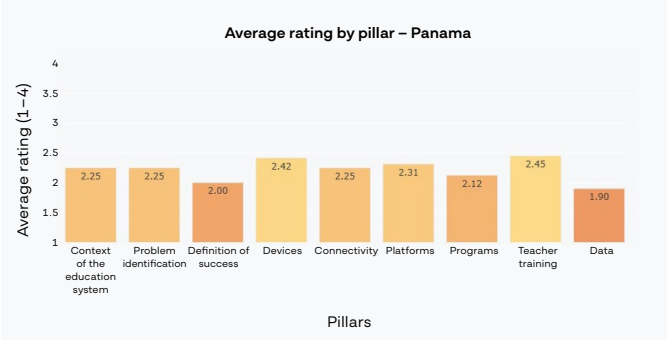
Mexico



Pillar Table by Dimensions – Dimension Analysis – Mexico

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
LEARNING	DIGITAL TRANSFORMATION FOCUS	SUPPORT	MARKET AND SUPPLY	ASSESSMENT	LEARNING	POLICY COORDINATION	LEARNING	CAPACITY
EQUITY	TARGET POPULATION	EQUITY	OBJECTIVE	MARKET	EQUITY	DESIGN	POLICY COORDINATION	DATA USAGE CULTURE
EXPERIENCE	KEY CHALLENGES	AI	SUPPORT AND MAINTENANCE	OBJECTIVE	DEVELOPMENT MODEL	AI	CAPACITY	EQUITY
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

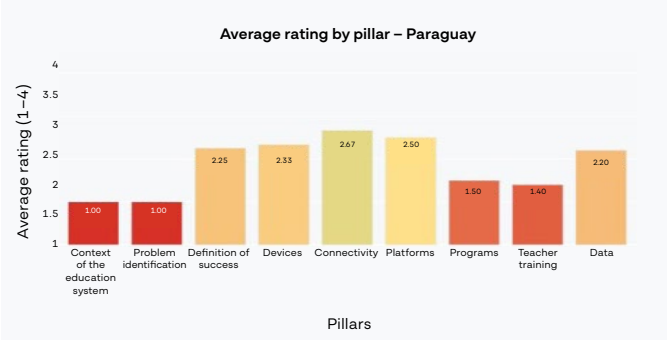
Panama



Pillar Table by Dimensions – Dimension Analysis – Panama

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
LEARNING	DIGITAL TRANSFORMATION FOCUS	SUPPORT	MARKET AND SUPPLY	ASSESSMENT	LEARNING	POLICY COORDINATION	LEARNING	CAPACITY
EQUITY	TARGET POPULATION	EQUITY	OBJECTIVE	MARKET	EQUITY	DESIGN	POLICY COORDINATION	DATA USAGE CULTURE
EXPERIENCE	KEY CHALLENGES	AI	SUPPORT AND MAINTENANCE	OBJECTIVE	DEVELOPMENT MODEL	AI	CAPACITY	EQUITY
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

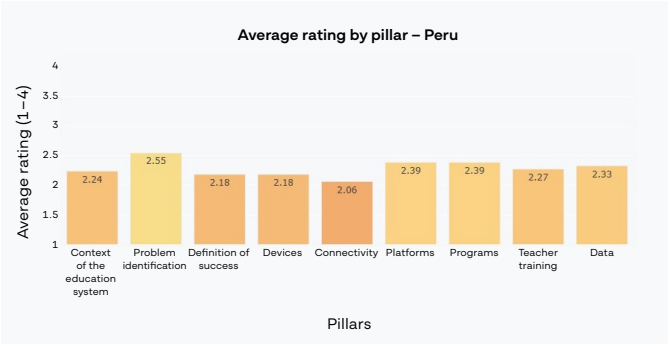
Paraguay



Pillar Table by Dimensions – Dimension Analysis – Paraguay

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
LEARNING	DIGITAL TRANSFORMATION FOCUS	SUPPORT	MARKET AND SUPPLY	ASSESSMENT	LEARNING	POLICY COORDINATION	LEARNING	CAPACITY
EQUITY	TARGET POPULATION	EQUITY	OBJECTIVE	MARKET	EQUITY	DESIGN	POLICY COORDINATION	DATA USAGE CULTURE
EXPERIENCE	KEY CHALLENGES	AI	SUPPORT AND MAINTENANCE	OBJECTIVE	DEVELOPMENT MODEL	AI	CAPACITY	EQUITY
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

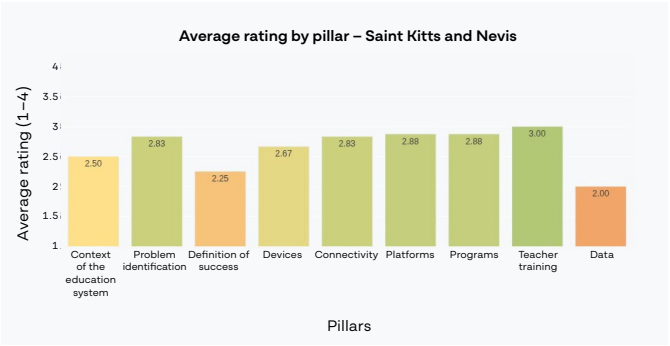
Peru



Pillar Table by Dimensions – Dimension Analysis – Peru

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
LEARNING	DIGITAL TRANSFORMATION FOCUS	SUPPORT	MARKET AND SUPPLY	ASSESSMENT	LEARNING	POLICY COORDINATION	LEARNING	CAPACITY
EQUITY	TARGET POPULATION	EQUITY	OBJECTIVE	MARKET	EQUITY	DESIGN	POLICY COORDINATION	DATA USAGE CULTURE
EXPERIENCE	KEY CHALLENGES	AI	SUPPORT AND MAINTENANCE	OBJECTIVE	DEVELOPMENT MODEL	AI	CAPACITY	EQUITY
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

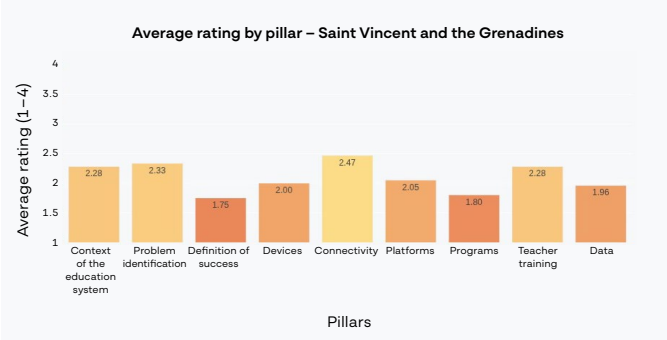
Saint Kitts and Nevis



Pillar Table by Dimensions – Dimension Analysis – Saint Kitts and Nevis

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
LEARNING	DIGITAL TRANSFORMATION FOCUS	SUPPORT	MARKET AND SUPPLY	ASSESSMENT	LEARNING	POLICY COORDINATION	LEARNING	CAPACITY
EQUITY	TARGET POPULATION	EQUITY	OBJECTIVE	MARKET	EQUITY	DESIGN	POLICY COORDINATION	DATA USAGE CULTURE
EXPERIENCE	KEY CHALLENGES	AI	SUPPORT AND MAINTENANCE	OBJECTIVE	DEVELOPMENT MODEL	AI	CAPACITY	EQUITY
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

Saint Vincent and the Grenadines



Pillar Table by Dimensions – Dimension Analysis
Saint Vincent and the Grenadines

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
LEARNING	DIGITAL TRANSFORMATION FOCUS	SUPPORT	MARKET AND SUPPLY	ASSESSMENT	LEARNING	POLICY COORDINATION	LEARNING	CAPACITY
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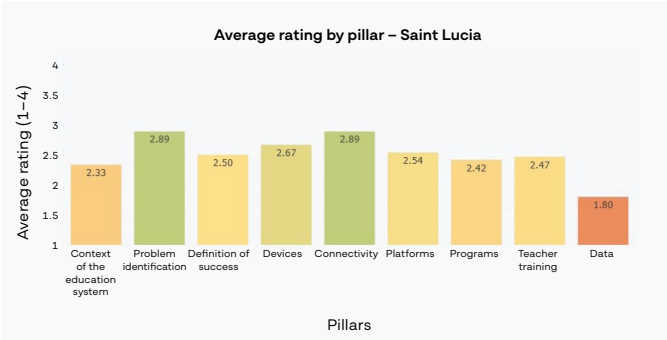
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

Saint Lucia



Pillar Table by Dimensions – Dimension Analysis – Saint Lucia

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
LEARNING	DIGITAL TRANSFORMATION FOCUS	SUPPORT	MARKET AND SUPPLY	ASSESSMENT	LEARNING	POLICY COORDINATION	LEARNING	CAPACITY
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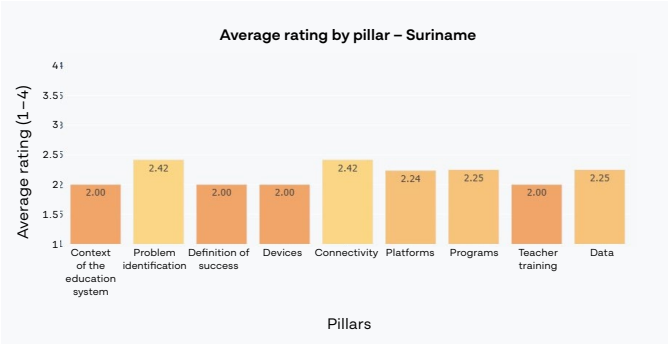
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

Suriname



Pillar Table by Dimensions – Dimension Analysis – Suriname

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
LEARNING	DIGITAL TRANSFORMATION FOCUS	SUPPORT	MARKET AND SUPPLY	ASSESSMENT	LEARNING	POLICY COORDINATION	LEARNING	CAPACITY
EQUITY	TARGET POPULATION	EQUITY	OBJECTIVE	MARKET	EQUITY	DESIGN	POLICY COORDINATION	DATA USAGE CULTURE
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GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
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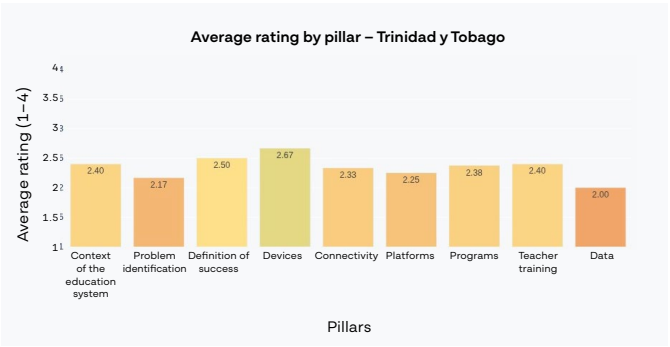
Trinidad & Tobago



Pillar Table by Dimensions – Dimension Analysis – Trinidad and Tobago

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
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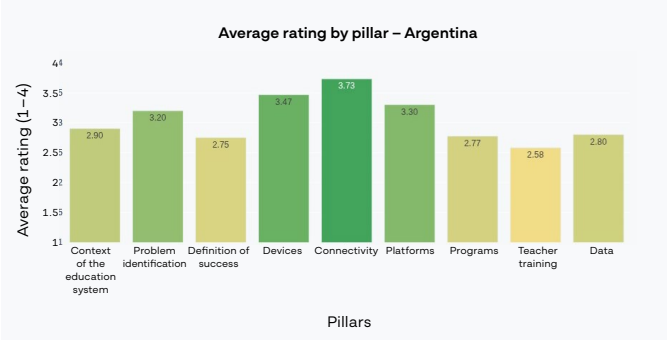
GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

Uruguay



Pillar Table by Dimensions – Dimension Analysis – Uruguay

STRATEGIC PLANNING			TACTICAL PLANNING					
Context of the education system	Problem identification	Definition of success	Devices	Connectivity	Platforms	Programs	Teacher training	Data
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GOVERNANCE		PLANNING			OBJECTIVE	OBJECTIVE	EQUITY	AI
AI							OBJECTIVE	INFORMATION SYSTEMS

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