

The power of curriculum to  
transform education:  
How education systems incorporate  
21st century skills to prepare  
students for today's challenges

Editors:  
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Education Division

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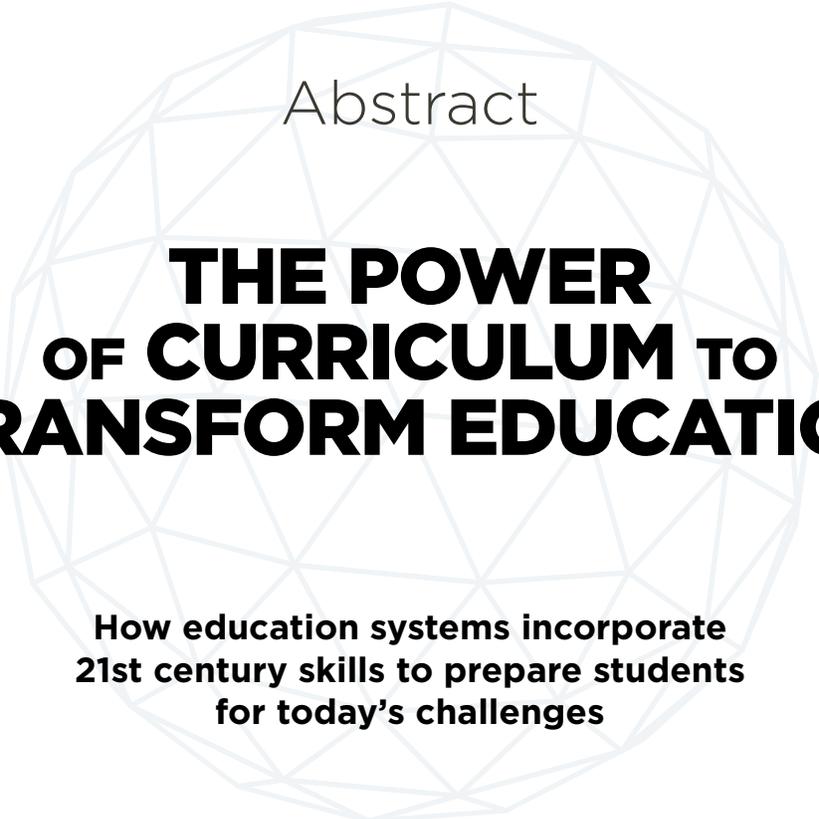


# THE POWER OF CURRICULUM TO TRANSFORM EDUCATION

How education systems incorporate  
21st century skills to prepare students  
for today's challenges



Edited by  
**Mercedes Mateo Díaz** and  
**JungKyu Rhys Lim**



Abstract

# **THE POWER OF CURRICULUM TO TRANSFORM EDUCATION**

**How education systems incorporate  
21st century skills to prepare students  
for today's challenges**

Curriculum reform is at the top of the education agenda today. Skills gaps between what society and the labor market need and what formal systems of education and training provide are growing. The curriculum is the primary instrument for education systems to translate what society needs in terms of human capital, into specific content, competencies, and skills. The curriculum reflects the standards of what students should know and be able to do by the end of their school and formative years. However, regardless of the approach education systems take to design their curriculum, there is not always a straight correspondence between the intended standards on paper (i.e., the intended curriculum), and the actual teaching and learning that happens in the classroom (i.e., the de facto curriculum). This report examines how different education systems inside and outside Latin America and the Caribbean have incorporated 21st century skills in their curriculum, and the enabling conditions to translate the intended curriculum into a de facto curriculum in the classroom. How people are educated and trained today will determine whether countries in the region will be able to transform and provide greater prosperity and opportunities for all.

# Acknowledgment

We would not have this publication without full support from many people. We received immense support on this project from our colleagues and partners over the last two years. This publication is a result of our research, discussions, and workshops on how countries in Latin America and the Caribbean can better incorporate 21st century skills into curriculums. Also, this publication is a part of the 21st century Skills Initiative led by IDB to strengthen learning ecosystems to equip Latin American and Caribbean citizens with transversal skills with our coalition members.

It takes a village to raise a child, and the same applies to this publication. We have been extremely lucky to have an exceptional group of colleagues. We thank Richard Culatta, Marci Price, Brittany Singleton, and Vanesa Gómez for their participation and coordination of related activities for us to have this publication. Additionally, the authors would like to thank Emma Naslund-Hadley, Maria Luisa Zeta, Diana Hincapie, and Gregory Elacqua for their detailed reviews and constructive feedback. Many thanks to Liliana Serrano, Cecilia Rodriguez Alcala, Jorge Bazan, Mariana Zuluaga, and Valentina Gimenez for their communication and dissemination efforts, Alejandro Scaff for his design and graphics, and Elena Lafuente and Renee Pendleton for their support in translation and copyediting. They have an extraordinary ability to connect dots and make things happen. We are grateful for the opportunity to work with you to generate knowledge to create solutions.

We owe special thanks to the Organization of Ibero-American States for Education, Science and Culture (OEI) for opening the space to launch this publication in the international seminar *'Education for the 21st century in Latin America and the Caribbean: Prospering, competing and innovating in the digital era'* co-hosted by OEI and IDB in Madrid on July 18, 2022. In this blended event, we had the opportunity to share our publication's findings and the potential impacts of 21st century skills curriculums using hybrid education models with high-level authorities, including ministers, from 11 countries in Latin America in a panel discussion called *'The power of curriculum to transform education: Implications for designing hybrid education models.'* This event reflects our commitment to bring public and private sector stakeholders to offer quality education and relevant learning for all in the 21st century. Many thanks to Elena Arias and Cecilia Giambruno for their coordination across multiple organizations and panel moderation.

Lastly, this publication and the panel discussion were made possible through generous support from JP Morgan. Any opinions, findings, conclusions, and recommendations expressed in this material are those of the authors and do not necessarily reflect the views of OEI or JP Morgan. We hope our findings here can enrich their missions and make a difference.

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# Authors

## Chapter 1

### The Power of Curriculum in the 21st century



#### **Mercedes Mateo Díaz**

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Mercedes is Chief of the Education Division at the Inter-American Development Bank (IDB), where she leads a team of specialists and professionals to support the transformation of the educational systems in Latin America and the Caribbean. Convinced of the value of investing in people to transform societies, she leads and contributes to the research, design, and execution of innovative education projects. Moreover, she coordinates IDB's 21st-Century Skills initiative, a multidisciplinary group developing effective solutions to help individuals of any age cope with an increasingly digitized world, reinvent themselves throughout their work lives, and coexist with different people and environments. Her work covers various areas of international development and social policy, with a strong emphasis on inequality. Mercedes joined IDB in 2004. Between 2002 and 2004, she was a postdoctoral research fellow and honorary researcher at the Belgian Scientific Research Foundation (FNRS). In 2002, she was awarded a Marie Curie Fellowship at the European University Institute.



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Rhys is a behavioral scientist and educator. Rhys's research investigates how to help individuals, communities, and organizations better prevent, prepare for, respond to, and recover from risks and crises (such as climate change, automation, aging, migration, and public health risks). At the Inter-American Development Bank (IDB), he supports the bank-wide initiative that strengthens education and training ecosystems for 21st-century skills. Before joining IDB, Rhys taught undergraduate communication classes at the University of Maryland. Rhys also helped design maternal and reproductive health and gender-based violence programs to help young girls and mothers after consecutive cyclones in Mozambique. He developed effective science-based messages to motivate community members to adopt disaster preparedness behaviors for tornadoes, hurricanes, floods, and wildfires. Rhys has published more than 35 refereed journal articles, conference papers, and government reports. He holds a Ph.D. in Communication from the University of Maryland.

## Chapter 2

### How to Incorporate 21st century Skills in Education Systems:

A Comparison of 20 Countries' Experiences



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Carmen Pellicer is President of Trilema Foundation since 1998, an Ashoka Fellow since 2016, and Director of Cuadernos de Pedagogía. She also has ownership of seven educational centers in Valencia, Madrid, Soria and Zamora, where pedagogical innovations are applied to achieve inclusion, a multidisciplinary approach and personalization. She leads numerous training programs for teachers and managers inside and outside Spain, as well as directs the Project How to Educate Entrepreneurial Talent of the Princess of Girona Foundation (FPdGI). Since 2019, the Trilema Foundation is a member of the 21st Century Skills Coalition of the Inter-American Development Bank (IDB).



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Carlos Magro Mazo is President of the Asociación Educación Abierta. He is a member of the Department of design, innovation and educational technology at the University Camilo José Cela. He is a member of the advisory board of *Cuadernos de Pedagogía* and member of the research group Conocimiento Abierto para la Acción Social CAAS (University of Granada).

Carlos holds a degree in Physics from the Universidad Complutense de Madrid (UCM) and in Geography and History from the Universidad Autónoma de Madrid (UAM) and an MBA from EOI Escuela de Organización Industrial.

## Chapter 3

### Learning and Development of Digital Skills: Lessons Learned from Successful Experiences



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Susan Brooks-Young has 38 years of experience in PK-12 education as a teacher, school administrator and professional development provider. She has written many books and is co-author of the ISTE book *Pathways to Wellbeing: Helping Educators (and Others) Find Balance in a Connected World* (2019).



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Ximena Álvarez is Director of Aula Activa Digital Education with a focus on digital citizenship and the development of digital skills. During her professional career, she has sought to participate and collaborate with organizations that promote the integration of technology with a pedagogical focus to develop digital skills in all the educational system stakeholders. She worked in the Centre of Education and Technology of the Chilean Ministry of Education, where she led the definition of a digital skills' framework for school students and a nation-wide assessment of the school students' digital skills. Ximena is a sociologist with specialization in research methodology and statistics for the social sciences.



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Yolanda Ramos is a professional leader with more than 25 years of significant senior experiences working with national and international nonprofit organizations in partnership with the academia, government and private sectors. She is an ambassador of 21st-century skills development, an advocate for equity in education and workforce and economic development. During her tenure of almost 11 years at ISTE, Dr. Ramos led international professional learning programs, partnerships and consulting services for K-12 educators, higher education faculty, and local and state government staff. Yolanda was a member of the ISTE core team responsible for the development of the third generation of ISTE Standards for Students 2016, a competency based framework for learning, teaching and leading in the digital age, that provide organizations a comprehensive roadmap for the effective use of technology in learning environments around the world.

## Chapter 4

### 21st century Skills in the Educational Systems of Latin America



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Axel Rivas is Dean of the School of Education at the University of San Andrés. He wrote thirteen books on comparative education policy. His most recent publications include: *Examining Educational Policy in Latin America: Comprehensive Insights into Contemporary Reform* (Routledge, 2022); *The keys to education: a comparative study on the improvement of subnational educational systems in Latin America* (2020) and *Who controls the future of education?* (2019). Axel is editor for South America of the journal Education Policy Analysis Archives.



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Ignacio Barrenechea is Coordinator of Academic Research at Catholic University of Argentina. He is also a researcher at the Centro de Investigación Aplicada en Educación San Andrés (CIAESA), in Buenos Aires, where he is also a teaching assistant for Comparative Education. Ignacio is also Coordinating Editor of Education Policy Analysis Archives (EPAA/AAPE) for Latin America and is a part-time Adjunct Professor at the University of Miami. Ignacio holds a Ph.D. in Educational and Psychological Studies from the University of Miami, and his dissertation focused on the self-perception of autonomy of secondary school teachers teaching in highly vulnerable schools.

## Chapter 5

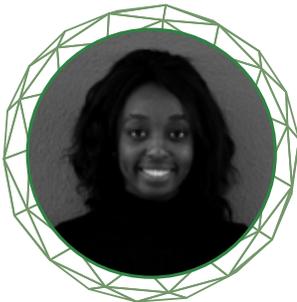
# Evidence-Based Behavioral Interventions to Boost 21st Century Skills



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Vasco Brazão is Head of Research & Behavioral Advisor at CLOO. He has contributed to several education projects at CLOO. He is involved in maintaining the scientific practices and research integrity at CLOO, and has been involved in a variety of projects ranging from reducing food waste to reducing high school dropout rates. Vasco has MSc in Psychology in Business and Economics.



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# Chapter 1

## Introduction

### The Power of Curriculum in the 21st century

How education systems incorporate 21st century skills to prepare students for today's challenges

Mercedes Mateo Díaz and JungKyu Rhys Lim



## 1. Introduction

**Curriculum reform is at the top of the education agenda today.** Skills gaps between what society and the labor market need and what formal systems of education and training provide are growing, and there is a pressing need for adaptation. People need tools to navigate significant global challenges and a reality constantly reshaped by technological changes brought by the Fourth Industrial Revolution with artificial intelligence and automation; by climate change, migration, and aging; and, since 2020, by the COVID-19 pandemic. More than ever, how people are educated and trained today will determine whether countries in the region will be able to transform and provide greater prosperity and opportunities for all.

**The curriculum is the primary instrument for education systems to translate what society needs in terms of human capital into specific content, competencies, and skills.** The curriculum reflects the standards of what students should know and be able to do by the end of their school and formative years. **There are different approaches to curriculum design and reform. Increasingly, systems are moving from content-based toward competency-based standards of teaching and learning.** Whereas the content-based curriculums focus on memorizing facts, the competency-based curriculums emphasize acquiring specific skills and competencies. Cross-curriculum content and competency-based curriculum are used across disciplines and subjects to help learners connect knowledge in a more holistic way (Goodlad & Su 1992). The curriculum approach is important as it will determine the selection of pedagogical approaches, how we train teachers, and how we assess and evaluate students' performance.

Regardless of the approach that education systems take to design their curriculum, there is not always a straight correspondence between what teachers are supposed to teach and what students are supposed to learn on paper (the intended curriculum), and the actual teaching and learning that happens in the classroom (the de facto curriculum).

**The purpose of this publication is to compare curriculum reforms focusing on 21<sup>st</sup> century skills.** The first part of the report (Part 01) presents how top-performing education systems have been incorporating those skills to help students prepare for today's challenges.

In the first chapter, authors from Trilema Foundation examine how 20 reference countries around the world have incorporated 21st century skills into their education, teaching, and training systems through document analyses. They look at five dimensions: curriculum, teaching, evaluation, institutional factors to enable change, and financing strategies.

**How people are educated and trained today will determine whether countries in the region will be able to transform and provide greater prosperity and opportunities for all.**

In the second chapter, authors from International Society for Technology in Education (ISTE) use nine case studies to analyze the conditions underlying a successful inclusion and deployment of education technology and digital skills in education systems. They identify 14 critical conditions to effectively promote the use of digital resources for learning, across infrastructure, pedagogical, governance, and community elements.

The second part of the report (Part 02) focuses on Latin American and Caribbean (LAC) countries and helps us understand the challenges ahead.

The third chapter by Axel Rivas and Ignacio Barrenechea examines how LAC countries have incorporated 21st century skills in their curriculums through a comparative analysis across 18 countries. They describe the policy instruments and a selection of specific programs that have been particularly relevant. They also share concrete actions and alternatives that policymakers in the region can implement to effectively integrate these skills into their educational systems.

Finally, in chapter four, authors from CLOO review how behavioral interventions can be used to complement curriculum reforms to foster 21st century skills in different education contexts. Specifically, they focus on educational nudges, wise interventions, and socioemotional learning interventions and identify the most promising, evidence-based, and low-cost behavioral interventions that focus on developing these skills.

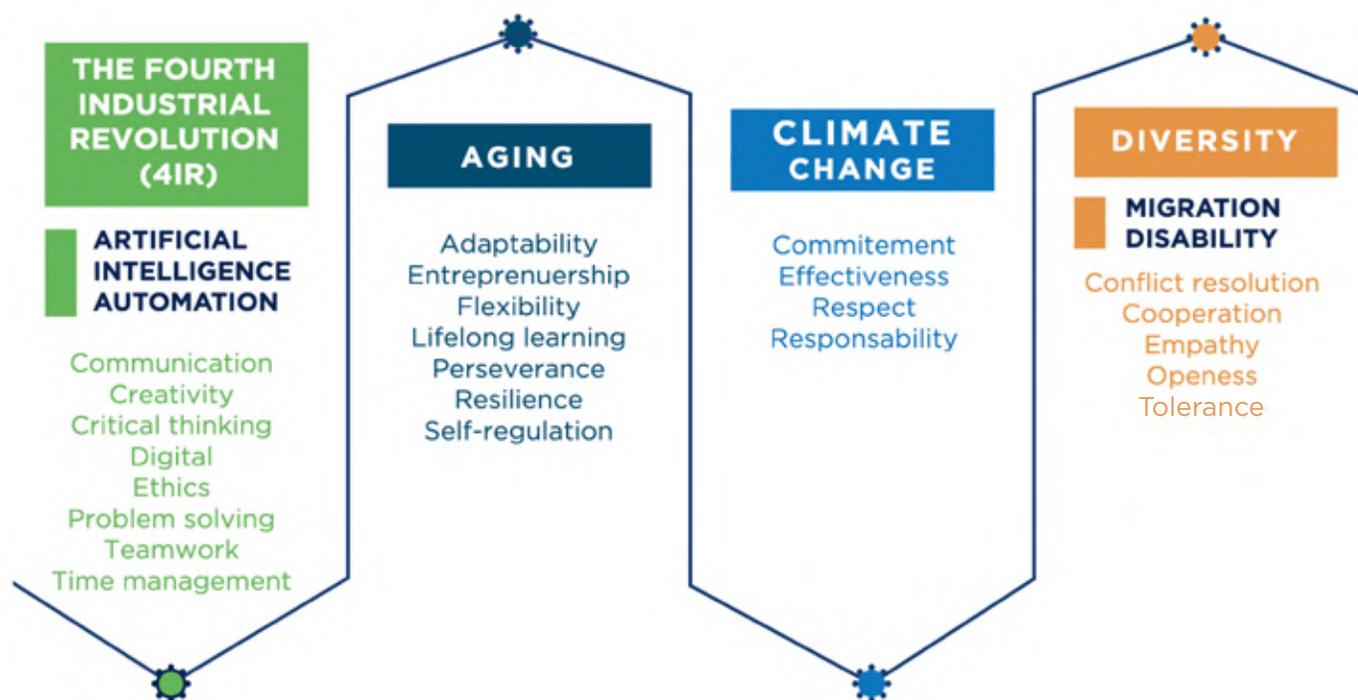


## 2. Uncertain Realities Demand a Greater Emphasis on Portable Skills

To help people prepare for a constantly and dynamically changing future, countries cannot focus exclusively on developing specific technical knowledge and skills, and individuals cannot miss opportunities to learn and develop skills continuously throughout their lives (Auger, 2019; Mateo Diaz et al., 2019). With constantly changing realities and market demands, education needs to help people better understand and adapt to ever-changing situations (Amadio et al., 2014).

There are at least two important contextual elements to understand why people need skills to help them navigate unpredictability and increasingly complex realities. First, **individuals need to respond to the challenges that come with automation and artificial intelligence**, which bring not only different ways of working but also different ways of living and interacting socially. **Aging** is another important trend of our time; many LAC countries have already passed or are in the process of going over the tip of their demographic bonus and will need to adjust for an increasingly older population. **Climate change** is affecting the space where we live and our ability to access its resources. We are also living **in increasingly diverse societies** that need to absorb important migration flows and require a greater degree of open-mindedness, accepting and understanding people with other background and experiences, and higher degrees of cooperation (see Figure 1.1).

**Figure 1.1. Challenges that 21st century Skills Can Help People Navigate**



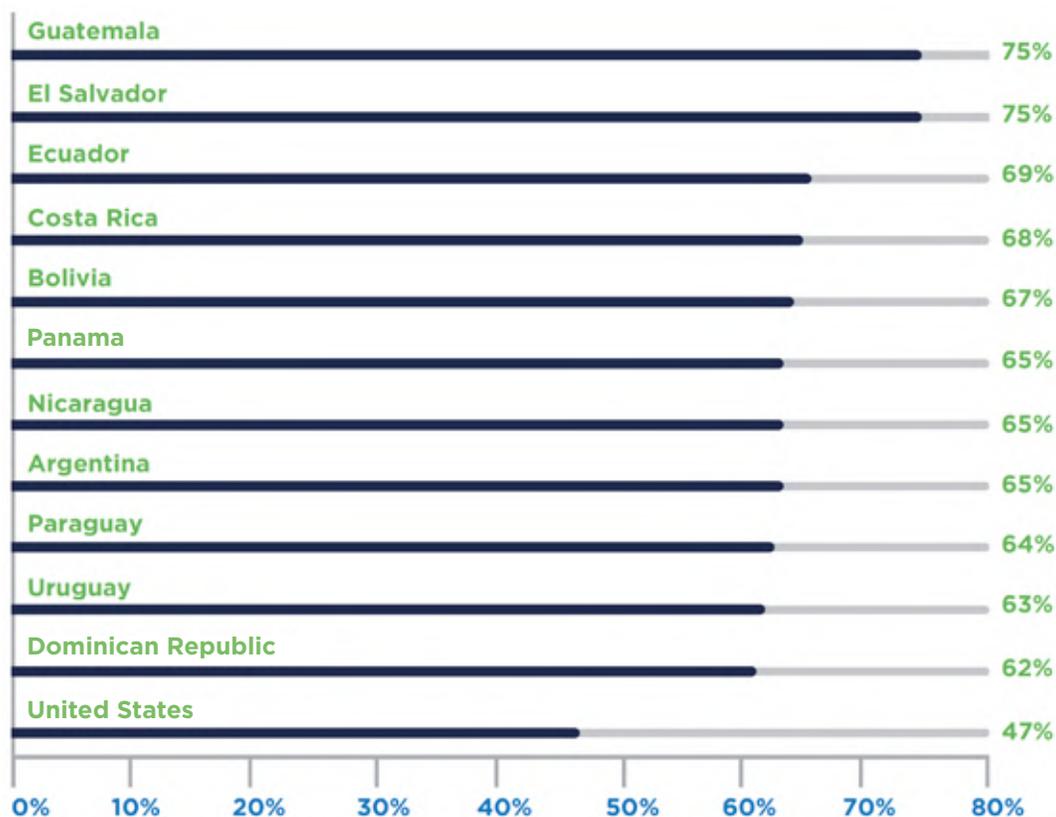
Source : Mateo Díaz et al. (2019)

Second, **the labor market is becoming increasingly polarized**. On the one hand, we have the *low-pay* occupations that require manual labor and the ability to work with people (such as professionals taking care of children, older adults, or people with disabilities; the bartender; the hairdresser; etc.). At the other extreme, those *high-pay* occupations that require higher order cognitive functions (such as critical thinking, leadership, etc.) and highly specialized technical skills. And, the jobs that were previously in the middle are in the process of disappearing and being taken up by machines.

Some sources estimate that by 2025, 97 million new jobs may emerge, while 85 million jobs may be displaced because of automation and a new division of labor between humans and machines (World Economic Forum [2020](#)). The number of jobs requiring routine cognitive tasks and manual tasks has dropped significantly, while the number of jobs requiring non-routine analytical work and interpersonal skills has expanded (Autor et al., 2003; Autor & Price, 2013; Deming, 2017; Edin et al., 2017).

This trend will intensify in the coming years. However, many of the jobs that we have today are specialized and repetitive, which means that they could easily be replaced by machines. Some data indicate more than 50% of jobs are at high risk of automation in LAC countries (Bosch et al., 2018; McKinsey, 2017; Plastino et al., 2018; World Bank, 2016) (see Figure 1.2). **Skills that improve human interaction (such as empathy), connect previously disconnected ideas, manage unpredictable situations, use and understand human emotions to solve problems and conflicts, and generate new ideas will be less likely to be replaced by robots and artificial intelligence** (Berger & Frey, 2015).

**Figure 1.2. Workers in Occupations at High Risk of Automation (in Percentages)**



Source: Bosch et al. (2018).



## 2.1 What are 21st century Skills?

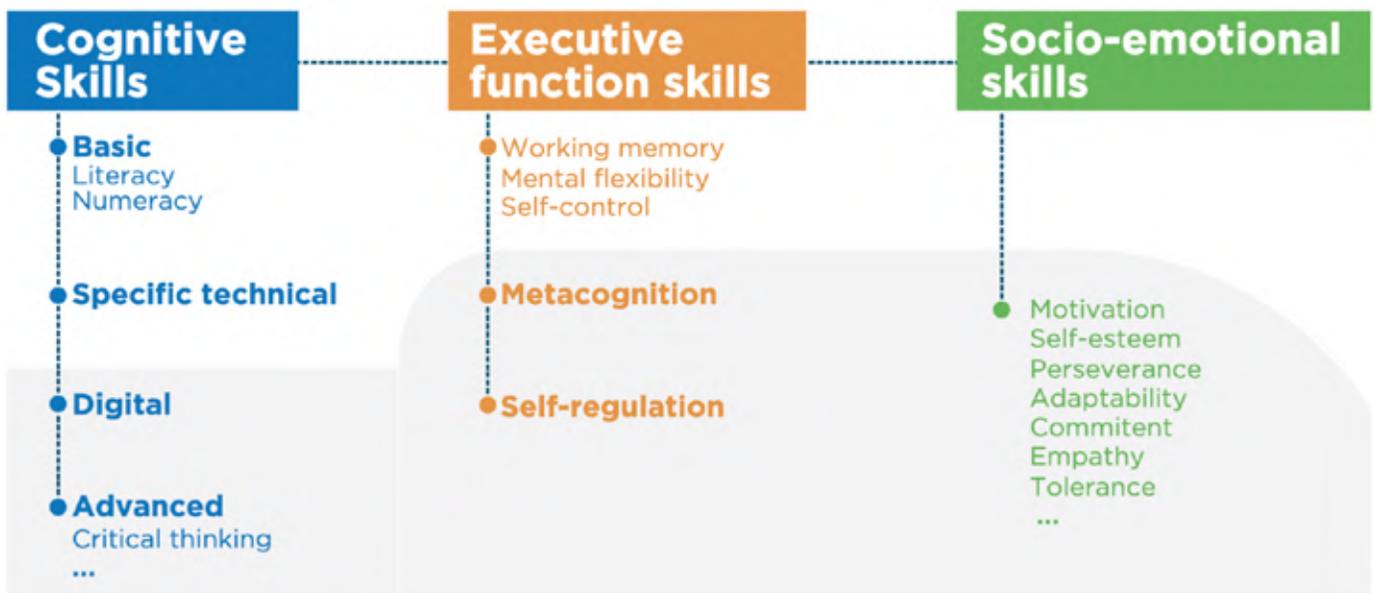
Countries around the world are increasingly focusing on teaching and learning transversal and portable skills (Care et al., 2017; OECD, 2021; Voogt & Roblin, 2012). But what are they? **The so-called 21st century skills are not new, but they are particularly relevant today.** Why?

21st century skills are a set of foundational and transversal skills that include **digital skills** (e.g., computational thinking); **advanced cognitive skills** (e.g., critical thinking or problem-solving); skills related to **executive function** (e.g., self-regulation and metacognition, which have a dynamic relationship with cognitive skills), and **socioemotional skills** (e.g., self-esteem, perseverance, or empathy; see Figure 3).

Basic skills, such as literacy or math, are also foundational and fundamental for the individual, but they are not a differentiating factor in the training requirements between the past and the present century. They are essential in both periods and therefore not included as 21st century skills ([Mateo Diaz et al., 2019](#)).

**21st century skills are essential to human development. Today more than ever, they are necessary to navigate healthy, productive, and happy lives;** not specific to a job, task, profession, or occupation; and applicable to multiple contexts because they are transferable from one field to another. They help people learn other skills (Carretero Gómez, 2021; Chung & Yoo, 2021), and can also help individuals secure high-demand occupations ([Azulara Herrera et al., 2019](#); Mateo Diaz et al., 2022) (see Figure 1.3).

**Figure 1.3 21st century Skills**



Source : Mateo Díaz et al. (2019)

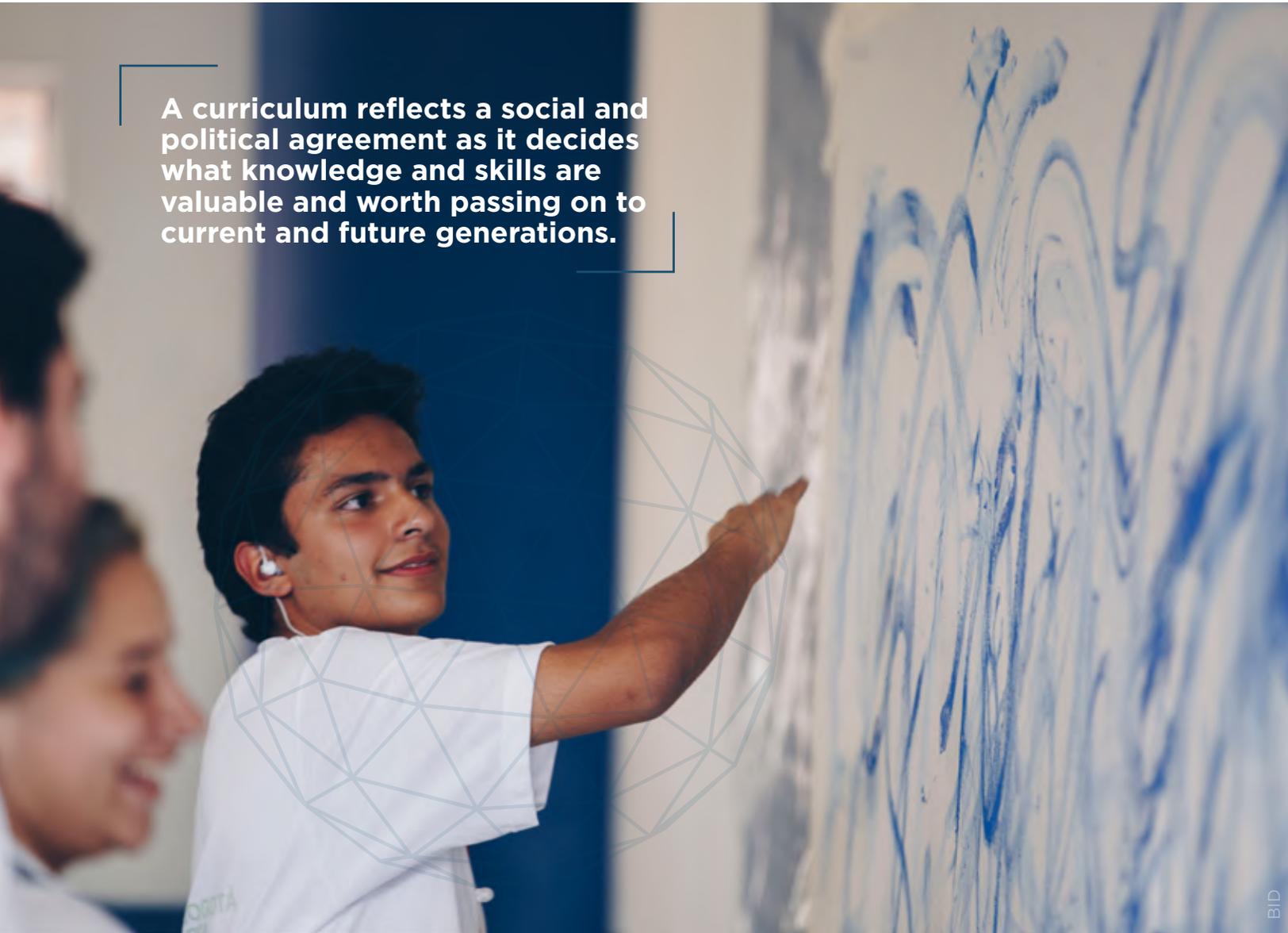
21st century skills help individuals self-regulate, persevere, adapt, and empathize; show more resilience and self-confidence; and have higher expectations for their futures. Existing evidence shows that these skills can help socioemotional development and academic and professional performance (Berger & Frey, 2015; Duckworth & Seligman, 2005; Duckworth et al., 2007; Durlak et al., 2011; Heckman & Kautz, 2013). They are also related to individual and collective well-being across health, violence and other behavioral outcomes (Berger & Frey 2015; Brookings, 2015; Case & Deaton, 2017; Chernyshenko et al., 2018; Azuara Herrera et al., 2015; Kankaras, 2017).

### 3. Curriculum Reforms

Education should provide individuals with a foundational understanding of essential skills and knowledge to help them succeed in their work, personal, and community lives, while binding societies together with a shared understanding (Fadel et al., 2015). A curriculum is generally a course of study or a plan for learning (Taba, 1962; van den Akker, 2010) for all students to attain educational goals (Tyler, 1949). Still, a curriculum can be broader than just a plan of study.

A curriculum has four dimensions: aims or objectives, content or subject matters, methods or procedures, and evaluation or assessments (Scott, 2014). Saavedra and Steele (2012) further define curriculum as including aspects such as teaching methodology, class size, learning hours allocation, learning objectives, assessment, and examination practices. A curriculum reflects a social and political agreement as it decides what knowledge and skills are valuable and worth passing on to current and future generations (Stabback, 2016; Fullan, 2015; IBE-UNESCO, 2008; Marope, 2017; Reimers, 2020a).

**Curriculum reforms are attempts to review or update the content of knowledge, including its selection, organization, and associated learning-related issues** (Gilbert, 2010). Countries have engaged in curriculum reforms to help people prepare for a fast-changing world and to produce more equitable learning outcomes (Boser et al., 2015; Chingos et al., 2012; Steiner, 2017).



A curriculum reflects a social and political agreement as it decides what knowledge and skills are valuable and worth passing on to current and future generations.

Reimers (2020a) pointed out that education reforms always include a range of perspectives and influences: cultural (i.e., social expectations, norms, values), psychological (i.e., theories of learning and teaching to support instruction), professional (i.e., education professionals' knowledge and expertise as a driver of change), institutional (i.e., education institutions, structures, norms, incentives, and resources influencing the educational status), and political (i.e., how interests are negotiated and conflicts are resolved).

Curriculum reforms require changes in existing beliefs and subjective realities across individual and organizational contexts (Fullan, 2015). Costs, uncertainty, and associated risks to training teachers and developing materials can create additional challenges in the process of negotiating and implementing curriculum reforms. Since a curriculum reflects socially accepted skills and knowledge to teach and learn, reforms require changing not only the objectives but also the ways of learning (van den Akker, 2010) and how it should be evaluated.

There are two curriculum models: the process model and the product model.



**Product curriculum model.** The product model originated from Tyler (1949) and influenced American curriculum development (O'Neill, 2010). The product model focuses on results and has a clear definition of learning outcomes in the cognitive, affective, and psychomotor domains. This helps communicate the learning outcomes and choose teaching structure and content, which in turn support choosing accurate evaluation methods (Rowntree, 1974). The product model is generally used in contexts with high constraints, where teachers have to follow a comprehensively developed syllabus. It may narrow students' learning experience with its pre-established outcome maps (OECD, 2020).



**Process curriculum model.** Conversely, the process model was developed by Stenhouse (1975) and focuses on independent and individualized learning processes rather than learning outcomes. The process model requires students to actively solve problems either by choosing the problem or negotiating their choice with the teacher. The process model aims to develop skills through learning experiences. Ireland, Scotland, and Finland adopted the process model during their last curriculum revisions (OECD, 2020). In general, the process model is used in contexts with low constraints, where teachers have considerable freedom and flexibility in designing curriculums. Still, because the process model sees learning as holistic, evaluation and measurement can be challenging (Gouédard et al., 2020; Wette, 2010).

**Curriculum reforms can be motivated by changes in educational goals, to respond to social, economic, and technological changes, and concerns about the current education system's performance** (Barber et al., 2010; Bolstad & Gilbert, 2012; Curriculum Development Council, 2015). For example, Scotland had a national debate on how education can help young people in the future, resulting in its Curriculum for Excellence (McAra et al., 2013; Donaldson, 2014). Curriculum reforms also include changes in instructional time, subjects (e.g., adding new subjects, merging subjects, and reorganizing subjects into learning areas), and content (e.g., adding new content while reducing other content). Generally, targeted curriculum changes, such as those at specific subjects and grade levels tend to be shorter than national curriculum reforms (OECD, 2020; OECD, 2021).

### 3.1 Frequency of Curriculum Reforms

Given the magnitude of the change, curriculum reforms take time, and individuals and institutions tend to favor the status quo (Gouëdard et al., 2020; OECD, 2020). Implementing a curriculum involves multiple stakeholders understanding and translating the curriculum into practices to their local contexts (Coburn, 2006; Spillane, 2000; Spillane et al., 2002). These stakeholders include teachers (Ketelaar et al., 2012) and school leaders (Jackson & Davis, 2000; Thompson et al., 2004). While providing teachers and school leaders with a sense of ownership is important, there are no one-size-fits-all solutions (OECD, 2020).

Some countries have engaged in curriculum reforms regularly at a set number of years, while others countries have done curriculum reforms on an ad hoc basis when needed, without fixed intervals (OECD, 2020; Sargent et al., 2010). Establishing periodic curriculum review cycles can help to establish a long-term nonpartisan education vision at its own pace and avoid political debates (Gray et al., 2014; Pietarinen et al., 2017; Sargent et al., 2010).

One major challenge is the time lag between curriculum reforms, their implementation, and future needs (Halinen, 2017; OECD, 2020; van den Akker, 2007). Many countries want to adapt their formal education standards to a new reality, but they struggle with curriculum reforms that may take several years to complete. In a world of continuous transformation, these reforms will be outdated by the time the new curriculum will be implemented. In addition, countries experience delays first in recognizing the need for curriculum changes in response to emerging needs and then in making decisions and building consensus, adopting the revised curriculum in classroom practices, and measuring impacts on students (Halinen, 2017; OECD, 2020; van den Akker, 2007).

To close such time lags, some countries have used alternative approaches to curriculum reform: curriculums individualized or tailored to students' individual needs and interests (Pane et al., 2017) and customization of instruction to each learner (Peterson et al., 2018); flexible curriculum that provides teachers with some freedom to develop, adopt, implement, and modify learning content, goals, pedagogies, and assessment to meet students' needs (Jonker et al., 2020; Nikolov et al., 2018). These curriculum innovations existed before, but costs have been an obstacle. Today, digital applications can help address those challenges (Papadakis, 2016; Pepin et al., 2016).

## 4. How 21st century Skills Have Been Integrated into Curriculums

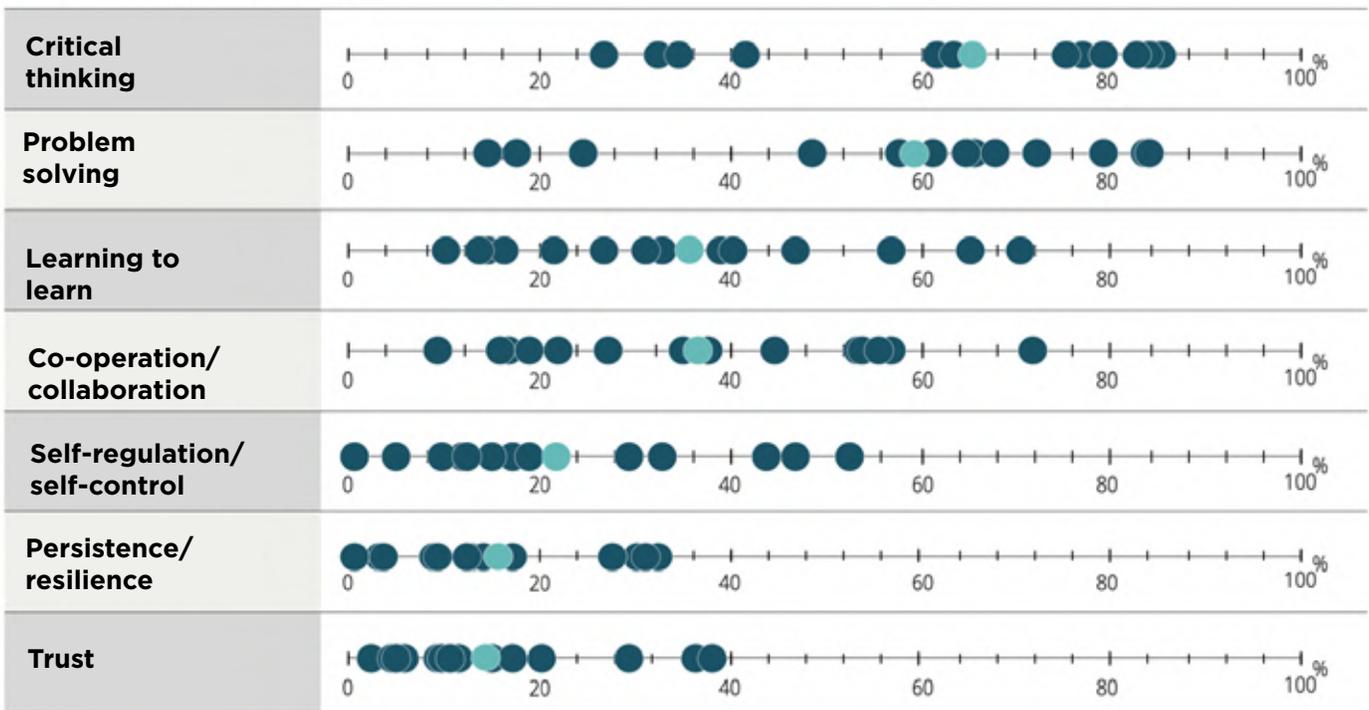
Governments have expanded their curriculum goals to incorporate various cognitive and socioemotional skills (Reimers & Chung, 2016). **Worldwide, there is considerable variation in how countries have incorporated 21st century skills within their curriculums** (Care et al., 2017; Global Partnership for Education, 2020; Voogt & Roblin, 2012). Updating those standards requires significant reforms to restructure the curriculum and adapt teaching methods and assessments (Voogt & Robin, 2012). In addition, LAC countries are adapting their formal education systems to the new reality and progressively engaging in curriculum reforms. Most prior research used the case study method, focusing on specific countries (Reimers, 2020a, 2021; Sinnema et al., 2020; So & Kang, 2014). Some research compared multiple frameworks (Voogt & Roblin, 2012) or multiple countries (Care et al., 2017; OECD, 2021).

However, **despite a consensus and commitment to teaching and learning 21st century skills, many countries have struggled with how to incorporate them within their curriculum.** One study shows that while about 86% of 113 countries expressed a commitment to 21st century skills in their national education documents, only a few countries included plans for how they will incorporate them into their curriculum at policy and practice levels (Care et al., 2017; Global Partnership for Education, 2020). Voogt and Roblin (2012) found a similar dynamic: major international and regional frameworks have a consensus on the importance of including 21st century skills, but could not agree on how to integrate them within the curriculum. The three main approaches are as follows: adding these skills to an already existing curriculum as new or existing subjects, integrating them as cross-curriculum competencies, or adding them as a new curriculum combined with school transformation (Gordon et al., 2009). There is, however, a strong consensus that 21st century skills require significant curriculum changes, including incorporating new teaching methods and assessments.

The OECD's Curriculum Content Mapping (2020) revealed that across participating countries, critical thinking skills are the most frequently mapped curriculum item, followed by problem-solving (59%). Conversely, trust (15%) and persistence/resilience (16%) are the least mapped among the seven skills (see Figure 1.4).

**Figure 1.4. 21st century Skills in OECD Countries' Curriculums**

- Individual country/jurisdiction averages
- Cross-country/jurisdiction average



Source: OECD (2020).

Note. The percentage refers to the total percentage of the mapped curriculum that embeds the competency as a main or sub-target. The averages include OECD countries/jurisdictions and partner economies participating in the Curriculum Content Mapping exercise. OECD countries and jurisdictions: Australia, British Columbia (Canada), Saskatchewan (Canada), Estonia, Greece, Israel, Japan, Korea, Lithuania, Northern Ireland (United Kingdom), Portugal, and Sweden. Partner countries: China, Kazakhstan, and the Russian Federation.

## 5. Keys for a 21st century Skill and Competency-Based Education

The first part of the report (Part 01) presents how top-performing education systems have been incorporating those skills to help students prepare for today's challenges.

### 5.1 A Shift in Focus: From Educational Access to How Students Learn

How education systems need to adapt and respond to the profound transformations in the world is a central question of the global education agenda. Although the debate has predominantly focused on *what* students learn, in recent years, there has been increasing attention to *how* they learn. This shift has allowed for frameworks to expand their final goals beyond the acquisition of 21st century skills to incorporate processes of knowledge transfer, skill development, and deeper learning. The increasing presence of 21st century skills in different frameworks signals their rising importance in the current education policy debate globally. However, there is less consensus on how these skills and competencies are defined, prioritized, and implemented (see Chapter 2).

**Governments face the challenge of designing a curriculum that achieves an equilibrium between standardization and flexibility, and that is coherent with the decentralization level of their education system.** Most of the 20 countries analyzed outside the Latin-American and Caribbean region have curriculums that are rather flexible in allowing teachers to translate the curriculum goals into classroom practices.



Until today, the debate has predominantly focused on what students learn, in recent years, there has been increasing attention to how they learn.

Countries tend to reflect a long list of skills in their curriculums, which may pose a challenge for the implementation, and for translating the intentions (defined in the legal framework), to what happens in the classroom, both in terms of teaching practice and learning by students. Certain skills are more recurrent than others. In the curriculums of the 20 countries analyzed there is an explicit mention to skills such as autonomy, communication, emotional well-being, and creativity. Those skills are connected to four common guiding principles underneath those standards: learning, well-being, commitment, and sustainable development.

**Strengthening formative evaluation: a common goal.** In terms of approach, a majority of countries in the studied sample emphasize the learning process more than the results. Most of the countries emphasize a type of evaluation focused on how students learn and how they acquire skills. Some countries, such as Japan and Denmark, have deployed mechanisms to evaluate skills and competencies beyond content knowledge only.

While some countries have evaluation processes that are self-directed, allowing students to take responsibility in their own learning process, others emphasize the metacognitive dimension of the formative evaluation process. An approach worth highlighting is that of Australia and Scotland, both of which have clearly defined profiles in terms of competencies acquired at different education levels.

**An ideal teacher for 21st century challenges.** All countries envision the ideal teachers as teachers with an inquiry-based profile, knowledge creators, and who foster a collaborative environment for learning. Hence, there is an increasing tendency for practical approaches to teacher professional development. Countries like New Zealand, Norway, Germany, and Austria have two years of practical experience in school settings linked to the teacher career training. Japan and South Korea have the strong teacher support and emotional training, as well as high recognition and status of teachers in society.

**Institutional factors and financing strategies matter for the implementation of the 21st century skills.** Policies oriented to close educational, cultural, and social gaps require strengthening the institutional capacity of the ecosystem of actors involved. Depending on the institutional layout, policies may generate different outcomes in different places. The level of public spending matters, but even more so does the efficiency of public spending. In the same way, creating a culture that values education as a social good and investing in students' socioemotional well-being can provide higher efficiency in spending and effectiveness in outcomes.

## 5.2 EdTech Policies and Digital Skills: The Importance of a Shared Vision

**Fostering education technology (EdTech) policies and digital skills development has proven to be a key step to embracing 21st century skills in education systems** (see Chapter 3). The effectiveness of a policy can be amplified if policymakers and all involved actors have a shared vision and understanding of its implementation. The cases studied show that achieving a shared vision on the role of EdTech policies can be achieved through participatory processes that both ensure involvement from the education community and empower its members. An example of this is Finland, where there is a systematic approach for community members to join the design process of curriculum revisions.

The implementation of education reforms should be connected to other productive strategies and supported by frameworks at the national, regional, and local levels. In Singapore, for instance, curriculum reforms to incorporate 21st century skills were linked to an already existing framework of employment skills implemented at different levels.

**Ensuring equal access to EdTech learning opportunities.** A prerequisite to incorporate digital skills in education systems is to ensure equal access to technology. Access is defined both in terms of providing adequate technological coverage to participate in new learning opportunities and building skills for a sustainable use of technology. The experiences of Canada, Japan, and Uruguay are of particular interest in terms of extensive supply of technological equipment and internet access.

In terms of teacher training to ensure sustainability of EdTech reforms, some experiences are worth highlighting. In Uruguay, teachers are provided with in-person, online, and hybrid modality courses to promote a more effective and sustainable use of technology in the classroom. Similarly, Austria has a framework of digital skills for educators, and Finland has a mentoring program to encourage innovative use of EdTech.

EdTech policies provide an opportunity to expand teachers' skills in their planning, execution, and assessment of learning opportunities centered on students. The comparative experiences of the countries analyzed show that EdTech can mediate new learning processes and promote innovation among teachers. The cases of Singapore and Uruguay, both of which support innovative uses of technology, support this premise.

**Good governance and adequate financing for sustainable reforms.** EdTech innovations have been shown to be more successful in contexts where strong partnerships between the private, public, and civil society sectors are built and strengthened. When reforms are inserted within larger shared visions, the probability of sustainability both socially and financially is higher. Various countries in the sample studied rely on public, private, or hybrid entities to ensure the financing of the reforms. Most countries analyzed have embedded processes to evaluate their EdTech reforms. Estonia and Austria have linked evaluation processes to accreditation and access to financing, which is a strong incentive for continued assessment and improvement of EdTech policies.

## 6. 21st century Skills in Latin America and the Caribbean

The second part of the report (Part 02) focuses on Latin American and Caribbean (LAC) countries and helps us understand the challenges ahead.

### 6.1 21st century Skills Are Central to the Curriculum In Some LAC Countries

**How LAC countries have progressed in the inclusion of 21st century skills in their curriculum programs is a central question to understand the challenges ahead.** Overall, LAC countries have made **sustained but heterogeneous progress** toward incorporating 21st century skills into their curriculum programming. In some countries, such as Chile and Costa Rica, 21st century skills are explicitly stated in the curriculum, indicating an increasing consensus on their importance. In other countries, 21st century skills are also present, with some adaptations in the terminology to respond to certain concerns about the fact that the role of education should go beyond preparing students for work and therefore shouldn't be exclusively tailor-made to the needs of the labor market.

There does not seem to be a clear and strong relationship between the level of regulation by the central government over curriculum design and the level of inclusion of 21st century skills. Hence, there is great variation regarding the inclusion of these skills within highly centralized and regulated systems such as Chile and Honduras. Similarly, a clear pattern does not emerge within more decentralized systems such as those in Colombia and Brazil.

The inclusion of 21st century skills in curriculums does not necessarily imply effective application in the classroom. Often, these skills are loosely defined or are grouped with other cognitive constructs. Defining 21st century skills for teachers in such a way that allows them to incorporate these skills into their pedagogical practices remains a challenge for most countries in the region.

Some lessons for education policy emerge from these experiences are as follows:

First, **it is imperative to strengthen governments' capabilities and competences in curriculum design.** This process involves building stable and highly technical teams with access to continued professional development that can respond to rapidly changing contexts. The curriculum agencies within the Ministries of Education are critical to establishing processes of curriculum reform that can be maintained over time.

Second, for curriculum reforms to be sustainable, **there needs to be a culture that incentivizes reflection, research, and debate around curriculum transformations.** Participatory mechanisms are key in generating consensus around education policies and reforms.

Third, to successfully integrate 21st century skills into curriculums, **countries need to aim for coherence across different channels and instruments of curriculum policies at all levels.** Including these skills in the curriculum programs does not imply that they will translate into practice. Hence, the challenge that remains is how to clearly define 21st century skills in a way that speaks to concrete teaching practices.

Fourth, **it is important to evaluate specific interventions and programs,** in addition to the curriculum design. These programs are usually targeted and small scale, but they are effective vehicles to deepen understanding of the underlying processes of curriculum transformations.

Fifth, **digital, socioemotional, and civic skills are easily integrated into curriculum reforms.** Digital skills have gained increasing importance in the curriculum programming in LAC countries. As opposed to other 21st century skills, which are often bundled with other competences and objectives, digital skills have a specific place in curriculums. Although students have interacted with digital devices for quite some time, some countries have pioneered the inclusion of innovative fields such as computer science, programming skills, and robotics.

Sixth, **although socioemotional skills are not yet as central as digital skills, there is an increasing effort to include them in curriculums.** In some countries, socioemotional skills are crosscutting content areas, while in other countries, these skills have a specific place in the curriculum programming. Some key actors have noted that the former approach could make it more difficult for these skills to be taught.

Finally, **all the normative frameworks analyzed mention the importance of developing and strengthening civic skills.** Previous studies also documented this tendency in the region. In 2020, a UNESCO study (2020) showed that concepts like *identity*, *citizenship*, and *respect* are highly present in the curriculum programs of LAC countries. It is worth noting that in most countries, the references to civic skills are embedded within the national rather than the global context. The cases show mixed practices in how civic skills interact with other skills: In some countries they are crosscutting, while in others they have a specific place in the curriculum programming.



## 6.2 Curriculum as Practice and Experience: Fostering 21st century Skills Through Behavioral Interventions

**Behavioral interventions are a promising vehicle to integrate 21st century skills into school and classroom practice** (see Chapter 4). In particular, socioemotional skills are getting increased attention. These skills have proven to be critical to face the challenges brought by uncertain times such as health crisis. An increasing body of literature shows that several skills related to socioemotional growth of students can be boosted through interventions based on behavioral sciences.

**The most widely known form of behavioral interventions are *nudges*.** Nudges are brief, low-cost, and can be administered in schools to elicit positive behaviors in participants. They take the form of prompts and/or reminders to influence people's choices. The current literature showed that educational nudges have been effective in improving several educational outcomes, such as academic achievement and attendance. More recently, in Brazil, an intervention using nudges through text messages was successful in keeping students engaged in remote learning and motivating them to return to in-person instruction. While nudges have shown to work well in some settings, the context, and conditions under which they are administered matter for their effectiveness. For example, evidence shows that two-way text messaging programs are more effective than one-way automated messaging in improving subjective well-being of students.

**Another set of effective interventions are called *wise interventions*,** which target students' meaning and interpretations of themselves and their environment to help them create adaptive responses to challenging situations. These interventions target 21st century skills that relate to adaptability, collaboration, growth mindset, and resilience. In this realm, studies have documented positive results from interventions of growth mindset, belonging, and self-affirmation. Just as with nudges, the context and design of these interventions matters for the outcomes. In Peru, a growth mindset intervention was implemented at the school-level with large positive results in math and reading scores. Students read a text on growth mindset, debated the content, and wrote a reflective letter to a friend on what they learnt. A similar but much lighter intervention was implemented in Argentina with no results in academic achievement. These mixed results confirm that the effectiveness of growth mindset interventions will differ based on the context they are applied in, as well as on key implementation decisions, such as intensity of the treatment.

Finally, **socioemotional learning interventions have also emerged as promising instruments to foster 21st century skills.** These interventions target the development of skills such as self-awareness, self-management, and relationship skills. A rigorous body of literature has documented that the following key elements make socioemotional learning interventions more effective: (i) sequenced (connected to a set of activities), (ii) active (modes of learning that are engaging), (iii) focused (on personal and social skills), and (iv) explicit (focused on a specific set of skills). For example, the Coping Power Universal is among the most successful interventions to help children improve their social skills and better regulate their emotions (Lochman & Wells, 2003; Muratori et al., 2020). This intervention lasts 24 weeks. It consists of six modules delivered to students and weekly meetings with their teacher, who is a trained instructor. Results have shown positive impact in increasing prosocial behavior of students as rated by parents and teachers.



## 7. Leveraging the Crisis as an Opportunity

The crisis brought on by the pandemic has exacerbated and deepened pressing global challenges. The crisis calls for rebuilding and transforming education systems to respond, more than ever, to uncertain times. Curriculum reform is at the top of the education agenda today. Still, LAC countries have struggled to incorporate 21st century skills into their curriculum programs, and even more so to translate such policies into practice. However, the region has made important progress toward taking ownership of the 21st century agenda, creating consensus among the education community, and encouraging innovative approaches to EdTech policies. Taking advantage of the efforts made in response of the challenges posed by the pandemic to prepare students for the challenges of the future through curriculum reform can be a turning point for the region's trajectory.

## References

- Abizanda, B., G. Almeyda, E. Arias Ortiz, C. Berlanga, I. Bornacelly, M.S. Bos, M. S., ... & Zoido, P. (2022). *¿Cómo reconstruir la educación postpandemia? Soluciones para cumplir con la promesa de un mejor futuro para la juventud*. Inter-American Development Bank. <http://dx.doi.org/10.18235/0004241>
- Amadio, M., Opertti, R., and Tedesco, J. C. (2014). *Curriculum in the twenty-first century: Challenges, tensions and open questions* (ERF Working Paper No. 9). UNESCO Education Research and Foresight. <http://www.ibe.unesco.org/sites/default/files/resources/229458e.pdf>
- Autor, D. H., & Price, B. (2013). *The changing task composition of the US labor market: An update of Autor, Levy, and Murnane (2003)* [Unpublished manuscript]. <https://economics.mit.edu/files/9758>
- Autor, D. H., Levy, F., & Murnane, R. J. (2003). The skill content of recent technological change: An empirical exploration. *The Quarterly Journal of Economics*, 118(4), 1279–1333. <https://doi.org/10.1162/003355303322552801>
- Azuara Herrera, O., Pagés, C., Rucci, G., Amaral, N., Ospino, C., Torres, J., & González, S. (2019). *El futuro del trabajo en América Latina y el Caribe: ¿Cuáles son las ocupaciones y las habilidades emergentes más demandadas en la región?* Inter-American Development Bank. <http://dx.doi.org/10.18235/0001677>
- Barger, M., Chijoke, C., & Mourshed, M. (2010). *How the world's most improved school systems keep getting better*. McKinsey & Company. <https://www.mckinsey.com/industries/education/our-insights/how-the-worlds-most-improved-school-systems-keep-getting-better>
- Berger, T., & Frey, C. B. (2015, July 7). *Future shocks and shifts: Challenges for the global workforce and skills development* [Working group presentation]. OECD Education 2030 First Informal Working Group Webinar/ Meeting, Paris. <https://www.oecd.org/education/2030-project/about/documents/Future-Shocks-and-Shifts-Challenges-for-the-Global-Workforce-and-Skills-Development.pdf>
- Bialik, M., and Fadel, C. (2018). *Knowledge for the age of artificial intelligence: What should students learn?*. Center for Curriculum Redesign. [https://curriculumredesign.org/wp-content/uploads/CCR\\_Knowledge\\_FINAL\\_January\\_2018.pdf](https://curriculumredesign.org/wp-content/uploads/CCR_Knowledge_FINAL_January_2018.pdf)
- Bolstad, R., & Gilbert, J. (2008). *Disciplining and drafting or 21st century learning?: Rethinking the New Zealand senior secondary curriculum for the future*. NZCER Press.
- Bosch, M., Pages, C., & Ripani, L. (2018). *The future of work of Latin America and the Caribbean: A great opportunity for the region?* Inter-American Development Bank. <http://dx.doi.org/10.18235/0001339>
- Boser, U., Chingos, M., & Straus, C. (2015). *The hidden value of curriculum reform*. Center for American Progress. <https://cdn.americanprogress.org/wp-content/uploads/2015/10/06111518/CurriculumMatters-report.pdf>
- Care, E., Kim, H., Anderson, K., & Gastafsson-Wright, E. (2017). *Skills for a changing world: National perspectives and the global movement*. Brookings. <https://www.brookings.edu/wp-content/uploads/2017/03/global-20170324-skills-for-a-changing-world.pdf>
- Carretero Gómez, S. (2021). *Skills for life: Digital skills*. Inter-American Development Bank. <http://dx.doi.org/10.18235/0003126>
- Case, A., & Deaton, A. (2017). Mortality and morbidity in the 21st century. *Brookings Papers on Economic Activity*, 2017, 397-476. <https://doi.org/10.1353/eca.2017.0005>
- Chernyshenko, O. S., Kankaraš, M., & Drasgow, F. (2018). Social and emotional skills for student success and well-being: Conceptual framework for the OECD study on social and emotional skills. OECD. <https://doi.org/10.1787/db1d8e59-en>
- Chingos, M. M., & Whitehurst, G. J. (2012). *Choosing Blindly: Instructional Materials, Teacher Effectiveness, and the Common Core*. Brookings Institution.
- Chung, J., & Yoo, J. (2021). *Skills for life: Digital literacy*. Inter-American Development Bank. <http://dx.doi.org/10.18235/0003368>

- Coburn, C. E. (2006). Framing the problem of reading instruction: Using frame analysis to uncover the microprocesses of policy implementation. *American Educational Research Journal*, 43(3), 343-349. <https://doi.org/10.3102/00028312043003343>
- Curriculum Development Council. (2015). *Ongoing curriculum renewal of the school curriculum: Focusing, deepening and sustaining. An overview*. [https://www.edb.gov.hk/attachment/en/curriculum-development/renewal/Overview\\_e\\_2015Dec.pdf](https://www.edb.gov.hk/attachment/en/curriculum-development/renewal/Overview_e_2015Dec.pdf)
- Deming, D. J. (2017). The value of soft skills in the labor market. *NBER Reporter* (4): 7–11. <https://www.econstor.eu/bitstream/10419/178757/1/2017-no4-2.pdf>
- Donaldson, G. (2014). Teacher Education and Curriculum Change in Scotland. *European Journal of Education*, 49(2), 178-191. <https://doi.org/10.1111/ejed.12077>
- Duckworth, A. L., & Seligman, M. E. (2005). Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological Science*, 16(12), 939-944. <https://doi.org/10.1111/j.1467-9280.2005.01641.x>
- Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, 92(6), 1087-1101. <https://doi.org/10.1037/0022-3514.92.6.1087>
- Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development*, 82(1), 405-432. <https://doi.org/10.1111/j.1467-8624.2010.01564.x>
- Edin, P-A., Fredriksoon, P., Nybom, M., & öckert, B. (2017). *The rising return to non-cognitive skill*. Discussion paper series IZA DP No. 10914. IZA Institute of Labor Economics. <http://ftp.iza.org/dp10914.pdf>
- Fadel, C., Bialik, M., & Trilling, B. (2015). *Four-dimensional education: The competencies learners need to succeed*. Center for Curriculum Redesign.
- Fullan, M. (2015). *The New Meaning of Educational Change*. Fifth Edition. Teachers College Press. <https://books.google.fr/books?id=YxGTCwAAQBAJ>
- Gilbert, R. (2010). Curriculum reform. In P. Peterson, E. Baker, & B. McGaw. (Eds.). *International encyclopedia of education*. Elsevier; Academic Press. 510-513. <https://doi.org/10.1016/B978-0-08-044894-7.00103-2>
- Global Partnership for Education. (2020). *21st century skills: What potential role for the global partnership for education?*. <https://www.globalpartnership.org/content/21st-century-skills-what-potential-role-global-partnership-education>
- Goodlad, J. I., & Su, Z. (1992). Organization of the curriculum. In P. W. Jackson. (Ed.). *Handbook of research on curriculum*, 327-344.
- Gordon, J., Halsz, G., Krawczyk, M., Leney, T., Michel, A., Pepper, D., Putkiewicz, E., & Wisniewski, W. (2009). *Key competences in Europe. Opening doors for lifelong learners across the school curriculum and teacher education* (CASE Network Report No. 87). Center for Social and Economic Research. <https://www.econstor.eu/bitstream/10419/87621/1/613705459.pdf>
- Gouédard, P., Pont, B., Hyttinen, S., & Huang, P. (2020). *Curriculum reform: A literature review to support effective implementation* (OECD Education Working Paper No. 239). OECD. <https://doi.org/10.1787/efe8a48c-en>
- Gray, S., Scott, D. & Auld, E. (2014), *Curriculum Development: A Report for the International Baccalaureate Organization (IBO)*, Institute of Education. <https://www.ibo.org/globalassets/publications/ibresearch/curriculumdevelopmentfinalreport.pdf>
- Halinen, I., & Holappa, M. S. (2013). Curricular balance based on dialogue, cooperation and trust–The case of Finland. *Balancing curriculum regulation and freedom across Europe. CIDREE yearbook, 2013*, 39-62. [http://www.cidree.org/wp-content/uploads/2018/07/yb\\_13\\_balancing\\_curriculum\\_regulation\\_and\\_freedom.pdf#page=40](http://www.cidree.org/wp-content/uploads/2018/07/yb_13_balancing_curriculum_regulation_and_freedom.pdf#page=40)
- Heckman, J. J., & Kautz, T. (2013). Fostering and measuring skills: Interventions that improve character and cognition, National Bureau of Economic Research (NBER). <https://doi.org/10.3386/w19656>

- IBE-UNESCO (2008). *Inclusive education: The way of the future; Conclusions and recommendations of the 48th session of the International Conference on Education*. UNESCO International Bureau of Education.
- Jackson, A., & Davis, G. (2000). *Turning points 2000: Educating adolescents in the 21st century*. Teachers College Press
- Jonker, H., März, V., & Voogt, J. (2020). Curriculum flexibility in a blended curriculum. *Australasian Journal of Educational Technology*, 36(1), 68–84. <https://doi.org/10.14742/ajet.4926>
- Kankaraš, M. (2017). Personality matters: Relevance and assessment of personality characteristics, OECD Education Working Papers, OECD. <https://doi.org/10.1787/8a294376-en>
- Ketelaar, E., Beijaard, D., Boshuizen, H.P.A., & Den Brok, P.J. (2012). Teachers' positioning towards an educational innovation in the light of ownership, sense-making and agency. *Teaching and Teacher Education*, 28(2), 273–282. <https://doi.org/10.1016/j.tate.2011.10.004>
- Lochman, J., & Wells, K. (2003). The Coping Power program at the middle-school transition: Universal and indicated prevention effects. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*, 16(4, Suppl), S40–S54. <https://doi.org/10.1037/0893-164X.16.4S.S40>
- Marope, P. T. M. (2017). *Reconceptualizing and repositioning curriculum in the 21st century: A global paradigm shift*. UNESCO International Bureau of Education. [http://www.ibe.unesco.org/sites/default/files/resources/reconceptualizing\\_and\\_repositioning.pdf?fbclid=IwAR3oOL6pkLL-j4VtLB4CIIFtuDP6fD2M5SAz2zvTKcsfe2NDg3\\_i0\\_nL-Ao](http://www.ibe.unesco.org/sites/default/files/resources/reconceptualizing_and_repositioning.pdf?fbclid=IwAR3oOL6pkLL-j4VtLB4CIIFtuDP6fD2M5SAz2zvTKcsfe2NDg3_i0_nL-Ao)
- Mateo Diaz, M., Lim, J. R., Cardenas-Navia, I., & Elzey, K. (2022). *A world of transformation: Moving from degrees to skills-based alternative credentials*. Technical Note IDB-TN-02347, Inter-American Development Bank. <https://doi.org/10.18235/0004299>
- Mateo Diaz, M., Rucci, G., Amaral, N., Arias Ortiz, E., Becerra, L., Bustelo, M., Cabrol, M., Castro, J., Caycedo, J., Duryea, S., Groot, B., Heredero, E., Hincapie, D., Magendzo, A., Navarro, J. C., Novella, R., Rieble-Aubourg, S., Rubio-Codina, M., Scartascini, C., & Veza, E. (2019). *The future is now: Transversal skills in Latin America and the Caribbean in the 21st century*. Inter-American Development Bank. <http://dx.doi.org/10.18235/0001950>
- McAra, K., Broadley, E., & McLauchlan, J. (2013). Curriculum for Excellence in Scotland—local flexibility or national exemplification. *Balancing curriculum regulation and freedom across Europe*, 211–228.
- McKinsey. (2017). *A future that works: Automation, employment, and productivity*. McKinsey Global Institute. <https://www.mckinsey.com/~media/mckinsey/featured%20insights/Digital%20Disruption/Harnessing%20automation%20for%20a%20future%20that%20works/MGI-A-future-that-works-Executive-summary.ashx>
- Muratori, P., Bertacchi, I., Catone, G., Mannucci, F., Nocentini, A., Pisano, S., & Lochman, J. E. (2020). Coping Power Universal for middle school students: The first efficacy study. *Journal of Adolescence*, 79, 49–58. <https://doi.org/10.1016/j.adolescence.2019.12.014>
- Nikolov, R., Lai, K. W., Sendova, E., & Jonker, H. (2018). Distance and flexible learning in the twenty-first century. *Second handbook of information technology in primary and secondary education*, 1–16. [https://doi.org/10.1007/978-3-319-53803-7\\_45-2](https://doi.org/10.1007/978-3-319-53803-7_45-2)
- O'Neill, G. (2010). Initiating curriculum revision: exploring the practices of educational developers. *International Journal for Academic Development*, 15(1), 61–71. <https://doi.org/10.1080/13601440903529927>
- OECD. (2018). *The future of education and skills, education 2030: The future we want* [Position paper]. [https://www.oecd.org/education/2030/E2030%20Position%20Paper%20\(05.04.2018\).pdf](https://www.oecd.org/education/2030/E2030%20Position%20Paper%20(05.04.2018).pdf)
- OECD. (2020a). *How's life? 2020: Measuring well-being*. OECD. <https://doi.org/10.1787/9870c393-en>
- OECD. (2020b). *Technical report: Curriculum analysis of the OECD future of education and skills 2030*. [https://www.oecd.org/education/2030-project/contact/Technical%20Report\\_Curriculum\\_Analysis\\_of\\_the\\_OECD\\_Future\\_of\\_Education\\_and\\_Skills\\_2030.pdf](https://www.oecd.org/education/2030-project/contact/Technical%20Report_Curriculum_Analysis_of_the_OECD_Future_of_Education_and_Skills_2030.pdf)
- OECD. (2020c). *What students learn matters: Towards a 21st century curriculum*. <https://doi.org/10.1787/d86d4d9a-en>

- Pane, J. F., Steiner, E. D., Baird, M. D., Hamilton, L. S., & Pane, J. D. (2017). *Informing progress: Insights on personalized learning implementation and effects*. RAND Corporation. [https://www.rand.org/pubs/research\\_reports/RR2042.html](https://www.rand.org/pubs/research_reports/RR2042.html)
- Papadakis, S. (2016). Creativity and innovation in European education. Ten years eTwinning. Past, present and the future. *International Journal of Technology Enhanced Learning*, 8(3-4), 279-296.
- Pepin, B., Choppin, J., Ruthven, K., & Sinclair, N. (2017). Digital curriculum resources in mathematics education: foundations for change. *ZDM Mathematics Education*, 49(5), 645-661. <https://doi.org/10.1007/s11858-017-0879-z>
- Peterson, A., Milligan, A., & Wood, B. E. (2018). Global citizenship education in Australasia. In *The Palgrave handbook of global citizenship and education* (pp. 3-20). Palgrave Macmillan. [https://doi.org/10.1057/978-1-137-59733-5\\_1](https://doi.org/10.1057/978-1-137-59733-5_1)
- Pietarinen, J., Pyhältö, K., & Soini, T. (2017). Large-scale curriculum reform in Finland—exploring the interrelation between implementation strategy, the function of the reform, and curriculum coherence. *The Curriculum Journal*, 28(1), 22-40. <https://doi.org/10.1080/09585176.2016.1179205>
- Plastino, E., Zuppolini, M., & Govier, M. G. (2018). América Latina: habilidades para el trabajo en la era de las máquinas inteligentes. Accenture.
- Reimers, F. M. (Ed.). (2020a). *Audacious education purposes: How governments transform the goals of education systems*. Springer. <https://doi.org/10.1007/978-3-030-41882-3>
- Reimers, F. M. (2020b). Transforming education to prepare students to invent the future. *PSU Research Review* 4(2), 81–91. <https://doi.org/10.1108/PRR-03-2020-0010>
- Reimers, F. M. (Ed.). (2021). *Implementing deeper learning and 21st century education reforms: Building an education renaissance after a global pandemic*. Springer. <https://doi.org/10.1007/978-3-030-57039-2>
- Reimers, F. M., & Chung, C. K. (Eds.). (2019). *Teaching and learning for the twenty-first century: Educational goals, policies, and curricula from six nations*. Harvard Education Press.
- Rowntree, D. (1974). *Two styles of communication and their implications for learning*. Open University Institute of Education Technology.
- Saavedra, A., and J. Steele. (2012). *Implementation of the common core state standards: Recommendations for the Department of Defense Education Activity Schools*. RAND Corporation.
- Sargent, C. et al. (2010). *Curriculum review in the INCA countries*. National Foundation for Educational Research. [https://webarchive.nationalarchives.gov.uk/20130220111913/http://www.inca.org.uk/Curriculum\\_review\\_probe\\_final\\_01\\_dec\\_2010.pdf](https://webarchive.nationalarchives.gov.uk/20130220111913/http://www.inca.org.uk/Curriculum_review_probe_final_01_dec_2010.pdf)
- Scott, D. (2014). Knowledge and the curriculum. *The Curriculum Journal*, 25(1), 14–28.
- Sinnema, C., Nieveen, N., & Priestley, M. (2020). Successful futures, successful curriculum: What can Wales learn from international curriculum reforms?. *The Curriculum Journal*, 31(2), 181–201. <https://doi.org/10.1002/curj.17>
- So, K., & Kang, J. (2014). Curriculum reform in Korea: Issues and challenges for twenty-first century learning. *The Asia-Pacific Education Researcher*, 23(4), 795–803. <https://doi.org/10.1007/s40299-013-0161-2>
- Spillane, J. P. (2000). Cognition and policy implementation: District policymakers and the reform of mathematics education. *Cognition and instruction*, 18(2), 141-179. [https://doi.org/10.1207/S1532690XCI1802\\_01](https://doi.org/10.1207/S1532690XCI1802_01)
- Spillane, J. P., Reiser, B. J., & Reimer, T. (2002). Policy implementation and cognition: Reframing and refocusing implementation research. *Review of Educational Research*, 72(3), 387-431. <https://doi.org/10.3102/00346543072003387>
- Stabback, P. (2016,) *What makes a quality curriculum?* (Current and Critical Issues in Curriculum and Learning, In-Progress Reflection No. 2). UNESCO International Bureau of Education. <http://unesdoc.unesco.org/images/0024/002439/243975e.pdf>

- Steiner, D. (2017). Curriculum research: What we know and where we need to go. Standards Work. <https://jscholarship.library.jhu.edu/bitstream/handle/1774.2/62999/sw-curriculum-research-report-fnl.pdf?sequence=1>
- Stenhouse, L. (1975). *An introduction to curriculum research and development*. Heinemann Educational.
- Taba, H. (1962). *Curriculum development: Theory and practice*. Harcourt, Brace & World.
- Thompson, S. C., Gregg, L., & Niska, J. M. (2004). Professional learning communities, leadership, and student learning. *RMLE Online*, 28(1), 1-15. <https://doi.org/10.1080/19404476.2004.11658173>
- Tyler, R. W. (1949). *Basic principles of curriculum and instruction*. University of Chicago Press.
- UNESCO. (2020). *Latin America and the Caribbean. Inclusion and education: All means all*. <https://unesdoc.unesco.org/ark:/48223/pf0000374614>
- van den Akker, J. (2007). Curriculum design research. In T. Plomp, & N. Nieveen. (Eds.). *An introduction to educational design research*. SLO: Netherlands Institute for Curriculum Development. [http://cls.ea.gr/sites/default/files/Curriculum\\_design\\_research\\_Van\\_der\\_Akker.pdf](http://cls.ea.gr/sites/default/files/Curriculum_design_research_Van_der_Akker.pdf)
- Voogt, J., & Roblin, N. P. (2012). A comparative analysis of international frameworks for 21st century competences: Implications for national curriculum policies. *Journal of Curriculum studies*, 44(3), 299–321. <https://doi.org/10.1080/00220272.2012.668938>
- Wette, R. (2011). Product–process distinctions in ELT curriculum theory and practice. *ELT Journal*, 65(2), 136-144. <https://doi.org/10.1093/elt/ccq022>
- World Bank. (2016). *World development report 2016: Digital dividends*. <https://www.worldbank.org/en/publication/wdr2016>
- World Economic Forum (2016). *The Future of Jobs Report 2020*. <https://www.weforum.org/reports/the-future-of-jobs-report-2020/>

**Part 01:  
Curriculum Reforms  
for the 21st Century  
Around the World**

## Chapter 2

# How to Incorporate 21st century Skills in Education Systems:

A Comparison of 20  
Countries' Experiences





## Chapter 2

# How to Incorporate 21st century Skills in Education Systems: A Comparison of 20 Countries' Experiences

### Abstract

Integrating the teaching of 21st century skills into education systems is critical, but such implementation can be challenging. We investigated the extent to which 20 countries with medium to high Human Development Index (HDI) values have incorporated the 21st century skills into their school systems, documenting the work carried out by each. We begin with a look at the state of the art regarding the concept of teaching skills students need for the 21st century.

We present five dimensions along which we compare the experiences with and current state of skills-based teaching in the 20 countries: curriculum, teaching, evaluation, institutional factors that favor change, and financing strategies and supplies. We used a review of the pertinent literature, an examination of official education-related documents and legislation in the sample countries, and interviews with teachers themselves. We present our findings about the 20 countries in a comparative format, categorized by the five dimensions.

Key takeaways from our study include, but are not limited to, these: curriculum models very often fall into two categories: knowledge-based curriculum model that is in the service of *content* and skills-based curriculum model that is in the service of the *person*; many countries are embracing “formative assessment,” which involves the teacher but, importantly, encourages and promotes self-assessment by students; and with regard to support given to teachers themselves, communities of professional practice are key to implementing curricula that promote 21st century skills going forward. Lastly, we propose some keys to success that policymakers and educators alike may refer to in the implementation of educational programs to develop 21st century skills.

## 1. Introduction: 21st century Skills within Education Systems

**How could educational systems promote 21st century skills? What can we learn from the countries that have successfully incorporated 21st century skills into their curriculums?** In this second chapter, we systemically review how 20 countries have integrated 21st century skills into their education systems. We organize our inquiry along five broad dimensions, namely, curriculum, evaluation, teachers, educational policies, and financing strategies.

**The accelerated changes of a volatile, uncertain, complex, and ambiguous social context force schools to assume that they must transform themselves at a rate similar to that experienced by the social and economic system.** In the current situation, even that objective could be too modest, since the best way to achieve an education system with the potential for social transformation would be to go one step ahead: the school should change faster than the social context. Unfortunately, most education systems are far from doing that.

For the past 40 years, the discourse on how education systems should respond to the demands of the 21st century seems to have been stuck in an endless debate focused on what people should learn in school and what role schools should have in society. That debate, overly focused on *content*, makes it challenging to have a dialogue about the skills and competencies people need to acquire through education. Understanding that an education should accompany the process of people opening up to themselves and reality, it seems logical to conclude that the school should teach one *how* to live. Thus, reflection on skills and competencies involves asking about the very *goals* and *objectives* of schooling—and that should be the leading debate today.

**Today's societies demand a transformative school, one that allows people to mobilize their acquired knowledge to understand the world and act on that understanding.** Such a school cannot limit itself to the teaching and learning of discipline-based content; nor can it be a mere vehicle for transmitting basic skills to earn a living. Instead, the school we need must start from the conviction that learning does not consist so much in appropriating the truth but in a dialogue with uncertainty and facing the challenges of an increasingly globalized world.

**The implementation of a pedagogy centered on 21st century skills has created multiple battlefields** on which educational policy, institutions, communities, and educational practices have contended for four decades. Such efforts have been built around concepts, such as content knowledge, skills, abilities, capacities, strategies, and procedures. Of those, the concept of “competence” is seen as a bridge between education, training, knowledge management, and informal learning, as well as an opportunity to achieve the goals of the 2030 Agenda for Sustainable Development.

**The approaches to classifying 21st century skills and competencies** (e.g., Fadel et al., 2015; IFTF, 2011; Joynes et al., 2019; Marope et al., 2017) **have all been subject to some criticism**, mainly originating in the teaching and academic spheres. Those sources emphasize the importance of a series of refocusing actions aimed fundamentally at (1) establishing a common starting point that unifies the language we use to talk about skills; (2) maintaining a balance between a utilitarian, practical vision and a vision that prioritizes knowledge and school culture; and (3) eliminating the opposition between competencies and disciplines.

There are even more incisive criticisms of the way in which the definition of 21st century skills has been approached, arguing that the work has proceeded in fundamental alignment with corporate interests and market-driven needs instead of being oriented toward a humanistic education

centered on the human being and oriented to social welfare. In that regard, we reference Lucas and Claxton (2009), who denounce the shortcomings of such frameworks as often inconsistent, lacking clear indications for their implementation, and having little awareness of the context in which these skills make sense and are developed (in the classroom or outside the classroom, in the disciplinary framework or within the curriculum or outside the curriculum).

Despite the criticism, the abundance of frameworks aimed at defining competencies, skills, and abilities is a sign that those concepts are experiencing a great moment in the educational debate. However, **the terms do not mean the same thing for everyone; there is a remarkable diversity of conceptions behind each of those terms. Their diffuse and unclear use is common, even within the same legislative framework** (i.e., legislation applying to a country's education system). Consequently, **the actual educational challenge of the 21st century lies in defining what skills and abilities need to be promoted at school and detailing when and how** (Henward & Lorio, 2011; Ravitch, 2000).

We support the belief that a **comparative approach can help us resolve some of these issues** as it allows the incorporation of the *good practices* of different educational systems as well as their respective *lessons learned*. Along such lines, we highlight Reimers and Chung (2015)'s comparative study of six countries with educational policies oriented toward teaching by competencies (Singapore, China, the United States, Chile, India, and Mexico). They find that, despite differences in size, governance, and development of education systems, these countries have a series of features in common: (1) explicit recognition of the need to expand educational goals for all students; (2) persisting imbalance that favors cognitive skills over interpersonal and intrapersonal skills; and (3) a tendency to emphasize and prioritize certain skills and abilities.

**Despite interest in the comparative approach, the presence of such studies in the scientific literature is minimal.** Moreover, the complexity of unraveling the singularities of each educational system makes it difficult to develop very ambitious comparative proposals and can discourage the researcher. The present work assumes this task, aware that to improve teaching effectiveness in the area of skills, it is essential to conduct empirical studies that compare the models of implementation of a pedagogy to teach 21st century skills in different countries and educational contexts.

**In this chapter, we use five broad categories to compare how 20 countries incorporated 21st century skills within their education systems: curriculum, teaching, evaluation, institutional factors that favor change, and financing strategies and supplies.** We chose the 20 countries based on their medium to high Human Development Index (HDI) values. The HDI is a widely used measurement summarizing a country's achievements in human development (UNDP, 2020). Sixteen of the countries are members of the Organisation for Economic Co-operation and Development (OECD). The selection represents the four continents, although most countries are European (11) and Asian (four). Based on our findings, we propose some keys to success for the implementation of education programs to develop 21st century skills.

**The actual educational challenge of the 21st century lies in defining what skills and abilities need to be promoted at school and detailing when and how.**

## 2. Five Analytical Dimensions

In the following sections, we discuss how we arrived at the five analytical dimensions and the justification for their use in the comparison study of the 20 countries. For the objectives of the work, we wanted analytical dimensions that offer a good overview of an education system. For this, we applied a systemic model—the context, input/entrance, process, product (CIPP) model—to evaluate the education programs and systems (Stufflebeam & Shinkfield, 1987; Stufflebeam et al., 1971). The CIPP model proposes that to evaluate an intervention or educational system one must describe the context, assess the inputs, assess the processes, and evaluate the results, putting all these dimensions in relation. The model is comprehensive; it combines a perspective based on phases and areas with a global perspective. It offers one more proposed process—that is, observe how an objective is achieved, emphasizing contextual issues. We believe it provides significant attention to needs, problems, and opportunities, focusing on establishing programs for improvement. We regard it as a systemic model because it considers the context in which education takes place and the way in which it is organized. It incorporates inputs to education measured in terms of human, material, and financial resources and focuses on the functioning of education itself. In the CIPP model, the results of education are conceived of in terms of academic achievement and social impact, which, in turn, again influence the context.

The systematic application of the CIPP model is demanding in terms of information. Consequently, it was decided to select one dimension related to the context in which the implementation of 21st-century-skills pedagogy is developed (the institutional factors dimension), two dimensions related to the resources necessary for such an implementation (teachers and financing strategies and supplies), and two dimensions related to the key processes of the educational system (curriculum and evaluation).

For purposes of exposition, the dimensions are listed as follows: (1) curriculum, (2) evaluation, (3) teachers, (4) institutional factors that facilitate implementation, and (5) financing strategies and supplies. These five variables were selected ad hoc based on the needs and objectives of the study.



## Keys to Success

### Skills and competencies for the 21st century

#### CURRICULUM

- 1 Provide a good foundation of competencies/skills in the country's legislative framework
- 2 Give priority to teaching transversal competencies and competence standards
- 3 Find a balance between the development of skills and a knowledge base
- 4 Slim down and adjust curricular content adapting to each school context



#### EVALUATION

- 5 Periods of the school year in which to carry out formative evaluation exclusively
- 6 Make a commitment to formative evaluation including indicators at different levels of achievement in rubrics
- 7 Focus on the students' metacognitive skills so they can assume and monitor their own learning process
- 8 Provide education in the cognitive, emotional, social and physical skills for a health and well-being context
- 9 Prioritize emotional factors as intrinsic to the teaching-learning process



#### TEACHING

- 10 Description of the student's graduation profile, in personal, citizenship and global terms
- 11 Collaborative dynamic that includes teacher networks and co-design among teachers
- 12 Pay attention to the provision of teacher support and professional development in every stage of their career
- 13 Work toward a consolidated teaching performance focused on the teaching and learning processes



#### INSTITUTIONAL FACTORS THAT FAVOUR IMPLEMENTATION

- 14 Promote educational centers' flexibility to make decisions in all areas
- 15 Generate synergies opening the educational center to a variety of agents and institutions
- 16 Train in Global Competence skills allowing the students to adapt to an interconnected world
- 17 Entrepreneurial profile transversal in all subjects
- 18 Global competency framework including personal standards
- 19 Learning toward creating learning communities
- 20 Promote the SDGs and the 2030 Agenda for Sustainable Development as a working horizon



#### FINANCING STRATEGIES

- 21 Balance between the distribution of money and resources and the reduction of equity and social gaps
- 22 Provide educational centers the autonomy to manage and organize their resources
- 23 An economic investment in improving the results of instrumental areas in international competency tests
- 24 Investment to attract and retain talent among the teachers
- 25 Favor feedback between education and investigation





The curriculum dimension is to shed a light on each country's situation related to a curriculum based on global competencies or 21st century skills.



## 2.1. Curriculum Dimension

**The curriculum dimension is to shed a light on each country's situation related to a curriculum based on global competencies or 21st century skills.** The scientific literature refers to this as a "global competency-based curriculum" (and uses such terms as "competency-based education systems" and "21st century skills"). *Curriculum* has been defined as the regulation of the elements that determine the teaching and learning processes for each of the teachings (Coll & Martin, 2006). The curricular goals, judging from our review, should have a high degree of flexibility, both in progress and process. It is necessary to keep in mind that, depending on the perspective of each agent participating in the education system, curriculums come in various types: a prescribed curriculum (the one that is defined in the legal regulations and constitutes the basis on which the curriculum scheduled by teachers is built); a taught curriculum (the one that is actually taught in schools); and, finally, a learned curriculum (the one that the students have actually learned).

Each country government must specify, or define, the curriculum as much as possible, maintaining a balance between the need for standardization and the flexibility and autonomy of the educational centers and the teaching staff while being consistent with the level of decentralization of its system. This will allow (1) a shared understanding and language to be generated; (2) the establishment of standards/indicators; and (3) the convergence of subsequent actions. Here are some possible actions to implement the teaching of 21st century skills at the curricular level:

- **Ensure** that the standards are reflected in a legislative framework.
- **Increase** the flexibility of the curriculum.
- **Organize** the curriculum by standards based on competencies.
- **Prioritize** transversal skills (skills that can be present in most areas at each educational level).
- **Reduce** content in the prioritized learning vectors.
- **Define** the graduation profile at each stage.

Regardless of how they are configured, education systems should aim to ensure that anyone can achieve their maximum comprehensive development through the school curriculums that the respective country considers appropriate. In general, our analysis of the literature yields studies that have to do with two types of curricular models: knowledge-based and skills-based. The first knowledge-based model is the traditional academic and disciplinary model (Tyler, 1976; Clark, 1976), which emphasizes the teaching of subjects so that children acquire knowledge in various disciplines. The second skills-based model is a globalizing, inclusive, and comprehensive model (Chalkiadaki, 2018) that focuses on pedagogy to develop all of students' capacities and potentialities, making available for this purpose the selection, organization, and presentation of the curricular content. Our observation is that the first knowledge-based model is in the service of *content*, and the second skills-based model is in the service of *the person*. This present comparative study is focused on the second skills-based model and its relationship to 21st century skills.



## 2.2 Evaluation Dimension

**Assessment has been defined as a component of learning whose objective is the continuous improvement of students.** Bloom (1968) uses the terminology “mastery of learning.” Faced with a predominance of models focused on qualification and external evaluation, it has gained wide support to educate students to be able to self-regulate and evaluate their achievements and improvement goals—as well as to train their self-assessment capacity and develop metacognition.

Such concerns have a long history in research. Decades ago, Skager (1979) defined self-directed learning as “the willingness to initiate and maintain systematic learning on the student’s own initiative” (p. 75). Students learn material based on their interests and at a comfortable pace in a self-directed learning environment. Although the teaching staff outlines what is to be learned, students build their knowledge and understanding by exploring, creating, testing, and observing others.

Clark (1976) proposed mentoring and peer help that can facilitate open and safe learning environments. Indeed, today the power of feedback is unquestionable when it occurs between equals—not just between teacher and student—because it generates greater cognitive involvement (Carless & Boud, 2018).

It has gained wide support to educate students to be able to self-regulate and evaluate their achievements and improvement goals—as well as to train their self-assessment capacity and develop metacognition.

At the same time, Clark (1976), as part of his idea of an “open system,” said that in the development of education based on competencies, it is essential for all the agents concerned (students, teachers, and families) to be involved in the evaluation.

The evaluation dimension has been defined as a curricular element that emphasizes the formative nature of evaluation (Williams, 2017; Moss & Brookhart, 2019). Formative assessments are “all those activities undertaken by teachers and/or their students to modify teaching and learning activities in which they [the students] are engaged” (Black & Wiliam, 1998, p. 8). So, formative assessment is a process and involves working with students so that learners know where they are in their learning, where they need to be, and how they are going to get there. When we talk about formative evaluation, we mean the procedure used to assess student learning whose focus is to provide strategies by which students can improve their own learning. Promoting metacognition and feedback is essential in this process.

Such evaluation is standardized and based on specific indicators, such as rubrics, to allow the student’s maturation and learning process to be followed. Evaluation can provide students with meta-cognitive tools that enable them to know the steps necessary to acquire the desired competence. The following procedures can help us achieve that end:

- Favor an evolution from a “formative evaluation” carried out by the teaching staff (that is, teachers collect evidence of learning, analyze it, and make decisions) toward a “formative evaluation” in which the students themselves execute the process.
- Design personalized itineraries and evaluate in process.
- Include the educational community—as well as other external agents—in evaluation processes.
- Establish a ladder of achievement levels for each thematic core.

The “mastery of learning” approach proposed by Bloom assumes that most students can learn what is intended to be taught, and that the means must be found to help them master each subject. Toward that purpose, that author proposes that evaluation take place before and after a lesson, with an understanding that instruction is based on the learning objectives and should focus on the specific behaviors a student will need to adopt to perform and achieve competence.



## 2.3 Teaching Dimension

The studies we reviewed conceptualize the *teaching* dimension around such influential variables as trust, feeling welcomed and valued, leadership, the balance between socio-affective support and technical-professional contributions, communication between the components of the teaching community, and the definition of clear objectives for the group (Lantz-Andersson et al., 2018; Maciá & García, 2016; Vangrieken et al., 2017).

This new collaborative culture focuses on promoting a real shared and joint construction of the entire pedagogical process (Fernández Muñoz, 2003; Gutiérrez Esteban et al., 2011; Hernández-Sellés et al., 2014). Some key criteria of the approach are:

- the co-design—among teachers and agents outside the school—of learning projects based on 21st century skills;

- accompaniment of the teacher throughout all the phases of the student's career;
- a quality professional network capable of generating learning communities;
- specific strategies and tools for teachers' professional development, such as peer observation, mentoring, pedagogical coaching, a professional portfolio, or managerial interviews; and
- teachers who are increasingly focused on measuring the pedagogy's impact on student learning.

Much study over the past two decades has been directed at the value of professional development and improvement of teaching practices. On that topic, Lantz-Andersson et al. (2018), Maciá and García (2016), and Vangrieken et al. (2017) reviewed a wide range of experiences. Findings from those studies suggest that successful professional development and continued improvement in teaching practices are advanced by (1) trust, (2) feeling welcomed and valued, (3) leadership, (4) the balance between socio-affective support and technical-professional contributions, (5) communication between the components of the teaching community, and (6) the definition of clear objectives for the group. Based on such evidence, governments would be advised to favor induction and support programs that promote these variables.



Several studies underscored the importance of collaboration among teachers to develop sound learning assessment systems (Datnow et al., 2013; Farley-Ripple & Buttram, 2014; Jimerson, 2014). Lomos et al. (2011) reviewed the influence of communities of professional practice on improvement in educational practices. They found that the work of communities of professional practice improves teaching performance, as well as the orientation of the teaching role toward a more investigative profile (see also Voelkel & Chrispeels, 2017; Rickards et al., 2021; Dewitt, 2020; Knight, 2018).



## 2.4 Institutional Factors

We define the *institutional factors* dimension as one that brings together crucial factors for a change in the school institution toward providing an increasingly competent education. According to the literature, primary drivers at the institutional level are (1) promotion of entrepreneurship, (2) consolidation of networks and the sense of a learning community of schools, (3) the transfer of learning, and (4) ensuring the sustainability of the actions taken (Bieber et al., 2015; Breakspear, 2014). To drive change, the literature suggested that education systems should:

- Strengthen the decision-making autonomy of educational centers;
- transfer to all stages the balanced theoretical–practical vision of professional training/vocational education;
- promote inter-institutional cooperation, especially to implement measures that improve the well-being of the student–family ecosystem;
- support a legislative framework that promotes an entrepreneurial and transversal profile throughout subjects; and
- establish learning communities.

**As part of the institutional dimension, large-scale international educational assessments,** such as the OECD’s Programme of International Student Achievement (PISA) surveys, represent the most recognized efforts to measure the performance of educational systems. **Such instruments have become a central tool for prescribing national educational reforms** (Bieber et al., 2015; Breakspear, 2014).

Institution-focused efforts to implement change seek to fairly distribute the load. Several studies allude to that aspect and, in turn, help us define this dimension. Our review found studies on equality implementation (Strietholt et al., 2019); regarding autonomy (Hanushek et al., 2013); on participation as a key factor in effective implementation, on generating participation through digital literacy, and on parenting (Ansari & Gershoff, 2016); of the first legal advice programs for migrant families (Violand-Sanchez, 1991); and about families oriented to provide academic support to students (St. Clair & Jackson, 2006).

Various programs that focus on strengthening links and collaboration between family members and teachers fall within the institutional factors dimension. One example would be the setting up of training spaces where teachers and family members participate jointly.



## 2.5 Financing Strategies Dimension

We define the *financing strategies* dimension as the set of financial planning and economic management decisions available to an educational system or institution to use its resources efficiently so that it can achieve the objectives it sets (Niemann et al., 2017). The practical approaches of this category are closely linked to those of the previous category.

**For competing world economies, human capital is considered an important factor in economic growth and a fundamental tool to adapt to changes brought about by globalization.** The growing realization that education can contribute to productivity brings with it a strong demand for efficiency and responsibility within national educational systems. Thus, large-scale standardized international student assessments have become more prevalent in recent decades and have attracted considerable interest from politicians, the media, and academia (Niemann et al., 2017).

In the endogenous approach to growth, education is a crucial economic development engine. Therefore, public spending on education is widely considered to have a positive effect on the economic development of societies, both over the medium and long term (Kim & Ahn, 2020). But there are many factors to consider when analyzing the “efficiency” of spending on education. For example, the quality of teaching, educational infrastructure, and curricula will condition the results of educational investment, so that greater spending will not always ensure better results (Bosworth & Collins, 2003; Ciccone & Papaioannou, 2005; Sutherland et al., 2007). Trabelsi (2017) found that spending on education promotes economic growth if the quality of education exceeds a certain threshold, suggesting that educational quality must be improved to make the spending profitable. Barro (2013) indicated that science, mathematics, and reading proficiencies, reported in PISA, are more decisive in a country’s economic growth than years of schooling.

In a study of European Union countries, Clements (2002) concluded that there is no positive relationship between percentage of gross domestic product (GDP) invested per student and educational efficiency (neither in graduation rates nor in results on standardized tests such as PISA). On the other hand, that study also found that, when starting from a threshold and beginning from similar training levels, higher teacher salaries correspond to better educational results. At the same time, greater spending on items not related to teachers was not associated with greater efficiency.

According to Hanushek et al. (2013), teachers’ cognitive skills and how good they are at teaching are fundamental keys to schools’ results (something already pointed out in previous works such as Barber and Mourshed [2007]). The quality of talent attracted to the teaching profession is related to the salary offered (Carlo et al., 2013; Darling-Hammond et al., 2017; Hargreaves et al., 2007). However, the social status associated with the profession (linked to salary, according to Carlo et al., 2013) and economic incentives throughout a teacher’s professional career also play an essential role.

Now that we have reviewed the dimensions used to analyze the 20 cases (countries), we turn, in the following section, to the essential facts extracted from the information search and the documentary work carried out in different geographical areas worldwide.



**Financing strategies are the set of financial planning and economic management decisions available to an educational system or institution to use its resources efficiently, so that it can achieve the objectives it sets.**

### 3. Findings

In this section we present, in a synthetic manner, the pertinent primary data and characteristics of the educational systems of the 20 countries under study, structuring the information based on the five aforementioned dimensions. Finally, we collect the data in tabular form, and support each table with a general summary.

Before moving to our findings, it is relevant to point out that a vast diversity of terminology brings some difficulty to the comparative work. Whereas some country literature speaks of competencies/skills specific to each area, the literature of others speaks only of transversal/axiological and instrumental competencies, and others of skills. Table 2.1 summarizes the most frequently used terminology by country (using the English translation). However, these terminological nuances do not seem to affect the nature of implementation practices.

**Table 2.1. Most commonly used terminology to refer to 21st century skills and competencies**

	Competence (to know/to know how/to know how to be)	Competence = Skills	Skill	Capacity
 Germany	✓			
 Australia			✓	✓
 Austria	✓		✓	
 Belgium	✓			
 Canada			✓	
 South Korea		✓		
 Denmark			✓	
 United States		✓	✓	
 Scotland			✓	✓
 Slovenia			✓	
 Spain	✓			
 Finland	✓			
 Netherlands		✓		
 Japan			✓	✓
 Kenya	✓			
 New Zealand		✓		
 Norway	✓		✓	
 Portugal	✓			
 Singapore		✓	✓	
 Taiwan		✓		✓



### 3.1 Curriculum Dimension

**In general, one can see that the 20 countries studied incorporate 21st century skills in the implementation of their curriculums.** However, they do so with different ways of reinterpreting practices in the classroom, with different rhythms, and with contextual differences that mark the future. Likewise, although some countries have a relatively more prescriptive curricular model that regulates in detail the teaching program, most give teachers more freedom to interpret and specify the curriculum as they transfer it to the classroom.

We see a close relationship between 21st century skills and curricular competencies. Some educational systems set out an extensive list of skills to be developed—we see that as likely to generate difficulties when it comes to carrying out an exemplary implementation in the classroom. However, all of the education systems talk about learning aimed at the student's autonomy, emotional well-being, development of communication skills, global awareness, creativity and leadership, and effectiveness in decision making. If we summarize these lines of action in four principles, we could say that these skills are governed by a kind of "ABCD" of education, with A = learning, B = well-being, C = commitment, and D = sustainable development (García Monge & Rodríguez Navarro, 2009).

We also found two marked trends in the 20 cases (just as the scientific literature indicates). One trend is to embrace a more academic, results-focused curricular approach. Another trend is a movement toward the comprehensive development of subjects from a 21st century skills perspective, and most of the countries analyzed fall into that group.

We could interpret the findings by invoking the curricular polarity of "results versus process." That is, we could say that the education philosophy in countries such as Finland, Australia, Norway, Austria, Canada, Taiwan, the United States, Scotland, Singapore, and Denmark is in alignment with 21st century skills and competencies. In contrast, other countries, such as Spain, South Korea, Germany, and Kenya, find themselves located more toward the other extreme. That is not to say that those countries do not work on 21st century skills, but rather that their itineraries, which stretch from educational purposes to practical development, are geared more toward achieving immediate academic results, with less emphasis on the long term. Of course, explaining the factors that determine the choice of one approach or another is difficult. But it is likely that political tensions concerning the educational system, the performance of various advocacy agents, and the articulation of public opinion are all in play to differing degrees, advocating for or against the 21st-century-skills-and-competencies approach. However, for example, in the case of Germany, it is remarkable to see the presence, within the curriculum, of general transversal themes that are integrated into the classroom and offered in interdisciplinary forms of teaching and external projects. We also find a powerful trend linked to the Sustainable Development Goals (SDGs) in some Spanish regions (*comunidades autónomas*), including Catalonia and the Canary Islands. However, in general terms of implementing a skills-and-competencies-based culture in the curriculum, both countries still have a long way to go.

Table 2.2 presents our observations on the curriculum dimension based on our review. Following the table, we attempt a synthesis of the state of the matter with regard to the curriculum.

**Countries, such as Finland, Australia, Norway, Austria, Canada, Taiwan, the United States, Scotland, Singapore, and Denmark is in line with 21st century skills and competencies. In contrast, other countries, such as Spain, South Korea, Germany, and Kenya, are more towards the other extreme.**

**Table 2.2 The curriculum and 21st century skills and competencies**

 <b>Germany</b>	The curriculum establishes competencies for each subject taught and indicators of level of achievement; it also defines teaching processes highly adapted to the different levels and rhythms of learning.
 <b>Australia</b>	The curriculum has three dimensions: eight learning areas; seven general capabilities (ethical understanding ability, personal and social ability, intercultural understanding, critical and creative thinking, technology, communication and information, literacy and numeracy); and three cross-curricular priorities (Aboriginal culture, Asia, and sustainability).  As a singularity, the AQF (Australian Qualification Framework) and VET (Vocational Education and Training) criteria are based on the level of achievement of competencies.
 <b>Austria</b>	The curriculum reflects a three-dimensional map of action-oriented skills related to people (i.e., health education, reading, social and personal skills, language education), groups (e.g., career guidance, argumentation, gender equality, political education), and the environment and technology (environment-related skills, skills related to traffic and mobility). In general, it prioritizes life skills.
 <b>Belgium</b>	The curriculum is differentiated by community. The Flemish community prioritizes a critical-thinking curriculum focusing on critical-thinking skills. The Walloon community is committed to the principles of continuity of learning, differentiated pedagogy, formative assessment, learning strategies, and mental processes. Finally, the German-language community focuses its curriculum on student responsibility.
 <b>Canada</b>	The curriculum emphasizes personalization of learning, openness to the world with learning inside and outside the classroom, and subject-oriented skills.
 <b>South Korea</b>	The curriculum is derived from The Character Education Promotion Act. The goal is to teach students to “develop the mindset and attitude necessary to live with others and in nature.” This country’s curriculum bets on 21st century skills (information and communications technology, social skills, problem solving, sustainability, and English, among others).
 <b>Denmark</b>	The curriculum includes skills focused on building competent, critical, and participatory citizens. It has a focus on developing students’ abilities to cooperate and debate. Four transversal approaches are present in all curriculum areas to work on skills: technology and media, linguistic development, innovation, and entrepreneurship. The curriculum is informed by the United Nations Sustainable Development Goals (SDGs).
 <b>United States</b>	There is much emphasis on the social-emotional learning (SEL) model. That curriculum details five competencies: self-management, responsible decision making, relationship skills, social awareness, and self-awareness. It defines 21st century skills as information management, collaboration, communication, creativity, and innovation.
 <b>Scotland</b>	The Curriculum for Excellence (new 2019 curriculum) contemplates four capacities: successful students, confident individuals, responsible citizens, and effective contributors. It also considers four contexts: curriculum areas and subjects, interdisciplinary learning, school ethos and life, and opportunities for personal achievement.
 <b>Slovenia</b>	The curriculum is designed with the following objectives in mind: learning abilities, human rights education, sustainable education, and communication skills. The curriculum prioritizes outdoor school education.

 <b>Spain</b>	<p>The curriculum is based on the European Reference Framework (eight key competencies) and is remarkably diverse in the different regions. The new law (LOM-LOE) prioritizes the acquisition of skills, generating a graduation profile at each stage linked to three dimensions (attitudinal, instrumental, and cognitive). Each area has its specific skills that contribute to the profile. There is a clear commitment to the SDGs.</p>
 <b>Finland</b>	<p>The curriculum incorporates topics based on student interest, and those topics are selected with their participation. Transversal competencies and digital competence have a leading role. The curriculum is envisioned to take place in rich and personalized learning environments.</p>
 <b>Netherlands</b>	<p>The curriculum groups competencies into ways of thinking, acting, knowing oneself, and dealing with others.</p>
 <b>Japan</b>	<p>The national curriculum standards include three pillars: ability to think, motivation to learn, and sense of humanity. It proposes an approach to the skills of the 21st century through the Japanese language and sciences.</p>
 <b>Kenya</b>	<p>In the 2017 reform, the country chose a competency-based curriculum based on the Needs Assessment Study carried out by KICD (Kenya Institute of Curriculum Development) and inspired by the vision and mission of the BECF (Basic Education Curriculum Framework).</p>
 <b>Norway</b>	<p>The curriculum includes three multidisciplinary fields: public health and life management; democracy and citizenship; and sustainable development. Differences are noted between the skills applying to each subject and the five basic skills of reading, writing, accounting, oral skills, and digital skills.</p>
 <b>New Zealand</b>	<p>Teaching staff enjoy a high level of flexibility to make decisions regarding the curriculum. Five key competencies are prominent: thinking, use of symbols and linguistic texts, self-management, relationship with others, and participation and contribution.</p>
 <b>Portugal</b>	<p>Per the curriculum, attainment of several skills is required: knowledge and command of the body; interpretation of texts, information, and communication; critical and creative thinking; reasoning and problem solving; scientific and technological knowledge; interpersonal relationships; personal and autonomous development; well-being; and environmental, aesthetic, and artistic sensibility. The model prioritizes curricular flexibility linked to the flexibility regarding organization, times, and spaces. The model also defines the competency graduation profile by stage.</p>
 <b>Singapore</b>	<p>The curriculum includes rings: core values as the central ring and the outer ring. Core values include social and emotional competencies. The outer ring represents the emerging 21st century competencies needed—civic literacy, global awareness and intercultural skills, critical and creative thinking, communication, collaboration, and information skills.</p>
 <b>Taiwan</b>	<p>The curriculum is collected in the White Book of the learning society. It aims to increase national competencies, such as humanistic attention, communication, and English, as well as an international perspective and a sense of a global village. Sports, health education, and character building are prioritized, to the point that mastering a sport is a requirement to enter university.</p>



## 3.2 Evaluation Dimension

All the countries that we studied shared a common goal to promote good formative assessment in all learning contexts. **By this, we mean an evaluation aimed at improving students in their day-to-day lives by facilitating skills development.** We mean an evaluation in which the teacher collects evidence, analyzes it, and makes decisions based on it, progressively giving students a leading role in the three stages of the process. Another aspect found in many countries is the diversity of approaches to evaluate skills in action—until very recently, educational systems were experienced only in evaluating content. We see examples in countries, such as Japan and Denmark that focus on problem-solving by contextualizing learning situations.

Countries such as Norway, Slovenia, Australia, and Taiwan have of late been focusing mainly on self-directed evaluation processes regarding learning. This means the responsibility for learning falls on the student him- or herself, emphasizing personal responsibility for his or her own school process. On the other hand, other countries, such as Finland, Belgium, Kenya, Portugal, Spain, Germany, and Singapore are emphasizing formative assessment, focusing on the metacognitive processes that make students aware of the processes involved in their own learning and in what they have to do to improve.

Two interesting cases are Australia and Scotland: they employ graduation profiles by stages that facilitate the initialing of all the competencies in a developmental framework for the students so that teachers can accompany the process. In the case of South Korea, one of the most interesting innovations is the so-called exam-free semester, which aims to enable students to discover their dreams and talents and continuously improve themselves by exploring their aptitudes and designing their futures.

Currently, all countries feel pressure to maintain their levels in international rankings (such as PISA and others). In some contexts, this is a source of incentive to improve services, but in others it hinders progress due to a mismatch between international standards and local needs. When those factors are not aligned, educational proposals suffer more alterations and difficulties in implementation.

Our findings related to the evaluation dimension are collected in Table 2.3. A synthesis of the findings follows the table.

**Table 3. Assessment and 21st century skills and competencies**

 <b>Germany</b>	The emphasis is on self-managed evaluation. Each student evaluates their own progress and frequently uses the learning portfolio. The learning portfolio is a formative assessment tool that students use with evidence to diagnose their own learning process.
 <b>Australia</b>	The model is characterized by formative and continuous evaluation, rubric evaluation with achievement levels, and multiple opportunities for the transfer of learning to real life. The evaluation system is characterized by competencies from infant to secondary school and has accompanying materials for families.
 <b>Austria</b>	The system highlights a type of evaluation with standards at some moments of students' school life, for strictly educational purposes, and having no effect on students' grades or certification.
 <b>Belgium</b>	The country has developed assessment models to regulate learning by making students aware of their own progress, successes, and achievement. Such evaluation allows teachers to observe the effect of teaching strategies on each student and adjust them accordingly.
 <b>Canada</b>	Students enjoy significant autonomy and work with small opportunities to develop self-regulation. Teachers are not required to formally assess and report on competency development separately from learning outcomes.
 <b>South Korea</b>	Students get to take one semester without exams or tests: a clear example of formative evaluation and stress relief for students, exclusively promoting talents.
 <b>Denmark</b>	The system employs process evaluation. There is no repetition of the student's course because it is thought that, if there is real personalized education, the work of accompanying and adapting the rate of progress of each student makes repetition unnecessary. Students participate in problem-solving within a close context, and emphasis is placed on seeking innovative solutions.
 <b>United States</b>	Although evaluation and tests continue to play a significant role in schools, formative assessment is gaining prominence in most states. Such formative assessments can provide concrete and practical feedback to students and actively involves them in their own learning.
 <b>Scotland</b>	Competency-based formative assessment has been employed. Benchmarks are used for assessment with evidence of learning from the four learning contexts (i.e., curriculum areas and subjects, interdisciplinary learning, ethos and school life, opportunities for personal achievement). In addition, the teaching staff has indicators of experiences and results with which to assess the breadth of knowledge, skills, and attitudes.
 <b>Slovenia</b>	There is formative assessment throughout all educational stages. This gives importance to personalization in the evaluation-learning processes.
 <b>Spain</b>	There are notable differences in the forms of evaluation. The region of Catalonia is a pioneer in evaluation, with key components devoted to competencies, which facilitates formative evaluation and puts less importance on qualification.
 <b>Finland</b>	One of the tasks of primary education is to develop the capacity for self-assessment and self-regulation among students. Homework aims to support the growth of self-awareness and study skills and to help students become aware of their progress and learning process.

 <b>Netherlands</b>	<p>The proposals for formative evaluation in teaching and learning processes and external evaluations based on standards stand out, as well as teacher training.</p>
 <b>Japan</b>	<p>The system has marked curricular standards for evaluation and achievement of objectives. They include three interrelated pillars: (1) skills and knowledge; (2) the ability to think, judge, and express oneself; and (3) the motivation to learn and a sense of humanity. At 16, students take a competitive and rigid exam with quantitative evaluation to enter university.</p>
 <b>Kenya</b>	<p>Evaluation is basically summative. In other words, the evaluation is used to determine the degree of achievement of a student related to objectives set for the subject or stage. Usually, the summative evaluations take place at the end of a teaching-learning process and is linked to promotion, qualification, and certification decisions. The school system is beginning to implement new tools such as observations, checklists, rubrics, questionnaires, and work folders. Self-regulation and metacognition in learning are emphasized.</p>
 <b>Norway</b>	<p>There is formative assessment in a learning context through practical teaching and everyday school-life challenges. The school assumes the role of helping students reflect on their own learning.</p>
 <b>New Zealand</b>	<p>The student's learning history is a key tool the educational system uses to facilitate the development of skills. The system has the evaluative participation of the families themselves.</p>
 <b>Portugal</b>	<p>Assessment of learning is based on a balance between knowledge, skills, and critical thinking. Formative evaluation is focused on giving self-regulation opportunities to students and promoting talents.</p>
 <b>Singapore</b>	<p>Each programs area works on skills expressed in terms that each subject makes possible, sequencing at various levels, with a common focus (for example, using mathematics to solve problems). Metacognition, skill, and processes relate to each competency content and level.</p>
 <b>Taiwan</b>	<p>Learning is organized through problem-solving, and assessment employs self-inquiry and self-management. The system promotes an evaluation in which all community agents participate, offering feedback and ideas for improvement, and where everyone is enriched, always prioritizing the improvement of the student's learning capacity.</p>



### 3.3 Teaching Dimension

**The teaching staff is a fundamental component of the resources an education system uses to implement a 21st century skills and competencies pedagogy.**

The teacher dimension (teacher quality, teacher development, etc.) has been well studied in the scientific literature, but in practice, how the different countries handle this dimension is difficult to assess due to the subjectivity it entails. The most objective and clear indicators that we have found with which to analyze the teacher aspect of educational implementations have to do with (1) the selection of teachers, (2) the approach to professional development (more theoretical versus more applied), (3) the continuous support and aspects of leadership and teacher mentoring, and (4) the degree of investment in training.

From the analytical fieldwork in the 20 countries and the related literature, we can infer that **the option for communities of professional practice is a key to implementation going forward**. Many studies show good results in educational systems that understand their functioning as communities of professional practice, where networks and support systems are created to professionalize teaching. This is the case in the United States, Portugal, Spain, and Scotland. Furthermore, **we see a correlation between implementation support and training funding**. This correlation is found, as a process, at the beginning and during the professional career and lifelong training, as is the case in Japan, Singapore, and Taiwan.

In some countries, such as Spain and Portugal, we see a marked difference between theoretical and practical training in the course of study of teachers. Thus, although educational intentions are described as practical and competency-based, there is still a mismatch between these two aspects in university teaching.

All of the countries envision the ideal teacher as one who acts in harmony with the 21st century skills and competencies—that is to say, an up-to-date, competent teacher who exercises leadership, has social awareness, is innovative, has communication and emotional skills, and has an entrepreneurial profile. They envision a teacher with a clear investigative profile, a creator of content, who operates within a collaborative culture of sharing knowledge, and is very inclined to generate a great environmental sensitivity and to search for a sustainable future in the students. Therefore, there is a tendency toward an increasingly practical teacher training orientation. Thus, countries such as New Zealand, Germany, Norway, and Austria stand out for having two years of only practical and applied training in their schools, linking the initial training to the professional career.

Regarding how the culture esteems teachers, Japan and South Korea stand out for the high recognition and status of teachers in society, paying very high salaries compared to the country GDP and giving enormous emotional recognition of teachers' work. They also stand out for the importance they place on teacher support and emotional training throughout teachers' professional careers due to the high rates of depression and low self-esteem (this is notable considering they are the countries that afford teachers the most social and economic status). Also noteworthy, for being ambitious and detailed, is the Canadian program to support teachers for the duration of their career.

In countries, such as Slovenia, Japan, Canada, and Singapore, the selection of teachers who will work in schools is done individually, with personal interviews and a practical demonstration of teaching skills evaluated by experts. However, in other countries, such as Germany, Spain, and Portugal, more general and standardized processes are used, which makes it more challenging to analyze an applicant's nuances.



As in previous sections, we present the main findings in tabular form (Table 2.4) and follow with a discussion.

**Table 2.4. Teachers and 21st century skills and competencies**

 <b>Germany</b>	The teaching staff is trained through a theoretical-nature degree. Subsequently, the teacher completes a master's degree at a center or institute in an applied manner. The work focuses on accompaniment of teachers, with particular attention to the teacher's first years in the classroom.
 <b>Australia</b>	The teaching staff has various training options: continuous updating in the best universities (two or three days), an hour and a half of weekly training in the faculty, and two hours of weekly training within school hours. Research is rewarded with a salary. To encourage teachers to conduct research at a university, the system rewards them with nonteaching hours.
 <b>Austria</b>	Teachers undergo practical training in classrooms from the beginning of their training. Mentoring by expert teachers is mandatory for all new teachers.
 <b>Belgium</b>	Schools have the autonomy to define the professional profile.
 <b>Canada</b>	A double program of accompaniment and teacher performance evaluation is established within the teacher professional development model: for new teachers and experienced teachers. Management hires teaching staff based on each school's needs, after a selection interview and through a test based on taking a class with experts.
 <b>South Korea</b>	Teachers enjoy high social prestige with high salaries and strong support for their professional growth. Teachers are constantly evaluated throughout their teaching work.
 <b>Denmark</b>	Principals design, organize, and schedule conversations with teachers to provide feedback on their performance and to identify their professional development needs and opportunities. It is noteworthy that there are two teachers per center who specialize in mentoring and who accompany the rest of the teaching staff on social-emotional issues.
 <b>United States</b>	The teaching staff are accredited according to basic standards. They enjoy networks, innovative actions, and programs such as "Our Future Teachers," "Comprehensive Projects to Improve Training and Teaching Skills," and "Teachers for a New Era." They also have stable coaching and mentoring teams in public centers.
 <b>Scotland</b>	Teachers meet annually to agree on a professional learning plan based on their needs assessment. There is dynamic interaction among schools, universities, the third sector, and other social actors to co-design study plans.
 <b>Slovenia</b>	Continuous training programs accompany the different stages of the teaching career. Training teachers to attend to the special educational needs of the students is a priority.
 <b>Spain</b>	There is a disconnect between academic theory and the practical reality of teacher performance. Some universities offer internships in innovative centers.

 <b>Finland</b>	<p>The teaching staff is the center of the educational system—the work of teaching is developed through collaborative teams, with an intense teacher support program. Consequently, the teaching staff stays up to date, is innovative, and has high levels of motivation and experience.</p>
 <b>Netherlands</b>	<p>The management of each school is responsible for the professional development of its teachers and has the freedom and resources to do so. Teachers are listed in a national registry that ensures their professional qualifications.</p>
 <b>Japan</b>	<p>The high (almost sacred) consideration of teachers contrasts with their low self-esteem as professionals. Teachers are obliged to renew their accreditation certificate every 10 years. Japan has one of the highest teacher salary structures in the OECD countries.</p>
 <b>Kenya</b>	<p>The country has had problems elaborating and implementing a national educational policy; this is made manifest in difficulties in hiring teachers.</p>
 <b>Norway</b>	<p>Five years' training is required, with the last of those years consisting of practice in a center. Norway has one of the highest teacher salary structures in the OECD. The authorities are responsible for identifying the needs of teachers and for preparing a skills development plan together with the local workers' association.</p>
 <b>New Zealand</b>	<p>The teaching staff undergoes three years of initial university training and two years of classroom work. Every three years, teachers must pass a practical performance update certification test in the classroom.</p>
 <b>Portugal</b>	<p>A restructuring of the curriculum took place in 2012 accompanied by the master's degree requirements for teachers. The country has continuous training programs.</p>
 <b>Singapore</b>	<p>Prior to training, there is a rigorous selection (30% of the promotion). There is a selective follow-up and a solid mentoring program during teacher training. Teachers are evaluated according to a comprehensive system throughout their professional life, and their level depends on an evaluation on three categories. Teachers enjoy a high social and salary status and strong government support. For managerial positions, leaders are recruited from among the best teachers, and a solid qualification is provided for the exercise of the managerial function.</p>
 <b>Taiwan</b>	<p>The country has made an important effort for continuous teacher training, aligned with the SDGs and global competencies. In fact, 30% of teachers are in 360-degree teacher professional development programs. Teachers are subject to continuous, standardized evaluation processes throughout their professional careers.</p>



### 3.4 Institutional Factors Dimension

Institutional factors constitute an important factor in gauging models for implementing a 21st-century-skills-and-competencies pedagogy.

This dimension's breadth of meanings has forced us to centralize its content in those data related to the key aspects that favor the implementation of institutional actions. In that regard, we find that the scientific literature suggests that **the key to success lies in how an education system can reduce gaps in social inequality in a country** (Strietholt et al., 2019).

The ability to reduce social, cultural, and educational differences is closely related to such implementation factors as (1) the autonomy of the centers, (2) the ownership of the centers (state or social initiative), (3) the standardization of teaching, and (4) the participation and involvement of families in the school context. These factors are interrelated.

Depending on how they are oriented, those four elements can reduce, or on the contrary increase, educational inequalities, and different nuances come into play depending on the context. What, in one context, functions as an inclusive action can, in another context, be a factor that generates inequality. Thus, for example, the greater autonomy of the teaching staff in the Netherlands is indicative of greater efficiency in internal organization and facilitates the making of adjusted decisions. However, in other countries with a highly competitive and hierarchical environment, such as South Korea, said autonomy can produce an educational culture that generates inequalities, as the system is not guided by a standardized operating pattern that ensures minimum standards that guarantee equality.

Despite the contextual differences, studies, such as the one conducted by the National Commission on Excellence in Education (1983) and the one conducted by the National Research Council (2011), have come to conclusions such as the following: (1) privately managed schools obtain better results in the implementation of the teaching of skills and competencies; (2) localities where public financing ensures that all families have a wide range of choices (including what school to enroll their children in or what type of learning they want to expose them to) also obtain better results; (3) those schools that can make decisions autonomously about personnel show more effectiveness in implementation; and (4) schools in which teachers have incentives to select appropriate teaching methods do better in implementation.

In turn, the scientific review of the aspects that constitute the institutional factors dimension finds great variability, depending on the geographical and socio-historical context, in operating cultures. Likewise, it is worth highlighting some actions that promote an educational culture that is increasingly based on competencies, such as (1) analyzing and evaluating different agents, including those outside the education system; (2) the establishment of output profiles or evaluation tools that facilitate reflection and transfer of knowledge; (3) defining clear objectives and listening to the voices of students and teachers to understand the system better; and (4) creating a shared identity and optimizing the resources available within the channels of educational policies (specific programs, teacher training, or professional development) to achieve concrete results that favor a gradual implementation of a 21st century skills pedagogy. Table 2.5 shows our country-specific findings related to this dimension.

**Table 2.5. Institutional factors and their relationship to implementation of 21st-century-skills-and-competencies curricula**

 <b>Germany</b>	<p>A process of modernization and development of public administration is under way, with the objective of achieving a more effective and efficient use of resources. One aim is to eliminate excessive regulation in the use of resources by extending the financial autonomy of schools. As a result, legislative changes have been made for schools to self-manage their funds.</p> <p>Regarding the education system structure, there is early segregation at the age of 11 between students who receive an academic versus an applied education. The commitment to highly consolidated dual training, balancing theory with practice in the world of work, is also quite characteristic.</p>
 <b>Australia</b>	<p>Australia is among the 20 best education systems globally in international rankings, such as the World Top 20. The participation of family members (Australian Parents Council) is essential to the system.</p>
 <b>Austria</b>	<p>The provinces are responsible for paying teaching staff, as well as language training and remedial and other educational needs.</p>
 <b>Belgium</b>	<p>Municipalities are responsible for early childhood education for preschoolers, even distributing the funds. They receive funding or a state subsidy in the rest of the stages.</p>
 <b>Canada</b>	<p>The states participate in the schools' governing bodies. In terms of structure, we note that education is compulsory up to age 16 or 18. Ontario's Teacher Performance Appraisal System is considered a good practice in support of high-quality teaching.</p>
 <b>South Korea</b>	<p>Education is considered a national heritage and is considered a critical variable in the country's competitiveness and development. This generates a very sophisticated system of incentives and accountability, in which the key incentive is the master teacher designation, which implies a leadership role. Additional incentives include bonuses and study-abroad opportunities.</p>
 <b>Denmark</b>	<p>The system promotes a context of trust between all the actors in the educational community, with strong teacher-student relationships. The Folkeskole Act gives responsibility for the administrative and pedagogical management of schools to their directors, which includes the professional development of their teachers. The Danish Foundation for Entrepreneurship, a national knowledge center for developing entrepreneurship teaching at all educational levels, stands out.</p>
 <b>United States</b>	<p>There is no national curriculum in the United States. The states, school districts, and national associations require or recommend specific standards to guide school instruction.</p>
 <b>Scotland</b>	<p>The rules in Scottish schools are based on making the most of a young person's potential and nascent talent. Per an agreement between the government and the Convention of Local Authorities, decisions on the use of the entire government subsidy are fully delegated to local authorities. The Scottish Attainment Challenge tries to achieve equity in education and reduce any gaps.</p>

 <b>Slovenia</b>	<p>The country is notable for its exhaustive inspection of the centers of education and the prominence of external evaluations. The results of those evaluations are not made public; they are used only for effective intervention. There is a commitment to higher technical and professional education.</p>
 <b>Spain</b>	<p>Differences exist among the regions vis-à-vis implementation of the teaching of 21st century skills and competencies due to the marked decentralization of policy on educational skills and competencies and differences in educational provision between regions. Low levels of technological competence and a suboptimal connection between school, family, and environment are noted.</p>
 <b>Finland</b>	<p>Finland has a decentralized teacher support system. The family-municipality-school collaboration increases the prestige of an environment of high educational performance. Education is a national priority.</p>
 <b>Netherlands</b>	<p>Schools have a certain level of autonomy. More than two-thirds of Dutch primary and secondary school students attend “independent” schools run by private or religious organizations.</p>
 <b>Japan</b>	<p>Educational assistance from 6 to 15 years is compulsory. There are three levels of government—national, prefectural, and municipal—and 47 prefectures, each with its own municipalities. The state pays 50% of teachers’ salaries in private schools to reduce the gap. There is minimal administrative staff, with only one management position and one nurse. Efficiency is high to reduce the gap, encouraging teachers assigned to the most challenging centers to overcome teaching challenges with the highest salaries.</p>
 <b>Kenya</b>	<p>Primary school access and completion have improved considerably in rural and urban areas, with gaps in northern and northeastern counties.</p>
 <b>Norway</b>	<p>Differences in implementation exist between municipalities and counties, both in income and expenses, and also in the form of implementation. There is a high level of public services throughout the country, distributing income to ensure there is no gap.</p>
 <b>New Zealand</b>	<p>There is confidence in the education system and strong relationships between students, parents, and teachers. The New Zealand system regards the teaching profession as one of the most important in society.</p>
 <b>Portugal</b>	<p>The country promotes teacher networks for good practices exchange. Results on the PISA and Trends in International Mathematics and Science Study (TIMSS) tests are above the OECD average. The centers have autonomy and educational change programs (autonomy and flexibility).</p>
 <b>Singapore</b>	<p>Under the motto “teach less, teach more,” the country is fifth in the PISA ranking. Segregation is begun at a very early age with a strongly centralized culture based on national exams. Except for preschool education, the entire education system, from primary to university level, is under the administrative control of the Ministry of Education.</p>
 <b>Taiwan</b>	<p>Once a year, the entire system is reviewed, using student surveys, to ensure quality. There is dialogue between formal and informal education, and the relationships between the school and the society.</p>



### 3.5 Financing Strategies and Inputs Dimension

The last dimension of our analysis concerns financing strategies—especially those resources used to implement a skills and competencies curriculum.

In the context of implementing a skills-and-competencies-based curricula, this dimension interacts, directly or indirectly, with each of the previous ones. For example, investment in teacher training has repercussions for academic results, since one of the factors having the greatest impact on the quality of learning is the quality of teachers, as shown by the different McKinsey & Company reports (Barber & Mourshed, 2007; Mourshed et al., 2010).

With that in mind, some observable indicators are the following: (1) the salary of teachers and the relationship between teaching status and teaching results, (2) investment in attracting talented teachers, and (3) the relationship between scholarships aimed at reducing inequality and the efficiency of their results.

The literature offers disparate data regarding these indicators because there is great variability depending on the geopolitical situations of each country. Thus, for example, Finland offers completely free education and obtains good results; other countries offer family vouchers so that parents can opt for the public or private education they want for their children. Others, such as Portugal, have demonstrated the efficiency of public spending invested in education. Nevertheless, **the findings seem to indicate that countries that, in addition to investing their economic resources in infrastructure, are interested in and capable of building cultures where education is considered a common good and a national heritage (such as South Korea) and that invest in emotional health and align investment with the SDGs (like Taiwan) obtain greater efficiency from their education spending.** Table 2.6 shows our findings.



**Table 2.6. Funding strategies and 21st century skills and competencies**

 <b>Germany</b>	Spending on education is 4.9% of GDP (\$11,700 per student in 2016). Public authorities maintain most educational institutions.
 <b>Australia</b>	The country has reduced spending on education from 5.7% to 5.3% of its GDP, implying spending per student is slightly below the OECD average. Australian government funding for nongovernment schools considers the capability of school communities to contribute to the school's operating costs (e.g., the parents' capability to pay school fees).
 <b>Austria</b>	In 2015, Austria proposed a budget guided by two objectives: 1. Increase the students' educational level. 2. Increase gender equity in education.
 <b>Belgium</b>	The financing model considers two objective differences: the freedom-of-choice guarantee and the responsibility of all schools organized by public authorities.
 <b>Canada</b>	Values close to 7% of GDP are allocated to education. Each province has its own ministries and its own regulations, and education is financed through local taxes. The neighborhoods can increase their taxes so that the school is of higher quality.
 <b>South Korea</b>	Seven percent of GDP is allocated to education, putting South Korea among the countries with the highest investment in education. Education ranks high in the government budget and attracts significant nongovernment funds.
 <b>Denmark</b>	The principal is the key figure in implementing policies and economic management of the education center.
 <b>United States</b>	Expenditure on education is 4.9% of GDP. Funding for public schools in the United States comes from federal, state, and local sources. However, with nearly half of that funding coming from local property taxes, the system creates significant funding gaps between rich and poor communities.
 <b>Scotland</b>	The funding of the national education system is done almost entirely through public funding from the Scottish government. Local authorities manage almost all spending on school education in Scotland (around 97%).
 <b>Slovenia</b>	There is both public and private ownership of the education centers. States and municipalities finance public education entirely. Four-point-eight percent of GDP is allocated to education.
 <b>Spain</b>	The country's education financing is marked by autonomy and economic decentralization. The regions (comunidades autónomas) have significant managerial autonomy, with authority to approve their own annual budgets and determine their resources.

 <b>Finland</b>	<p>The country provides completely free education. Expenditure on education is 6.3% of GDP. The Ministry of Education and Culture oversees all publicly funded education.</p>
 <b>Netherlands</b>	<p>In 2020, spending on education dropped from 5.48% to 5.17% of GDP (World Bank, 2020). Netherlands has a publicly funded education system of choice. All schools, independent or public, receive public funding at the same level, as long as they operate following the guidelines established by the Ministry of Education and agree to be supervised by its Inspectorate.</p>
 <b>Japan</b>	<p>Education expenditure amounts to 3.18% of GDP (below the average for OECD countries). Expenditure per student is \$8,748. Private schools also receive public funds.</p>
 <b>Kenya</b>	<p>Expenditure on education accounts for 5.3% of GDP. However, a significant proportion of this spending is made outside the school, mainly by households and local institutions.</p>
 <b>Norway</b>	<p>Expenditure on education accounts for 8% of GDP and is \$14,400 per student in primary and secondary school. The main source of revenue for municipalities and counties is general and earmarked grants from local municipalities.</p>
 <b>New Zealand</b>	<p>New Zealand allocates 7.3% of its GDP to education. The latest reforms call for substantial decentralization, although the government maintains financial control over policy development and standard-setting for the three types of schools in New Zealand: state, integrated, and private.</p>
 <b>Portugal</b>	<p>Efficiency of public spending (5% GDP to education) is a hallmark. There is optimization of professional and material resources. Portugal's education policies have demonstrated the commitment to public school and social initiative.</p>
 <b>Singapore</b>	<p>Total spending on education is around 3% of GDP. Expenditure per student in primary education is \$8,500 and in secondary education \$11,400. Public education in Singapore is funded almost entirely by the government out of general revenue. However, schools and universities are encouraged to raise funds, especially for capital expenditures for constructing major buildings or facilities.</p>
 <b>Taiwan</b>	<p>Spending on education is 5% of GDP. Central government funds fall into two categories: general education funds, which can be spent flexibly, and special education funds, which must be spent for specific purposes related to specialized education (students with identified disabilities and gifted students).</p>

In general, we can conclude that many contextual factors influence educational results and make it difficult to generalize and draw convincing conclusions from the research. However, **we can identify some common factors that affect those results—they include cultural characteristics of citizens and families, household resources, geographic location, neighborhood characteristics, and the importance that citizens and families attach to education.** In the next section, we expand on those factors and the lessons learned based on the experiences of the countries in our sample.

## 4. Keys to Success in Implementing a Curriculum for Developing 21st century Skills

In this section, we offer some practical approaches those in the field of education can use to help promote a skills-based education system for the 21st century. These are guidelines and proposals for concrete action. They are organized according to the five areas of our analysis and could be implemented in decision making in and across international education systems.

We derive the keys to success from the treatment of the information from the 20 countries under study, which, as explained in the foregoing sections, we analyzed according to five related dimensions. Each dimension can be thought of as an axis along which we have organized, linked, compared, and discussed the representative information from each country.



### 4.1. The Curriculum Dimension

- **Provide a good foundation for the teaching of skills in the country's legislative framework.** This should incorporate a vision of education focused on skills and abilities and an initiative to make them consistent with the proposals formulated by the different social agents and approved through dialogue mechanisms.
- **In each educational center, give priority to teaching transversal competencies in all their dimensions, generating spaces for dialogue and debate to create a positive culture.** Formulate the curricular areas using competence standards with indicators of achievement, tools, and so on from the internal structure and the didactics of each area.
- **Find a balance between the development of skills and the development of a knowledge base,** keeping in mind that the function of the school is to transform people and reality through knowledge.
- **Slim down the curricular content in each of the educational stages,** specifying essential components of knowledge, in balance with the necessary curricular flexibility that allows adaptation to the context of each school.



La tendencia parece indicar que los países donde, además de invertir en infraestructuras, son capaces de construir culturas donde la educación es considerada un bien común y un patrimonio nacional, obtienen una mayor eficiencia en sus resultados educativos.



## 4.2. The Evaluation Dimension

- **Designate periods of the school year in which to carry out formative (not summative, non-cumulative) evaluation exclusively**, to favor the work in competencies, designing personalized and evaluated itineraries at each step in the process.
- **Make a commitment to formative evaluation, including all kinds of indicators at different levels of achievement in rubrics.** In this way, teachers can make decisions that accompany their students' learning processes. The final objective of this process is for students themselves to be able to make these decisions on the way to a formative evaluation.
- **Focus on developing the child's metacognitive skills necessary to improve learning capacity.** Teachers should focus not only on the knowledge students acquire but also on how they are learning and, above all, on their self-awareness of their learning processes. We must prioritize a continuous attitudinal change in the students, so they can assume the leading role in their learning and in the monitoring of the process.
- **Provide education in the cognitive, emotional, social, and physical skills one needs to achieve a healthy lifestyle**, and evaluate students' development of the knowledge, understanding, and practice they need to live in the present and the future in a context of health and well-being.
- **Prioritize emotional factors as intrinsic to the teaching-learning process**, involving the educational community, and implementing achievement indicators that allow continuous reflection.



## 4.3. The Teaching Dimension

- **Coordinate the set of professional competencies and skills that teachers should master with a clear description of the student's graduation profile in personal terms**, but also in terms of citizenship, and, in some cases, global citizenship, and based on the values, principles, and traditions that make each student unique.
- **Establish a collaborative dynamic** that includes teacher networks and didactic co-design among teachers and facilitates successful initiatives in educational innovation, prioritizing the development of skills.
- **Pay particular attention to the provision of teacher support and professional development at each stage of the teacher's career.** This implies personalized professional development strategies such as mentoring and coaching. Offer specific guidelines to teachers on teaching skills to their future students.
- **Work over time toward a consolidated teaching performance focused on developing all kinds of skills in the teaching and learning processes.** This work requires research, reflection, excellent curricular stability, and evaluation of the impact itself.



## 4.4. The Institutional Factors That Favor Implementation Dimension

- **Promote educational centers' flexibility to make decisions in all areas** (organization, management, curriculum, and so on). Some noteworthy actions in this regard are simplifying the number of subjects, grouping them by area, and giving the teacher ample autonomy to carry out all kinds of interventions.

- **Establish opportunities to transfer content to society, keeping in mind that skills development is a process.** Open the educational center to a variety of agents and institutions in order to generate synergies between formal and informal education.
- **Set a goal of training students in global competence skills.** Such skills should allow students to adapt to an unprecedented rate of change, coexist in an interconnected world, understand different perspectives, and take responsible measures toward sustainability and collective well-being. This implies promoting and accompanying lifelong learning.
- **Orient each area of teaching, at all levels of specification,** toward a clearly entrepreneurial profile that is transversal in all subjects and present at all educational stages.
- **Develop a global competency framework to be taught.** Such a framework should transcend the school environment (extend to life beyond school) and include personal standards that accompany students' training and professional development.
- **Build connections between the school and the surrounding environment to work on competencies**—leaning toward creating learning communities and increasing the connection of families through specific competency guidelines that allow working in partnership with teachers.
- **Promote the Sustainable Development Goals (SDGs),** including the 2030 Agenda for Sustainable Development, as a working horizon, specifying how the goals relate to skills for a sustainable future. The SDGs emphasize strong social and ethical commitment, citizenship skills, sustainability, and environmental care.



#### 4.5. The Financing Strategies Dimension

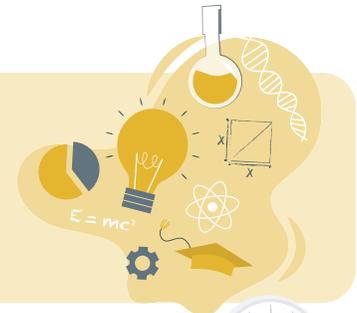
- **Ensure that the distribution of money and resources is balanced by an awareness of the need to reduce equity gaps in society.** Countries that distribute their budgets with a goal of reducing societal gaps and geopolitical differences achieve a better quality of educational services not only in global terms but in terms of the teaching of 21st century skills.
- **Provide educational centers the autonomy to manage and organize their resources.** This produces outstanding efficiency when it comes to adapting to the specific needs of each municipality and each center.
- **An economic investment in improving the results of instrumental areas in international competency tests** (Trends in International Mathematics and Science Study [TIMSS], Progress in International Reading Literacy Study [PIRLS], and Programme of International Student Achievement [PISA]) ensures better attention to competency-based learning.
- **Investment to attract and retain talent** among the teaching staff improves the quality and results of teaching and contributes to economic growth.
- **Use investment to build a bridge between the formal and informal educational environments,** one that favors feedback between research and teaching and promotes the link between university and school through laboratories that validate what we want to see in the classroom. One illustration of this is the generation of what we call “success incubators” that validate the development of our students' skills in practice.

The keys to success arise from the experiences of countries that are in the process of rethinking their education systems' curriculums, that are listening to the entire educational community, and that have a solid commitment to a curriculum based on 21st century skills. Of course, each country has its own circumstances, economy, contexts, traditions, values, and citizenship criteria. However, the keys to success (for implementing a skills-based curriculum) are common enough that they are available to all of those countries interested in an education system that accounts for the present and responds to challenges of the future.

## Basis of the analysis dimensions

### CURRICULUM

- Ensure that the standards are reflected in a legislative framework.
- Increase the flexibility of the curriculum
- Organize the curriculum by standards based on competencies
- Prioritize transversal competencies subjects for each education level
- Reduce content in the prioritized learning vectors
- Define the graduation profile at each stage



### EVALUATION

- Favor an evolution from a formative evaluation in which the collection of evidence of learning, its analysis, and decision making is carried out by the teaching staff toward a formative evaluation in which the students themselves execute this process
- Design personalized itineraries and evaluate in process
- Include the educational community—as well as other external agents—in evaluation processes
- Establish a ladder of achievement levels for each thematic core



### TEACHING

- The co-design—among teachers and agents outside the school—of learning projects based on 21st century skills and competencies
- Accompaniment of the teacher throughout all the phases of the professional career
- Specific strategies and tools for teachers' professional development, such as peer observation, mentoring, pedagogical coaching, a professional portfolio, or managerial interviews...
- A quality professional network capable of generating learning communities
- Teachers who are increasingly focused on measuring the pedagogy's impact on student learning



### INSTITUTIONAL FACTORS THAT FAVOR IMPLEMENTATION

- Strengthen the decision-making autonomy of educational centers
- Transfer to all stages the balanced theoretical-practical vision of professional training/vocational education
- Promote inter-institutional cooperation, especially to implement measures that improve the well-being of the student-family ecosystem
- Support a legislative framework that promotes an entrepreneurial and transversal profile throughout subjects
- Establish learning communities



### FINANCING STRATEGIES

- Human capital production as an important factor of economic growth
- Education and public spending on education as a crucial engine of economic development
- The quality of teaching, infrastructure and curriculum determine the results of educational investment
- If there is quality in teaching at non-equal teacher training levels together with high teacher salaries, then there is economic growth
- Relationship between talent attraction to the teaching profession and salary offered in education with economic growth
- Economic growth increase with social consideration of the profession and economic incentives





## References

- Ansari, A., & Gershoff, E. (2016). Parent involvement in Head Start and children's development: Indirect effects through parenting. *Journal of Marriage and Family*, 78(2), 562–579. <https://doi.org/10.1111/jomf.12266>
- Barber, M., & Mourshed, M. (2007). *How the world's best-performing school systems come out on top*. McKinsey & Company.
- Barro, R. J. (2013). Education and economic growth. *Annals of Economics and Finance*, 14(2), 277–304.
- Bieber, T., Niemann, D., Martens, K., & Teltemann, J. (2015). *Towards a global model in education*. Interdisciplinar.
- Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: principles, policy & practice*, 5(1), 7–74. <https://doi.org/10.1080/0969595980050102>
- Black, P., & Wiliam, D. (2010). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan*, 92(1), 81–90. <https://doi.org/10.1177/003172171009200119>
- Bloom B. S. (1968). Learning for mastery. *Evaluation Comment (UCLA-CSIEP)*, 1(2), 1–12.
- Bosworth, B. P., & Collins, S. M. (2003). The empirics of growth: An update. *Brookings Papers on Economic Activity*, 2003(2), 113–206.
- Breakspear, S. (2014). *How does PISA shape education policy making? Why how we measure learning determines what counts in education*. Centre for Strategic Education. <https://allchildrenlearning.org/wp-content/uploads/2019/11/Breakspear-PISA-Paper.pdf>
- Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning (Technical Report No. 481). University of Illinois, Center for the Study of Reading. <https://core.ac.uk/download/pdf/4826414.pdf>
- Carless, D., & Boud, D. (2018). *Evaluación en la educación superior*. Taylor & Francis.
- Carlo, A., Michel, A., Chabanne, J. C., Bucheton, D., Demougin, P., Gordon, J., Sellier, M., Udave, J.-P., & Valette, S. (2013). *Study on policy measures to improve the attractiveness of the teaching profession in Europe* (Research Report EAC-2010-1391). European Commission, Directorate General for Education and Training.
- Chalkiadaki, A. (2018). A systematic literature review of 21st-century skills and competencies in primary education. *International Journal of Instruction*, 11(3), 1–16.
- Ciccone, A., & Papaioannou, E. (2005). *Human capital, the structure of production, and growth* (ECB Working Paper No. 623). European Central Bank.
- Clark, F. W. (1976). Characteristics of the competency-based curriculum. In M. L. Arkava & E. C. Brennen (Eds.), *Competency-based education for social work: Evaluation and curriculum issues* (pp. 22–46). Council on Social Work Education.
- Clements, B. (2002). How efficient is education spending in Europe? *European Review of Economics and Finance*, 1, 3–26.
- Coll, C., & Martín, E. (2006). *Vigencia del debate curricular. Aprendizajes básicos, competencias y estándares*. Segunda Reunión del Comité Intergubernamental del PRELAC.
- Darling-Hammond, L., Burns, D., Cambell, C., Goodwin, A. L., Hammerness, K., Low, E. L., McIntyre, A., Sato, M., & Zeichner, K. (2017). *Empowered educators: How high-performing systems shape teaching quality around the world*. Jossey-Bass.
- Datnow, A., Park, V., & Kennedy-Lewis, B. (2013). Affordances and constraints in the context of teacher collaboration for the purpose of data use. *Journal of Educational Administration*, 51(3), 341–362.
- Dewitt, P. (2020). *Instructional leadership*. Corwin.
- Fadel, C., Bialik, M., & Trilling, B. (2015). *Four-dimensional education: The competencies learners need to succeed*. Center for Curriculum Redesign.

- Farley-Ripple, E., & Buttram, J. (2014). Developing collaborative data use through professional learning communities: Early lessons from Delaware. *Studies in Educational Evaluation, 42*, 41–53.
- Fernández Muñoz, R. (2003). Competencias profesionales del docente en la sociedad del siglo XXI. *Praxis, 1*, 4–8. <http://www.uclm.es/profesorado/Ricardo/Cursos/CompetenciaProfesionales.pdf>
- García Monge, A., & Rodríguez Navarro, H. (2009). Asimilación de códigos de género en las actividades del recreo escolar. *Revista interuniversitaria de formación del profesorado, 64*, 59–72.
- Gutiérrez Esteban, P., Yuste, R., Cubo, S., & Lucero, M. (2011). Buenas prácticas en el desarrollo de trabajo colaborativo en materias TIC aplicadas a la educación. *Profesorado, Revista de Currículum y Formación del Profesorado, 15*(1), 180–194. <http://www.ugr.es/~recfpro/rev151ART13.pdf>
- Hanushek, E. A., Link, S., & Woessmann, L. (2013). Does school autonomy make sense everywhere? Panel estimates from PISA. *Journal of Development Economics, 104*, 212–232. <https://doi.org/10.1016/j.jdeveco.2012.08.002>
- Hargreaves, L., Cunningham, M., Everton, T., Hansen, A., Hopper, B., McIntyre, D., & Turner, P. (2007). *The status of teachers and the teaching profession in England: Views from inside and outside the profession*. University of Cambridge; University of Leicester.
- Henward, A., & Lorio, J. M. (2011). *What's teaching and learning got to do with it?: Bills, competitions, and neoliberalism in the name of reform*. Teachers College Record.
- Hernández-Sellés, N., González-Sanmamed, M., & Muñoz-Carril, P. (2014). La planificación del aprendizaje colaborativo en entornos virtuales. *Comunicar, 21*(42), 25–33. <https://doi.org/10.3916/C42-2014-02>
- IFTF (Institute for the Future). (2011). *Future work skills 2020*. [https://www.iftf.org/uploads/media/SR-1382A\\_UPRI\\_future\\_work\\_skills\\_sm.pdf](https://www.iftf.org/uploads/media/SR-1382A_UPRI_future_work_skills_sm.pdf)
- Jimerson, J. B. (2014). Thinking about data: Exploring the development of mental models for “data use” among teachers and school leaders. *Studies in Educational Evaluation, 42*, 5–14.
- Joynes, C., Rossignoli, S., & Fenyiwa Amonoo-Kuofi, E. (2019). *21st century skills: Evidence of issues in definition, demand, and delivery for development contexts* (K4D Helpdesk Report). Institute of Development Studies.
- Kim, S., & Ahn, S. (2020). Social investment effects of public education, health care, and welfare service expenditures on economic growth. *Asian Social Work and Policy Review, 14*, 34–44.
- Knight, J. (2018). *The impact cycle*. Corwin.
- Lantz-Andersson, A., Lundin, M., & Selwyn, N. (2018). Twenty years of online teacher communities: A systematic review of formally-organized and informally-developed professional learning groups. *Teaching and Teacher Education, 75*, 302–315.
- Lomos, C., Hofman, R. H., & Bosker, R. J. (2011). Professional communities and student achievement—a meta-analysis. *School effectiveness and school improvement, 22*(2), 121–148.
- Lucas, B., & Claxton, G. (2009). *Wider skills for learning: What are they, how can they be cultivated, how could they be measured, and why are they important for innovation?* NESTA.
- Macià, M., & García, I. (2016). Informal online communities and networks as a source of teacher professional development: A review. *Teaching and Teacher Education, 55*, 291–307. <https://doi.org/10.1016/j.tate.2016.01.021>
- Marope, M., Griffin, P., & Callagher, C. (2017). *Future competences and the future of curriculum: A global reference for curricula transformation*. UNESCO, International Bureau of Education.
- Moss, C., & Brookhart, S. (2019). *Advancing formative assessment in every classroom: A guide for instructional leaders*. ASCD.
- Mourshed, M., Chijioke, C., & Barber, M. (2010). *How the world's most improved school systems keep getting better*. McKinsey & Company.

- National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform*. U.S. Government Printing Office.
- National Research Council. (2011). *Incentives and test-based accountability in education*. National Academies Press.
- Niemann, D., Martens, K., & Teltemann, J. (2017). PISA and its consequences: Shaping education policies through international comparisons. *European Journal of Education, 52*(2). <https://onlinelibrary.wiley.com/doi/abs/10.1111/ejed.12220>
- Perrenoud, P. (2012). *Desarrollar la práctica reflexiva en el oficio de enseñar*. Elsevier.
- Ravitch, D. (2000). *Left back: A century of failed school reforms*. Simon and Schuster.
- Reimers, F., & Chung, K. (2015). *Enseñanza y aprendizaje en el siglo XXI. Metas, políticas educativas y currículo en seis países*. Harvard Education Press.
- Rickards, F., Hattie J., & Reid, C. (2021). *The turning point for the teaching profession*. Routledge.
- Skager, R. (1979). Self-directed learning and schooling: Identifying pertinent theories and illustrative research, *International Review of Education / Internationale Zeitschrift Für Erziehungswissenschaft / Revue Internationale De L'Education, 25*(4), 517-543. <http://www.jstor.org.ezp.twu.edu/stable/3443667>
- St. Clair, L., & Jackson, B. (2006). Efecto de la capacitación sobre participación familiar en las habilidades lingüísticas de los niños pequeños de la escuela primaria de familias migrantes. *School Community Journal, 16* (1), 31–42.
- Stake, R. E. (2010). *Qualitative research: Studying how things work*. Guilford.
- Strietholt, R., Gustafsson, J. E., Hogrebe, N., & Rolfe, V. (2019). The impact of education policies on socioeconomic inequality in student achievement: A review of comparative studies. In L. Volante, S. Schnepf, J. Jerrim, & D. Klinger (Eds.), *Socioeconomic inequality and student outcomes*. Springer.
- Stufflebeam, D. L., Foley, W. J., Gaphart, W. J., Guba, E. G., Hammond, R. L., Merriman, H. O., & Provus, M. (1971). *Educational evaluation and decision making*. Peacock.
- Stufflebeam, D. L., & Shinkfield, A. J. (1987). *Evaluación sistemática. Guía teórica y práctica*. Paidós/MEC.
- Sutherland, D., Price, R., Joumard, I., & Nicq, C. (2007). *Performance indicators for public spending efficiency in primary and secondary education* (Working Paper No. 546). OECD Economics Department.
- Tedesco, J. C., Opertti, R., & Amadio, M. (2013). *Porqué importa hoy el debate curricular* (IBE Working Papers on Curriculum Issues, No. 10). UNESCO, International Bureau of Education.
- Trabelsi, S. (2017). Public education expenditure and economic growth: The educational quality threshold effect. *Region et Developpement, 45*, 99–112.
- Tyler, R. W. (1976). *Perspectivas sobre la educación estadounidense: Reflexiones sobre el pasado, desafíos para el futuro*. Science Research Associates.
- UNDP (United Nations Development Programme). (2020). *Human Development Report 2020: The next frontier: Human development and the Anthropocene*. <https://hdr.undp.org/content/human-development-report-2020>
- Vangrieken, K., Meredith, C., Packer, T. & Kyndt, E. (2017). Teacher communities as a context for professional development: A systematic review. *Teaching and Teacher Education, 61*, 47–59.
- Violand- Sánchez, E. (1991). *Fomento de la cooperación entre el hogar y la escuela*. Cámara de Compensación Nacional para la Educación Bilingüe.
- Voelkel, R., & Chrispeels, J. (2017). Understanding the link between professional communities and teacher collective efficacy. *International Journal of Research, Policy, and Practice, 28*(4), 68–103.
- Williams, D. (2017). *Embedded formative assessment*. Solution Tree Press.

## Appendix

### Method

We conducted the research from July 2019 to December 2021 based on official documentation and scientific literature related to 20 countries, describing and documenting the work each has carried out to incorporate the teaching of skills for the 21st century in their educational plans.

#### 1. Country Selection

The 20-country sample comprises countries characterized by medium or high Human Development Index (HDI) values. The HDI is a widely used measure summarizing a country's achievements in human development (UNDP, 2020). Sixteen of the sample countries are members of the Organisation for Economic Co-operation and Development. The selection represents the four continents, although most of the countries are European (11) or Asian (four). Oceania has two representatives and Africa one, while the Americas have only representatives from North America (the United States and Canada). One nonstate entity, Scotland, is represented. We point out that this constitutes a sample of convenience, of great magnitude, and one that facilitates the analysis of different approaches and allows for establishment of a typology of responses to the challenge of implementing a pedagogy of 21st century skills.

#### 2. Data Collection and Analysis

We conducted an exploratory analysis of secondary sources to gather the data between 2019 and 2021. Initially, we reviewed the scientific literature on comparative studies in different countries and on socio-educational skills for the 21st century. That review was based on articles indexed in the ISI Web of Knowledge database, and priority was given to journals included in Journal Citation Reports. With that review, we selected bibliographic sources, allowing us to outline a general panorama of the situation of the five central dimensions.

Subsequently, based on the main contributions of the reviewed scientific literature, we did the following: (1) examined official documents extracted from the websites of the different governments of each selected country; (2) conducted open interviews with teachers from some of the countries to obtain their perspectives; and (3) examined educational legislation of the selected countries.

Having collected that information, we qualitatively coded it into the five selected dimensions. We then carried out the following analytical process (Stake, 2010): The data were further coded into themes (issues and topics), categories, and subcategories. Following the multiple case study analysis model proposed by Stake (2010), the properties and dimensions of each category were defined for extract. From there we derived details, codes, classifications, relations, progressions, analysis of facilitators and hinderers of the inclusion of 21st century skills, detailed descriptions of processes, and interpretations of the interviews carried out in the countries, finally arriving at the elaboration of hypotheses, indicators, and some explanatory theories.

## Chapter 3

# Learning and Development of Digital Skills:

Lessons Learned from  
Successful Experiences





## Chapter 3

# Learning and Development of Digital Skills:

## Lessons Learned from Successful Experiences

### International Society for Technology in Education (ISTE)

Andrea Vásquez Guerra, Ana Virginia Quesada Alvarado, Susan Brooks-Young, Ximena Álvarez and Yolanda Ramos

### Abstract

Many countries recognize the need to incorporate a new set of cognitive, social, and emotional tools into their educational curriculums, but their experiences have varied in their speed, methods, and success. In this chapter, we analyzed case studies from nine countries that have successfully integrated the skills needed for the 21st century into their educational systems, focusing on digital skills. The chosen cases are innovative, internationally renowned initiatives that often result in high student scores on international standardized tests.

Findings indicate that the design and implementation of successful school initiatives for developing digital skills share three elements: They consider the needs of the society, ensure equitable access to learning opportunities, and promote governance that fosters educational innovation. First, an educational initiative can increase its impact and effectiveness when the country, as a society, is committed to its implementation through a social context that approves the changes and concrete actions to achieve a shared vision for the reform. Second, equitable access to new teaching and learning methods, particularly in technology, requires both widely available technological infrastructure and ongoing training and support opportunities for the entire population. Lastly, to promote educational innovation, governments need to focus on both programs' economic sustainability and their student outcomes by tying program evaluation to grants, funding, and access to additional pedagogical resources.

During the COVID-19 pandemic, thriving educational systems overcame the challenges of social isolation through digital technology. In this new reality, national stakeholders should first observe and analyze those success stories, and then, based on the knowledge gained, implement curriculum reforms to promote the development of digital skills in students, teachers, and families.

# 1. Introduction

The unprecedented speed of today's social, economic, and environmental changes has prompted countries to critically review their curriculums in search of the knowledge, skills, and competencies required to thrive in the future. As a result, **various nations have recognized the need to update their curriculums to integrate these new skills needed for a changing world. However, they have done so at different paces and using different methods** (Gouédard et al., 2020).

These efforts have not always resulted in improvements in learning, and those countries that succeeded did it because they transformed their education systems in the context of broader strategies to incorporate technology to achieve the countries' socioeconomic growth (Mateo-Berganza Díaz & Lee, 2020).

**The present study analyzes nine cases worldwide, showing successful ways to address the inclusion of digital learning oriented to developing skills required for the 21st century in the education system.** Policies, programs, and initiatives were reviewed in search of the relevant factors that led to successful implementation, obtaining useful implications for designing or directing policies and initiatives of a similar nature.

The analysis of the selected cases was guided by a framework composed of the **14 Essential Conditions of the International Society for Technology in Education (ISTE)**. These elements have proven necessary by evidence to enhance the use of digital resources for learning effectively (ISTE, 2021a) and cover infrastructural, pedagogical, governance, and community elements.

**Successful school design and implementation initiatives for developing digital skills share three elements: They consider the needs of the society, ensure equitable access to learning opportunities, and promote governance that fosters educational innovation.**

The chapter is organized into three sections:

- The first section defines the notion of digital skills used in the study and describes the Essential Conditions matrix that served as a framework for analyzing the cases investigated.
- The second section presents the nine case studies and the process and criteria used in their selection. An overview of the instrument used for the literature review also is presented, given the fact that it may constitute a helpful tool for other studies of this type and scope.
- The third section synthesizes the main findings of the case study analysis and describes the most prevalent Essential Conditions in the successful implementation of the national policies and initiatives reviewed. The section also outlines the main lessons learned to be considered by decision makers regarding digital learning at the local and national levels.

## 2. Digital Skills and Essential Conditions

This section discusses the concept of digital skills considered in the study and presents the matrix of Essential Conditions that served as an instrument to guide the analysis of the selected initiatives.

### 2.1. Digital Skills

Ability, or *skill*, is a form equivalent to know-how referred to as technique; that is, it represents a demonstrable ability to perform a task (Clarke & Winch, 2006). It is the capacity to apply theoretical knowledge in a practical context, which can be developed from internal and external conditions throughout the life cycle.

Transversal or foundational skills enable individuals to achieve higher levels of well-being throughout their lives by equipping them with the necessary tools to respond to the uncertainty of today's world (Mateo-Berganza & Rucci, 2019). Within this set are digital skills, which go beyond the simple understanding of the use of technologies but are related to digital behavior, experience, and knowledge (Carretero Gómez, 2021; Mateo-Berganza & Rucci, 2019). For the same reason, digital skills are not only acquired but also constantly adapted and updated (Fau & Moreau, 2018).

There are currently multiple approaches to linking demonstrable behaviors with digital skills, but there is consensus about what these skills allow us to do. Thus, **digital skills are defined as those that will enable us to appropriate digital technologies and use them productively in everyday and work environments.**

A relevant consideration is that appropriation goes beyond use. From a sociocultural perspective, appropriation is understood as “a material and symbolic process of interpretation and endowment of meaning regarding a cultural artifact by a social group, by emphasizing the ability of subjects to make them meaningful according to their own purposes” (Hernández & López, 2019). We appropriate digital technologies when we are able to use them to participate successfully in practices that are valuable for the groups and society in which we live and when we can adapt their use and exploitation to the needs and circumstances that are required in the context in which we develop.

**Appropriating digital technologies means “making them our own” so that they allow us to integrate into an increasingly changing, complex, and globalized society.** It means knowing how to ask ourselves the questions that enable us to use the tools to their full potential to maximize our benefit in areas as diverse as learning, communication, creation, expression, participation, and work. This appropriation is a lifelong work, as technological development does not stop.

The social transformation that digital technologies have brought about in all areas also has brought significant changes and challenges to the nature and ways in which we interact with ourselves, other people, and the environment. Today, the unlimited amount of information to which we are exposed and the extension of possibilities that technological development offers us oblige us to be ethically and responsibly cautious in our practices in technological networks.

**Within digital skills, digital citizenship makes it possible to recognize our rights, responsibilities, and opportunities in an interconnected world and to act safely, legally, and ethically in this new context** (ISTE, 2021b). The exercise of digital citizenship involves managing online identity, privacy, and reputation; being aware that digital actions remain distributed in networks; and recognizing intellectual property in the material produced by third parties. Moreover, analyzing instantly available

information through the lens of digital citizenship makes us aware of different worldviews at local, national, and global scales. This facilitates open and respectful interactions with people from different contexts and cultures, contributing to our development as more critical and tolerant people seeking the common good (Organisation for Economic Co-operation and Development [OECD], 2018b).



**Digital skills will enable us to appropriate and use digital technologies productively in everyday and work environments.**

## 2.2. Essential Conditions

Bringing educational policy to reality is a complex task, and doing so successfully requires a comprehensive understanding of the elements that make up teaching and learning (Gouédard, 2022). In addition to planning the contents, their purpose, and their organization, it is essential to have an educational vision that guides the implementation of the curriculum and the methodologies to be used, especially considering the role of teachers as mediators for their execution (van den Akker, 2013). This vision must permeate all actors in the education system, including the government, so that their resources and actions point in the same direction (Petrie et al., 2021).

For the specific case of digital skills, these elements translate into a set of indispensable aspects that provide a framework, supported by research, by which educational leaders and educators guide their successful implementation at all academic levels. **The ISTE Essential Conditions** (ISTE, 2021a) **are 14 critical elements that have been identified to effectively leverage digital technologies in teaching and learning processes.** They are the following:



### 2.2.1. Shared Vision

Proactive leadership is needed to develop a shared vision for educational technology among all stakeholders, including teachers and support staff, school and district administrators, teacher educators, students, parents, and the community.

The shared vision encompasses the entire system and identifies all stakeholders. It considers a plan for disseminating the vision, receiving community input, and ensuring everyone understands it.



### 2.2.2. Empowered Leaders

System-level changes require empowered leadership to experiment, decide, take risks, and adjust course. Instead of a hierarchical governance model, a distributed, plural, and shared model should be promoted, creating a system capable of leveraging existing strengths while strategically using resources.

Empowering stakeholders at all levels results in proactive individuals capable of making critical decisions about their teaching and learning while being able to support others in solving problems and effecting change through their spheres of influence.



### 2.2.3. Implementation Planning

This is a systematic plan aligned with a shared vision for school effectiveness and student learning through implementing information and communications technology (ICT) and digital learning resources. It is the foundation for technology deployment in the system, and it takes charge of every aspect of the program, from infrastructure to professional development.

Implementation planning allows for maximizing available resources and achieving learning objectives by outlining a road map with short- and long-term objectives.



### 2.2.4. Consistent and Adequate Funding

Ongoing funding is required to support all aspects of the initiative: technology infrastructure, personnel, digital resources, maintenance and upgrades, and teacher professional development.

Achieving financial sustainability depends on various factors inherent to the system, such as the available sources of financing. But regardless of this, a strategic budget is one that, considering all the options, selects the most cost-effective ones to achieve the program's objectives.



### **2.2.5. Equitable Access**

This is robust and reliable access to current and emerging technologies and digital resources, with connectivity for all students, teachers, staff, and school leaders.

Equitable access must be considered at two levels. On the one hand, the technical level implies providing sufficient bandwidth and availability of equipment. On the other, it is necessary to train teachers in using technology to create equitable learning experiences for all, including students with special educational needs.



### **2.2.6. Skilled Personnel**

Educators, support staff, and other leaders must be trained in selection and effective use of appropriate ICT resources for academic purposes. In other words, the educational community can use digital tools, at different levels, to increase productivity and improve learning.

Educational leaders can model this condition by being technology users, providing access to resources for ongoing training, and establishing hiring practices that reflect the relevance of technology skills.



### **2.2.7. Ongoing Professional Learning**

Educators require professional learning plans and programs related to the educational use of technology as well as opportunities with dedicated time to practice, collaborate, and share ideas.

These training instances must meet three conditions: be relevant to the participant's individual needs, be regularly implemented, and keep up to date with trends and technologies.



### **2.2.8. Technical Support**

Consistent and reliable technical assistance is necessary for maintaining, renewing, and using ICT and digital learning resources. Without it, technology can be unusable and disruptive, becoming a barrier to learning.

Technological support reflects sufficient infrastructure, access to technical specialists, and the diversification of responsibilities in the use of technology, its implementation, and technical support.



### **2.2.9. Curriculum Framework**

A curriculum framework comprises aligned content standards and digital curriculum resources that support learning and work.

Technology should not be an accompaniment but should be woven into the curriculum so that the tools are commensurate with the expected learning outcomes. A curriculum framework bridges the gap between broad curriculum objectives and technology for teaching and learning.



### **2.2.10. Student-centered Learning**

This corresponds to planning, teaching, and assessing by putting students' needs and abilities at the center. Teachers design instruction and use technology to serve each student's learning path.

When schools effectively leverage technology and pedagogy, an unprecedented level of personalized learning is achieved, with valuable opportunities to monitor competency development. Teachers and students become empowered and make decisions about their teaching and learning processes.



### **2.2.11. Assessment and Evaluation**

These entail the continuous assessment of teaching, learning, leadership, and evaluation of the use of technologies and digital resources. They allow measuring the progress of technological integration in the system concerning technology itself and those who use it.

There must be metrics and objectives to measure the initiative's success as well as a continuous improvement process to apply what is learned from the assessment. Metrics should consider the impact of technology on student assessment and achievement and the level of technological competence of teachers.



### **2.2.12. Engaged Communities**

Partnership and collaboration within communities should be encouraged to support and fund the use of digital learning technologies and resources. This increases the likelihood of successful implementation by promoting the incorporation of local resources and values into planning.

Community engagement requires the school to establish a constant channel of feedback and communication with all stakeholders. It is essential to gauge the initiative's community awareness level.



### **2.2.13. Support Policies**

These are the policies, financial plans, accountability measures, and incentive structures to support the use of technologies and other digital resources for learning and school operations. They keep students safe in digital environments and guide the appropriate use of technology by encompassing all aspects of technology across all stakeholders.

High-level policies such as those concerning web filters and low-level policies, such as digital citizenship and fair use agreements should be designed.



### **2.2.14. Supportive External Context**

The existence of policies and initiatives at the national, regional, and local levels to support schools and teacher preparation programs in the effective implementation of digital technologies to meet curriculum goals and learning standards should be assessed. External influences such as these can either facilitate or hinder a technology integration plan, so educational leaders should be aware of how to use these influences to their advantage.

Although the external context is beyond the school's control, achieving change with sufficient time, energy, and effort is possible. This requires awareness of relevant policies and their impact on local schools as well as positioning the system to take advantage of future programs to push the implementation of the vision.

### 3. Successful Cases of Inclusion of Digital Skills in the Education System

Education reforms are often the scaffolding on which countries build new visions for national development. However, most of these reforms tend to be slow, and nations take decades to achieve the proposed changes. Although research is inconclusive regarding the frequency with which reforms should occur, it has been documented that many reforms take an average of six years between design and implementation (OECD, 2020c).

In OECD countries alone, no less than 450 educational reforms were adopted between 2008 and 2014 (OECD, 2015). **Several of the reforms under way in recent years involve the promotion of digital learning and aspire to develop digital skills in people of all ages and at all educational levels.** An international assessment of the state of digital learning shows different levels of adoption of transversal skills in education systems. In general, digital skills have had a greater penetration in recent curriculum reforms (Petrie et al., 2021) and in policies that include lifelong learning initiatives (Mateo-Berganza & Rucci, 2019).

**After an exhaustive review of multiple experiences worldwide, nine outstanding cases were identified and selected from which recommendations and lessons applicable to other instances and realities can be derived.** These cases are described below along with the criteria used in their selection and a summary of the main findings related to their successes.

#### 3.1. Selected Cases

The nine selected cases illustrate aspects of the design and implementation of national digital learning initiatives leading to the development of 21st century digital skills, as described below (see Figure 3.1).

**Figure 3.1. Categorization of each case according to the aspect with which it deals**



Table 3.1 shows which particular case was studied in each country.

**Table 3.1. Cases studied, by country**

Country	Case Study
 <b>Australia</b>	Implementation of digital and 21st century skills throughout the curriculum
 <b>Austria</b>	Equity as a guiding principle for the digitization of education
 <b>Canada</b>	21st century and digital skills job training
 <b>Estonia</b>	Conditions for the successful design and implementation of an educational strategy for skills development
 <b>Finland</b>	Teacher professional development focused on digital and 21st century skills
 <b>Japan</b>	Digital skills for the 5.0 society
 <b>Singapore</b>	Pathway to educational transformation: the role of technologies and digital skills
 <b>South Korea</b>	Ecosystem for the development of digital skills in education
 <b>Uruguay</b>	Implementation of a national digital learning plan for social inclusion

### 3.2. Selection Criteria: Why These Cases?

The case studies were selected based on the quantity and quality of the information available about the initiative, specifically information that would allow the intervention to be placed in context. Thus, **the analysis integrated those cases in which it was possible to know the target population, the theoretical justification of the program, the educational approach to integrating digital learning, and the lessons learned in the implementation.**

A matrix was created to assess the feasibility and relevance of the information sources. First, a list of national digital learning initiatives recognized and highlighted for their educational performance in global evaluations was obtained. Innovative and well-documented cases also were identified from countries that do not participate in international measurements but are widely recognized for their track records.

The documentary review was carried out by validating information from key informants, the comparative analysis of the proposals, and the evidence of their results. There were three main sources:

- 1 International educational performance reports and “country scores” from the Programme for International Student Assessment, the Teaching and Learning International Survey (International Association for the Evaluation of Educational Achievement, 2019; OECD, 2019b), the Trends in International Mathematics and Science Study report (Mullis et al., 2020), the International Computer and Information Literacy Study (International Association

for the Evaluation of Educational Achievement, 2020), the Programme for the International Assessment of Adult Competencies (OECD, 2019a), and the European Schoolnet.

- 2 Documentation provided by governments, ministries of education, and governmental and nongovernmental agencies in charge of integrating digital technologies in education.
- 3 Research reports, evaluations, and dissemination of digital learning initiatives and developing digital skills in students, educators, and society.

The selection criteria matrix (see Appendix A) was applied to the preliminarily selected cases to refine the options and define the final list, considering the lessons that could be applicable in other contexts.

An inductive process was followed to construct the matrix. All aspects to be observed were listed, and categories or dimensions were created to group them according to their nature. Once organized, definitions were elaborated to describe the scope of each criterion. Fifteen criteria were obtained, organized into three dimensions: availability of information, rationale for implementation, and innovative approach to learning.

The information availability dimension grouped criteria related to the access and quality of information available in the general context in which the system or program to be studied is developed. The rationale for implementation dimension grouped factors that would allow the initiative to be assessed. Aspects describing and understanding how the system or program was designed, implemented, executed, and evaluated were considered. Finally, the innovative approach to learning dimension contained elements that amplify the analysis of the learning approach and how it relates to conditions for the development of 21st century digital skills, as detailed in Table 3.2.

**Table 3.2. Matrix's dimensions and criteria for case selection**

Dimensions	Criteria
<b>Information availability</b> 	<ul style="list-style-type: none"> <li>• Has relevant information and data available (context, beneficiaries, history)</li> <li>• Has documented information about achievements</li> <li>• Illustrates very well one or more aspects of 21st century digital skills</li> <li>• Tests or works with a specific group (students, teachers, school leaders)</li> </ul>
<b>Implementation rationale</b> 	<ul style="list-style-type: none"> <li>• Defines its objectives and goals</li> <li>• Describes in detail its implementation process</li> <li>• Has design or results that may motivate others to implement it</li> <li>• Solves an identified need or problem</li> <li>• Can identify one or more Essential Conditions and supports sustainability and replicability</li> <li>• Describes lessons learned that favor its total or partial replication</li> <li>• Considers diversity and social inclusion</li> </ul>
<b>Innovative approach to learning</b> 	<ul style="list-style-type: none"> <li>• Establishes an educational approach to integrate defined digital technologies, consistent with the 21st century Skills Framework and the ISTE Essential Conditions</li> <li>• Presents an inspiring approach that other educators can partially or fully replicate</li> <li>• Transcends the automation of traditional tasks</li> <li>• Shows ways in which 21st century digital skills are creatively assessed</li> </ul>

A preliminary selection of more than 20 potential initiatives was made, taking as a starting point existing comparative studies such as the one published by UNESCO-UNEVOC (Sustainable Skills, 2019): *Building Tomorrow's Digital Skills—What Conclusions Can We Draw from International Comparative Indicators?* To this preliminary choice, the selection criteria matrix was applied, and as a result, national initiatives in nine countries were selected.

Eight of the nine countries show good performance in international tests applied to students and educators. Furthermore, all the selected countries enjoy international recognition for the educational reform processes implemented for digital learning and developing digital skills.

**In addition to being initiatives valued as internationally successful and meeting the criteria established for selection, selected cases consistently represented two or more Essential Conditions from which to draw lessons to inspire decision makers and people in general.**

An important factor for not selecting a case study was that it did not meet the criteria described in the information availability dimension of the matrix. These were interesting initiatives—they had well-conceived proposals and were even internationally recognized—but they lacked publicly available information about design and implementation as well as documentation or evidence of results. This shows that digitization is a challenge in many countries. Among the main obstacles related to the availability of information were the following:

- Sparse information in publicly available digital media or contradictory information among different information media
- Insufficient availability of official public information about actions taken, investment made, and results obtained by digital learning initiatives
- Lack of documentation related to curriculum design and implementation processes and only proposal documents' being available
- Insufficient or no published evidence of implementation results, whether derived from systematic evaluations or research

### **3.3. Comparative Elements of the Context**

To better understand the dynamics of the initiatives studied, some elements of the educational context in the selected case countries were compared. Three aspects were observed: the structure of the educational system from preschool to upper secondary education, the governance of the system, and the model for integrating digital learning into the curriculum.

#### **3.3.1. The Structure of the Educational System**

In most countries studied, entry to primary education begins at the age of six; only Estonia and Singapore have it set at seven years of age. Schooling is compulsory for 9 years, except in Canada, with 10 years, and in Uruguay, with 11 years.

The distribution of years of schooling in primary and lower secondary education cycles is quite regular: usually six years of primary education and three or four years of lower secondary education. Only Australia and Austria have different structures in this distribution, with the former's depending on each territory and the latter's having more years of lower secondary education. Similarly, lower secondary education in Singapore can extend up to five years, depending on the type of school attended.

As for preschool education, the various countries studied differ in the duration and compulsory nature of the level. For example, preschool is still optional in Australia, Canada, South Korea, Estonia, and Finland. On the other hand, the year before entering primary school is compulsory in Austria and Singapore. In Uruguay, two years are compulsory. In Japan, it was only a couple of years ago that this level was considered part of the education system.

The main differences in upper secondary education lie in its duration and educational offerings, where Austria, Canada, and Singapore stand out for their track record and a wide variety of vocational training tracks.

The details can be seen in Table 3.3.

**Table 3.3. Structure of the education system according to years of compulsory schooling, by country**

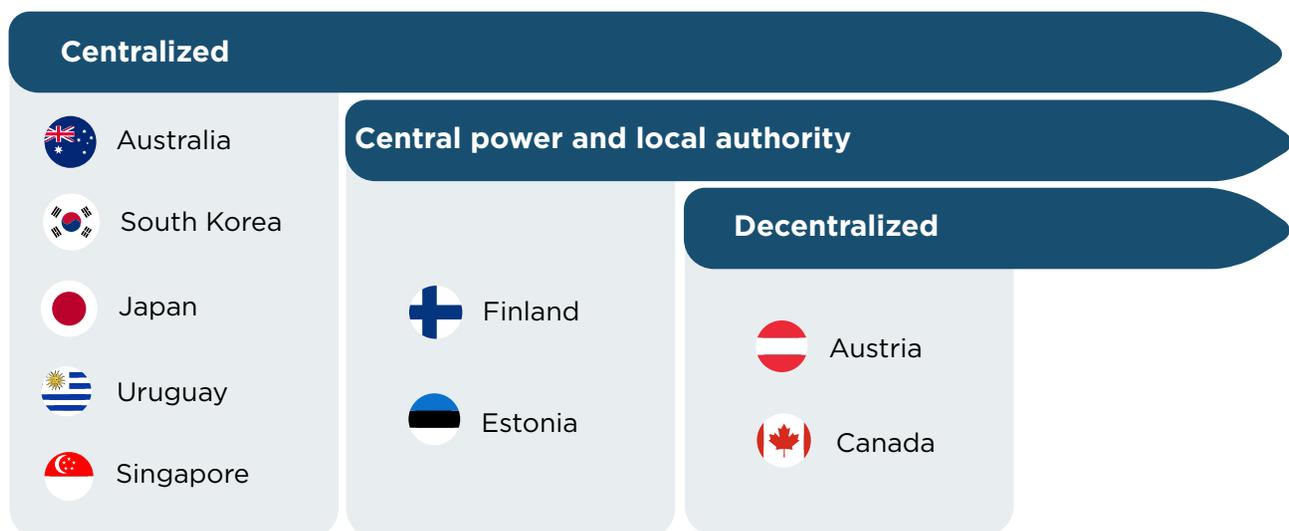
Country	School Age		Number of years of compulsory schooling	Years of Schooling		
	Preschool	Starting year		Primary	Lower secondary	Upper secondary
 <b>Australia</b>	3 to 5 years (optional)	6 years	11	7-8	4	2
 <b>Austria</b>	Available from birth but mandatory at 5 years	6 years	9	4	4	3-5
 <b>Canada</b>	4 to 5 years (optional)	6 years	10	6	2	4
 <b>Estonia</b>	18 months to 7 years (optional)	7 years	9	6	3	2
 <b>Finland</b>	Birth to 6 years, nursery and preschool (1 year) are optional	6 years	9	9 years of compulsory education not divided between primary and secondary		3-4 (voluntary)
 <b>Japan</b>	Recently integrated into the educational system, 3 to 5 years	6 years	9	6	3	3
 <b>Singapore</b>	5 to 6 years (mandatory)	7 years	9	6	4-5	1-6
 <b>South Korea</b>	3 to 5 years (optional)	6 years	9	6	3	3
 <b>Uruguay</b>	4 to 5 years (mandatory)	6 years	11	6	3	2

### 3.3.2. Governance of the Education System

Educational governance affects the implementation of national policies and initiatives. The selected countries were classified according to their centralization levels in three groups (see Figure 3.2):

- **Centralized:** The ministry or secretariat of education defines and implements educational policy and follows the general priorities established by the state.
- **Central power shared with educational centers:** There is a national ministry but decentralized administration and school autonomy. The central level sets standards and policies, and the schools are autonomous.
- **Decentralized:** Educational centers are entirely autonomous. Autonomy may be regional, with each region's defining its own policies and managing its own resources.

**Figure 3.2. Levels of centralization of educational systems**



Note: Prepared by the authors, based on Viennet and Pont (2017).

### 3.3.3. Model for Integrating Digital Learning into the Curriculum

Comparing the ways countries integrate digital learning oriented to the development of digital skills for the 21st century into curriculum policy, three models were found: through a curriculum subject, transversally in the curriculum, and through the establishment of digital standards and competencies.



**Through creating a specific subject.** Australia, Austria, and Japan incorporated subjects related to 21st century skills into the curriculums in their curriculum reforms. In Australia, two technology courses were included at the national level: (1) Design and Technology and (2) Digital Technologies. Austria had a compulsory subject called Basic Digital Education taught between fifth and eighth grade, and in upper secondary, educators proposed elective courses that address specific digital education content, such as Computer Programming. Japan incorporated Technology and Home Economics,

which covers information processing topics, at the middle level. At the secondary level, educators in Japan included mandatory and elective courses related to programming.



**Through having cross-cutting digital learning across subjects.** On the other hand, South Korea, Estonia, and Uruguay called for frequent and cross-cutting use of digital learning in the curriculum subjects. Estonia added the topic Technology and Innovation, which requires all educators to integrate technology into their subjects. South Korea, in addition to using technology in the classroom, provides digital content repositories and online learning environments for students in order to continue learning beyond school. Uruguay enriches the supply of curriculum activities that use digital technologies in different subjects by developing innovative projects in which educators participate voluntarily.



**Through establishing digital standards.** Finally, Canada, Finland, and Singapore have integrated curriculum standards and digital competencies into their curriculums, which serve as a framework of common understanding about 21st century skills and translate into observable behaviors to be developed in citizens. For example, Canada bases all its public servant training on the Government Digital Standards; Finland incorporated seven transversal skills; and Singapore established five core values that permeate the curriculum, along with the Skills Framework for Work.

## 4. Main Actions for Success

The Essential Conditions matrix reflects the most relevant elements of each case study, which, according to the ISTE Essential Conditions, promote the effective use of technology to enhance learning.

The comparative review shows that **in all cases, the commitment of the people at the national level was involved in the deployment of educational reforms.** This happened either in the form of a social context favorable to implementation or through concrete actions to achieve a shared vision around curriculum updates.

On the other hand, **actions to achieve equitable access to technological infrastructure and teacher professional development plans were also frequent.** Those conditions must go hand in hand since teachers are the key actors in making educational reforms a reality and require specific training to use digital resources in a pedagogical manner (Mishra & Koehler, 2006). It is important to note that all the cases reviewed based educational reforms on the use of devices by teachers and students. Those countries that did not consider equitable access part of their deployment did so because they had already carried out other interventions to achieve it.

**Financial sustainability is the least prevalent essential condition in the analysis.** Although all educational reforms usually have state financing from the outset, only one of the cases involved the design of special governance for implementation that deemed actions to boost the funding by considering external sources.



**Table 3.4. Essential Conditions matrix for each case study**

	 Australia	 Austria	 Canada	 Estonia	 Finland	 Japan	 Singapore	 South Korea	 Uruguay
 <b>Shared vision</b>	✓		✓	✓	✓				✓
 <b>Empowered leaders</b>		✓					✓		
 <b>Implementation planning</b>			✓			✓	✓		✓
 <b>Consistent and adequate funding</b>								✓	
 <b>Equitable access</b>		✓	✓			✓	✓		✓
 <b>Skilled personnel</b>			✓						✓
 <b>Technical support</b>						✓			✓
 <b>Curriculum framework</b>				✓		✓	✓		
 <b>Student-centered learning</b>				✓	✓		✓		✓
 <b>Assessment and evaluation</b>				✓			✓		
 <b>Ongoing professional learning</b>	✓	✓		✓	✓	✓	✓		✓
 <b>Engaged communities</b>		✓	✓	✓	✓			✓	✓
 <b>Support policies</b>				✓			✓		✓
 <b>Supportive external context</b>	✓	✓		✓		✓	✓	✓	✓

## 4.1. Synthesis and Findings

**There are multiple pathways for integrating digital learning and skills development for the 21st century.** This study reviewed experiences, evidence, and results that can breed reflections and informed actions for effective reforms. The Essential Conditions matrix and the analysis from the cases presented can be helpful tools to guide the design, implementation, and evaluation of initiatives such as those studied.

The COVID-19 pandemic made evident the relevance of having educational systems capable of relying on digital technologies to face the challenges of social distancing. In this new reality, it is urgent to study, analyze, and implement curriculum updates based on best practices to enhance digital skills development in students, educators, and families.

The following is a set of recommendations derived from the strategic actions and conditions that digital learning initiatives have developed to achieve their purposes and reach successful performance in light of the ISTE Essential Conditions.

## 4.2. Align Education Policy with the Needs of Society

*Condiciones Esenciales 1*  *, 2*  *, 3*  *, 12*  *y 14* 

**The potential for effectiveness and the possibility of impact of any reform, policy, or strategy is increased when the formulators and all stakeholders share the same vision and understanding of the concepts and implementation so that they can work together in the process.**

As observed in the case studies, this can be achieved through participatory processes to generate a shared vision regarding the role of educational technology (Essential Condition 1). Such is the case in Finland, where there is a systematized procedure for inviting the entire educational community to participate in the design of curriculum reforms.

**Involving stakeholders in educational policies from the design stage can empower educational leaders** (Essential Condition 2). For example, Australia was able to move from a decentralized system to a single national curriculum because leaders identified the strategy that each community required to achieve buy-in for change.

**Another factor that influences the success of educational reforms is a supportive external context, that is, the existence of national, regional, or local policies that facilitate implementation** (Essential Condition 14). Singapore articulated its curriculum-updating processes with the changes taking place in the country, making the resulting proposal coherent with society's demands on the education system. In addition, Singapore had the Skills Framework for Work, which allowed educators to create a common language regarding the skills required for the future workforce.

**When the community is involved in the implementation, they are more likely to support and fund the use of digital learning resources** (Essential Condition 12). In Estonia, foundations have been created to channel the participation of target groups of society, involving them in design and implementation.

**Once the new education policy has been designed, with input from the broad community, it is necessary to have a systematic plan to carry out the shared vision** (Essential Condition 3). Uruguay is currently implementing a reform that began in 2007, deployed in stages to ensure its sustainability over time.

### 4.3. Ensure Equitable Access to Learning Opportunities

Essential Conditions 5  6 , 7  8 , 9  y 10 

**Any curriculum implementation must consider, together with the vision of change, the tools and resources necessary to carry it out** (OECD, 2020c). Therefore, equitable access to technology is understood from two perspectives. On the one hand, **it refers to providing the necessary technological coverage to implement new teaching-learning strategies. On the other hand, it requires building the capacities and resources that allow the sustainable use of technology over time.**

The initiatives of Canada, Japan, and Uruguay stand out **in terms of technological deployment capacity** (Essential Condition 5). These countries' initiatives achieved a high rate of access to computer equipment and internet connectivity to provide the infrastructure required for developing national digital learning initiatives. Japan also incorporated instructions for technical service and self-repairs into the teaching support, promoting the renewal and maintenance of equipment (Essential Condition 8). On the other hand, Canada trained a large number of public service employees so that they could select and effectively use the ICT resources most relevant to their work (Essential Condition 6).

Speaking specifically about teacher **training for the use of technology** (Essential Condition 7), Uruguay stands out for its program with learning paths for teachers in the classroom and in online and hybrid formats, with hundreds of courses that are updated periodically. Similarly, Austria has a model of digital competencies for educators that can be regularly improved and evaluated. In addition, like Finland, Austria established a mentoring scheme among education professionals to encourage the development of teachers' networks for the innovative use of educational technologies.

To boost the massive use of the technology deployed, South Korea decided to **prioritize developing digital content and resources** aligned with its reform (Essential Condition 9). Through public-private partnerships, South Korean educators managed to position the country as a leader in creating eLearning material with high-quality standards, which are effectively acquired and used by its schools. For its part, Japan placed particular emphasis on making this material available to all its students and dedicated part of its budget to acquiring tools and resources for its students with special educational needs.

**The incorporation of technology must go beyond the digitalization of analogical educational processes. It should be an amplifier of teachers' abilities to plan, teach, and evaluate with a focus on the needs and skills of their students** (Essential Condition 10). Digitally competent educators possess the knowledge and skills necessary to use technology and incorporate it into their work in a pedagogical sense, generating activities and learning experiences that are oriented to the development of digital skills in students. This aspect has been particularly developed in the initiatives of Singapore and Uruguay, which propose innovative uses of technology, for example, adaptive systems to achieve self-paced learning, learning based on authentic projects mediated by technology, and analyzing student performance to adjust instruction.

## 4.4. Promote Governance That Fosters Educational Innovation

Essential Conditions 4  , 11  y 13 

**The sustainability of policy implementation is fundamental.** One of the reasons any digital learning policy or initiative should be part of a broader vision is that this integration provides it with certain conditions of continuity and sustainability. **National projects for the integration of digital technologies require a significant initial investment and subsequent sustained investment, so it is essential to consider this in the design to ensure its potential impact.**

Although states have financed educational reforms since their inception, South Korea stands out because it has managed to boost the educational market beyond the government. The **Korea Education and Research Information Service (KERIS)**, an agency specially created for educational innovation, provides resources to schools so that they can support their technological infrastructure and acquire digital resources (Essential Condition 4). **Other countries studied followed a similar model and created public, private, or mixed entities to foster educational innovation. The Information Technology Foundation for Education in Estonia, the Finnish National Agency for Education in Finland, the Innovation Foundation for Education in Austria, and the Educational Connectivity Plan for Basic Computing for Online Learning Study Center in Uruguay** are examples of this type of governance model.

**Most of the countries reviewed in this study review their educational reforms on a regular basis, recognizing the relevance of continuously evaluating teaching, leadership, and the use of technologies in the curriculums** (Essential Condition 11). Estonia went a step further and offered a digital maturity self-assessment tool for its schools, getting the vast majority of them to participate in the process by making it a condition of access to funding. Austria also recognizes its schools as certified in digital education and gives them a seal of “eLearning experts,” which allows them to apply for funds for project development and teacher training.

**Effective implementation of educational technologies requires providing concrete guidelines that allow their safe use**, from applying web filters to establishing policies regarding digital citizenship and the reasonable use of the digital resources provided (Essential Condition 13). This is especially relevant for countries with digital infrastructure policies with a one-to-one model, where students and teachers have personal computers that they can take home. This is how Japan, within the *Global Innovation Gateway for All* plan, has Guidelines for an Information Security Policy in Education, which informs schools about measures to safeguard private data, among other suggestions about digital citizenship practices.

## 5. Keys for Implementation

In this chapter, we will discuss key factors for governments to incorporate digital skills into their education systems.

### 5.1. Design and Implement an Education Policy Aligned with the Needs of Society

- 1. National leaders should invest time and resources in planning** to ensure that all stakeholders have the opportunity to participate in the design and implementation of the digital learning policy, strategy, or initiative.
- 2. Educators must be invited to make suggestions** throughout the process of designing and implementing new curriculums.
- 3. Greater employer involvement in skills building and assessment must be achieved.** Employees need to work closely with key agencies, employers, and unions to identify sector-specific skill requirements.
- 4. Educational priorities must be anchored to a long-term national project.** Educational changes cannot and should not be driven by political expediency but should be derived from the evidence obtained.
- 5. It is essential to plan implementation.** A necessary condition is to deepen the ways in which “the how” of the reform will be developed to guarantee governance and the achievement of the objectives.

### 5.2. Ensure Equitable Access to Learning Opportunities

- 1. Ensure a high rate of device coverage and broadband internet access** as an infrastructural requirement.
- 2. Recognize the need for in-service educator training**, and generate adequate offers that consider the conditions of professional practice. Explore digital channels that allow greater flexibility and personalization of training.
- 3. Define the digital skills that educators are expected to develop** through a framework articulated with their proposed teacher professional development offerings.
- 4. Encourage and strengthen the generation of learning networks and communities**, both within and between educational communities, taking advantage of technology to connect and enable collaboration.
- 5. Explore options for certifying educators as specialists who can support** or accompany the professional development of their colleagues in a mentoring scheme.
- 5. Define guiding purposes that aim to enhance and transform** learning and establish coverage indicators that focus on the amount of equipment delivered to schools.

- 6. Establish or assume quality and usability** criteria that guide the development of digital resources and consider the elements of universal design and accessibility with an inclusive approach.

### 5.3. Promote Governance That Fosters Educational Innovation

- 1. Perform periodic implementation evaluations** to ensure feedback that can be used in a timely manner to confirm successes and inform corrections as required.
- 2. Empower local and central authorities** to define a governance structure to support educational reform.
- 3. Establish procedures to monitor the use of digital resources,** and safeguard privacy in the context of digital citizenship.



## References

- Álvarez, X., Brooks-Young, S., Quesada, A., & Ramos, Y. (2020). *Consultoría para el diagnóstico de políticas y programas de habilidades digitales. Producto 1: plan de investigación y selección de casos*. [Unpublished manuscript]. ISTE.
- Aru-Chabilan, H. (2020). Tiger leap for digital turn in the Estonian education. *Educational Media International*, 57(1), 61–72. <https://doi.org/10.1080/09523987.2020.1744858>
- Australian Curriculum, Assessment and Reporting Authority. (2012). *The shape of the Australian curriculum: Version 4.0*. [https://acaraweb.blob.core.windows.net/resources/The\\_Shape\\_of\\_the\\_Australian\\_Curriculum\\_v4.pdf](https://acaraweb.blob.core.windows.net/resources/The_Shape_of_the_Australian_Curriculum_v4.pdf)
- Australian Curriculum, Assessment and Reporting Authority. (2020). Términos de referencia: Revisión del currículum australiano F-10. *Australian Curriculum Review*. [https://www.acara.edu.au/docs/default-source/curriculum/ac-review\\_terms-of-reference\\_website.pdf?sfvrsn=2](https://www.acara.edu.au/docs/default-source/curriculum/ac-review_terms-of-reference_website.pdf?sfvrsn=2)
- Barr, A., Gillard, J., Firth, V., Scrymgour, M., Welford, R., Lomax-Smith, J., Bartlett, D., Pike, B., & Constable, E. (2008). *Melbourne declaration on educational goals for young Australians*. Ministerial Council on Education, Employment, Training and Youth Affairs. [http://www.mceetya.edu.au/verve/\\_resources/National\\_Declaration\\_on\\_the\\_Educational\\_Goals\\_for\\_Young\\_Australians.pdf](http://www.mceetya.edu.au/verve/_resources/National_Declaration_on_the_Educational_Goals_for_Young_Australians.pdf)
- Carretero Gómez, S. (2021). *Skills for Life: Digital Skills*. Inter-American Development Bank. <https://doi.org/10.18235/0003126>
- CEIBAL Foundation. (2021). *Sobre nosotros*. <https://www.ceibal.edu.uy/es/institucional>
- CEIBAL Plan. (2022). *Formación Docente*. <https://www.ceibal.edu.uy/es/formacion-docente>
- Clarke, L., & Winch, C. (2006). A European skill framework? But what are skills? Anglo-Saxon versus German concepts. *Journal of Education at Work*, 19(3), 255–269. [http://westminsterresearch.wmin.ac.uk/2715/1/Clarke\\_%26\\_Winch\\_2006\\_final.pdf](http://westminsterresearch.wmin.ac.uk/2715/1/Clarke_%26_Winch_2006_final.pdf)
- Clastornik, J., Dornel, S., & Parra, D. (2016). Uruguay's digital policy. *Proceedings of the 9th International Conference on Theory and Practice of Electronic Governance*, 64–67. <https://doi.org/10.1145/2910019.2910070>
- Cobo, C., & Montaldo, M. (2016). *Plan Ceibal en Uruguay ¿Cómo se educa en aprendizaje para descifrar lo desconocido?* UNESCO International Bureau of Education.
- Edwards, P., Fritz, A., & Kehoe, K. (2015). *Blueprint 2020: Desarrollemos juntos la administración pública del mañana*. Asociación Canadiense de Programas de la Administración Pública. <https://www.glendon.yorku.ca/cappa2015/wp?content/uploads/sites/22/Presentation-Edwards-Fritz-Kehoe-EN-final-21may.pdf>
- European Commission. (2018). *Digital Economy and Society Index 2018 Report*. <https://digital-strategy.ec.europa.eu/en/library/digital-economy-and-society-index-2018-report>
- Eurydice. (2021). *Lifelong learning strategy*. European Commission. [https://eacea.ec.europa.eu/national-policies/eurydice/content/lifelong-learning-strategy-24\\_en](https://eacea.ec.europa.eu/national-policies/eurydice/content/lifelong-learning-strategy-24_en)
- Fau, S., & Moreau, Y. (2018). *Building tomorrow's digital skills: What conclusions can we draw from international comparative indicators?* UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000261853>
- Federal Ministry for Digital and Economic Affairs. (2016). *Digital Roadmap Austria*. <https://www.digitalroadmap.gv.at/en/#unser-weg-in-die-digitale-Zukunft>
- Fortier, M. (2021). *2020–21 departmental results report*. Canada School of Public Service. [https://www.csp-s-efpc.gc.ca/about\\_us/currentreport/drr-rrm2020-21/drr-rrm2020-21-eng.pdf](https://www.csp-s-efpc.gc.ca/about_us/currentreport/drr-rrm2020-21/drr-rrm2020-21-eng.pdf)
- Government of Canada. (2014). *Destination 2020*. <https://www.canada.ca/en/privy-council/services/reports/blueprint-2020/destination.html>

- Government of Canada. (2020). *Future Skills Council*. <https://www.canada.ca/en/employment-social-development/programs/future-skills/council.html>
- Gouédard, P., Pont, B., Hyttinen, S., & Huang, P. (2020). *Curriculum reform: A literature review to support effective implementation* (OECD Education Working Paper No. 239). <https://doi.org/10.1787/efe8a48c-en>
- Hakamies, K. (2019). *Maestros tutores—desarrolladores de la comunidad escolar*. JYUnity. <https://jyunity.fi/en/science-news/tutor-teachers-developers-of-the-school-community/#:~:text=The>
- Hernández, O., & López, M. (2019). Apropiación social de tecnologías digitales en un contexto de trabajo informal y precario. *Entreciencias: Diálogos en la Sociedad del Conocimiento*, 7(19). <https://doi.org/10.22201/enesl.20078064e.2018.19.67275>
- Information Technology Foundation for Education [HITSA]. (2020). *Historical overview*. <https://www.hitsa.ee/about-us/historical-overview>
- Innove. (2020). *The activities of Foundation Innove will be transferred to Education and Youth Authority as of 1st of August 2020*. <https://www.innove.ee/en/>
- Inter-American Development Bank (2020). *Lo que la Tecnología puede y no puede hacer por la Educación*. <https://publications.iadb.org/publications/spanish/document/Tecnologia-Lo-que-puede-y-no-puede-hacer-por-la-educacion-Una-comparacion-de-cinco-historias-de-exito.pdf>
- Inter-American Development Bank (2017). *Aprender ajor. Políticas públicas para el desarrollo de habilidades*. <https://www.iadb.org/es/investigacion-y-datos/dia-2017-aprender-mejor-politicas-publicas-desarrollo-habilidades>
- International Association for the Evaluation of Educational Achievement. (2019). *Preparing for life in a digital world. IEA International Computer and Information Literacy Study, ICILS, 2018 International Report*. <https://www.iea.nl/sites/default/files/2020-04/IEA%20International%20Computer%20and%20Information%20Literacy%20Study%202018%20International%20Report.pdf>
- International Association for the Evaluation of Educational Achievement. (2020). *TIMSS 2019 international results in mathematics and science*. <https://www.iea.nl/sites/default/files/2020-12/TIMSS%202019-International-Results-in-Mathematics-and-Science.pdf>
- International Trade Administration. (2021). *Japan: GIGA update*. <https://www.trade.gov/market-intelligence/japan-giga-update-edtech>
- International Society for Technology in Education. (2021a). *Essential conditions*. <https://www.iste.org/standards/iste-essential-conditions>
- International Society for Technology in Education. (2021b). *ISTE standards*. [https://cdn.iste.org/www-root/PDF/ISTE%20Standards-One-Sheet\\_Combined\\_09-2021\\_vF3.pdf](https://cdn.iste.org/www-root/PDF/ISTE%20Standards-One-Sheet_Combined_09-2021_vF3.pdf)
- The Japan Times*. (2021). Japan's GIGA school program equips students for digital society. <https://www.japantimes.co.jp/2021/03/22/special-supplements/japans-giga-school-program-equips-students-digital-society/>
- Korea Education and Research Information Service [KERIS]. (2016). *A Korean model for using ICT in Education: Policy*. <https://www.keris.or.kr/eng/cm/cntnts/cntntsView.do?mi=1190&cntntsId=1335>
- Korea Education and Research Information Services. (2020). *White paper on ICT in education in Korea (Summary)*. <https://www.keris.or.kr/eng/cm/cntnts/cntntsView.do?mi=1190&cntntsId=1335>
- Lavonen, J. (2020). Reformas al plan de estudios y la educación de los maestros en Finlandia que respaldan el desarrollo de aptitudes para el siglo XXI. In F. Reimers (Ed.), *Objetivo educativos audaces*. Springer. [https://doi.org/10.1007/978-3-030-41882-3\\_3](https://doi.org/10.1007/978-3-030-41882-3_3)

- Mateo-Berganza, M., & Rucci, G. (2019). *El futuro ya está aquí. Habilidades transversales en América Latina y el Caribe en el Siglo XXI*. <https://publications.iadb.org/es/el-futuro-ya-est%C3%A1-aqui-habilidades-transversales-de-america-latina-y-el-caribe-en-el-siglo-xxi>
- Mateo-Berganza Díaz, M. M., & Lee, C. (2020). *What technology can and can't do for education: A comparison of 5 stories of success*. Inter-American Development Bank. <https://doi.org/10.18235/0002401>
- Ministry of Education, Culture, Sports, Science and Technology [MEXT] (2020). White Paper on Science and Technology 2020. [https://www.mext.go.jp/en/publication/whitepaper/title03/detail03/mext\\_00024.html](https://www.mext.go.jp/en/publication/whitepaper/title03/detail03/mext_00024.html)
- MEXT (2018). Human Resource Development for Society 5.0-Changes to Society, Changes to Learning (Summary) [https://www.mext.go.jp/b\\_menu/activity/detail/pdf2018/20180605\\_001.pdf](https://www.mext.go.jp/b_menu/activity/detail/pdf2018/20180605_001.pdf)
- Ministry of the Interior and Safety. (2008). *National informatization master plan*. [https://www.mois.go.kr/eng/bbs/type001/commonSelectBoardArticle.do;jsessionid=S9hjw+UChZp2xqDbZKks4hfy.node30?bbsId=BBSMSTR\\_000000000019&nttId=30994](https://www.mois.go.kr/eng/bbs/type001/commonSelectBoardArticle.do;jsessionid=S9hjw+UChZp2xqDbZKks4hfy.node30?bbsId=BBSMSTR_000000000019&nttId=30994)
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054.
- Mullis, I., Martin, M., Foy, P., Kelly, D., & Fishbein, B. (2020). *TIMSS 2019 international results in mathematics and science*. <https://timss2019.org/reports/wp-content/themes/timssandpirls/download-center/TIMSS-2019-International-Results-in-Mathematics-and-Science.pdf>
- National Center on Education and the Economy. (2021). *Top-performing countries; Singapore*. <https://ncee.org/country/singapore/>
- Niemi, H., Erma, T., Lipponen, L., Pietilä, M., Rintala, R., Ruokamo, H., Saarivirta, T., Moitus, S., Frisk, T., Stylman, V., & Huhtanen, M. (2018). *Lo maestros más competentes del mundo—Evaluation del Foro de Educación para Maestros en 2016–2018*. Centro finlandés de evaluación de la educación (FINEEC). <https://karvi.fi/en/publication/the-worlds-most-competent-teachers/>
- Organisation for Economic Co-operation and Development [OECD]. (2015). *Perspectivas de la política educativa 2015: Hacer realidad las reformas*. [https://www.fundacionsantillana.com/PDFs/politicas\\_educativas\\_para\\_la\\_web.pdf](https://www.fundacionsantillana.com/PDFs/politicas_educativas_para_la_web.pdf)
- Organisation for Economic Co-operation and Development [OECD]. (2018a). *Education policy in Japan: Building bridges towards 2030, Reviews of National Policies for Education*. <https://doi.org/10.1787/9789264302402-en>
- Organisation for Economic Co-operation and Development [OECD]. (2018b). *PISA preparing our youth for an inclusive and sustainable world. The OECD PISA global competence framework*. <http://www.oecd.org/pisa/Handbook-PISA-2018-Global-Competence.pdf>
- Organisation for Economic Co-operation and Development [OECD]. (2019a). *Skills Matter: Additional Results from the Survey of Adult Skills*. OECD. <https://doi.org/10.1787/1f029d8f-en>
- Organisation for Economic Co-operation and Development [OECD]. (2019b). *TALIS 2018 results: Vol. 1. Teachers and school leaders as lifelong learners*. [https://www.oecd.org/sites/1d0bc92a-en/index.html?itemId=/content/publication/1d0bc92a?en#countryli\\_container](https://www.oecd.org/sites/1d0bc92a-en/index.html?itemId=/content/publication/1d0bc92a?en#countryli_container)
- Organisation for Economic Co-operation and Development [OECD]. (2020a). *National Innovation and Science Agenda* <https://stip.oecd.org/stip/interactive-dashboards/policy-initiatives/2021%2Fdata%2FpolicyInitiatives%2F2946>
- Organisation for Economic Co-operation and Development [OECD]. (2020b). *Panorama de la política educativa*. <http://www.oecd.org/education/policy-outlook/country-profile-Finland-2020.pdf>
- Organisation for Economic Co-operation and Development [OECD]. (2020c). *What students learn matters. Towards a 21st century curriculum*. <https://doi.org/10.1787/d86d4d9a-en>

- Pei-Ling, J., Koh, E., Chan, M., Costes-Onishi, P., & Hung, D. (2017). *Advancing 21st century competencies in Singapore*. Center for Global Education. <https://asiasociety.org/sites/default/files/2017-10/advancing-21st-century-competencies-in-singapore.pdf>
- Petrie, C., García-Millán, C., & Mateo-Berganza, M. (2021). *Spotlight: Habilidades del siglo XXI en América Latina y el Caribe*. HundrED Research. <https://publications.iadb.org/es/spotlight-habilidades-del-siglo-xxi-en-america-latina-y-el-caribe>
- Presidency of the Republic of Uruguay . (2011) *Memoria Anual 2011: Plan Ceibal*. [https://medios.presidencia.gub.uy/jm\\_portal/2012/mem\\_anual/presidencia/ceibal.pdf](https://medios.presidencia.gub.uy/jm_portal/2012/mem_anual/presidencia/ceibal.pdf)
- Singapore Government Agency. (2021, February 27). *Skills framework. Skills future*. <https://www.skillsfuture.gov.sg/skills-framework>
- Singapore Ministry of Education (2021a, October 18). *21st century Competencies*. <https://www.moe.gov.sg/education-in-sg/21st-century-competencies>
- Singapore Ministry of Education (2021b, December 28). *Educational technology journey*. <https://www.moe.gov.sg/education-in-sg/educational-technology-journey>
- Sustainable Skills. (2019). *Building tomorrow's digital skills—What conclusions can we draw from international comparative indicators?* <https://sustainableskills.org/building-tomorrows-digital-skills/73017/>
- Tan, C. (2017). Lifelong learning through the SkillsFuture movement in Singapore: Challenges and prospects. *International Journal of Lifelong Education*, 36(3), 278–291. <https://doi.org/10.1080/02601370.2016.1241833>
- United Nations Educational, Scientific and Cultural Organization. [UNESCO] (n.d.). *Estonia: Lifelong learning strategy 2020, issued in 2014*. UNESCO Institute for Lifelong Learning. <https://uil.unesco.org/document/estonia-lifelong-learning-strategy-2020-issued-2014>
- Vahtivuori-Hänninen, S., Halinen, I., Niemi, H., Lavonen, J., & Lipponen, L. (2014). A New Finnish National Core Curriculum for Basic Education (2014) and Technology as an Integrated Tool for Learning. In H. Niemi, J. Multisilta, L. Lipponen, & M. Vivitsou (Eds.), *Finnish Innovations and Technologies in Schools* (pp. 21–32). SensePublishers. [https://doi.org/10.1007/978-94-6209-749-0\\_2](https://doi.org/10.1007/978-94-6209-749-0_2)
- van den Akker, J. (2013, November 23-26). Curricular development research as a specimen of educational design research. *Educational design research: An introduction*. Seminar conducted at the East China Normal University, Shanghai.
- Viennet, R., & Pont, B. (2017). *Education policy implementation: A literature review and proposed framework* (OECD Education Working Papers, No. 162). <https://doi.org/10.1787/fc467a64-en>

## Appendix A. Case Selection Criteria

Dimension: Information Availability	
Criterion	Definition
<b>Relevant information and data available (context, beneficiaries, history)</b>	<ul style="list-style-type: none"> <li>• It is possible (through published information or a request) to access program information such as               <ul style="list-style-type: none"> <li>○ characterization of the context in which it is developed,</li> <li>○ characterization of beneficiaries,</li> <li>○ definition of objectives and goals,</li> <li>○ detailed description of program implementation,</li> <li>○ description of the organization that carries out the program (organization and characteristics of the professionals), and</li> <li>○ financing sources.</li> </ul> </li> <li>• Program members may be approached for interviews or surveys to supplement information.</li> </ul>
<b>Has documented information about achievements</b>	<ul style="list-style-type: none"> <li>• It is possible to access information regarding the program's achievements under the following conditions:               <ul style="list-style-type: none"> <li>○ Reports or studies that account for the program's achievements, according to the stated objectives</li> <li>○ Reports that consider both primary information (it is desirable to have testimonies that can be consulted) and secondary information</li> <li>○ Program contacts who are accessible for interviews or surveys as needed to supplement information</li> </ul> </li> </ul>
<b>Illustrates very well one or more aspects of 21st century digital skills</b>	<ul style="list-style-type: none"> <li>• The available information allows for verifying the alignment of the program's objectives, goals, implementation, and achievements with the digital Skills Framework of the case study (International Society for Technology in Education Essential conditions).</li> <li>• The information available from the program makes it possible to clearly identify the digital skills it aims to develop and the achievements attained.</li> </ul>
<b>Works with a specific group (students, teachers, school leaders)</b>	<ul style="list-style-type: none"> <li>• The available information clearly establishes the target beneficiary group of the program.</li> <li>• There is evidence that the work developed by the program has considered the declared beneficiaries as the target audience.</li> </ul>

## Dimension: Implementation Rationale

### **Defines its objectives and goals**

- The available information about the program makes it possible to clearly identify the objectives and goals of the program (without having to deduce them).
- The objectives and targets are consistent with each other, and the program implementation information is available (what was intended has been done).

### **Describes well its implementation process**

- The information available from the program allows identification of the implementation process, or contact information can be accessed to obtain it.
- The description of the implementation process used in the program is detailed and can serve as a guide for others.

### **Has design or results that may motivate others to implement it**

- The program's design or results are inspiring because of their benefits to its target audience.
- There is evidence that other initiatives' facilitators aspire to implement a program based on the case study (this is a plus).
- There is evidence that the program's facilitators collaborate with others to achieve similar implementation (this is a plus).

### **Solves an identified need or problem**

- The development of the program is based on meeting a need or solving a problem that is easily identifiable in its approach.
- The need or problem that the program seeks to meet or solve aligns with the general Skills Framework, particularly digital skills for the 21st century.
- Some public policy is involved.

### **Can identify one or more essential conditions and supports sustainability and replicability**

- The program's information can evidence the contribution to the success of one or more essential conditions.

### **Describes lessons learned that favor its full or partial replication**

- The information available from the program describes lessons learned that other stakeholders could use.
- Lessons learned arise from actions taken that can be identified and easily understood as useful.
- Lessons learned are relevant to guiding the work of other stakeholders.

### **Considers diversity and social inclusion**

- The program considers diversity and social inclusion in its design and implementation regulations.
- The program respects personal and cultural diversity.
- The program is inclusive and promotes social inclusiveness.

## Dimension: Innovative Approach to Learning

**Defines an educational approach to integrating defined digital technologies, consistent with the 21st century Skills Framework and International Society for Technology in Education standards**

- The alignment between the described learning approach and the framework of general and digital skills for the 21st century is evident.
- The educational approach privileges the transformative use of digital technologies.

**Presents an inspiring approach that other educators can partially or fully replicate**

- The learning approach describes a story that is both compelling and replicable, as is or with modifications, to suit the local needs of others.

**Transcends the automation of traditional tasks**

- Evidence shows that digital technologies help students expand learning by significantly redesigning the task at hand or by encouraging students to identify and solve real-world problems using these tools in creative ways.

**Shows ways in which 21st century digital skills are creatively assessed**

- A variety of strategies are used to evaluate the success of the program.
- Assessments challenge students to be creative in demonstrating their acquired skills and knowledge.

## Appendix B. Most Relevant Essential Conditions, Based on the Initiatives Analyzed in Each Country

### What Did Each Case Comprise?

This section describes each of the nine case studies analyzed by Álvarez et al. (2020), and the main actions taken to achieve success.

#### Australia

#### **Implementation of a New National Approach and Curriculum That Emphasizes Digital and 21st century Skills**

How did a nation as large and diverse as Australia move from entirely locally controlled education programs to a national content model with local delivery? How did it get agreement from national education leaders to implement the new curriculum and incorporate 21st century digital skills? These were the challenges facing Australian educators when, in 2008, all of the country's education ministers agreed to adopt the Melbourne Declaration on Educational Goals for Young Australians (Barr et al., 2008). To this end, they initiated an educational reform with a view to developing a single national curriculum with an emphasis on 21st century digital skills.

Implementing the reform implied that states and territories relinquish local control over curriculum development while retaining autonomy over its implementation. For this change to be successful, the commitment of educational leaders at all levels, who were responsible for identifying strategies to achieve teacher buy-in, was critical.

One of the strategies implemented by the national government was to carry out a participatory process to develop the curriculum. The objective was to achieve a shared vision regarding educational reform, which laid the groundwork for planning the implementation and made it possible to direct collective expertise and energies toward a common goal, improving the use of time and resources across the country (Australian Curriculum, Assessment and Reporting Authority, 2012).

This process began with gathering information from key stakeholders to create an initial document describing the content and the standards to achieve it. Next, the document went through a public review process, and once fine-tuned, it was tested in selected classrooms before being officially published (Australian Curriculum, Assessment and Reporting Authority, 2020).

A second strategy was to establish long-term policies to ensure ongoing support for teachers in implementing the new curriculum. To this end, the Australian government continuously funds 15 teacher professional development programs through Australia's National Innovation and Science Agenda (OECD, 2020a).

The support offered includes workshops for change management and the development of specific didactic materials to implement the contents of the reform. In the former, each school presents a curriculum implementation project and is accompanied in its development by members of government educational agencies. In the second, teachers can download ready-to-use learning activities that also can be used as models when educators create their own resources.



## Austria

### **Equity as a Guiding Principle for the Digitization of Education**

In 2016, the Austrian federal government promoted a national digitalization strategy that will enable Austria to “remain economically successful and [where] everyone can share in this prosperity” (Federal Ministry for Digital and Economic Affairs, 2016). The goal is to close the digital divide by 2025 and ensure that all citizens can acquire the necessary skills to participate in the opportunities and benefits of digital society.

The government led a digitization strategy jointly designed by technology and digital information experts; social actors; and representatives of the provinces, cities, and towns. The proposal was submitted to an online public consultation, and its implementation was entrusted to a new body: the Ministry of Digital Affairs.

Within the framework of this strategy, the National Policy for the Digitalization of Education in Austria was born, with three focuses of action: infrastructure, teacher training, and curriculum. More than €230 million are allocated annually to implement this policy, which has made it possible to expand basic technology connectivity in schools and carry out actions to facilitate the acceptance of this reform in the school community.

One of the actions has been to frame the implementation of the policy in a bottom-up approach, seeking improvements in digitization processes from and with its main actors. To this end, the Foundation for Educational Innovation was created in 2017, generating networks between civil society, academia, and business, with the education system to sponsor projects that contribute to pedagogical innovation.

Another action has been to promote the participation of educational leaders in the design of local school digital plans since they are the ones who can translate policy guidelines into concrete actions that respond to the characteristics of their context. To this end, the Austrian Ministry of Education and Science established a voluntary program that certifies schools as eLearning experts, wherein the management teams of already certified institutions act as advisors to the new schools. Upon completion of certification, management teams can access additional budgets for teacher training and pedagogical project development.

Finally, another critical action for the success of the National Policy for the Digitalization of Education was support for teacher training. In 2016, the Ministry of Education and Science defined a model of eight digital competencies for educators, which those educators can periodically perfect and evaluate through various digital platforms. On the other hand, the Virtual Pedagogical University provides courses and pedagogical material to promote the development of competencies for the 21st century in its educators and students.



## Canada

### **Job Training in 21st century Digital Skills**

In 2011, Canada conducted a participatory process to evaluate national and global innovations in the public service. The process involved the participation of public administration employees, experts from academia and the private sector, and beneficiaries of government services. Although Canada has been recognized as a pioneer nation in digital government for more than 20 years, the results

of the participatory process yielded a negative assessment of the state of the public administration (Edwards et al., 2015).

This led to the creation of the Blueprint 2020 initiative (now Beyond 2020), which aims to modernize public administration to facilitate access to and dissemination of information. To this end, the government of Canada undertook to train every employee in the Canadian public sector, regardless of his or her place of work, in digital tools and 21st century skills. To date, the government has trained more than 200,000 public employees, out of a total of 300,500, spread over 9.5 million square kilometers of territory (Fortier, 2021).

The first step of Blueprint 2020 was developing a shared vision for the modernization process and its implementation. Thousands of people employed in the public sector contributed their ideas, which led to identifying the tools they needed to optimize joint work and better serve beneficiaries (Government of Canada, 2014).

Subsequently, online training based on the Government of Canada Digital Standards (Government of Canada, 2020) was developed and made available to employees through the Canadian Digital Academy, part of the School of Public Administration (Government of Canada, 2014). In addition, Shared Services Canada procured Wi-Fi access in government buildings nationwide.

In this way, the government delivered a uniform digital curriculum that is available to public servants free of charge, regardless of their locations, promoting equitable access to training. This was an important aspect considering Canada's geographic limitations, which make it difficult to participate in face-to-face training.

The set of courses offered under Beyond 2020 includes continuing professional development opportunities for individuals and groups at all stages of employment, from new hires to experienced employees. Courses are currently available online in both synchronous and asynchronous formats, and specific face-to-face events have been held, such as refresher courses and microlearning opportunities regarding the culture of public service in Canada.

## South Korea

### **Ecosystem for Digital Skills Development**

Since the 1980s, South Korea has promoted the incorporation of technology as a strategic means for the country's development, becoming widely recognized for its level of digitalization in all areas (Ministry of the Interior and Safety, 2008). In the case of the educational system, the Informatization of Education Policy has meant the diversification and improvement of educational content, methodologies, and modes of education to integrate technology (IDB, 2020).

A key actor in the development of the Informatization of Education Policy has been the Korea Education and Research Information Service (KERIS). It is an autonomous institution but reports to the Ministry of Education, and it aims to promote digital education for all, focusing on innovation and people (KERIS, 2020). Its mandate is to generate academic research on digital technologies in education; lead pedagogical innovation and new methodologies processes; and create a new educational ecosystem based on continuous collaboration at local, national, and international levels. In practice, KERIS plans and implements the Informatization of Education Policy of the Ministry of Education, ranging from providing technological infrastructure to developing teacher training opportunities and teaching materials.

The public-private nature of KERIS has favored strategic linkages between companies and academia, resulting in greater educational resources available for the educational system. This was key to responding to one of the pillars of the Informatization of Education Policy: the development of content that promotes the use of technology deployed in schools.

To involve the private sector in the generation of learning materials in a sustainable way and to foster the local eLearning industry, KERIS intervened in three areas: the creation of a legal framework, the establishment of quality standards, and the dynamization of the market.

First, KERIS articulated the creation of laws related to the standardization of content, the management of distribution structures, the establishment of an accountability system, and elements for the protection of beneficiaries.

Then, measures were taken to maintain high-quality standards in content production, considering the diversity of creative entities. KERIS coordinated job meetings between industry and academic experts, whose efforts culminated in creating an eLearning quality certification.

Finally, KERIS provided funding to schools and, through the creation of catalogs and the organization of mass events, was able to provide a showcase for the demonstration and acquisition of didactic material.

With the above, the actions of KERIS are recognized as fundamental to activating and laying the foundations of eLearning in South Korea, contributing directly to transforming the country into a knowledge industry powerhouse (KERIS, 2016).



### **Conditions for the Successful Design and Implementation of an Educational Strategy for Skills Development**

Estonia has been at the forefront of technological development since regaining its independence in 1990 and is now one of the most digitized countries on the planet (European Commission, 2018). This has been achieved thanks to a close relationship between the Estonian government, the private sector, and the school system, all of which have set out to make Estonian citizens of all ages develop digital skills and trust in technology (Aru-Chabilan, 2020).

This common goal is the result of the Lifelong Learning Strategy—a document developed by the Ministry of Education and Research, the Estonian Cooperation Assembly, and the Estonian Education Forum—which guided the country's educational development from 2012 to 2020. Its main objective was the creation of learning opportunities following the needs and abilities of all individuals throughout their lives to guarantee them the possibility of realizing their full potential in the personal, family, work, and social spheres (Eurydice, 2021).

Lifelong learning includes the formal education system, from preschool to higher education, as well as learning that occurs outside that system. Estonia recognizes that opportunities for acquiring new knowledge can happen in the workplace, during leisure time, while pursuing a hobby, and in virtual spaces, individually or in collaboration with others; for this entire universe, strategic objectives are defined to motivate students and teachers (UNESCO, n.d.).

Within these objectives, the Digital Focus on Lifelong Learning stands out; it consists of applying educational technology more efficiently and with better results. To achieve this, it is proposed that Estonia incorporate a digital culture in the teaching-learning process by providing a modern technological infrastructure that facilitates access to online learning resources. Furthermore, the strategy considers that a prerequisite of digital culture is providing support to school leaders, teachers, and students in technological education in all educational institutions.

The Lifelong Learning Strategy was implemented by the Information Technology Foundation for Education (HITSA), created by the Ministry of Education and Research to contribute to the development of educational policies and the application of modern educational informatics in Estonia (HITSA, 2020). HITSA worked with stakeholders from the school community to develop the digital competence model for students and supported its implementation through the creation of pedagogical material and the organization of teacher training sessions. In addition, performance indicators were defined and made known to stakeholders from the beginning of implementation.

A success factor in the acceptance of the strategy was applying a digital maturity self-assessment tool for schools, which provided information regarding the technological infrastructure and installed capacities for change management and pedagogical innovation. It is important to note that most Estonian schools participated in the self-assessment process, as it was a prerequisite for receiving technological equipment (Innove, 2020).

## Finland

### **Professional Development for Teachers Focused on Digital and 21st century Skills**

The Finnish education system is considered one of the most successful in the world, and part of its success is attributed to the practice of periodically reviewing its curriculums and the high professionalization of teaching careers.

During one of the curriculum reviews at the beginning of the past decade, Finland reported a fall in learning achievement, difficulties in achieving collaborative knowledge-building experiences, problems in the use of technology as a means for teaching and learning, and heterogeneity in the quality and content of the teacher training provided.

Therefore, in 2016, Finland's Ministry of Education and Culture sponsored an education reform project called the New Comprehensive School Action Plan, whose aim was to address the weaknesses identified by equipping students and teachers with the skills and knowledge needed for the future.

A characteristic of the Finnish process is that its reforms are carried out collaboratively. To this end, the Finnish National Board of Education, a panel of experts including teachers, educational leaders, teacher educators, researchers, and representatives of various stakeholders, was convened and made its progress available at all times through social networks, discussion forums, and local events throughout the country. There was also digital participation in collecting and incorporating the opinions of the broad educational community (Vahtivuori-Hanninen et al., 2014).

Following this work, it was decided to incorporate into the curriculum seven transversal skills, transferable to diverse contexts, to promote students' growth as individuals and future citizens. Among these skills are two directly related to 21st century skills: multiliteracy and digital competencies (Lavonen, 2020).

To ensure a standardized implementation of the new curriculum throughout Finland, the Ministry of Education and Culture recognized the need to guide and support teachers and promoted two training strategies. While participatory planning activities allowed educators to become familiar with the content and skills of the curriculum, various agencies recommended centralizing professional development to equalize it and improve educational outcomes (OECD, 2020b).

The first strategy was the Teacher Education Development Programme, which established the guidelines for creating all educator professional development programs. This initiative involved more than 1,000 education experts, students, and educators, who achieved a structure for training programs that fostered teacher networking and community development (Niemi et al., 2018).

The second was a tutoring program that mentored, coached, and assisted teachers through peer coaching. This program delivered professional development tools in digital skills, cross-cutting skills, and other needs that peers identified during mentoring (Hakamies, 2019; Lavonen, 2020).

## Japan

### **Digital Skills for Society 5.0**

The Japanese education system shows sustained high performance in standardized tests among youth and adults. However, the country is going through sociodemographic challenges that question the sustainability of this successful model (OECD, 2018a).

In 2018, Japan recognized that it is at a turning point where traditional education is no longer sufficient to respond to current and future societal changes. Therefore, in its periodic curriculum reviews, the Ministry of Education, Culture, Sports, Science, and Technology (MEXT) designed the Third Basic Plan for the Promotion of Education. This plan highlights the relevance of lifelong learning, which was already established in the previous curriculum update, in light of Society 5.0: a model wherein artificial intelligence, the internet of things, and big data permeate every area of life and wherein the life expectancy of citizens borders on 100 years. For full personal development in this new social order, education must provide the skills people require to contend with these changes and take an active role throughout their lives (MEXT, 2018).

The Third Basic Plan for the Promotion of Education is an update of the Japanese Curriculum Standards with a new pedagogical approach, which promotes using technology and the English language to achieve meaningful learning experiences. The development of digital literacy is framed at the same level of importance as traditional language skills, so the curriculum considers hours of instruction in programming, data science, and “problem-solving in the information society” (MEXT, 2018).

Among the plan’s objectives is the “development of the foundations for the use of digital technologies,” which translates into four dimensions: the digital literacy of the student body, the use of technologies for teaching in all subjects, the digitalization of school management processes, and the development of technological infrastructure to support this objective.

MEXT’s Global Innovation Gateway for All (GIGA) initiative provided support to educational communities in implementing the reform. This program provided the technological infrastructure for equitable access to the learning opportunities required in the Third Basic Plan for the Promotion of Education, which consisted of laptops for each educator and student, smart boards, and ultra-high-speed networks in classrooms. In addition, specific technological equipment was provided for students with special educational needs. Moreover, GIGA provided schools with digital textbooks,

teaching materials, and technical support resources such as a list of certified services and tutorials on self-repair of equipment (MEXT, 2020). In addition, schools receive the Guidelines for an Information Security Policy in Education, which includes practical actions to be taken by students and teachers to protect their personal information within the framework of digital citizenship (International Trade Administration, 2021).

The reason behind the emphasis on technological coverage in Japanese educational reform is an instructional design that promotes three strategies for the use of technology: individual learning that students can do with their mobile devices; simultaneous learning, guided by a teacher through the use of a smart board; and collaborative learning, in which students use their devices to collaborate both face-to-face and remotely. This is because students are expected to be able to take the devices home to continue learning.

GIGA also coordinates teacher training in learning technologies. An IT advisory board was established that was composed of IT professionals who advise schools and offer courses to teachers to develop digital learning environments (*The Japan Times*, 2021).

## Singapore

### **Building the Road Map for Educational Transformation: The Role of Digital Skills and Technologies**

A feature of Singapore's successful educational process has been its alignment with the country's vision. Given the increasing life expectancy of its population, the state recognizes the need to foster lifelong learning in its citizens through ongoing education and job training projects that develop relevant skills for the future (Tan, 2017).

For the labor market, Singapore has the Skills Framework, which provides critical information about sectors, career paths, jobs, and roles as well as existing and emerging skills required for different occupations and a list of training programs for skills upgrading and mastery. The Skills Framework aims to create a common skills language for individuals, employers, and training providers, facilitating assessment, certification, and training course development (Singapore Government Agency, 2021).

At the school education level, since 1997, the country's vision has been translated into sectoral Master Plans aimed at educating citizens capable of facing future challenges such as globalization, demographic changes, and technological advances. To this end, the government declared the development of skills for the 21st century a priority in school education, for which it was necessary to transform students' experience through digital teaching-learning environments (Singapore Ministry of Education, 2021a).

Master Plans are designed at the Ministry of Education level and are implemented by local educational leaders. All schools conduct self-evaluations of their performance in areas such as leadership, personnel management, and strategic planning as well as academic results. This is part of a continuous improvement process supervised by the Ministry of Education, which regularly requests evidence for accreditation of institutional self-evaluation (National Center on Education and the Economy, 2021).

There have been four Master Plans in education. The first one (1997–2002) focused on providing basic technological infrastructure and equipping teachers with fundamental digital competencies, thus ensuring that technology was widely used in education. Subsequently, the Second Master Plan (2003–2008) strengthened digital integration in the curriculum and prioritized equitable access to

technology. Then, the third plan (2009–2014) focused on equipping students with skills for self-directed and collaborative learning and tools for the responsible use of technology. Finally, the Fourth Master Plan (2015–2019) focused on 21st century skills and responsible digital citizenship.

From 2019 onward, the Master Plan was renamed the Technology Education Plan, reflecting its evolution to better respond to the rapid changes in technology and the forces influencing education (Singapore Ministry of Education, 2021b). The new plan aspires to personalized education according to each student's needs, interests, and motivations, where learning experiences are collaborative and connected to the community and the world. To this end, the plan states the need to promote four enabling pillars: developing the capacity of teachers to teach with technology and to analyze and interpret the data generated by their students, strengthening education for digital citizenship by incorporating elements of protection and security in virtual environments, promoting alliances with industry to achieve authentic learning experiences, and streamlining the processes and structures of the school environment to support all of the above.

Along with the enabling pillars, five fundamental values that shape a person's beliefs, attitudes, and actions are declared. These are considered the nucleus from which the skills for the 21st century are formed, so they are integrated into the curriculum transversally, allowing sustainability for these skills in Singapore's education system (Pei-Ling et al., 2017).

## Uruguay

### **How Did Uruguay Do It? Implementation of a National Digital Learning Plan for Social Inclusion**

The Uruguay Digital Agenda is a public policy in force since 2007 that seeks to provide development opportunities, especially to the most excluded people, by strengthening digital skills for equity (Clastornik et al., 2016). In this context, Uruguay created the Educational Connectivity Plan for Basic Computing for Online Learning (CEIBAL), a social and technological inclusion project implemented through the educational system (Presidency of the Republic of Uruguay, 2011).

The goal of CEIBAL is to reduce the digital divide that deepens social and economic inequalities, which is achieved by providing opportunities for equitable access to technology and learning environments. It does not propose an educational reform to enable the incorporation of technology. Instead, it facilitates various digital solutions that can be adopted according to the local context and needs to foster pedagogical innovation and develop students' 21st century skills (Cobo & Montaldo, 2016).

To achieve this, the plan's implementation was structured on three axes: provision of technological infrastructure for teachers and students, professional development for teachers and production of digital educational resources, and creation of new programs to improve students' competencies and skills.

The deployment of the technological infrastructure was carried out in stages. First, a pilot test was carried out in a single school, and then coverage was extended to all public elementary schools in that province. The following year, primary education institutions were equipped in all the regions of the country's interior except for the metropolitan province, where the deployment began in a pilot format in eight schools. During the following year, all the remaining schools were equipped, and by the end of 2008, every teacher and student in Uruguay had his or her own laptop computer. In addition, a Wi-Fi network was installed in all the schools and their neighborhoods so that students could remain connected when they took the equipment home. In this way, the equity mandate was fulfilled by also benefiting families with access to technology.

CEIBAL's teacher training focuses on ensuring that digital technologies are used as tools for social learning through real projects and problems. To this end, CEIBAL provides teachers with courses, certifications, workshops, support plans, and platforms for educational use that promote pedagogical innovation. In addition, an Open Educational Resources repository with multimedia material created by a CEIBAL team is available for the teaching community to adapt and share (CEIBAL Plan, 2022).

As for new programs, initiatives that use technology to modify or transform pedagogical practices stand out. Some examples are videoconferencing for the teaching of English with native speakers, the adaptive study of mathematics that allows self-paced exercise, the creation of digital fabrication spaces in each school, and programming and robotics workshops (Mateo-Berganza Díaz & Lee, 2020). Part of the research in educational innovation that makes these programs possible is carried out by the CEIBAL Study Center. This autonomous organization promotes, develops, and coordinates technology projects in education (CEIBAL Foundation, 2021).

## Most relevant essential conditions, based on the initiative analyzed in each country

 <b>Australia</b>		
	<b>Shared vision</b>	• Participatory process to develop the curriculum
	<b>Ongoing professional learning</b>	• 15 teacher professional development programs
	<b>Supportive external context</b>	• Adoption of the Melbourne Declaration on Educational Goals for Young Australians
 <b>Austria</b>		
	<b>Empowered leaders</b>	• Certification of “eLearning expert” schools
	<b>Equitable access</b>	• €230 million for technology infrastructure
	<b>Ongoing professional learning</b>	• Digital competencies model for educators • Virtual Pedagogical University
	<b>Engaged communities</b>	• Innovation Foundation for Education, with a bottom-up implementation approach
	<b>Supportive external context</b>	• National digitalization strategy
 <b>Canada</b>		
	<b>Shared vision</b>	• A shared vision to modernize Canada’s public sector
	<b>Implementation planning</b>	• Alignment of courses created to support Blueprint 2020 with the government of Canada’s digital standards
	<b>Equitable access</b>	• Sufficient, adequate infrastructure and technological support for all public-service employees to have equal access to learning opportunities
	<b>Skilled personnel</b>	• Expanded high-quality learning opportunities for employees to incorporate digital and 21st century skills
	<b>Engaged communities</b>	• A participatory process that resulted in a negative assessment of the state of public administration
 <b>Estonia</b>		
	<b>Shared vision</b>	• Development of digital skills and reliance on technology by citizens of all ages
	<b>Curriculum framework</b>	• Development of a digital competencies model for students
	<b>Student-centered learning</b>	• Learning’s occurring outside the school system, during leisure time, individually or collaboratively, face to face or virtually
	<b>Assessment and evaluation</b>	• Digital Maturity Self-Assessment Tool for Schools

	<b>Ongoing professional learning</b>	<ul style="list-style-type: none"> <li>• Digital culture's requiring support from school leaders, teachers, and students</li> </ul>
	<b>Engaged communities</b>	<ul style="list-style-type: none"> <li>• Estonian Cooperation Assembly and Estonian Education Forum</li> </ul>
	<b>Supportive external context</b>	<ul style="list-style-type: none"> <li>• Lifelong Learning Strategy</li> </ul>
	<b>Finland</b>	
	<b>Shared vision</b>	<ul style="list-style-type: none"> <li>• Decrease in learning achievements, difficulties in achieving collaborative knowledge construction experiences, and problems in using educational technology</li> </ul>
	<b>Student-centered learning</b>	<ul style="list-style-type: none"> <li>• Seven cross-cutting skills, transferable to diverse contexts, including skills for the 21st century</li> </ul>
	<b>Ongoing professional learning</b>	<ul style="list-style-type: none"> <li>• Teacher Education Development Programme with national guidelines</li> <li>• Mentor Teacher Program</li> </ul>
	<b>Engaged communities</b>	<ul style="list-style-type: none"> <li>• Participatory educational reform process: New Comprehensive School Action Plan</li> </ul>
	<b>Japan</b>	
	<b>Implementation planning</b>	<ul style="list-style-type: none"> <li>• Third Basic Plan for the Promotion of Education</li> </ul>
	<b>Equal access</b>	<ul style="list-style-type: none"> <li>• Providing technological infrastructure to schools today to train tomorrow's citizens</li> <li>• Ensuring access to technology for all students and educators</li> </ul>
	<b>Technical support</b>	<ul style="list-style-type: none"> <li>• Availability of self-repair manuals and technical services</li> </ul>
	<b>Curriculum framework</b>	<ul style="list-style-type: none"> <li>• Digital literacy's being at the same level as traditional language skills</li> </ul>
	<b>Professional development</b>	<ul style="list-style-type: none"> <li>• Advisory directory on information technology for teacher training</li> </ul>
	<b>Internal use policies</b>	<ul style="list-style-type: none"> <li>• Educational informatics policies for digital citizenship</li> </ul>
	<b>Favorable external context</b>	<ul style="list-style-type: none"> <li>• Concern for Society 5.0</li> </ul>
	<b>Singapore</b>	
	<b>Empowered leaders</b>	<ul style="list-style-type: none"> <li>• Local educational leaders' being in charge of implementation</li> </ul>
	<b>Implementation planning</b>	<ul style="list-style-type: none"> <li>• Master Plans since 1997</li> </ul>
	<b>Equitable access</b>	<ul style="list-style-type: none"> <li>• High rate of access to computer equipment and internet connectivity in a short time</li> </ul>
	<b>Curriculum framework</b>	<ul style="list-style-type: none"> <li>• Five core values' shaping a person's beliefs, attitudes, and actions</li> </ul>
	<b>Student-centered learning</b>	<ul style="list-style-type: none"> <li>• Personalized education based on the interests, needs, and motivations of each student</li> </ul>

	<b>Assessment and evaluation</b>	<ul style="list-style-type: none"> <li>• Schools' conducting self-evaluations of their performance in leadership, management, and planning as well as academic results</li> </ul>
	<b>Internal use policies</b>	<ul style="list-style-type: none"> <li>• Education for digital citizenship, with security and privacy elements in virtual environments</li> </ul>
	<b>Supportive external context</b>	<ul style="list-style-type: none"> <li>• Need to promote lifelong learning, given increasing life expectancy</li> <li>• Government's declaring skills for the 21st century a priority</li> </ul>
	<b>South Korea</b>	
	<b>Financial sustainability</b>	<ul style="list-style-type: none"> <li>• Long-term policies and strategies that built synergies to generate an educational ecosystem involving academia and industry</li> <li>• Research-based educational innovation</li> </ul>
	<b>Curriculum framework</b>	<ul style="list-style-type: none"> <li>• Quality digital content's being available in the native language to strengthen digital skills development</li> </ul>
	<b>Engaged communities</b>	<ul style="list-style-type: none"> <li>• Incorporation of the private sector to generate quality educational content</li> </ul>
	<b>Supportive external context</b>	<ul style="list-style-type: none"> <li>• Informatization of Education Policy</li> </ul>
	<b>Uruguay</b>	
	<b>Shared vision</b>	<ul style="list-style-type: none"> <li>• Social inclusion as a guiding principle of all reforms, including educational reform</li> </ul>
	<b>Implementation planning</b>	<ul style="list-style-type: none"> <li>• Phased implementation, starting with a pilot, until full coverage is achieved</li> </ul>
	<b>Equitable access</b>	<ul style="list-style-type: none"> <li>• High rate of access to computer equipment and internet connectivity in a short time</li> </ul>
	<b>Skilled personnel</b>	<ul style="list-style-type: none"> <li>• All schools and their stakeholders' having internet access to digitalize administrative processes</li> </ul>
	<b>Technical support</b>	<ul style="list-style-type: none"> <li>• Technical service points throughout the country</li> <li>• Students' training independently to provide technical services</li> </ul>
	<b>Student-centered learning</b>	<ul style="list-style-type: none"> <li>• Development of adaptive learning platforms</li> <li>• A curriculum with a focus on social learning through authentic projects</li> </ul>
	<b>Ongoing professional development</b>	<ul style="list-style-type: none"> <li>• A platform for creating virtual, classroom, and hybrid learning paths</li> </ul>
	<b>Internal use policies</b>	<ul style="list-style-type: none"> <li>• Digital citizenship for data protection</li> </ul>
	<b>Supportive external context</b>	<ul style="list-style-type: none"> <li>• Uruguay Digital Agenda</li> </ul>

**Part 02:  
Curriculum Reforms  
for the 21st Century in  
Latin America and the  
Caribbean**

## Chapter 4

# 21st century Skills in the Educational Systems of Latin America





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### Abstract

In this chapter, we explore how the 21st century skills have penetrated the educational systems of Latin America through a comparative analysis of 18 countries. We also describe which educational policy instruments and programs have been used to incorporate these skills in the region.

We used the document analysis of the main educational legislations, the current curricular documents, related research studies and reports, and interviews with current or outgoing officials (N = 25). Our comparative study shows state of the art in terms of recent curricular reforms and policies with some exceptional cases of innovative programs in the region.

We were able to formulate some preliminary hypotheses related to the various ways in which the 21st century skills were reflected in the curricular policies of Latin America. First, 21st century skills are very difficult to identify in curriculum policies and even more so in the applied curriculums. Second, a profound change in pedagogical approach is needed. To have an impact on teaching practices, curriculum changes require a sophisticated ability to interact with the beliefs and abilities of the educational system. Third, curriculum change is more feasible in countries where external demands (social, cultural, and labor) are combined, with ample doses of reflection and capacity for pedagogical and curricular action within the education system and with strong curricular governance capabilities, including flexible approaches to incorporating changes and revisions. Fourth, government can achieve greater regulation in countries with a tradition of centralized intervention and with the use of fundamental channels of curricular regulation, such as curricular regulation, mass distribution of textbooks, teacher training programs, or standardized assessments. Lastly, the 21st century skills that are most straightforward to identify and that have the most significant impact on recent curricular reforms are digital, socioemotional, and citizen training skills.

## 1. Introduction

**We live in an age of continuous change.** The fourth industrial revolution combines speed, scope, and systemic impact that evolves exponentially (Schwab, 2017). People’s capacities to manage change and make sense of the environment in which they live will determine which economies win the battle. How do we prepare for this world? What skills will be most **necessary if we want to be an active part of the changes and not merely passive subjects without control of our environment?**

The forces of the cultural and technological transformations that we are going through are increasingly interconnected and significantly shape our global village. How do we teach the cultural codes of an interconnected global world? Who will control the labor markets, and who will determine the skills required in each context and include them in educational systems? How do we teach coexistence in an increasingly intercultural context?

These questions require **rethinking the educational system’s curriculums**—the matrices of knowledge and skills that we want to teach for use in the future world. **One approach, which will be analyzed here, centers on defining a series of 21st century skills that can achieve convergences between different,** complementary fields of action: citizenship and the search for the common good, preparation for the job market and the economy, and broader personal development for achieving well-being and happiness. **Incorporating these skills into curriculums is a very complex task.**

**In this chapter, through a comparative study of 18 countries, we aim to explore how 21st century skills have penetrated the educational systems of Latin America.** It describes the educational policy instruments that have been used to incorporate these skills in the region and details some specific programs that have been especially relevant in doing so. To prepare this work, **we have used a documentary analysis strategy, analyzing the leading educational laws of Latin American countries.** Annex 1 presents more details about the methodological approach.



People’s capacities to manage change and make sense of the environment in which they live will determine which economies win the battle.

We offer results in three thematic categories, organized into sections. The first section explores the relationship between the level of curriculum regulation in the region's countries and the degree of penetration of 21st century skills. The second section offers a region overview, describing some cases in which 21st century skills have been occupying a central place in the curriculum structure and some in which there is still reluctance regarding the inclusion of 21st century skills. Finally, the third section details the three skill groups that have received the most attention in the region: digital skills, socioemotional skills, and citizenship skills. The chapter concludes with a brief compilation of findings and recommended public policy actions for integrating these skills into educational systems.

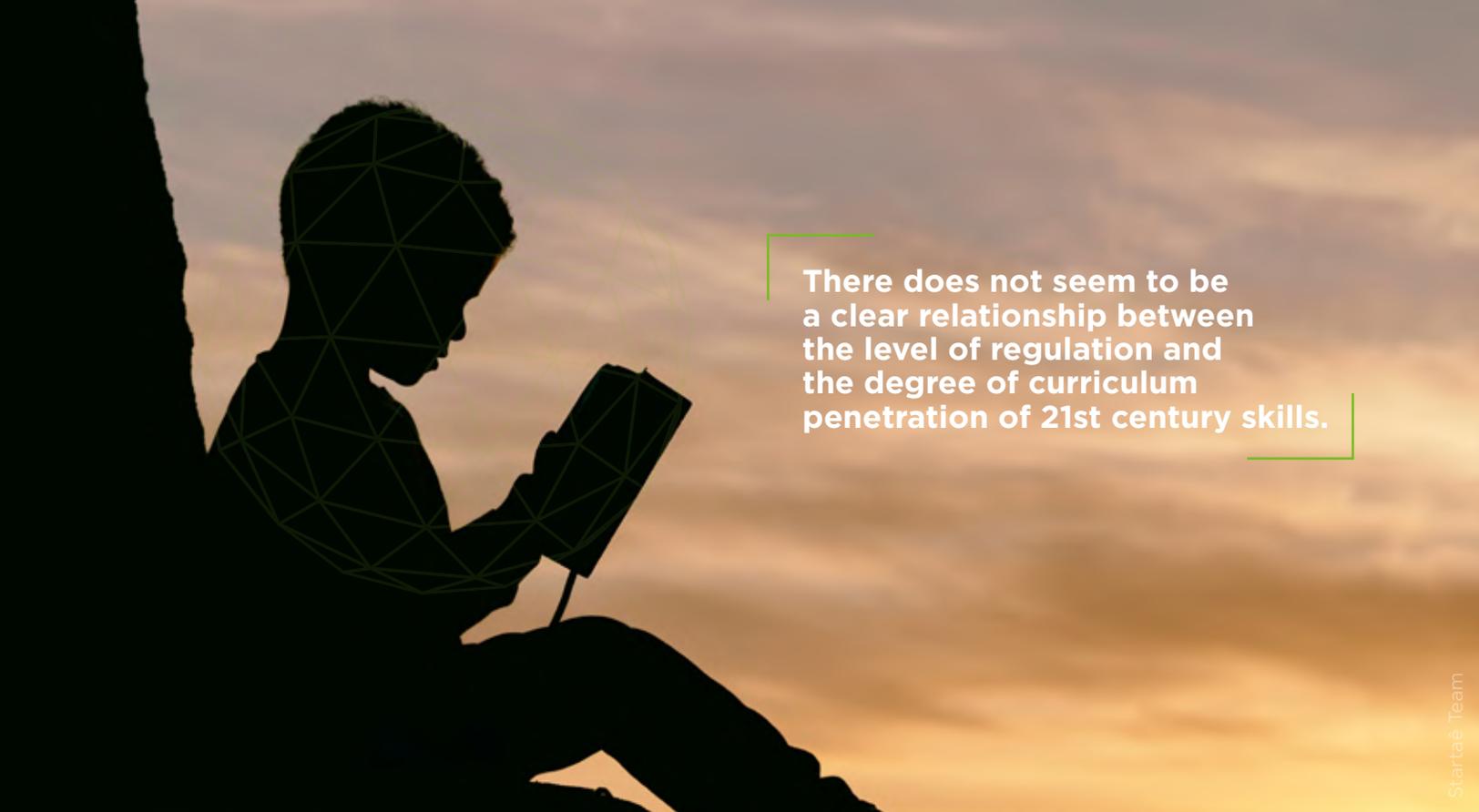
#### **Box 4.1 Skills or Content: The False Dichotomy that Blurs the Debate**

Any discussions of curriculum development and education necessarily include the concepts of skill development and content mastery. The vision of 21st century skills presented here does not fall into the false dichotomy of skills and content but recognizes the importance of both. The important thing is not to cover a large amount of content to be memorized but to make a better selection of the content to be explored in greater depth. Organization of curriculum must maintain a fundamental scheme of each great area of knowledge (Bruner, 1977), starting from the prioritization of its basic organizing principles, understanding each discipline as a domain that has substantial interconnected ideas.

Approaching curriculum as process and development is considered more likely to achieve a complementary balance between skills and content (Kelly, 2009). This view is opposed to a more goal-based approach to curriculum, which involves using short-term memory and acquiring knowledge in small, isolated steps. The process approach proposes conquering knowledge domains in a cognitive spiral. As Howard Gardner points out, learning a discipline involves acquiring a distinct way of thinking about and analyzing the world. The central purpose of education is to develop minds that can think in the terms of the discipline and use skills to connect knowledge with performance (Gardner, 2002).

David Perkins indicates that skill development also requires feelings and motives. Skills require being inclined to act in the world, thinking in frameworks, and understanding schemes (Perkins, 2014).

As indicated by classic studies on deep understanding, these skills cannot be acquired independently of knowledge. The infusion theory, for example, presents knowledge and skills as an interwoven fabric (Swartz et al., 2013). In another seminal study, Fullan, Quinn, and McEachen (2018) describe the importance of the so-called "6 Cs" (global citizenship, collaboration, character, communication, creativity, and critical thinking) in knowledge construction and argue that curriculum content must be relevant to students. In this view, teaching fuses content and skills in a continuum that fosters the powers of thought, reflection, and understanding.



There does not seem to be a clear relationship between the level of regulation and the degree of curriculum penetration of 21st century skills.

## 2. Curriculum Policy and 21st century Skills in Latin America

One of the most relevant results that we find in the analysis of the curriculum proposals of the Latin American region is that **there does not seem to be a clear relationship between the level of regulation and the degree of curriculum penetration of 21st century skills**. There are countries where the national government exercises a high level of curriculum regulation (as in Chile) and a significant level of penetration of 21st century skills in curriculum policies has been achieved. However, in other countries (such as Honduras) with an equally high level of government regulation, 21st century skills have not attained the same level of penetration in the curriculum.

Nor is there a clear pattern in countries with significant levels of decentralization in terms of curriculum policy. For example, in Colombia, where there is a low degree of government centralization, 21st century skills have a significant presence in the curriculum, but in Argentina and Brazil, 21st century skills have been relegated to a secondary role. Table 1 shows the centrality of different levels of government in curriculum matters and a classification (high, medium, or low) of the importance of 21st century skills in the curriculum policies of the countries analyzed. Some prominent specific programs are also noted.

**Countries** in which the current curriculum documents provide detailed descriptions of the various 21st century skills are categorized as “high” only when they have also implemented specific programs and interventions that include several of the 21st century skills. To identify this situation, normative and curriculum documents and websites of the different ministries and secretariats of education were analyzed, and this information was triangulated with fieldwork data. **Countries categorized as “medium”** include those in which **some 21st century skills were detected**, either in normative and curriculum documents or in specific programs and interventions, and **countries categorized as “low”** are those in which **few 21st century skills were detected**. The period analyzed was from the year of the most recent administrations to 2020, the year fieldwork was conducted.

**Table 4.1. The centrality of different levels of government in curriculum matters**

Country	Current Curriculum Material and Date	Level of Curriculum Regulation	Importance of 21st century Skills in Curriculum Policies (2010–2020)	Specific Outstanding Programs or Interventions
 <b>Argentina</b>	Priority Learning Cores (NAP in Spanish) for Initial, Primary, and Secondary Education, approved by the Federal Council of Education between 2004 and 2012, NAPs of Digital Education, Programming, and Robotics approved by the Federal Council of Education September 12, 2018 (Resolution No. 343/18)	National: <b>medium</b> Regional: <b>high</b>	<b>Low</b>	Creative environments Comprehensive national framework for development of competencies Digital education, robotics, and programming priority learning cores
 <b>Belize</b>	2006 Kindergarten Curriculum Framework Primary education: no modifications in curriculum framework since 2000 Secondary level: Curriculum Guidelines (not compulsory), 2005	National: <b>high</b> in primary education, <b>low</b> in secondary education	<b>Low</b>	Le Wagon
 <b>Bolivia</b>	The Base Curriculum of the Plurinational State, 2012	Not enough information	<b>Low</b>	Soy educador digital (I am a Digital Educator)
 <b>Brazil</b>	Standard Curriculum National Base approved December 20, 2017 Common Curriculum National Base for secondary education approved December 14, 2018	National: <b>low</b> Regional: <b>high</b>	<b>Low</b>	Socio-Emotional Dialogues SENNA 1.0
 <b>Chile</b>	Curriculum Bases of Primary and Middle Education in development since 2012 (by subjects) The Kindergarten Curriculum Bases in force since 2005	National: <b>high</b> Municipal: <b>low</b>	<b>Medium</b>	Socioemotional learning plan
 <b>Colombia</b>	1998 curriculum guidelines (modifications according to subjects)	National: <b>low</b> Regional: <b>low</b> School/local: <b>high</b>	<b>Medium</b>	Study of socioemotional competencies Evaluation of socioemotional skills

	<b>Costa Rica</b>	Curriculum plans from 2016 and 2017	National: <b>high</b> Regional: <b>medium</b>	<b>High</b>	Educational Computing National Program Curriculum reform: education for citizenship
	<b>Ecuador</b>	Curriculum in force in the Sierra Regime in September 2016 and the Coastal Regime in 2017	National: <b>high</b>	<b>Medium</b>	Eugenia's virtual world
	<b>El Salvador</b>	Curriculum framework in force since 2014	National: <b>high</b>	<b>Medium</b>	High school curriculum design Evaluation Strategy (AVANZO test)
	<b>Guatemala</b>	National Base Curriculum, 2010	National: <b>high</b>	<b>Medium</b>	National Policy of Environmental Education of Guatemala
	<b>Honduras</b>	National Basic Curriculum, 2004	National: <b>high</b>	<b>Low</b>	Portal de Género en Educación
	<b>Mexico</b>	Current curriculum in force since 2017	National: <b>high</b> Subnational: <b>medium</b>	<b>Medium</b>	Construye T
	<b>Nicaragua</b>	Current curriculum framework for initial education, 2017 Curriculum framework for primary and secondary levels, 2019	National: <b>high</b>	<b>Low</b>	National Human Development Program Tiempos de Victoria
	<b>Panama</b>	Curriculum programs in force since 2014	National: <b>high</b>	<b>Low</b>	Aprende al Máximo
	<b>Paraguay</b>	Curriculum Design of Basic Bilingual Education for Young People and Adults, 2011	National: <b>high</b>	<b>Low</b>	Valentina Program
	<b>Peru</b>	National Curriculum of Basic Education, 2016	National: <b>high</b> Subnational: <b>low</b>	<b>Low</b>	Sinfonía por el Perú
	<b>Uruguay</b>	Curriculum design in force since 2006	National: <b>high</b>	<b>Low</b>	Global Learning Network
	<b>Venezuela</b>	Curriculum design in force since 2007	National: <b>high</b>	<b>Low</b>	El Sistema (National System of Youth and Children's Orchestras of Venezuela)

Source: Authors' compilation.

### 3. 21st century Skills in Curriculum Programs in Latin America

This section discusses the main findings of the comparative analysis of current curriculum frameworks and the testimonies of interviews held during fieldwork. The curriculum documents listed in Annex 1 were examined to determine the presence of 21st century skills. Although many of the 21st century skills are included in the curriculum documents, this does not necessarily mean that they are taught in classrooms. Therefore, the analysis includes the **curriculum prescription** and other sources, such as **specific programs and the testimonies of specialists from the countries**. The specific 21st century skills and their inclusion in the curriculum documents of the countries included in this study are outlined in Table 4.2.

**Table 4.2. Incorporation of 21st century skills in the current curriculum documents**

21st century Skills	Skill Description Included in Current Curriculum Documents
 <b>Adaptability</b>	Chile, Colombia, Costa Rica, Mexico, Nicaragua
 <b>Self-regulation</b>	Argentina, Chile, Colombia, Costa Rica, Mexico
 <b>Communication</b>	Chile, Colombia, Costa Rica, Ecuador, El Salvador, Nicaragua, Mexico, Paraguay, Peru, Uruguay
 <b>Empathy</b>	Argentina, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, Panama
 <b>Leadership</b>	Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, Peru
 <b>Digital skills</b>	Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Paraguay, Uruguay, Venezuela
 <b>Entrepreneurship</b>	Chile, Costa Rica, Ecuador, Paraguay, Peru
 <b>Creativity</b>	Argentina, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Mexico, Uruguay, Venezuela
 <b>Global citizenship</b>	Argentina, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Nicaragua, Panama
 <b>Growth mindset</b>	Chile, Costa Rica, Mexico
 <b>Critical thinking</b>	Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Paraguay, Uruguay

	<b>Problem solving</b>	Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Paraguay, Uruguay, Venezuela
	<b>Self-knowledge</b>	Chile, Costa Rica, Mexico
	<b>Collaboration</b>	Argentina, Bolivia, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Nicaragua, Mexico, Uruguay
	<b>Learning to learn</b>	Chile, Costa Rica, Colombia, Ecuador, Mexico
	<b>Ethics</b>	Argentina, Chile, Costa Rica, Mexico
	<b>Mindfulness</b>	Chile, Colombia, Costa Rica, Mexico, Nicaragua
	<b>Perseverance</b>	Chile, Costa Rica, Mexico
	<b>Resilience</b>	Chile, Costa Rica
	<b>Motivation</b>	Chile, Costa Rica, Mexico

Source: Authors' compilation based on national law texts.

Our study indicates that **although 21st century skills are mentioned and developed in curriculum documents, they are not always reliably structured in the curriculum.** This finding is consistent with other studies based on curriculum analysis of the region. A survey by UNESCO (2020a) that included conclusions and reflections regarding the curriculum analysis of the 18 countries in the region found that, in many cases, **the presence of 21st century skills was more significant in declarative than programmatic terms.** For example, the study found that at the declarative level, *creativity* was found in curriculum documents in more than 70 percent of the region's countries, but it dropped below 50 percent at the programmatic level. Something similar happened with the skill *critical thinking*, with a declarative presence in 90 percent of the countries and a programmatic presence in 60 percent. These differences suggest that it is necessary to go beyond documentary analysis to **determine if 21st century skills have entered the region's classrooms.** For example, it would be interesting to conduct exhaustive fieldwork that included class observation work and interviews with teachers and other school actors.

### 3.1. 21st century Skills as the Central Axis of Curriculum Programs

In some countries in the Latin American region, the idea of 21st century skills has been well received within the educational community, and, consequently, the skills have particular importance and centrality in the curriculum design. The examples in this section illustrate different ways and various degrees to which 21st century skills have been received and have penetrated the curriculum programs of several countries in the region.

**In Chile, for example, the documents outlining the “Curriculum Bases” (Ministerio de Educación Chile, 2019) explicitly detail the centrality of 21st century skills.** These documents assert the importance of holistic education and classify 21st century skills into four groups: (1) “ways of thinking” (creativity, critical thinking, and metacognition); (2) “ways of working” (collaboration and communication); (3) “tools for work” (digital information technology literacy and information literacy); and (4) “life skills” (citizenship, social and personal responsibility, and life and career skills). These curriculum bases include two dimensions: (1) Transversal Learning Objectives (OAT), which refer to the individual, moral, and social development of students; and (2) Learning Objectives (OA), which are subdivided into skills, attitudes, and content.

Table 4.3 shows the learning objectives of the third-year intermediate-level subject “Sciences for Citizenship” in Chile, a subject common to all students regardless of their academic orientation. It illustrates the importance of 21st century skills in Chilean curriculum design.



**Although 21st century skills are mentioned and developed in curricular documents, they are not always reliably structured in the curriculum.**

**Table 4.3. 21st century skills in the module on technology and society in the “Citizenship Education” course in Chile**

Learning Objective Worksheet Mindset (OAA)	
	Working Tools
12	Take advantage of available tools to learn and solve problems.
13	Be interested in the possibilities offered by technology for the individual’s intellectual, personal, and social development.
14	Value ICT as an opportunity to learn, research, socialize, communicate, and participate as a citizen.
15	Act responsibly by managing time to carry out personal, academic, and work projects effectively.
16	Act following the principles of ethics in using information and technology, respecting intellectual property and people’s privacy.
Learning Objective Worksheet Mindset (OAA)	
	Ways of Thinking
01	Think persistently and proactively to find innovative solutions to problems.
02	Think openly to different perspectives and contexts, assuming risks and responsibilities.
03	Think conscientiously, recognizing that mistakes offer learning opportunities.
04	Think flexibly to re-elaborate your ideas, points of view, and beliefs.
05	Think with self-reflection and autonomy to manage your learning, identifying capacities, strengths, and aspects to improve.

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**06** Think consciously so that learning develops throughout life and enriches the experience.

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**07** Think openly toward others and value communication to relate to different people and cultures, sharing ideas that favor the development of life in society.

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**Learning Objective**  
**Worksheet Mindset** **Ways of Working**  
**(OAA)**

**08** Work collaboratively in the generation, development, and management of projects and problem solving, integrating different ideas and points of view.

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**09** Work with responsibility and leadership to accomplish collaborative tasks and achieve common goals.

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**10** Work with empathy and respect in the context of diversity, eliminating all expressions of prejudice and discrimination.

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**11** Work autonomously and proactively in collaborative and individual work to effectively carry out projects of various kinds.

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**Learning Objective**  
**Worksheet Mindset** **Ways of Living in the World**  
**(OAA)**

**17** Persevere around goals to build life projects and contribute to society and the country with self-determination, self-confidence, and respect for oneself and others.

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**18** Participate assuming reasoned positions in different areas: cultural, social, political, environmental, and others.

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**19** Make democratic decisions, respecting human rights, diversity, and multiculturalism.

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**20** Take responsibility for actions and decisions with an awareness of the implications for oneself and others.

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Source: Ministerio de Educación Chile (2019).

**Another excellent example of the centrality of 21st century skills in educational curriculum is in Costa Rica.** According to the testimonies collected in our study, Costa Rica managed to create broad curriculum agreements, unlike countries such as Argentina, Uruguay, Peru, and Paraguay that strongly resisted using the term *skills* in their curriculum designs. As in Chile, **actors in the educational system reached a consensus on the importance of explicitly incorporating 21st century skills in curriculum documents.**

Costa Rica also grouped 21st century skills into four main groups: (1) “ways of thinking” (creativity, systems thinking, and metacognition); (2) “ways of working” (collaboration and communication); (3) “tools to work” (literacy in digital information technologies and information literacy); and (4) “life skills” (citizenship, personal and social responsibility, and life and career skills).

The Costa Rican educational system also introduced changes to assessment policies to prioritize these skill competencies. Curriculum reforms in 2016 and 2017 highlighted the importance of a formative evaluation policy in Costa Rica and urged revaluing classroom work and maximizing the use of evaluative processes as instances for learning.

Rubrics are available for teachers on the Ministry of Public Education portal. An example of a rubric for evaluating the skill of *systems thinking* is shown in Table 4.4.



**Table 4.4 Costa Rican assessment rubric for systems thinking skill**

Dimension: Ways of Thinking					
Skill & Definition	Indicators <sup>1</sup>	Features <sup>2</sup>	Performance Levels		
Systems thinking: ability to see the whole and the parts, as well as the connections between them, that allows the construction of meaning according to the context	Abstracts data, facts, actions, and objects as part of larger and more complex contexts (patterns within the system)	Locates basic data, facts, or actions in a given context	Cites basic data, facts, or actions in a simple context Generally characterizes the data, facts, or actions of the context Places basic data, facts, or actions in a certain context Mentions data, facts, or actions in a specific context		
		Identifies simple patterns in data, facts, or actions in different contexts	Provides generalities about simple patterns found in data, facts, or actions Specifically indicates patterns in data, facts, or actions in different contexts		
		Classifies data, facts, or actions in charts, graphs, or others according to the patterns found	Sorts data, facts, or actions in simple tables Catalogs data, facts, or actions in charts or graphs according to the patterns found Associates data, facts, or actions through charts, graphs, or others according to the patterns found		
		Compares detected patterns between data, facts, or actions in various contexts	Cites data, facts, or actions for an established context Finds similarities and differences between the patterns detected in data, facts, or actions in several contexts Contrasts data, facts, or actions according to the patterns found in various contexts		
	Exposes how each object, fact, person, and living being are part of a dynamic system of interrelation and interdependence in their specific environment (causality between the components of the system)	Details patterns through data, facts, or actions in an established context	Recognizes data, facts, or actions in complex contexts	Mentions general aspects of a data pattern Highlights specific aspects of patterns through data, facts, or actions in a given context Points out significant aspects of patterns through data, facts, or actions in different contexts Mentions data, facts, or actions in a specific context Highlights relevant aspects about data, facts, or actions in a complex context Punctually distinguishes data, facts, or actions in complex contexts	
			Describes the causes and effects that originate the data, facts, or actions in complex contexts	Mentions the causes and effects that originate the data, facts, or actions Highlights specific aspects of the causes and effects that originate the data, facts, or actions in complex contexts Points out significant aspects regarding the causes and effects that originate the data, facts, or actions in complex contexts	
		Relates data, facts, or actions in complex contexts according to the causal relationship detected	Discovers causal relationships between data, facts, or actions in complex contexts	Lists the data, facts, or actions in an established context Highlights important aspects of the causal relationship between data, facts, or actions in a complex context Finds new cause-effect relationships between data, facts, or actions in various complex contexts	
			Complements the description of data, events, or actions according to the causal relationship found between them	Mentions data, facts or actions considering the causes and effects that originate them Highlights relevant aspects about data, facts, or actions, according to the causal relationship found between them Incorporates new aspects about the causal relationship between data, facts, or actions in complex contexts	
		Develops new knowledge, techniques, and practical tools that allow the reconstruction of meanings (modification and system improvements)	Identifies the components present in a system	Relates data, facts, or actions in complex contexts according to the causal relationship detected	Cites data, facts, or actions linked in a simple context Generally characterizes the data, facts, or actions according to the causal relationship detected Links data, facts, or actions according to the causal relationship detected in complex contexts
				Understands the relationship of factors that manifest in a system	List the components present in a system Provides general information about the components present in a system Specifically indicates the components present in a system Names the factors present in a system Generally characterizes the relationship of factors that are manifested in a system Discerns the relationship of factors that manifest in a system
			Raises new relationships between the components, parts, or stages present in a system	Describes the systems present in complex contexts for the understanding of a situation or phenomenon	Mentions the general aspects of a system present in a situation or phenomenon Points out significant aspects of the systems present in complex contexts for the understanding of a situation or phenomenon
				Examines the details of a system to envision the actions that can modify and improve it in complex contexts	Mentions the components, parts, or stages present in a system Refers to the relationships between the components, parts, or stages present in a system Presents new relationships between the components, parts, or stages present in a system Describes generalities of the components, parts, or stages of a system Delivers specific criteria about the system based on its components, parts, or stages Details relevant aspects of a system to envision the actions that can modify it and improve it in complex contexts

Source: Website of the Ministry of Public Education of Costa Rica, <https://www.mep.go.cr/>.

Notes: 1. Skill Development Guidelines (Curricular Policy pp. 33–37 and ATC21s Assessment and Teaching of 21st century Skills; 2. Prepared from the profiles established in the Curriculum Policy (pp. 39–48).

### 3.2. Reluctance to Include 21st century Skills

**In other countries in the region, there is some reluctance in some sectors of the educational systems to use concepts such as 21st century skills or competencies.** In several interviews, resistance to the implementation of these types of curriculum changes was specifically pointed out, explained as being resistance to the implied adaptation of education to the labor market.

**Argentina is a good example of this issue.** The problem in Argentina was using the term *skills*. Starting in 2016, the Ministry of Education brought the issue of 21st century skills to the agenda and agreed to develop, at the federal level, a base document called the National Framework for the Development of Capacities. This framework reflects different theoretical perspectives on the issue of 21st century skills, but the work teams that prepared the document used the term *capabilities* instead of *skills* to avoid rejection by parts of the teaching community.

Although a priori the terminology issue might seem merely semantic, the reason for it is rooted in deep ideological convictions. In Argentina, the term *skills* is linked to neoliberal and pro-market reforms rejected by some parties, including the teachers' unions. Ultimately, a consensus was reached on a document incorporating capabilities that in other contexts would be called 21st century skills.

The official document (Ministerio de Educación Argentina, 2019) establishes six transversal capacities interspersed with cognitive, intrapersonal, and interpersonal traits: (1) problem solving, (2) critical thinking, (3) learning to learn, (4) working with others, (5) communication, and (6) commitment and responsibility (illustrated in Figure 4.1). An innovative aspect of this framework is that these skills are intertwined with digital skills. The emphasis on this combination rests on the idea that today's world requires students to develop a high degree of digital literacy to participate in the future society.

**Figure 4.1. Set of relevant capabilities according to the Comprehensive National Framework for Competency Development (Argentina)**



Source: Ministerio de Educación Argentina (2019) Comprehensive National Framework for Skills Development (Argentina).

## 4. Most Valued Skills

This section presents the three types of 21st century skills that have received the most attention in Latin American education systems: digital, socioemotional, and citizenship. Each of these types of skills was targeted by specific initiatives in the region.

### 4.1. Digital Skills

**One of the most evident conclusions indicated by the analysis of normative texts, curriculum documents, and interviews is that digital skills have received the most attention in the region.** Unlike other 21st century skills that are less concrete or are intermingled with other skills that have long been present in curriculum frameworks, **there are visible efforts to teach digital skills in various countries in the region. These skills are easier to distinguish in study plans and curriculum sections**, allowing introduction in a more institutional format and systematization on a bigger scale.

**Digital skills have a specific place in various national curricula.** Although this is not new, since students have been interacting with specific technological devices for decades from different training spaces, certain countries have innovated in the curriculum content of those spaces. Some have even introduced new curriculum fields such as programming and robotics.

For example, in 2018, **Argentina** approved the **NAPs (Priority Learning Cores) for Digital Education, Robotics, and Programming.** Argentina became the first Latin American country to integrate programming and robotics into all compulsory education through this initiative. The central objective of the NAPs is to offer all students in the country the digital skills and abilities necessary to integrate into contemporary and future digital culture. In addition, the NAPs indicate suggested knowledge for all compulsory levels of schooling. Because Argentina is a federal country, the different provinces



must incorporate these NAPs into their curriculum designs.

In **Chile**, computer and technology education has had its own curriculum space within the subject area of technology for many years. However, **Chile has incorporated more sophisticated elements of curriculum thinking** into recent curriculum reforms. For some academic degrees (such as professional technician with orientation in technology and telecommunications), **greater depth of digital skills** is sought, and subjects such as programming, database design, and digital skills for interdisciplinary projects are included.

**Uruguay** has also made **significant advances in computer science** teaching, using the levers of **Plan Ceibal** (Fowler and Vegas 2021). The Plan Ceibal is a Uruguayan center for technological innovation in education. It was created in 2007 and since then has promoted both social and pedagogical inclusion through the use of digital tools.

Another example is in **Costa Rica**, where 21st century skills have been reflected in the curriculum documents since **1988**, when the **National Educational Informatics Program (PRONIE) was launched**. The documents that created PRONIE mention skills such as critical thinking, problem solving, creativity, and digital skills, among others. Due to its precocious treatment of these skills compared with other countries, Costa Rica is a notable example.

The **Omar Dengo Foundation (FOD)** has been in Costa Rica for more than 30 years, and **it carries out PRONIE together** with the Ministry of Public Education (MEP) of Costa Rica **in a public-private alliance**. Currently, the program includes approximately 4,000 schools, impacting almost 1 million students nationwide.

PRONIE is implemented primarily from preschool through the ninth year of middle school. However, in recent times, the MEP–FOD alliance has also implemented additional proposals for students at technical high schools. In the curriculum from preschool to the ninth year, there are two weekly sessions of 80 minutes each in which PRONIE’s main content is taught. Within the program, there are three main dimensions: (1) the educational computing program, (2) the entrepreneurship and employability program that emerged in 2004, and (3) the mobile technologies program.

The **educational computer science program** has been offered to most of the students reached by PRONIE. In this program, the curriculum (in which both the MEP and FOD participate) is oriented toward developing computational thinking. The **entrepreneurship and employability program** focuses on professional technical colleges through the LABORA platform, an initiative in which students develop and execute a business idea through a simulation process. Finally, **the mobile technologies program** runs 1:1 models and other equipment models (such as cell phones). This program uses a more transversal approach to achieve a higher level of technological mastery by both students and teachers.

One of PRONIE’s main characteristics is that it insists on **the importance of computer science labs**. To promote the development of computational thinking skills, the MEP and FOD decided that it was important to enhance computer science labs and maintain these spaces for teaching digital skills. The computer labs in Costa Rica go beyond a physical space, ensuring a curriculum autonomy dedicated exclusively to digital skills.

Within the framework of the PRONIE program, some schools have carts in which they store mobile devices used in different classrooms. In Costa Rica, this trolley system, called Movilab, is used in some schools. Although the PRONIE program does not follow the model of one laptop per child and

is based instead on computer labs, there are some circumstances in which the 1:1 scheme has been chosen. In general, though, this scheme was reserved for those areas where the digital divide was bigger, such as single-teacher schools or rural high schools.

**PRONIE has worked intensively on teacher training** through a specific training program developed by the MEP–FOD alliance over the years. The focus has also been placed on the daily centrality of counseling and support processes in schools. In addition, PRONIE offers teacher training plans that include training paths and a specific profile aimed at teachers specialized in digital skills.

The importance of digital skills in Costa Rica grew so much that **a major in educational computing was created**, and most Costa Rican schools have specialists in educational computing. Despite this, some program evaluation documents indicate that the initial training of those who aspire to a teaching career still needs improvement.

**Table 4.5. PRONIE in Costa Rica: Outstanding case of promoting digital skills in the region**

### Costa Rica—PRONIE

- » Public–private alliance between the government of Costa Rica and the Omar Dengo Foundation
- » Program developed in around 4,000 schools that has impacted 1 million students
- » Educational computing program that is oriented to the development of computational thinking
- » Program running from preschool through the ninth grade of middle school
- » Computer labs that go beyond a physical space, ensuring a curriculum autonomy dedicated exclusively to digital skills



## 4.2. Socioemotional Skills

Although socioemotional skills have not reached the centrality of digital skills in the Latin American region, there does seem to be a trend toward enhancing their curriculum presence. For example, the Fourth Regional Comparative Study (UNESCO 2020a) included an innovation module at the regional level that sought to investigate conflict resolution and integration among students and different socioemotional skills of students from a number of countries in the region.

In most of the countries included in this study, there are **specific, explicit efforts to incorporate socioemotional skills into curriculum policy**. In some cases, such as **Guatemala and Uruguay, a transversal approach has been adopted**. In both countries, it is understood that this type of skill cannot be readily isolated, so the various curriculum documents specify that every curriculum subject must promote training in socioemotional issues.

Other countries such as **El Salvador and Mexico** allocate **specific spaces to socioemotional skills in curriculum designs**. El Salvador, for example, includes a “Life Orientation” space in which students discuss and reflect on a group of socioemotional skills that an instructor selects.

In 2017, **Mexico** added to its curriculum programs an area called **“Socioemotional Education.”** This space has 30 minutes per week from preschool to high school and meets the requirements of the second component of the Mexican curriculum of personal and social development. The inclusion of this area started a debate in the heart of the educational community of Mexico, since those who opposed it argued that socioemotional education should be taught across the board. However, the position that it was essential to formalize a specific curriculum area beyond transversality for socioemotional skills prevailed.

In this space, there are no learning expectations or levels of achievement, so achievement indicators include skills such as empathy, solidarity, and collaborative participation. These are not evaluated numerically, as was done before the arrival of the new administration in 2018; instead, teachers offer qualitative comments. According to interviewees, the inclusion of a specific curriculum space to promote socioemotional skills was particularly important during the pandemic since a transversality approach would have meant little teaching of these skills due to the need to prioritize traditional academic content.

**Mexico** also has one of the **most outstanding programs in the region for socioemotional skills: the Construye-T (Build Yourself Up) program**, an initiative that began in 2014 and, to date, has had a presence in more than 9,000 public schools in the country (50 percent located in rural areas and 50 percent in urban areas). This program operates through a cooperation agreement between the Secretariat of Public Education of Mexico and the United Nations Development Program (UNDP), and its central objective is to promote socioemotional skills in middle school students.

The program also reaches out to teachers and management: the school principal is the leader of the Construye-T program, and a teacher from the school is designated as the “Tutor T,” the program’s liaison with the various actors in the school. In addition, the school creates a Construye-T school committee that includes teachers, students (and family members), tutors, and principals. The goal of the committee is to improve school environments by strengthening socioemotional skills, and to fulfill that goal, the committee diagnoses the school environment and designs a work plan. Moreover, teachers also implement Construye-T Moments in the classroom, specifically addressing socioemotional skills in 12 sessions of 20 minutes each during the school year.

The Mexican program starts from the idea that socioemotional skills are important for self-knowledge and responsible decision making, and that these skills are also beneficial in terms of academic challenges. Additionally, as indicated in various sections of the program website (<http://construyet.sep.gob.mx/>), scientific evidence suggests that the development of socioemotional skills is positively correlated with the improvement of students' academic performance.

The Construye-T program is made up of three fundamental dimensions: (1) Conoce-T (Get to Know Yourself) to develop self-knowledge and self-regulation, (2) Relaciona-T (Get Social) to develop social awareness and collaboration, and (3) Elige-T (Choose Yourself) to develop responsible decision making and perseverance.

**The Construye-T program also trains teachers** through various workshops. Between 2014 and 2016, 30,000 teachers and 4,000 principals of upper secondary schools were trained (Hernández Zavala et al., 2018). Teacher training equips schools with teachers and tutors who have experience developing socioemotional skills. The program also develops learning communities that allow those who have received training in the management of socioemotional skills to share their knowledge with colleagues.

The Construye-T program has strengthened during the COVID-19 pandemic: new proposals to improve students' physical and socioemotional health included workshops on diseases related to poor nutrition, discussions on obesity, guidance on lifestyle self-diagnosis, and comprehensive sexual education. The program also designed guides for students and teaching and management staff that recommended strategies aimed at socioemotional development at the individual and community levels.

**Table 4.6. Construye T (Build Yourself Up) in Mexico: Outstanding case of promoting socioemotional skills in the region**

### Mexico—Construye T (Build Yourself Up)

- » Cooperation agreement between the Secretariat of Public Education of Mexico and the United Nations Development Program
- » Main objective of promoting socioemotional skills in middle school students, also reaches out to teachers and managers
- » Three fundamental axes: Conoce-T (Get to Know Yourself) to develop self-knowledge and self-regulation, Relaciona-T (Get Social) to develop social awareness and collaboration, and Elige-T (Choose Yourself) to develop responsible decision making and perseverance



It is interesting to note **that most laws refer to citizenship as linked primarily to the national sphere.** For example, the laws of **Nicaragua, Honduras, Guatemala, El Salvador, and Mexico** emphasize the importance of democratic citizens for the benefit of the nation. In **Bolivia**, a plurinational state, the importance of education is highlighted in Article 80 of the 2009 Bolivia Constitution as a mechanism to contribute “to the strengthening of the unity and identity of all citizens, as part of the Plurinational State, as well as to the identity and cultural development of the members of each nation or original indigenous communities.” In **Argentina**, Article 3 of the General Education Law of 2006 establishes that education must promote “the exercise of democratic citizenship, respect human rights and fundamental freedoms, and strengthen the economic-social development of the Nation.”

However, **in other countries, there are national laws that place citizenship skills in a global context.** For example, in **Uruguay**, Article 3 of the General Law of Education of 2009 indicates that the educational system must promote “the responsible exercise of citizenship, as an essential factor of sustainable development, tolerance, and full enforcement of human rights, peace, and understanding between peoples and nations.” Uruguay also has a program that seeks to promote the idea of digital citizenship, which crosses and links the curriculum fields of 21st century skills.

**There is no pattern in the region in terms of the place of citizenship skills in the curricula. In some countries, citizenship skills are a separate subject; in others, they are included in a transversal way** (with a particular emphasis within the social sciences). Chile is one of the countries in the region that has paid the most attention to citizenship skills. In 2020, a group of compulsory subjects was selected for all three existing types of baccalaureates (humanistic-scientific, technical-professional, and media-artistic) that include a series of common skills for all Chilean students. The six subjects are citizenship science, citizenship education, philosophy, English, language and literature, and mathematics—two of the six explicitly include citizenship skills.

**Colombia is one of the pioneer countries in teaching and assessing citizenship skills.** There are various types of evaluations carried out in the primary, secondary, and middle levels through standardized tests (Saber tests) in the third, fifth, and ninth years. In the third year, the focus is on language and mathematics. In the fifth and ninth years, evaluations in sciences and citizen competency were added, and evaluations of socioemotional skills are currently being added.

**Every regulatory framework analyzed mentioned the importance of promoting values and skills related to civic education.**



Colombia's evaluation policy assesses and evaluates citizen competencies through gender identity, diversity, conflict management, and other similar parameters. Citizen competencies are assessed by the Colombian Institute for the Evaluation of Education (ICFES) in the Saber tests through Citizen Thinking (a cognitive component) and Actions and Attitudes (a noncognitive component) questionnaires. One of the interesting aspects of the citizenship evaluation policy is that its development, like the National Policy for Environmental Education in Guatemala, resulted from work in the Ministry of Education spanning different administrations: the centrality of the subject of citizenship competency transcended changes in government.

In 2002, for the first time, a subtest of citizenship competencies was added in the Saber tests in the fifth and ninth years. Two years later, the Colombian Ministry of Education approved the Basic Standards for Citizen Competencies. These standards became the main input for the standardized evaluation of citizen competencies. In 2012, citizenship competencies were incorporated into teaching evaluations: those who wanted a teaching career had to demonstrate citizenship competency knowledge. In 2014, the Saber 11 tests incorporated a subtest of citizen competencies for the first time, meaning that citizenship competencies are now evaluated in Saber 5, 7, PreSaber, 11, Saber T&T (for technical, professional, or technological programs), and Saber PRO (for undergraduate students from educational institutions of the upper level).

Another innovative aspect of the assessment of citizenship skills in Colombia is the evaluation of both cognitive and noncognitive skills. To evaluate cognitive skills, for example, in seventh-year Saber tests, students are asked to identify prejudices or intentions within a speech or statement. They must also demonstrate their knowledge regarding the current normative frameworks that regulate citizenship in Colombia. To evaluate noncognitive civic competencies, such as emotional skills (empathy, solidarity, etc.), students are given hypothetical scenarios based on everyday experiences and must describe their attitudes or possible reactions and actions.

**Table 4.7. Colombia: Outstanding case of citizenship skills assessment in the region**

### Colombia—Citizenship Skills Assessment

- » Citizenship skill assessment policy evaluates cognitive and noncognitive skills
- » Citizen competencies assessed by ICFES in Saber tests through Citizen Thinking and Actions and Attitudes questionnaires
- » Subtest of citizenship competencies added in 2002 for the fifth- and ninth-year Saber tests
- » Colombian Ministry of Education approved the Basic Standards of Citizen Competencies in 2004 to standardize evaluation of citizenship competencies for all levels including teachers

## 5. Policy Implications

### 5.1. Findings

This study offers a comparative overview of 21st century skills in Latin American curricula, highlighting recent state-of-the-art innovations in curriculum reforms and policies and analyzing some notable programs in the region. From this study, several main findings became evident.

- 1. Identifying 21st century skills in curriculum policies is challenging, but even more so in implemented curriculum.** Various teaching sequences already present in curriculum definitions include 21st century skills, but they require pedagogical transformation. Many of the skills are stated in curriculum designs, but in some cases they are mixed with other cognitive constructs in the teaching objectives. One of the primary policy challenges is to define 21st century skills so that they are understandable and practicable for teachers.
- 2. A profound change of pedagogical perspective is necessary to establish a 21st century skills approach in educational systems.** Incorporating 21st century skills in curricula is not only an issue of curriculum reform but also of profound change in pedagogical perspective. Curriculum changes require a sophisticated ability to interact with the beliefs and capacities of the educational system before they can affect teaching practices.
- 3. Introducing 21st century skills into educational systems requires a great capacity for curriculum management and flexible curriculum governance.** The ministries of education in Latin American countries must manage external demands and engage in deliberation about changes and revisions in order to be—not just appear to be—part of a process of real change. These are complex, dynamic learning objectives that must be integrated with other content, disciplines, and areas of knowledge. Curriculum change is more feasible in countries that combine external demands (social, cultural, and labor) with a wide degree of reflection and capacity for pedagogical and curriculum action within the educational system, a combination that is hard to manage. To some extent, Chile seems to be better positioned in this direction since it combines a strong capacity for curriculum governance and autonomy within the system.
- 4. Standard channels of curriculum intervention seem to be more appropriate for influencing systemic direction, focus, and equity than for generating curriculum changes.** Countries with a tradition of centralized intervention and use of the fundamental channels of curriculum regulation, such as curriculum regulations, massive distribution of textbooks, educational programs, teacher training, or standardized assessments can achieve greater regulation. However, these structural pathways are difficult to modify and adapt and are generally more conservative and not very permeable to curriculum revisions. Changing established pedagogical assumptions and making more profound organizational changes is more difficult through standard channels.
- 5. Digital, socioemotional, and citizenship skills are the easiest to identify and integrate.** The 21st century skills easiest to identify and with the most significant impact on recent curriculum reforms are digital, socioemotional, and citizenship skills, which are already part of the emerging knowledge present in many curriculum designs in the region. These skills can be more clearly isolated and integrated into curriculum spaces with a defined time frame and a more systematic set of professional knowledge, both of which favor their systemic reproduction. However, the proposals for curriculum innovation framed in these skills are frequently foreign to the educational system and consider little about schools' working cultures. This creates confusion and increases

the schools' curriculum loads when greater depth, integration, and coherence of the curriculum framework is being sought.

- 6. Informal or private programs are a gateway into the educational system's practices, beliefs, and habits and can initiate curriculum reform.** These channels seem to open more doors to achieve comprehensive changes, but they have limitations in scope (only for small groups of schools) or duration. Moreover, several programs analyzed in this study have an intense short-term policy focus. The big question is about the capacity of these curriculum renovations to influence current standards, not only with the individual actors but also in the design and implementation of educational policies.

## 5.2. Recommendations

From these findings, some preliminary hypotheses can be formulated about different ways in which Latin American curriculum policies can incorporate 21st century skills. The following suggestions for educational policy are recommended.

- 1. Strengthen the states' capacities for curriculum development.** The curriculum agencies in the ministries of education must install reform processes that are sustainable over time. It is essential to train and select nonpolitical curriculum specialists—in a meritocratic way—who can integrate stable teams and go beyond political trades. Some comparative studies on educational systems with better results indicate the importance of a “living institutional center” to maintain the coherence of the curriculum (Schmidt et al., 2001, p. 44). A living institutional center is an area of curriculum design and management within the ministry of education with stable teams and high technical capacities that can constantly interact with teaching practices on a systemic scale, producing curriculum regulations, offering advice and recommendations, providing teaching materials, and constantly evaluating any adaptations that the educational system makes to the new curriculum proposals.
- 2. Encourage a culture of curriculum reflection within the educational system.** Generate spaces for debate, research, and thinking on curriculum transformations. Some authors have called it a coherent and practical “curriculum environment” (Valverde, 2009). It is crucial to avoid the traps of ideological confrontations that curriculum reforms always entail. Generating spaces to discuss 21st century skills with various actors within and outside the educational system can be a fundamental mechanism to incorporate teachers' previous knowledge and generate practicable consensus (Tedesco, 2005).
- 3. Incorporate 21st century skills at the center of curriculum policies.** This is the most structural process of incorporating these skills into teaching and learning practices. It is necessary to coordinate the various curriculum policy channels and instruments: curriculum frameworks and designs, textbooks and educational materials, initial and ongoing teacher training, standardized learning assessments, and others (Cohen & Spillane, 1992). Achieving curriculum coordination and alignment is essential to generate coherence in the system and requires listening to teachers' voices and developing gradual processes that they can integrate into their practices. The literature on curriculum reforms shows the great importance of achieving this coherence within the educational system (Schmidt et al., 2005; Schmidt & Prawat, 2006). As Deng points out, “A successful blending model must strike a balance between top-down and bottom-up approaches. It is necessary to recognize, on the one hand, the key role of teachers as agents of curriculum

change and, therefore, the need for institutional and programmatic curriculum planning to guide, support, and enable curriculum change in the classroom level” (Deng, 2010).

- 4. Define the interrelation between 21st century skills and current curriculum designs.** It is critical to create hinge mechanisms that interact with the 21st century skills in each curriculum area in a transversal manner. Some skills can be taught specifically with an assigned space and specialized teachers (particularly digital and citizenship skills), but most are integrated into the curriculum and make sense in combination with more classic disciplinary content. This process requires their gradual incorporation into various policy instruments (curriculum designs, textbooks, training, evaluations, etc.). The more clearly these skills are taught and the closer they are to teaching practices, the more feasible the changes will be. It is necessary to draw medium-term paths to be sustained over time to make this possible.
- 5. Evaluate achievements and lessons from specific programs incorporating 21st century skills in parallel to the curriculum program.** Some of the programs analyzed in this study have mechanisms that allow testing curriculum change processes with greater speed and depth. Therefore, it is important to implement them along with impact evaluations and make sure they are replicable (in terms of budget, technical conditions, and application policies) so as not to remain on a small scale that is impractical in the complete system.



## Annex I: Methodology

For this study, we primarily used a strategy of documentary analysis, analyzing the leading educational laws of Latin American countries. First, we reviewed the main normative documents of each of the 18 Latin American countries. Then, for each of the national laws, we tried to identify whether the texts explicitly mentioned any of the 20 different 21st century skills listed in Table 2. The objective of this strategy was to generally explore the penetration of 21st century skills. The following table summarizes the legislative documents analyzed in each country.

**Table 8. Legal documents analyzed**

Country	National Law	Current Curriculum Documents
 <b>Argentina</b>	National Education Law No. 26.206 of 2006, subsequent reform of 2015	The Priority Learning Cores for Initial, Primary, and Secondary Education were approved in successive sessions of the Federal Council of Education between 2004 and 2012. The NAP of Digital Education, Programming, and Robotics was approved by the Federal Council of Education on September 12, 2018, through Resolution No. 343/18. However, jurisdictional curriculum designs depend on each province, so there is no common date for all.
 <b>Belize</b>		The Kindergarten Curriculum Framework dates from 2006. In the case of primary school, although there were no modifications to the Curriculum Framework since 2000, there were modifications to the Study Plans (for example, Social Sciences 2015 and Mathematics 2019). In secondary, the Curriculum Guidelines (not compulsory) are from 2005.
 <b>Bolivia</b>	Education Law Avelino Siñani—Elizardo Pérez No. 070 of 2010	The Base Curriculum of the Plurinational State dates from 2012.
 <b>Brazil</b>	General Education Law 9,394 of 1996, subsequent reforms of 2006, 2009, and 2013	The Common Curriculum National Base was approved on December 20, 2017. On December 14, 2018, the Common Curriculum National Base for secondary education was approved. Jurisdictional curriculum designs depend on each state.
 <b>Chile</b>	General Education Law of 2009	Two documents are in force: the Curriculum Framework and the Curriculum Bases. Since the enactment of the 2009 law, the Curriculum Bases have been the new main document of the national curriculum. The Curriculum Bases of Basic and Middle Education have been under development since 2012 (by subjects). The Kindergarten Curriculum Bases have been in force since 2005.

	<b>Colombia</b>	General Law of Education of 1994, subsequent reform of 1997	Decree No. 1290 of 2009 reaffirmed the autonomy of educational institutions to shape their curriculum. However, the national government offers curriculum guidelines (1998). These documents serve as a reference for schools.
	<b>Costa Rica</b>	Fundamental Law of Education of 1957, updated in 2017	The current curriculum plans in Costa Rica date from 2016 and 2017. Before these curriculum proposals, the programs were from the mid-1990s. Since 2009, there have been 46 reforms of all subjects' study programs.
	<b>Ecuador</b>	Organic Law of Intercultural Education of 2011, subsequent reform of 2016	The current curriculum came into effect in the Sierra Regime in September 2016 and the Coastal Regime in 2017. In the case of Cultural and Artistic Education and Physical Education, the curricula became effective in 2016.
	<b>El Salvador</b>	General Education Law of 1994, updated in 2014	The current curriculum framework is from 2014. The present study programs are from 2015. There were some modifications in the Basic Education study plans in 2019.
	<b>Guatemala</b>	National Education Law Legislative Decree No. 12 of 1991	The National Base Curriculum is from 2010.
	<b>Honduras</b>	Fundamental Law of Education Decree No. 262 of 2011, subsequent reform of 2014	The Basic National Curriculum is the framework document that guides all the curriculum work in the classroom. The current curriculum designs date back to 2004; however, they began to be used in 2006.
	<b>Mexico</b>	General Education Law of 1993, subsequent reform of 2017	The current curriculum dates from 2017, although two curriculum models still coexist: the 2011 and 2017 models.

**Nicaragua**

Law No. 582 General Education Law of 2006

The current curriculum framework for Initial Education is from 2017. The curriculum framework for the primary and secondary levels is from 2019.

**Panama**

Organic Law of Education of 1946, updated in 2003

The current curriculum programs are from 2014.

**Paraguay**

General Education Law of 1998

The Curriculum Design of Basic Bilingual Education for Young People and Adults is from 2011.

**Peru**

General Education Law No. 28.044 of 2003

The National Curriculum of Basic Education is from 2016.

**Uruguay**

General Education Law 18,437 of 2009

This law contains the minimum curriculum components of Uruguay.

**Venezuela**

Organic Law of the Bolivarian Republic of Venezuela of 2009

The current curriculum design is from 2007.

Once we had analyzed the main normative texts of each of the countries included in this study, we looked at the current curriculum documents and used qualitative coding techniques to identify the most important subject categories that emerged. For example, it emerged very clearly that some skills—such as digital and citizenship skills—had been explicitly mentioned, but others had not achieved much penetration. This is not to say that these skills are not included in the curriculum documents, but rather that they were much more difficult to isolate from other competencies, content, and skills defined by the curriculum frameworks.

The documentary analysis of current primary sources (national laws and curriculum frameworks) informed our development of data collection questionnaires for qualitative fieldwork. We conducted 25 interviews with current or outgoing officials from 13 of the 18 countries included in this study. The interviews lasted between 40 and 120 minutes. Although we originally intended to interview at least one curriculum reference from each country, unfortunately we could not contact representatives from Bolivia, Guatemala, Nicaragua, Panama, or Venezuela.

In addition to the analysis of these primary sources, we analyzed various secondary sources, including research, studies, and documents concerning curriculum reforms in the 18 countries.

## Annex 2: Limitations

To understand the penetration of 21st century skills in Latin American schools, it is necessary to enter school classrooms or carry out comparative studies of the prescribed curriculum, the taught curriculum, and the learned curriculum (Elmore & Sykes, 1992). Verifying the incorporation of these skills requires, for example, making class observations or studying curriculum application documents (class notebooks, exams, etc.) to understand whether what appears in the curriculum records is materialized in concrete actions. However, due to the methodological design of this work, we have not been able to empirically verify whether 21st century skills have been effectively incorporated into the teaching and learning processes.

Another limitation of our study is that we only analyzed national curriculum frameworks. However, in many countries studied, the curriculum policy is a fundamental component on the subnational level, and there are numerous examples of 21st century skills being introduced at that level of government that were not analyzed here.

On the other hand, our study found limitations inherent in the conceptual definition of 21st century skills. Many of these skills, such as empathy, critical thinking, self-regulation, perseverance, and creativity, are immersed in skills curriculum designs and in each specific teaching field. Their place in curriculum designs is complicated to discern and can only be located within teaching practices. Some skills are excepted from this difficulty: those that can be more clearly defined and distinguished as more solid fields of training with professionals trained to teach them, which allows them to be isolated in curriculum nuclei, time schedules, and specific intervention programs. Some of these programs are analyzed in detail in this report, such as those training digital or socioemotional skills.

## References

- Adelantado, J., Noguera, J. A., & Rambla, X. (2001). *Cambios en el estado de bienestar: Relaciones entre estructura social y políticas sociales*. Icaria.
- Amadio, M., Opertti, R., & Tedesco, J. C. (2014). *Un currículo para el siglo XXI: Desafíos, tensiones y cuestiones abiertas* (Investigación y Prospectiva en Educación Documentos de Trabajo ERF, No. 9). UNESCO. <https://repositorio.minedu.gob.pe/handle/20.500.12799/3126>
- Ball, S. J. (2010). New voices, new knowledges and the new politics of education research: The gathering of a perfect storm? *European Educational Research Journal*, 9(2), 124–137. <https://doi.org/10.2304%2Ffeerj.2010.9.2.124>
- Ball, S. J., Maguire, M., & Braun, A. (2012). *How schools do policy: Policy enactments in secondary schools*. Routledge.
- Ball, S. J., & Youdell, D. (2009). Hidden privatisation in public education. *NUT Education Review*, 21(2), 73–83.
- Bernstein, B. (1998). *Pedagogía, control simbólico e identidad: Teoría, investigación y crítica*. Morata.
- Bocconi, S., Chiocciariello, A., Dettori, G., Ferrari, A., & Englehardt, K. (2016). *Developing computational thinking in compulsory education: Implications for policy and practice* (JRC Science for Policy Report). Joint Research Centre, European Commission.
- Bruner, J. (1977). *The process of education*. Harvard University Press.
- Cardini, A., Sanchez, B., & Morrone, A. (2019). *Transitar la educación secundaria en el mundo: Análisis comparado de las propuestas curriculares de 11 sistemas educativos* (Documento de Trabajo No. 163). CIPPEC. <https://bit.ly/2OjD1Om>
- Carnoy, M. (1999). *Globalization and educational reform: What planners need to know* (Fundamentals of Educational Planning). UNESCO. <http://unesco.amu.edu.pl/pdf/Carnoy.pdf>
- Cohen, D. K., & Spillane, J. P. (1992). Policy and practice: The relations between governance and instruction. *Review of Research in Education*, 18(1), 3–49. <https://doi.org/10.3102/0091732X018001003>
- Coll, C. (2006). Cada vez que ha habido cambio curricular, ha sido como resultado de un debate ideológico y no del análisis de las evaluaciones. *Docencia*, 29, 30–39.
- Darling-Hammond, L. (2007). Third annual *Brown* lecture in education research—The flat earth and education: How America's commitment to equity will determine our future. *Educational Researcher*, 36(6), 318–334. <https://doi.org/10.3102/0013189X07308253>
- Deng, Z. (2010). Curriculum planning and systems change. In P. Peterson, E. Baker, & B. McGaw (Eds.), *International encyclopedia of education* (3rd ed., pp. 384–389). Elsevier.
- Díaz-Barriga Arceo, F. (2012). Reformas curriculares y cambio sistémico: Una articulación ausente pero necesaria para la innovación. *Revista Iberoamericana de Educación Superior*, 3(7), 23–40. <https://www.redalyc.org/pdf/2991/299129031002.pdf>
- Elmore, R., & Sykes, G. (1992). Curriculum policy. In P. W. Jackson (Ed.), *Handbook of research on curriculum* (pp. 185–215). Macmillan.
- Evers, J., & Kneyber, R. (Eds.). (2015). *Flip the system: Changing education from the ground up*. Routledge.
- Fadel, C., Bialik, M., & Trilling, B. (2015). *Four-dimensional education: The competencies learners need to succeed*. Center for Curriculum Redesign.
- Fowler, B., & Vegas, E. (2021). *How Uruguay implemented its computer science education program*. Center for Universal Education, Brookings Institution.
- Fullan, M. (2007). *The new meaning of educational change*. Routledge.

- Fullan, M., Quinn, J., & McEachen, J. (2018). *Deep learning: Engage the world change the world*. Corwin.
- Gardner, H. (2002). *La mente no escolarizada: Cómo piensan los niños y cómo deberían enseñar las escuelas*. Paidós.
- Giroux, H. A., & Schmidt, M. (2004). Closing the achievement gap: A metaphor for children left behind. *Journal of Educational Change*, 5(3), 213–228. <https://doi.org/10.1023/B:JEDU.0000041041.71525.67>
- Hernández Zavala, M., Trejo Tinoco, Y., & Hernández, M. (2018). El desarrollo de habilidades socioemocionales de los jóvenes en el contexto educativo. *Red*, 9, 88–97. <https://www.inee.edu.mx/wp-content/uploads/2018/12/Red09.pdf>
- Jara, I. (2016). *Revisión comparativa de iniciativas nacionales de aprendizaje móvil en América Latina: El caso del plan Ceibal de Uruguay*. IPE-UNESCO. <http://cdi.mecon.gov.ar/bases/docelec/az3186.pdf>
- Jessop, B. (2008). The rise of governance and the risks of failure: The case of economic development. *International Social Science Journal*, 50(155), 29–45. <https://doi.org/10.1111/1468-2451.00107>
- Kelly, A. V. (2009). *The curriculum: Theory and practice*. SAGE.
- Lingard, B., & Sellar, S. (2013). Globalization, edu-business and network governance: The policy sociology of Stephen J. Ball and rethinking education policy analysis. *London Review of Education*, 11(3), 265–280. <http://dx.doi.org/10.1080/14748460.2013.840986>
- Maggio, M. (2018). *Habilidades del siglo XXI: Cuando el futuro es hoy—XIII Foro Latinoamericano de Educación*. Fundación Santillana.
- Magro, C. (2017). *21 habilidades veintiuno*. Fundación Santillana. <https://fundacionsantillana.com/wp-content/uploads/2020/04/21-habilidades-VEINTIUNO-2.pdf>
- Ministerio de Educación Argentina (2019). Marco Nacional de integración de los aprendizajes: hacia el desarrollo de capacidades. Presidencia de la Nación, Buenos Aires, Argentina.
- Ministerio de Educación Chile (2019). Bases curriculares 3 y 4 medio. Unidad de Currículum y Evaluación, Santiago, Chile.
- Mourshed, M., Chijioko, C., & Barber, M. (2012). *Cómo continúan mejorando los sistemas educativos de mayor progreso en el mundo* (Serie Documentos No. 61). PREAL. <http://200.6.99.248/~bru487cl/files/McK61.pdf>
- Nelson, J. M. (2004). The politics of education sector reform: Cross-national comparisons. In R. R. Kaufman & J. M. Nelson (Eds.), *Crucial needs, weak incentives* (pp. 249–270). Johns Hopkins University Press.
- Perkins, D. N. (2014). *Future wise: Educating our children for a changing world*. Jossey-Bass.
- Perryman, J. (2006). Panoptic performativity and school inspection regimes: Disciplinary mechanisms and life under special measures. *Journal of Education Policy*, 21(2), 147–161. <https://doi.org/10.1080/02680930500500138>
- Piattoni, S. (2010). *The theory of multi-level governance: Conceptual, empirical, and normative challenges*. Oxford University Press.
- Reimers, F. M., Chopra, V., Chung, C. K., Higdon, J., & O'Donnell, E. B. (2016). *Empowering global citizens: A world course*. CreateSpace.
- Reimers, F. M., & Chung, C. K. (2016). *Teaching and learning for the twenty-first century: Educational goals, policies, and curricula from six nations*. Harvard Education Press.
- Rivas, A. (2013). *Educar hoy en el conurbano Bonaerense*. Aique.
- Rivas, A., Veleza, C., & Mezzadra, F. (2013). *Caminos para la educación: Bases, esencias e ideas de política educativa*. Granica.
- Schmidt, W. H., McKnight, C. C., Houang, R. T., Wang, H., Wiley, D. E., Cogan, L. S., & Wolfe, R. G. (2001). *Why schools matter: A cross-national comparison of curriculum and learning*. Jossey-Bass.

- Schmidt, W. H., & Prawat, R. S. (2006). Curriculum coherence and national control of education: Issue or non-issue? *Journal of Curriculum Studies* 38(6), 641–658. <https://doi.org/10.1080/00220270600682804>
- Schmidt, W. H., Wang, H. C., & McKnight, C. C. (2005). Curriculum coherence: An examination of US mathematics and science content standards from an international perspective. *Journal of Curriculum Studies* 37(5), 525–559. <https://doi.org/10.1080/0022027042000294682>
- Schwab, K. (2017). *La cuarta revolución industrial*. Penguin Random House.
- Swartz, R. J., Costa, A. L., Beyer, B. K., Reagan, R., & Kallick, B. (2013). *El aprendizaje basado en el pensamiento: Cómo desarrollar en los alumnos las competencias del siglo XXI*. Ediciones SM.
- Tedesco, J. C. (2005). *Pactos educativos: Difíciles pero necesarios*. Fundación Santillana.
- UNESCO. (2020a). *¿Qué se espera que aprendan los estudiantes de América Latina y el Caribe? Análisis curricular del Estudio Regional Comparativo y Explicativo (ERCE 2019)*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000373982?posInSet=33&queryId=3c96ff1e-b895-4232-8df4-04c3dd5c11b7>
- UNESCO. (2020b). *Análisis curricular Estudio Regional Comparativo y Explicativo (ERCE 2019): Hallazgos y reflexiones en el marco de la Agenda 2030 para el desarrollo sostenible en América Latina y el Caribe*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000373976?posInSet=55&queryId=73795b1c-c915-4ee9-b9d8-d5ab97238cef>
- Valverde, G. A. (2009). Estándares y evaluación. In S. Schwartzmann & C. Cox (Eds.), *Políticas educativas y cohesión social en América Latina* (pp. 57–88). Uqbar Editores.
- Volante, L. (2004). Teaching to the test: What every educator and policy-maker should know. *Canadian Journal of Educational Administration and Policy*, 35.

## Chapter 5

# Evidence-based Behavioral Interventions to Boost 21st Century Skills



## Chapter 5

# Evidence-based Behavioral Interventions to Boost 21st Century Skills



### Abstract

Behavioral interventions can be low-cost, scalable, and culturally relevant tools for developing 21st century skills as a part of curriculum reform. In this chapter, we introduce (1) evidence-based educational interventions and their insights, (2) an effect size metric that can help in assessing the cost-effectiveness of such interventions, and (3) a process for adapting successful interventions for application in a different culture.

This chapter highlights three types of behavioral interventions that can be a useful part of education curriculums for developing students' 21st century skills in Latin America and the Caribbean (LAC). The first type of intervention, labeled "educational nudges," targets behavioral barriers and biases that impede learning and achievement in schools, often through direct communication (e.g., SMS reminders). Second, "wise interventions" target the ways in which pupils interpret themselves and their environments, which can in turn change how they respond to challenging situations. Wise interventions are often implemented as short exercises that can be completed with pen and paper, and they seem to be most useful before or after critical transitions. Finally, "social-emotional learning interventions" explicitly target the development of social and emotional skills and are often delivered as programs (i.e., sequences of exercises typically integrated into the curriculum). For each intervention, we present scientific evidence and theoretical justification to help policymakers decision making.

LAC governments should consider the careful inclusion of evidence-based educational behavioral interventions in their curriculums as a part of their policy tool kit to develop 21st century skills.

## 1. Introduction

Twenty-first century skills are crucial to students' ability to navigate our ever-changing world (see also Mateo et al., 2019), and education nurtures these 21st century skills in various ways. Still, 21st century skills can and should be more comprehensively integrated into school curriculums, including via behavioral interventions, to improve schoolchildren's emotional and socioeconomic outcomes later on in life. In this chapter, we discuss behavioral interventions that focus on supporting the development of these skills and that can be administered either during class time or otherwise with relatively high cost-effectiveness as a part of curriculums for 21st century skills. These interventions, drawn from the behavioral science evidence base, should be considered complementary tools for curriculum designers to employ in their efforts to create curriculums that support the development of 21st century skills.

In this chapter, we focus on three main objectives:

**1.**

**To introduce interested readers to promising, low-cost, and evidence-based behavioral interventions for education**

**2.**

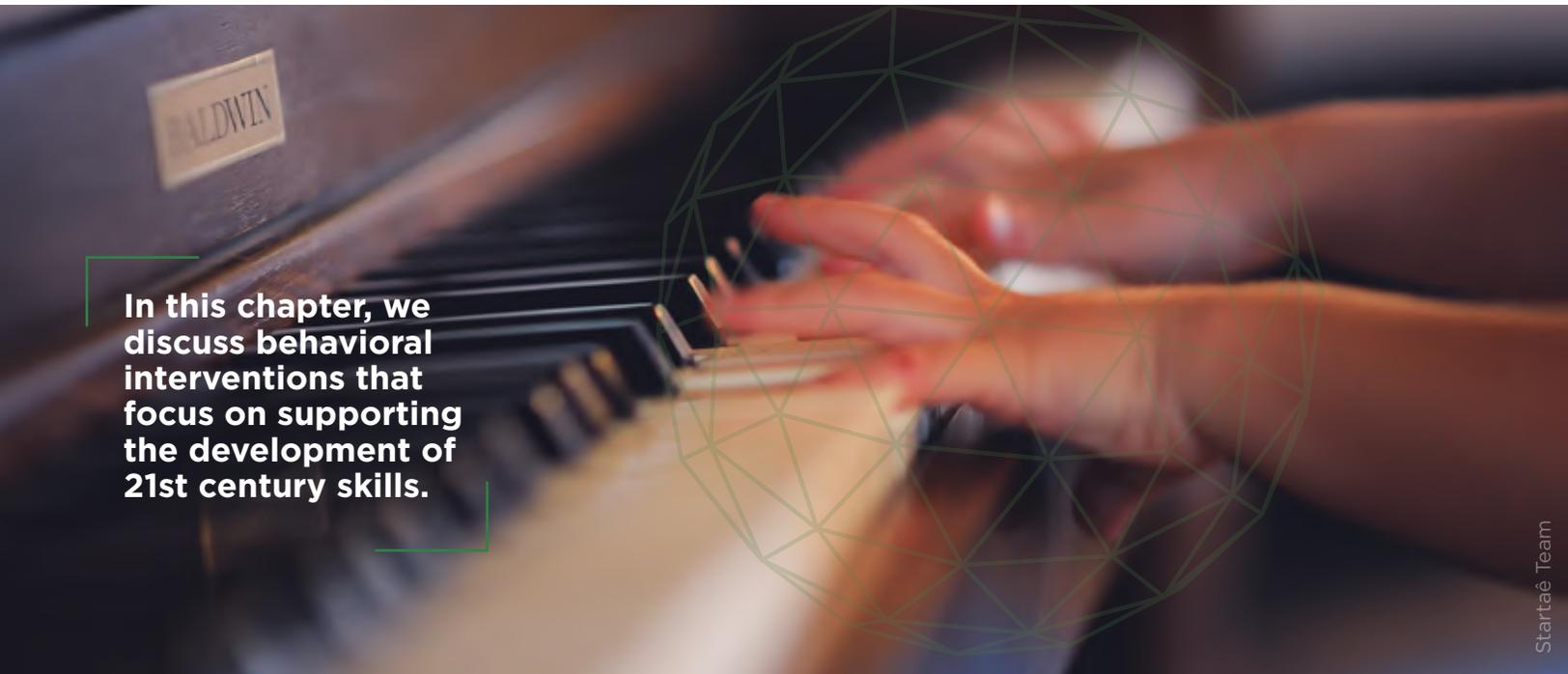
**To empower readers to make their own judgments about the cost-effectiveness of interventions**

**3.**

**To encourage policymakers to invest in the adaptation, implementation, and testing of these interventions in Latin America and the Caribbean (LAC)**

Further, we hope this chapter can spark a conversation about how to incorporate evidence-based interventions from the behavioral sciences into school curriculums in a manner that will facilitate the development of 21st century skills.

The chapter highlights interventions that can be broadly categorized into three distinct groups, as summarized in Table 5.1.



**In this chapter, we discuss behavioral interventions that focus on supporting the development of 21st century skills.**

**Table 5.1. Overview of the types of interventions included in this chapter**

	Educational nudges	Wise interventions	Social-emotional learning interventions
Description	Target behavioral barriers and biases that impede learning and achievement in school	Target the students' perceptions and interpretations of themselves and their environment, helping them create more adaptive responses and interpretations to achieve their goals	Target the development of social and emotional skills that extend beyond academic achievement, helping students develop interpersonal competencies
Example cost (in USD)	~\$0.00075-\$2/student	~\$3/student	~\$162/student
Effect size (SMD)	0.08-0.35	0.09-0.13	0.07-0.36
Methods	Direct communication (e.g., via text messages or mail)	Short in-class activities/exercises	Sequences of exercises typically integrated into the curriculum
Target population	Parents, students	Students	Students
Examples	SMS reminders encouraging students to return to school	Belonging interventions, growth mindset interventions, self-affirmation interventions	Coping Power Universal

## 2. Evidence-based behavioral interventions for education

### 2.1. Educational nudges

A curriculum to develop 21st century skills will not be successful unless students actually engage with the curriculum content in a sustained manner. At a basic level, this means attending classes and enrolling in school the next year. Unfortunately, LAC students often suffer from various forms of disengagement, hampering their development of 21st century skills. One low-cost way to address this disengagement, and thus indirectly promote skill development, is through “nudges.”

Nudges are brief, low-cost interventions that can be administered in schools to elicit positive behaviors in participants, for example, encouraging students to stay in school (as opposed to dropping out) and pursue further education. Nudges are derived from heuristics and biases research within the field of behavioral economics (e.g., Kahneman, 2011) and focus on providing prompts and/or reminders within a participant’s environment to positively influence the choices they make. Some recent applications of nudges include the following:

**1**

**Improving class attendance** (Kalil et al., 2019; Lasky-Fink et al., 2021; Robinson et al., 2018; Rogers & Feller, 2018)

**2**

**Improving academic performance** (Bergman, 2019; Bergman & Chan, 2018; Clark et al., 2020)

**3**

**Reducing dropout from school** (Kraft & Rogers, 2015; Oreopoulos et al., 2019)

**4**

**Encouraging students to apply to university** (Bettinger et al., 2012)

Following are some behavioral barriers that can help explain low investment in education and that can be targeted by nudges:<sup>1</sup>

- ➔ **Present bias:** We tend to overvalue present rewards as compared to future rewards. For example, a student might prefer to watch television now (present reward) instead of studying for their upcoming exam (present cost), even though in the future, they would value passing the exam (future reward) more than having watched the show.
- ➔ **Limited cognitive bandwidth:** We are unable to accurately process, access, and use all the information available to us at all times, which can lead to poor decisions. For example, a student may be overwhelmed by all the information regarding financial aid and scholarship choices if presented with a long list from a career counselor or online searches and may end up deciding not to pick a college at all.
- ➔ **Salience:** We tend to pay attention to and give more credence to things that appear more frequently in our surroundings. For example, if a student sees posters around school suggesting that signing up for a university fair is a great way to meet recruiters and find out about university programs, they are more likely to attend the fair than they would be if there weren’t as many posters around.

<sup>1</sup> Interested readers should refer to Damgaard and Nielsen’s (2018) study as well as Lavecchia and colleagues’ (2015) work for more detailed treatment.



**Nudges in the form of small prompts can help educators and policymakers to keep students engaged in curricular activities.**

Freepik

We focus on **nudges aimed at both parents and schoolchildren**, highlighting interventions conducted in the LAC region in particular that involve

- 1 nudging student persistence **or**
- 2 nudging parental engagement and involvement in their child's learning.



### **Encouraging prompts to motivate students to return after COVID-19 lockdown: A case from Brazil**

A recent experiment carried out in Goiás, Brazil, tested whether adolescents could be motivated to stay engaged with their learning while classes were suspended due to COVID-19 (Lichand & Christen, 2020). Students at 57 public schools received encouraging text messages twice per week ( $N = 12,056$ ), while students in the control group (across 30 additional schools) did not receive SMS texts. Treatment was assigned at the school level and stratified by gender, grade, and phone ownership.

The researchers collected two outcomes:

**1. Engagement with online learning activities during the semester**

**2. Intention to return to school after the lockdown**

Students who received the nudges (educational text messages) showed a **4.6 percentage point reduction in dropout from the online learning activities** during the experiment (from 6 percent to 1.4 percent). What's more, prior to the resumption of classes, these students reported being **more motivated to return to school than those in the control group**. It should be noted that the researchers were able to collect *intentions to return to school*, rather than actual behaviors. The authors announced<sup>2</sup> that the Goiás Secretariat of Education decided to continue the intervention once schools reopened.<sup>3</sup>

2 See the American Economic Association registry for the trial, including the pre-analysis plan, at <https://www.socialscienceregistry.org/trials/5986>.

3 In addition to extending the intervention period, the following long-term outcomes are to be collected: attendance, grades, grade repetition, and school dropout.

This intervention shows that **small prompts can help educators to keep students engaged in curriculum activities**. The authors suggest that the SMS messages kept the topic of learning top of mind and redirected students' attention accordingly. More generally, this example, and the principles behind it, underscores how nudges can be flexibly used to make sure as many students as possible continue to follow a curriculum even in the face of unpredictable disruptions.



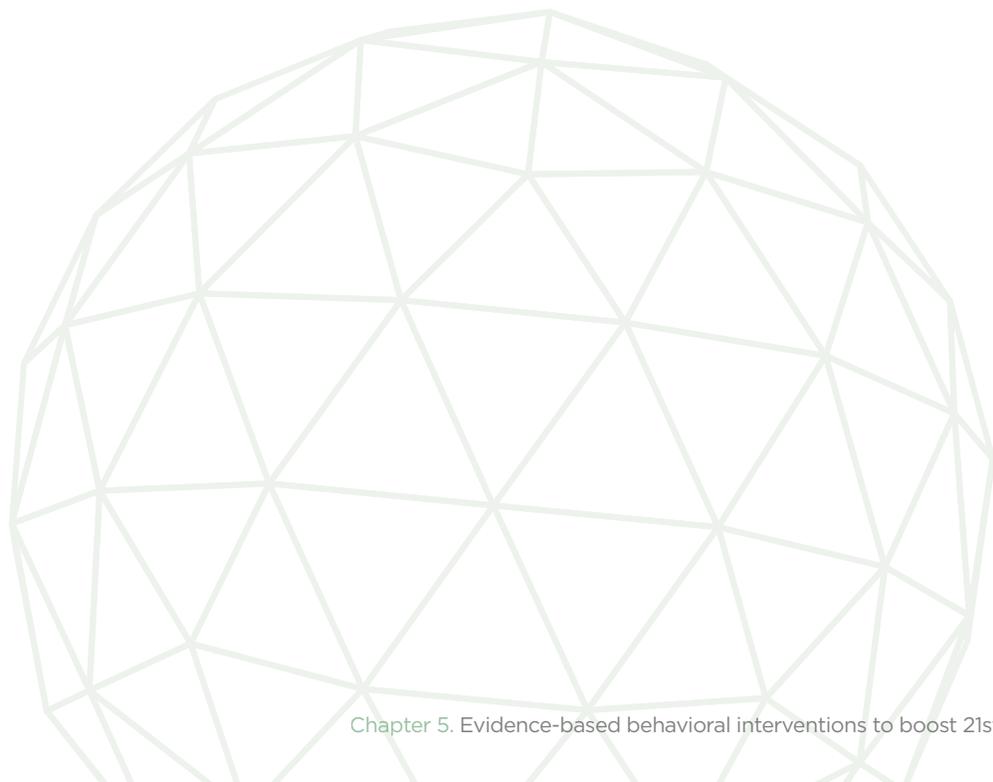
## Planning prompts and personalized coaching support to encourage planning and time management

We now turn our attention to assessing which methods are best for administering personalized communications to students.

Low-, medium-, and high-intensity interventions involving several types of personalized communications were implemented and evaluated over five years, with a sample of more than 25,000 students (Oreopoulos & Petronijevic, 2018). The outcomes of the various interventions were as follows:

- ➔ One-way automated text messages did not improve academic outcomes.
- ➔ Two-way text messaging, in contrast, did show moderate success.
- ➔ Face-to-face coaching significantly improved academic outcomes, with a 0.3 standardized mean difference (SMD) increase in grades and a 0.35 SMD increase in grade point average (GPA), which is equivalent to 5.95 percentage points.

Table 5.2 provides additional detail.



**Table 5.2. Summary of interventions involving personalized communications and their outcomes**

Intensity	Study authors	Delivery	Impact	Cost
<b>Low</b>	<b>Dobronyi et al. (2019); Oreopoulos and Petronijevic (2018)</b>	One-way text messaging campaign offering general encouragement, study preparation advice, and reminders. The messages were designed not to elicit a response from students.	The treatment had no observable main effect on the distribution of grades. Subgroup analyses of at-risk students also did not show a positive effect of the intervention.	The marginal cost of the one-way texts was low; each SMS cost US\$0.0075.
<b>Medium</b>	<b>Oreopoulos et al. (2019, 2020)</b>	Coach consultation via text message. Student coaches initiated two-way conversations and offered personalized support. Each student coach supported up to 100 students.	The two-way text messages did not have a significant effect on grades or credit accumulation (0.08–0.12 SMD, not significant), but impacted nongrade outcomes: students reported a greater sense of belonging, higher subjective well-being, and increased study time.	The cost of text messages sent throughout the intervention period was approximately US\$2 per student. This does not account for the cost of building the online platform that student coaches used to send out text messages.
<b>High</b>	<b>Oreopoulos and Petronijevic (2018)</b>	A small subset of randomly selected students met with coaches once a week for 30–60 minutes. They received counseling regarding their personal challenges. Students also received follow-up text messages from their coaches.	The face-to-face coaching program significantly improved academic outcomes, with a 0.3 SMD increase in average course grades and a 0.35 SMD increase in GPA.	The personal coaching program was costly: approximately US\$765 per student per year.

We can draw the following conclusions from these interventions:

- ➔ **Automated and one-way messages did not boost grades**, as, at least in the intervention highlighted above, the one-way text messaging campaign was not comprehensive enough to sustain long-term behavior change (Oreopoulos et al., 2019). Text messages can be delivered to thousands of students at a time, but **they lack the crucial aspect of a personal connection between coach and student**.
- ➔ **While student grades did not improve significantly in the two-way text messaging program with senior student coaches, treated students did report greater subjective well-being**, which is relevant.
- ➔ **Personalized coaching interventions are high-cost and high-impact initiatives**. The face-to-face coaching intervention was delivered to very few students ( $N = 17$ ), as it was expensive to implement on a larger scale.



## Breaking the cycle of intergenerational disadvantage through parental involvement with learning: Interventions targeting parents

**When parents engage in an active and positive way in their child's learning, they help create a positive home environment** in which children feel safe and confident enough to explore their interests and develop transversal skills at home. This has a knock-on effect, leading to more positive and effective school interactions (on the child's part) and higher-quality support to the child.

The following case studies further exemplify how parental involvement benefits children.



## Colombia: Informing parents about their child's performance using report cards

Researchers working with 31 schools in the city of Manizales in Colombia delivered factual and tailored information about student behavior to parents of children in grades four and five (ages 9–10) (Barrera-Osorio et al., 2020). This intervention was delivered as a randomized controlled trial (RCT) with two intervention groups and one control group (see Table 5.3 for a summary).

Parents in the intervention groups received a one-page report card with the following information:

- 1 Information about their child's performance in math and reading.
- 2 Information about their child's performance in comparison to the average performance in the class and grade. Parents in the first intervention group received information about the child's **ranking within the school**, while parents in the second intervention group received information about the child's **ranking within the whole city**, across the 31 participating schools.

- 3 Practical suggestions on how to engage with their child's learning in reading and mathematics. Parents assigned to both the first and second intervention groups received suggestions about how to discuss progress in school and how to incorporate math and English into everyday activities in the home.

The third group of parents (the control group) did not receive any information or practical suggestions. The students whose parents received the practical suggestions and other communication materials performed better on school tests in comparison to the students who were in the control group.<sup>4</sup> Additionally, this intervention is scalable and inexpensive, with the annual cost estimated at US\$7.50 per child.<sup>5</sup>



### São Paulo, Brazil: Informing parents via automated and personalized text messages

Cunha and colleagues (2017) tested whether it is necessary to personalize text messages to parents with information about their child's performance. They sent parents information regarding the benefits of attendance and completing school assignments, and varied the level of personalization. Some parents received detailed information about their child's performance (informational messages), while others received generic messages omitting personalized information (awareness messages):

- 1 **The informational messages** conveyed personalized information about their child's attendance, punctuality, and assignment completion in math. An example text message read: *"Nina missed fewer than 3 classes over the last 3 weeks."*
- 2 **The awareness messages** did *not* contain personalized information about their child's math performance, but only general messages about the importance of school. An example text read: *"For a good school performance, it is important that Nina doesn't miss school for no reason"* (Cunha et al., 2017, p. 10).

Students in the intervention groups **missed fewer classes, were more likely to be promoted to the next grade, and had higher math test scores than students whose parents did not receive any texts.**

The main takeaway from this intervention is that sending detailed information to parents may not be necessary in all contexts, and that simply **drawing attention to the benefits of consistent attendance and completing assignments** (Bettinger et al., 2020) can be sufficient: the outcome improvements attributable to the awareness messages were 89–129 percent of the outcome improvements attributable to the informational messages (Cunha et al., 2017), meaning **they were about equally as effective.**

Thus, it appears that practitioners may be able to generate the positive effects of awareness in their own schools by sending generalized messages to parents, without needing to have detailed information regarding each child's academic achievement.

4 The effect sizes are 0.10 SMD for the first treatment condition and 0.09 SMD for the second treatment condition and range from 0.20 to 0.28 for students who scored in the lower 25th percentile in baseline mathematics and reading scores.

5 Unfortunately, the researchers also found that these positive effects did not persist over the long term. The researchers suggest that parents' investment in their child's learning may have returned to pre-intervention levels. It seems fair to suggest, therefore, that any information intervention should be repeated over time.

**Table 5.3. Summary of the intervention groups and main results for the Manizales intervention**

	Control group	First treatment group	Second treatment group
Intervention	No intervention.	Report card with info on the child's performance in math and reading, including the child's ranking within the school. Practical suggestions on how to engage with the child's learning in reading and mathematics.	Report card with info on the child's performance in math and reading, including the child's ranking within the whole city. Practical suggestions on how to engage with the child's learning in reading and mathematics.
Main results	This group formed the baseline.	0.10 SMD improvement on standardized tests relative to the control group.	0.09 SMD improvement on standardized tests relative to the control group.

Fuente: Cunha et al. (2017)



### Message guidelines from the interventions

As the studies highlighted above indicate, text messages directed at parents show promise in improving student outcomes. Studies involving parent information interventions offer the following insights on how to construct message content:

- ➔ **Make a specific topic top of mind.** A message, whether in the form of a text message, email, or letter, acts as a prompt to draw attention to a specific piece of information.
- ➔ **Empower parents to become more involved with their child's learning.** Research shows that low-income parents in particular have low confidence about their ability to help their children (Harris & Goodall, 2008). **Reframing** their perceptions by offering **clear, timely, and easy-to-implement tips** can set in motion a positive feedback loop between parent and child.
- ➔ **Be frequent but don't overwhelm.** Most of the high-impact parent communication interventions are designed to deliver information at a relatively high frequency. Future messaging initiatives should experiment to determine the ideal frequency of communications, as this may depend heavily on contextual factors. It is also clear from the intervention delivered in Colombia (Barrera-Osorio et al., 2020) that a one-time reminder is unlikely to result in long-term improvements in parental involvement.
- ➔ **Communicate when parents have enough time to actively engage with their children.** Across the globe, working parents are typically too busy during the week to actively spend time with their children after work, in addition to the myriad of other barriers they face, such as not having access to information on how to be more supportive. Cortes and

colleagues (2019) found that, particularly for children who were on the lower-achieving end of the performance spectrum, text messages sent to parents on the weekend helped improve children's reading and math skills more than text reminders sent during the week.

Curriculums are meant for the classroom. But what if personal and behavioral barriers prevent students from experiencing the content developed for them? **In this section, we have shown that educational nudges can be a useful tool to ensure that the skills incorporated into a given year's curriculum are actually learned by as many students as possible within that year.** In the future, we hope that the body of research from which we drew the highlighted examples expands in size and robustness through the application and evaluation of more educational nudges in school curriculums.



## 2.2. Wise interventions

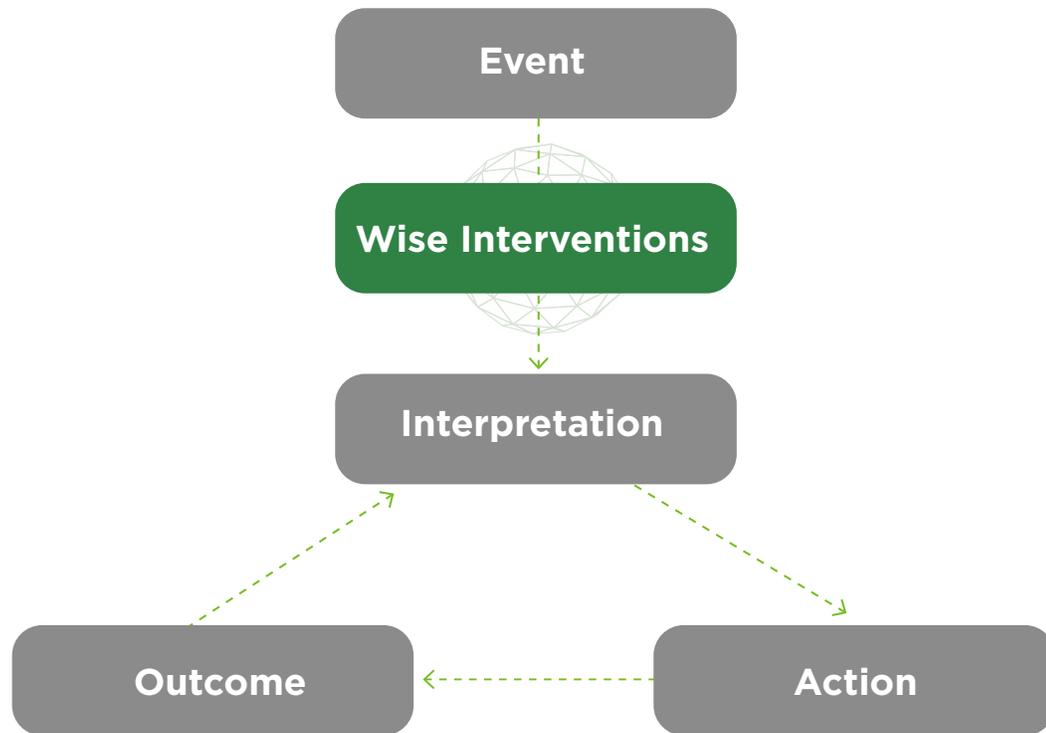
**How we perceive the world around us and how we perceive ourselves matters**, in terms of both the emotions we experience and the actions we take in response. What's more, the actions we take then contribute toward shaping our environment, resulting in positive and negative feedback loops (see Table 5.4). **Wise interventions (Figure 5.1) attempt to redirect negative or unhelpful loops by altering people's interpretations at the right moment** (Walton & Wilson, 2018).<sup>6</sup>

**Table 5.4. Exemplifying a negative feedback loop in contrast to a positive loop after a wise intervention**

Structure of a feedback loop: Event -> Interpretation -> Action -> Outcome -> Interpretation -> ...	
	
<b>Negative loop</b>	<b>Positive loop after wise intervention</b>
<p><b><i>“I’m struggling to complete my physics assignments.”</i></b></p> <ul style="list-style-type: none"> <li>• “I must simply not be good enough for this.”</li> <li>• “I suppose I don’t need to attend the study group I heard about—it won’t help me anyway.”</li> <li>• “I failed the class.”</li> <li>• “Perhaps I should switch to an easier major, since I don’t have what it takes to succeed.”</li> </ul>	<p><b><i>“I’m struggling to complete my physics assignments.”</i></b></p> <ul style="list-style-type: none"> <li>• “This is normal—most students struggle at first when they begin college.”</li> <li>• “I’ll join a study group and ask a teaching assistant for help if I still need it.”</li> <li>• “I passed the class!”</li> <li>• “Perhaps if I study harder next time I can do even better.”</li> </ul>

<sup>6</sup> For a recent compendium of cutting-edge wise interventions that have emerged from social psychology research, see Walton and Crum (2021).

**Figure 5.1.** Feedback loops can be influenced by wise interventions



Not all wise interventions target 21st century skills directly, but their relevance should not be discounted: aside from being low-cost, these interventions can pave the way for students to build and strengthen the resources they need to overcome the inevitable challenges they will face in today's complex world.

From a curriculum design perspective, wise interventions show particular promise when applied to **critical transitions**: moments in students' lives characterized by higher stress, insecurity, and uncertainty, such as starting a new cycle of studies (e.g., middle school), changing schools, or preparing for important exams. Moreover, the content of some wise interventions, such as the growth mindset and belonging interventions discussed in this chapter, could reasonably be integrated into curriculums aiming to foster 21st century skills.

We discuss the following **three** groups of interventions:

**1**   
**Growth mindset interventions**

**2**   
**Belonging interventions**

**3**   
**Self-affirmation interventions**



## 2.2.1. Growth mindset interventions

### >Traditional interventions



*21st century skills targeted: adaptability, collaboration, growth mindset, learnability, resilience*

**Growth mindset interventions focus on developing an individual's belief that their intelligence is something that can grow and increase with time and effort**, as opposed to being a fixed attribute that one either has or does not have (Blackwell et al., 2007). Unfortunately, while the evidence seems robust regarding the positive correlation between holding a growth (versus a fixed) mindset and achievement, there is no conclusive evidence that achievement can be improved by teaching growth mindset at scale through low-cost interventions.<sup>7</sup>

Growth mindset interventions are typically delivered as one-hour in-class sessions consisting of three key elements:

1. **Scientific credibility:** Materials highlight the new and emerging science of brain development, particularly the idea of plasticity—the brain is not a fixed object, and new and stronger neuronal connections can be created through intense learning.
2. **Memorable metaphor:** Students are then introduced to a metaphor that will help the ideas from the first element stick, such as the concept that “the brain is like a muscle.” This invites the students to conclude that, just like muscles, the brain can become stronger through effort.
3. **Bringing ideas to life:** Finally, students are exposed to testimonies that show how others have applied and benefitted from these ideas. These testimonies can come from older students or other admired figures.

These elements should be further complemented with written assignments, such as reflection questions, which help students to internalize the lessons.

**The effectiveness of growth mindset interventions will vary depending on the context they are applied in, as well as on key implementation decisions.** We present recent evidence from two studies, one carried out in Peru and the other in Argentina. The Peru intervention, tested by Outes-León, Sánchez, and Vakis (2020), was implemented by participating schools at a cost of US\$0.20 per pupil.

The core of the intervention consisted of three parts, each lasting 30 minutes:

- Students read a text introducing them to the concept of a growth mindset and thought about a few revision questions.
- They discussed the content of the text (and answers to the questions) in groups of four to five students and then with the classroom as a whole.

<sup>7</sup> As described in Groot (2019), large-scale studies in the United States and the UK find either very small positive effects of growth mindset interventions or no effects at all.

- Each student wrote a reflective letter to a friend or relative describing what they had learned.

Each of these steps was designed to encourage the students to actively engage with the content:

- The revision questions ensured that the students **understood the concepts**.
- The discussion and letter writing provided **opportunities for elaboration**, which is critical for memory retention (see, e.g., Reder, 1980). Additionally, students had the opportunity to **relate the information presented to their own life**, an important component of the intervention.
- Finally, the discussion also **gave the adolescents a voice**. As highlighted by Dweck and Yeager (2021), conveying respect is particularly important for adolescent participants, who can easily feel threatened by perceived impositions from adults (see, e.g., Vansteenkiste et al., 2014).

The math test scores of students in the treatment group showed statistically significant improvement, but the size of the effect was small.<sup>8</sup> These results persisted when measured 14 months after the intervention. The effect seemed to be driven by the regional sample: looking at only the metropolitan sample (from densely populated Lima), the intervention had no effect at all; looking at only the regional sample (from regional towns Ancash and Junín), **the intervention led to an improvement of 0.13 of a standard deviation in math and 0.09 of a standard deviation in reading comprehension**.<sup>9</sup> The authors speculate that the intervention may have worked better in the regional sample due to smaller class sizes and lower grades at baseline, which gave students more room for improvement.

Ganimian (2020) tested a similar intervention in Argentina and found that it did not improve student outcomes. What's more, the intervention cost almost US\$3 per student, since it was delivered by trained external implementers.

The intervention was very similar to the one tested in Peru, so why was this version not effective? Three differences are worth highlighting:

- 1 The Argentinean intervention was carried out by representatives of the Ministry of Education instead of the tutors who would usually be with the students in that class period.
- 2 There were no revision questions to be answered, alone or in a group.
- 3 There was no discussion of the text in small groups or with the whole classroom.

In short, **this intervention introduced new authorities** into the classroom, whom the students may not have trusted, and **did not include the key ingredients** highlighted previously. Ensuring that students have understood the reading materials “may be especially important in developing countries, where reading skills are low, and it may partly explain why the intervention had no effects in Salta, [Argentina,] where it was omitted” (Ganimian, 2020, p. 17).

8 Overall, the intervention sample showed improvements of 0.05 of a standard deviation in math test scores, with similar (but not statistically significant) improvements in reading comprehension.

9 Estimates of the effect were even higher when factoring in imperfect compliance—not all schools that were assigned to treatment actually received the package and showed evidence of implementing at least one session.

Thus, growth mindset interventions show some promise but should not be implemented unquestioningly.

To understand whether an intervention will work in a new context, we recommend trialing it with an RCT before scaling up. For example, the intervention could be randomized to half the classes in a school district to evaluate effectiveness before scaling up to all classes in the city and, eventually, including it officially in the country's curriculum. As suggested by Ganimian (2020), "if possible, governments [interested in implementing this intervention] **should consider using data already collected by their school system to evaluate the impact of the first iteration of the intervention through a randomized rollout.** This will reduce costs, avoid bias in responses, minimize differential participation, and allow the government to understand whether the intervention works for their school system" (p. 18, emphasis added).

Policymakers proposing to implement growth mindset interventions in their school systems should also pay careful attention to the lessons learned in the most recent large-scale trials in order to maximize the chance that the investment will have a positive impact.



## > Emotional growth mindset interventions



*21st century skills targeted: empathy, growth mindset, mindfulness, self-awareness*

In emotional growth mindset interventions, students are taught adaptive theories of emotions. These lessons highlight three key messages (Smith et al., 2018):

- 1 Emotions can be influenced.
- 2 The ability to influence emotions can be improved over time.
- 3 You are capable of influencing your emotions to feel better.

A study conducted in the United States ( $N = 1,645$ ) tested a low-cost online intervention designed to influence theories of emotion and improve emotional well-being in school (Smith et al., 2018). Middle schoolers in both the control and intervention groups participated in two 45-minute sessions and one 15-minute follow-up session via online modules.

In the treatment group, students learned

- 1 what emotions are,
- 2 how emotions are formed,
- 3 the importance of recognizing when they feel emotions, and
- 4 that regulating emotions is difficult.

They were also taught about adaptive emotion theories and emotion regulation strategies. Students learned that they can deal with unwanted emotions in three ways:

**1. By changing the situation causing the unwanted emotions.** Children read about a child who is upset about having to go home after school instead of playing with her friends. The child recognizes that she can accept the current situation and make plans to see her friends on the weekend instead, and thus feels less upset.

**2. By distracting themselves to get out of a negative feedback loop.** First, children are encouraged to notice when they are “in a loop”—that is, paying attention or remembering the same event and experiencing the associated emotions over and over. Next, they learn that distractions can be very useful to help them break away from a loop and start feeling better.

**3. By changing how they think about a particular situation.** Instead of being distracted from upsetting thoughts, sometimes it may be better to try to change the thoughts directly. For example, instead of thinking that the mistake he made during a presentation was embarrassing, a student could remind himself that everyone makes mistakes, and it’s perfectly normal.

Finally, the module acknowledged that it can be difficult to apply emotion regulation strategies and that it is normal to need help. Students were reminded that talking to others can help them distract themselves or think about the situation in a different way.

Control group students were taught about how the brain works and what tools scientists use to study it, but they were not subjected to any prompts that addressed emotional experiences.

Students in the intervention group showed an **improvement in their ability to recognize that emotions are malleable and can be influenced for the better**, compared to no significant changes for those in the control group. Students in the intervention group also **reported higher school well-being at follow-up than their peers**; although the well-being of students in both groups generally declined over the circa one-month follow-up period, being part of the intervention group reduced this decline by 58 percent.<sup>10</sup>

Both the content and the form of this intervention should be considered for inclusion in a curriculum with a strong focus on 21st century skills. Additionally, policymakers should take heed of the methods used to evaluate whether the content delivered to students indeed resulted in the expected changes in understanding and outcomes.



### 2.2.2. Belonging interventions



*21st century skills targeted: empathy, mindfulness, resilience, self-awareness, self-regulation*

One important contributor to well-being is feeling social connectedness and belonging (Baumeister & Leary, 1995). Therefore, “belonging uncertainty”—feeling like we may, in fact, not be welcome in our current environment—can have negative and long-lasting repercussions if not handled with care.

Similar to growth mindset interventions, in which children are taught that intelligence and emotions can change and be improved over time, the primary lesson that belonging interventions teach children is that “belonging is a normal process that develops over time” (Walton & Brady, 2021, p. 46). Children feel less threatened when they realize that their anxiety and worries are common, temporary, and malleable (Walton & Brady, 2017), and they are more receptive to interventions when those feelings about belonging are respected and validated (Yeager et al., 2016).

Belonging interventions focus on teaching students two key concepts:

- Worrying, at first, about whether you belong in your new environment is normal.
- Difficulties experienced do not mean that you do not belong, and most students come to feel belonging with time and effort.

Below we highlight two studies that support the effectiveness of belonging interventions.

Borman and colleagues (2019) conducted an RCT with 1,304 sixth-grade students who had just entered middle school. They received sheets labeled “Writing Exercise” and were asked to read about the results of a survey given to older students at their school and then answer questions about it. The survey results were presented in two summary sentences (e.g., “Almost all eighth graders said they had worried a lot about taking middle-school tests at the beginning of seventh grade.”) and then

<sup>10</sup> However, students’ emotional well-being at school did not translate into greater satisfaction within the general school environment, overall life well-being, or life satisfaction.

three quotes. The students answered three reflection questions, which encouraged them to think about how the material applied to them and the other students in their class. Control students read and answered questions about an unrelated survey topic.

The intervention resulted in a **12 percent increase in attendance, reduced the number of failing grades by 18 percent, and reduced the number of disciplinary actions (related to behavior problems) by 34 percent**, compared to students in the control group. Furthermore, around 80 percent of the long-term effects of the intervention on students' GPAs was accounted for by the lessons learned from the intervention (changes in their attitude and behavior).

In a double-blind preregistered replication involving 2,171 students (Pyne & Borman, 2020), English teachers carried out the intervention at the beginning of the school year. Teachers were asked to frame the exercise as a free writing exercise, and researchers informed teachers that the aim of the experiment was to learn about middle schoolers' opinions.



Students in the treatment group reported experiencing **fewer worries in both the academic and social contexts compared to their control group** counterparts. The impact of the exercise was positive for the objective outcome measures. Intervention group students, relative to the control, had higher GPAs (0.06 SMD) throughout the rest of the school year. Moreover, **students in the intervention group had fewer failing grades** (Ds and Fs) in seventh grade than control group students (the average number of failing grades was 0.05 SMD lower for intervention students). These effects did not differ across race or ethnicity.

As alluded to above, belonging interventions consist of **three** main elements:

1.

**Summary information:** The recipients of the intervention first receive summary information about previous students' experiences with the critical transition (e.g., transitioning to middle school), for example, in the form of questionnaire results (e.g., "80 percent of seventh-grade students last year reported low belonging at the beginning of the academic year.").

2.

**Stories:** Recipients read stories of upper-year students related to the theme. Each story describes (1) challenges to belonging, such as worries and negative experiences, and negative thoughts students might have in response to these challenges, and (2) improvement in belonging over time, due both to the simple passage of time and to students' effort, resourcefulness, and resilience.

3.

**Interactive components:** The session includes at least one exercise allowing students to actively engage with the ideas and reflect on their application, such as writing a letter to future students to help them with their own transition.

This intervention seems particularly promising for inclusion at the beginning of a new and challenging stage in students' lives, such as when they start a new educational cycle, potentially in a new school or with new classmates.



### 2.2.3. Self-affirmation interventions



*21st century skills targeted: empathy, mindfulness, resilience, self-awareness, self-regulation*

Gaps in educational achievement between groups of students are typically explained by economic, gender, or group differences. However, vast amounts of literature indicate that a significant portion of group differences can be accounted for by pervasive psychological threats that undermine the performance of people from underrepresented groups in academic environments (Steele et al., 2002). This is known as **stereotype threat**, defined as **the sense of threat people feel in a given context when they believe they are at risk of conforming to a negative stereotype** (Shapiro & Neuberg, 2007).

Similar to other wise interventions (such as growth mindset and belonging interventions), self-affirmation interventions are believed to **create positive feedback loops** when implemented at the right time.

A **values-writing exercise** is one of the most common methods of administering a self-affirmation intervention. Through this exercise, students are led to **reflect on their core values** and undergo a psychological experience of self-affirmation. One implementation consists of the following **four** steps:

- Children look at a list of values and rank them based on how important each value is to them.
- They think about and then describe in writing why and how the value ranked number 1 is important to them.
- They spell out the top two reasons why the chosen value is important to them.
- They respond to a short questionnaire that reinforces the writing done earlier.

A meta-analysis conducted by Wu and colleagues (2021), which analyzed 58 field studies to assess the impact of values-affirmation exercises on the academic achievement of students under social identity threat, found a bias-corrected effect size of 0.15 SMD for identity-threatened students. Consistent with theory, the effect size was close to zero for non-identity-threatened students.

The researchers noted, **“Affirmation appears to work best when it is delivered as a normal classroom activity and where identity threat co-occurs with resources for improvement and time to await cumulative benefits”** (p. 1). This remark is particularly important for curriculum designers, who should consider whether this intervention is appropriate for their context. Policymakers should also feel encouraged to collaborate with researchers to evaluate whether self-affirmation interventions can be useful in situations in which the students face challenges other than stereotype threat.

## 2.3. Social-emotional learning interventions



*21st century skills targeted: communication, critical thinking, empathy, mindfulness, self-awareness, self-regulation*

Many 21st century skills, such as empathy and conflict management, must be developed over time and with considerable effort. Thus, **high-touch interventions** are sometimes needed; these are usually delivered in person, by someone who must receive some prior training, often over multiple sessions. In particular, social-emotional learning (SEL) interventions help to integrate the learning of social and emotional skills into the school curriculum, and extensive evidence supports their effectiveness (Education Endowment Foundation, n.d.; Mahoney et al., 2018).

Children develop **five key skills** through SEL interventions:

- 1. Self-awareness:** Children learn to detect and label their own emotions and thoughts.
- 2. Self-management:** Children learn how to regulate their feelings, thoughts, and behaviors to serve personal and academic goals in different contexts. This includes learning how to delay gratification, cope with negative emotions, and motivate themselves.
- 3. Social awareness:** Children learn to sense what others are feeling by looking at situations from their perspective and empathizing with them.
- 4. Responsible decision making:** Children learn to assess the risks, costs, and benefits of their actions within their social context and how to apply improved decision making to solve problems.
- 5. Relationship skills:** Children learn crucial skills for developing positive and meaningful relationships, such as active listening, cooperation, and conflict resolution.

Effective implementation of SEL programs involves a coordinated effort by the community, parents and guardians, and the school administration. According to Durlak and colleagues (2010, 2011), effective SEL implementations should also contain the following four elements, represented by the acronym **SAFE**:

- 1. Sequenced:** There should be a coordinated and connected set of activities to foster skill development.
- 2. Active:** Programs should include active modes of learning for students.
- 3. Focused:** Emphasis should be placed on developing personal and social skills.
- 4. Explicit:** The intervention should target specific social and emotional skills.

To illustrate how SEL interventions work and their results, we highlight the Coping Power Universal intervention.

### 2.3.1. Example: Coping Power Universal

Coping Power Universal (CPU) is a type of SEL intervention that helps children both improve their social skills and better regulate their emotions (Lochman & Wells, 2003; Muratori et al., 2020).

School children meet with a CPU-trained instructor (their teacher) for an hour once a week, for 24 weeks. These sessions are held as part of class time, with one teacher responsible for a group of children.

The intervention comprises six modules that are delivered to students using a story as a guide throughout the modules. The story is entitled “We Are a Group” and follows a group of five schoolchildren who want to form a rock band together and audition for a school concert. Through the use of the story guide, the students integrate the lessons learned in the modules by identifying with the characters and reflecting on the emotions that these characters are feeling.

Accompanying the story are in-class activities and weekly goals that the students set for themselves. The modules are as follows:

- Module 1: Short- and long-term goals
- Module 2: The implementation of feelings awareness
- Module 3: Emotional regulation
- Module 4: Perspective-taking abilities
- Module 5: Problem-solving skills
- Module 6: Promotion of interaction with positive schoolmates

In the most recent implementation of the intervention, children who took part showed **improved grades, empathy, and prosocial behavior**, as well as **reduced hyperactivity, conduct issues, and internalizing behaviors** (Muratori et al., 2020).

The effect size estimates from the pretest-posttest analysis were as follows:

- Based on teacher ratings: **0.17 SMD decrease in internalizing behavior, 0.06 SMD decrease in externalizing behavior, and 0.36 SMD increase in prosocial behavior.**
- Based on parent ratings: **0.23 SMD decrease in internalizing behavior, 0.14 SMD decrease in externalizing behavior, and 0.28 SMD increase in prosocial behavior.**

Additionally, the effects of the intervention can be long-lasting: one year afterward, children who had received an earlier intervention still behaved more prosocially and less aggressively than their peers who had not received the intervention. The children in the intervention group also showed a significant improvement in language arts courses (Muratori et al., 2016) compared to their peers who had not received the intervention.

CPU in particular and SEL interventions in general are good candidates for integration into school curriculums. While most of these interventions have been developed outside LAC and would need to be modified to fit specific LAC contexts, they offer prepackaged and evidence-based solutions to boost some of the 21st century skills highlighted throughout this chapter.



### 3. From evidence to policy

In this section we highlight methods that policymakers and schools can use to best implement interventions locally, by

- **providing a brief primer on interpreting Cohen's  $d$** , the most common measure of effect size reported in this chapter (see Box 1);
- **suggesting preliminary benchmarks for what to consider a “small,” “medium,” or “large” effect** of an educational intervention; and
- **describing a process of cultural adaptation** to highlight the various stages of work involved in translating an intervention into a different cultural context.

#### Box 5.1. Cohen's $d$ : An explainer

##### How do you know if an intervention worked?

Ideally, you measure the outcome of interest (say, grades) among students who received the intervention and compare those scores to the scores of students who did not receive the intervention. The difference in average scores tells you something about whether one group performed better than the other. However, you might want to consider the variability of overall scores in determining whether the difference is actually meaningful: if scores are more spread out, there will be a greater overlap in scores between intervention and control students for the same average difference. What's more, when different evaluations use different scales (e.g., in one school system, grades range from 0 to 100, and in another from 0 to 20), the raw average difference won't make for a straightforward comparison.

Cohen's  $d$  is a standardized measure of effect size. To calculate it, researchers divide the raw effect size (e.g., the difference in average scores between two groups) by its standard deviation (a measure of how much the scores tend to spread out from the average). Thus, a Cohen's  $d$  of 0.5 suggests that students in the intervention group attained scores that are, on average, 50 percent of a standard deviation higher than the scores of students in the control group. In this chapter, to highlight the standardized nature of the effect size, we would write that the effect was “an improvement of 0.5 SMD” (where SMD = standardized mean difference). Once the scores have been standardized like this, we do not need to know the original scales to compare the effects of different interventions (or the same interventions in different contexts).

### 3.1. Understanding the evidence

Many factors influence the effect size reported in an intervention evaluation. This means that we need to carefully interpret the usefulness of an intervention rather than relying on that one number alone. Therefore, before introducing numerical benchmarks, we highlight some guidelines worth keeping in mind when interpreting effect sizes, relying heavily on Kraft (2020):

- 1. Correlation is not causation:** Two or more factors can be correlated, but the interaction between them, and the magnitude of the effect, may not necessarily be caused by one of the factors. Further, it is important to keep in mind that an intervention that is described as having a small effect size can have cumulative effects over time (as seen in the section on wise interventions), and so studies with small effect sizes should not be immediately discarded.
- 2. Ask what outcomes are measured, and when and how:** Factors such as the reliability of the scales and measures used and the timing of the recording of outcomes can affect the effect size of an intervention. To use the example of a classroom-based outcome, larger effect sizes are shown if a short-term outcome (upcoming class attendance) is measured, in comparison to a more long-term outcome (such as yearly GPA).
- 3. Study design matters:** Some factors to keep note of are how an intervention is administered to a population (those being offered the intervention versus those actually *receiving* it), the makeup of the groups of participants taking part in the intervention (do they share more features in common or are they varied with regard to factors such as neighborhood or age?), and any differences in the implementation of the intervention between the control group and the treatment group.
- 4. Consider scalability and cost:** As shown in Table 5, the interaction between effect size, scalability, and cost is important to take into account when designing interventions and adapting interventions conducted in other countries to a local context.

**Table 5.5. A cost-effectiveness comparison of educational interventions in the LAC context (based on Kraft, 2020)**

Effect size (Cohen's <i>d</i> )	Cost per pupil (USD) per year			Scalability
	Low (<\$1.50)	Moderate (\$1.50–\$2.50)	High (>\$2.50)	
Small (<.05)	Small effect size / low cost	Small effect size / moderate cost	Small effect size / high cost	Easy
Medium (<.05–.20)	Medium effect size / low cost	Medium effect size / moderate cost	Medium effect size / high cost	Reasonable
Large (>.20)	Large effect size / low cost	Large effect size / moderate cost	Large effect size / high cost	Difficult

*Note:* Cells are colored to highlight relatively better (green) or worse (red) cost-effectiveness ratios. Costs were adapted to better match LAC reality.

### 3.2. Translating interventions into a new context

Many educational interventions are not specifically designed to address a LAC context. To be effective, these interventions will first need to be adapted to the context they will be implemented in. The materials often need to be translated, but the form or the content of the interventions might need to change as well (see Box 2).

The **Cultural Adaptation Process (CAP)** (Bernal et al., 2009) is a framework that can help streamline the modifications. It is a systematic method for localizing an intervention that focuses on language, culture, and context.

#### Box 5.2. What kinds of adaptations might be necessary?

##### A non-exhaustive list

- **Linguistic adaptations**, namely, changing the language of the entire intervention or changing the language within stories used, such as using region-specific dialects and colloquial terms
- **Changing narratives** to be more culturally relevant.
- **Changing the structure of questions**, for example, the wording and order of questions.
- **Changing how or where the intervention is administered**, for example, in churches and other communal places instead of universities and/or research laboratories.

The CAP, developed by Barrera and colleagues (2013) based on multiple theories of cultural adaptation,<sup>11</sup> can be used to make the process of adapting interventions somewhat easier for practitioners. Table 6 describes the five stages.

**Table 5.6. Stages of the Cultural Adaptation Process (based on Barrera et al., 2013)**

Stage	Description	Who would take part in this phase?
<b>1. Information gathering</b>	The goals of this phase are twofold: to determine (1) whether a cultural adaptation is necessary, and, if it is, (2) which aspects of the intervention need to be changed.	Research unit, linguists, cultural experts
<b>2. Preliminary adaptation design</b>	Data gathered from the first step are used in the development of any changes to the original intervention.	Research unit, stakeholders, experts
<b>3. Preliminary adaptation tests</b>	This stage focuses on the implementation of a pilot study with the accepted modifications from the previous stage.	Research unit
<b>4. Adaptation refinement</b>	Suggestions for improvement emerging from the previous phase are incorporated into the intervention.	Research unit, cultural experts
<b>5. Cultural adaptation trial</b>	This final stage is where all the amendments and modifications made to the original intervention are empirically tested in a trial study. Depending on the results, further iterations of adaptation refinement followed by cultural adaptation trials may be required.	Research unit

An example of an intervention that was adapted from a U.S. cultural context to a Mexican cultural context, with promising results, was the PMTO intervention.<sup>12</sup> PMTO stands for the Parent Management Training–Oregon Model, which is a social interaction model based on teaching parents how to manage and help their children who are experiencing behavioral issues (Forgatch & Patterson, 2010).

<sup>11</sup> Most of the work in cultural adaptation has involved adapting mental health interventions, and there is scarce research on the effectiveness of cultural adaptation of educational interventions.

<sup>12</sup> See the results in Baumann and colleagues (2014).

## 4. Conclusion

**LAC governments should consider using evidence-based educational interventions as part of their policy tool kit and curriculums for the promotion of 21st century skills.** While no single solution will be a panacea, this chapter highlights several of the many interventions that have shown promise, and we encourage policymakers to invest in one or more of these interventions in addition to the structural changes that may be spurred by the other chapters of this publication.

This chapter has focused on evidence-based behavioral interventions that can be used to develop 21st century skills in students in the LAC region, in a cost-effective, scalable, and culturally relevant manner. Throughout the chapter, we have discussed ways in which some of these interventions might be included in curriculum planning.

We have highlighted three main types of behavioral interventions:

- 1. Educational nudges:** Low-cost interventions designed to help individuals develop and sustain focus and motivation
- 2. Wise interventions:** Interventions that target students' perceptions and interpretations of themselves and their environment, helping them create more adaptive responses and interpretations to help them achieve their goals
- 3. Social-emotional learning interventions:** Interventions that target the development of social and emotional skills that extend beyond academic achievement, helping students develop interpersonal competencies

We have also introduced **methods of cultural adaptation that can be used to modify interventions conducted in other nations to the LAC region and have provided guidance on how to interpret the cost-effectiveness of these interventions** (focusing specifically on the interpretation of effect sizes) as a means to empower policymakers to make informed choices about what would be best for their context.

Aside from the general recommendation that LAC governments use evidence-based educational interventions as part of their policy tool kit for developing 21st century skills, we have three further recommendations:

1. When selecting an intervention to bring to a given context, **consult local researchers and practitioners to assess whether the intervention addresses relevant needs and gaps.**
2. After selecting an intervention, follow the steps outlined in this chapter to appropriately **adapt the intervention to the cultural context where it will be applied.**
3. Before scaling up the intervention to the whole country or region, or indeed integrating it into a curriculum plan, **conduct a robust evaluation** of its effects to ensure that the benefits brought about by the adapted intervention are large enough to justify large-scale implementation.

We also encourage policymakers to invest in research and development within their own communities. Ensuring that local researchers and education experts have the necessary resources to use the growing body of knowledge in the behavioral sciences will allow them to create novel interventions that are best suited to meet their communities' needs.

## References

- Barrera, M., Castro, F. G., Strycker, L. A., & Toobert, D. J. (2013). Cultural adaptations of behavioral health interventions: A progress report. *Journal of Consulting and Clinical Psychology, 81*(2), 196–205. <https://doi.org/10.1037/a0027085>
- Barrera-Osorio, F., Gonzalez, K., Lagos, F., & Deming, D. J. (2020). Providing performance information in education: An experimental evaluation in Colombia. *Journal of Public Economics, 186*, 104185. <https://doi.org/10.1016/j.jpubeco.2020.104185>
- Baumann, A. A., Domenech Rodríguez, M. M., Amador Buenabad, N. G., Forgatch, M. S., & Parra-Cardona, J. R. (2014). Parent Management Training–Oregon Model (PMTO™) in Mexico City: Integrating cultural adaptation activities in an implementation model. *Clinical Psychology: Science and Practice, 21*(1), 32–47. <https://doi.org/10.1111/cpsp.12059>
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*(3), 497–529. <https://doi.org/10.1037/0033-2909.117.3.497>
- Bergman, P. (2019). How behavioral science can empower parents to improve children’s educational outcomes. *Behavioral Science & Policy, 5*(1), 52–67. <https://doi.org/10.1353/bsp.2019.0004>
- Bergman, P., & Chan, E. W. (2018). Leveraging parents through low-cost technology: The impact of high-frequency information on student achievement. *Journal of Human Resources, 56*(1), 125–158. <https://doi.org/10.3368/jhr.56.1.1118-9837R1>
- Bernal, G., Jiménez-Chafey, M., & Rodríguez, M. D. (2009). Cultural adaptation of treatments: A resource for considering culture in evidence-based practice. *Professional Psychology: Research and Practice, 40*(4), 361–368. <https://doi.org/10.1037/a0016401>
- Bettinger, E. P., Cunha, N., Lichand, G., & Madeira, R. (2020). *Are the effects of informational interventions driven by salience?* (Working Paper No. 350). University of Zurich. <http://www.econ.uzh.ch/static/wp/econwp350.pdf>
- Bettinger, E. P., Long, B. T., Oreopoulos, P., & Sanbonmatsu, L. (2012). The role of application assistance and information in college decisions: Results from the H&R Block FAFSA experiment. *The Quarterly Journal of Economics, 127*(3), 1205–1242. <https://doi.org/10.1093/qje/qjs017>
- Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78*(1), 246–263. <https://doi.org/10.1111/j.1467-8624.2007.00995.x>
- Borman, G. D., Rozek, C. S., Pyne, J., & Hanselman, P. (2019). Reappraising academic and social adversity improves middle school students’ academic achievement, behavior, and well-being. *Proceedings of the National Academy of Sciences, 116*(33), 16286–16291. <https://doi.org/10.1073/pnas.1820317116>
- Clark, D., Gill, D., Prowse, V., & Rush, M. (2020). Using goals to motivate college students: Theory and evidence from field experiments. *The Review of Economics and Statistics, 102*(4), 648–663. [https://doi.org/10.1162/rest\\_a\\_00864](https://doi.org/10.1162/rest_a_00864)
- Cortes, K. E., Fricke, H. D., Loeb, S., Song, D. S., & York, B. N. (2019). *When behavioral barriers are too high or low—How timing matters for parenting interventions* (NBER Working Paper No. 25964). National Bureau of Economic Research. <http://www.nber.org/papers/w25964>
- Cunha, N., Lichand, G., Madeira, R., & Bettinger, E. (2017). *What is it about communicating with parents?* [Unpublished manuscript]. Stanford Center for Education Policy Analysis. [https://cepa.stanford.edu/sites/default/files/cunha\\_cover\\_paper1.pdf](https://cepa.stanford.edu/sites/default/files/cunha_cover_paper1.pdf)

- Damgaard, M. T., & Nielsen, H. S. (2018). Nudging in education. *Economics of Education Review*, 64, 313–342. <https://doi.org/10.1016/j.econedurev.2018.03.008>
- Dobronyi, C. R., Oreopoulos, P., & Petronijevic, U. (2019). Goal setting, academic reminders, and college success: A large-scale field experiment. *Journal of Research on Educational Effectiveness*, 12(1), 38–66. <https://doi.org/10.1080/19345747.2018.1517849>
- Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development*, 82(1), 405–432. <https://doi.org/10.1111/j.1467-8624.2010.01564.x>
- Durlak, J. A., Weissberg, R. P., & Pachan, M. (2010). A meta-analysis of after-school programs that seek to promote personal and social skills in children and adolescents. *American Journal of Community Psychology*, 45(3–4), 294–309. <https://doi.org/10.1007/s10464-010-9300-6>
- Dweck, C. S., & Yeager, D. S. (2021). A growth mindset about intelligence. In G. M. Walton & A. Crum (Eds.), *Handbook of wise interventions: How social psychology can help people change* (pp. 9–35). Guilford Press.
- Education Endowment Foundation. (n.d.). *Social and emotional learning*. Retrieved March 22, 2021, from <https://educationendowmentfoundation.org.uk/evidence-summaries/teaching-learning-toolkit/social-and-emotional-learning>
- Forgatch, M., & Patterson, G. (2010). Parent Management Training–Oregon Model: An intervention for antisocial behavior in children and adolescents. In J. R. Weisz and A. E. Kazdin (Eds.), *Evidence-based psychotherapies for children and adolescents* (2nd ed., pp. 159–178). Guilford Press.
- Ganimian, A. J. (2020). Growth-mindset interventions at scale: Experimental evidence from Argentina. *Educational Evaluation and Policy Analysis*, 42(3), 417–438. <https://doi.org/10.3102/0162373720938041>
- Groot, B. (2019). Programas basados en las ciencias del comportamiento. In M. Mateo Díaz & G. Rucci (Eds.), *El futuro ya está aquí: Habilidades transversales de América Latina y el Caribe en el siglo XXI* (pp. 271–296). Inter-American Development Bank. <https://doi.org/10.18235/0001950>
- Harris, A., & Goodall, J. (2008). Do parents know they matter? Engaging all parents in learning. *Educational Research*, 50(3), 277–289. <https://doi.org/10.1080/00131880802309424>
- Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux.
- Kalil, A., Mayer, S. E., & Gallegos, S. (2019). Using behavioral insights to increase attendance at subsidized preschool programs: The Show Up to Grow Up intervention. *Organizational Behavior and Human Decision Processes*, 163, 65–79. <https://doi.org/10.1016/j.obhdp.2019.11.002>
- Kraft, M. A. (2020). Interpreting effect sizes of education interventions. *Educational Researcher*, 49(4), 241–253. <https://doi.org/10.3102/0013189X20912798>
- Kraft, M. A., & Rogers, T. (2015). The underutilized potential of teacher-to-parent communication: Evidence from a field experiment. *Economics of Education Review*, 47, 49–63. <https://doi.org/10.1016/j.econedurev.2015.04.001>
- Lasky-Fink, J., Robinson, C. D., Chang, H. N.-L., & Rogers, T. (2021). Using behavioral insights to improve school administrative communications: The case of truancy notifications. *Educational Researcher*, 50(7), 442–450. <https://doi.org/10.3102/0013189X211000749>
- Lavecchia, A. M., Liu, H., & Oreopoulos, P. (2015). *Behavioral economics of education: Progress and possibilities* (IZA Discussion Paper No. 8853). Institute for the Study of Labor. <http://ftp.iza.org/dp8853.pdf>
- Lichand, G., & Christen, J. (2020). Using nudges to prevent student dropouts in the pandemic. *ArXiv:2009.04767 [econ.GN]*. <http://arxiv.org/abs/2009.04767>

- Lochman, J., & Wells, K. (2003). The Coping Power program at the middle-school transition: Universal and indicated prevention effects. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*, 16(4, Suppl), S40–S54. <https://doi.org/10.1037/0893-164X.16.4S.S40>
- Mahoney, J. L., Durlak, J. A., & Weissberg, R. P. (2018). An update on social and emotional learning outcome research. *Phi Delta Kappan*, 100(4), 18–23. <https://doi.org/10.1177/0031721718815668>
- Mateo, M., Buenadicha, C., Bustelo, M., Duryea, S., Heredero, E., Rubio, M., Rucci, G., & Becerra, L. (2019). *21st century skills: Transversal skills development in Latin America and the Caribbean*. Inter-American Development Bank. <https://doi.org/10.18235/0001574>
- Muratori, P., Bertacchi, I., Catone, G., Mannucci, F., Nocentini, A., Pisano, S., & Lochman, J. E. (2020). Coping Power Universal for middle school students: The first efficacy study. *Journal of Adolescence*, 79, 49–58. <https://doi.org/10.1016/j.adolescence.2019.12.014>
- Muratori, P., Bertacchi, I., Giuli, C., Nocentini, A., Ruglioni, L., & Lochman, J. E. (2016). Coping Power adapted as universal prevention program: Mid-term effects on children's behavioral difficulties and academic grades. *The Journal of Primary Prevention*, 37(4), 389–401. <https://doi.org/10.1007/s10935-016-0435-6>
- Oreopoulos, P., Patterson, R. W., Petronijevic, U., & Pope, N. G. (2019). Low-touch attempts to improve time management among traditional and online college students. *Journal of Human Resources*, 57(1), 1–43. <https://doi.org/10.3368/jhr.57.1.0919-10426R1>
- Oreopoulos, P., & Petronijevic, U. (2018). Student coaching: How far can technology go? *Journal of Human Resources*, 53(2), 299–329. <https://doi.org/10.3368/jhr.53.2.1216-8439R>
- Oreopoulos, P., Petronijevic, U., Logel, C., & Beattie, G. (2020). Improving non-academic student outcomes using online and text-message coaching. *Journal of Economic Behavior & Organization*, 171, 342–360. <https://doi.org/10.1016/j.jebo.2020.01.009>
- Outes-León, I., Sánchez, A., & Vakis, R. (2020). *The power of believing you can get smarter: The impact of a growth-mindset intervention on academic achievement in Peru* (Policy Research Working Paper No. 9141). World Bank Group. <https://files.eric.ed.gov/fulltext/ED604386.pdf>
- Pyne, J., & Borman, G. D. (2020). Replicating a scalable intervention that helps students reappraise academic and social adversity during the transition to middle school. *Journal of Research on Educational Effectiveness*, 116(33), 16153–16154. <https://doi.org/10.1080/19345747.2020.1784330>
- Reder, L. M. (1980). The role of elaboration in the comprehension and retention of prose: A critical review. *Review of Educational Research*, 50(1), 5–53. <https://doi.org/10.3102/00346543050001005>
- Robinson, C. D., Lee, M. G., Dearing, E., & Rogers, T. (2018). Reducing student absenteeism in the early grades by targeting parental beliefs. *American Educational Research Journal*, 55(6), 1163–1192. <https://doi.org/10.3102/0002831218772274>
- Rogers, T., & Feller, A. (2018). Reducing student absences at scale by targeting parents' misbeliefs. *Nature Human Behaviour*, 2(5), 335–342. <https://doi.org/10.1038/s41562-018-0328-1>
- Shapiro, J. R., & Neuberg, S. L. (2007). From stereotype threat to stereotype threats: Implications of a multi-threat framework for causes, moderators, mediators, consequences, and interventions. *Personality and Social Psychology Review*, 11(2), 107–130. <https://doi.org/10.1177/1088868306294790>
- Smith, E. N., Romero, C., Donovan, B., Herter, R., Paunesku, D., Cohen, G. L., Dweck, C. S., & Gross, J. J. (2018). Emotion theories and adolescent well-being: Results of an online intervention. *Emotion*, 18(6), 781–788. <https://doi.org/10.1037/emo0000379>

- Steele, C. M., Spencer, S. J., & Aronson, J. (2002). Contending with group image: The psychology of stereotype and social identity threat. In *Advances in experimental social psychology* (Vol. 34, pp. 379–440). Academic Press. [https://doi.org/10.1016/S0065-2601\(02\)80009-0](https://doi.org/10.1016/S0065-2601(02)80009-0)
- Vansteenkiste, M., Soenens, B., Van Petegem, S., & Duriez, B. (2014). Longitudinal associations between adolescent perceived degree and style of parental prohibition and internalization and defiance. *Developmental Psychology, 50*(1), 229–236. <https://doi.org/10.1037/a0032972>
- Walton, G. M., & Brady, S. T. (2017). The many questions of belonging. In *Handbook of competence and motivation: Theory and application* (2nd ed., pp. 272–293). Guilford Press.
- Walton, G. M., & Brady, S. T. (2021). The social-belonging intervention. In G. M. Walton & A. Crum (Eds.), *Handbook of wise interventions: How social psychology can help people change* (pp. 36–62). Guilford Press.
- Walton, G. M., & Crum, A. (Eds.). (2021). *Handbook of wise interventions: How social psychology can help people change*. Guilford Press.
- Walton, G. M., & Wilson, T. D. (2018). Wise interventions: Psychological remedies for social and personal problems. *Psychological Review, 125*(5), 617–655. <https://doi.org/10.1037/rev0000115>
- Wu, Z., Spreckelsen, T. F., & Cohen, G. L. (2021). A meta-analysis of the effect of values affirmation on academic achievement. *Journal of Social Issues, 77*(3): 702–750. <https://doi.org/10.1111/josi.12415>
- Yeager, D. S., Romero, C., Paunesku, D., Hulleman, C. S., Schneider, B., Hinojosa, C., Lee, H. Y., O'Brien, J., Flint, K., Roberts, A., Trott, J., Greene, D., Walton, G. M., & Dweck, C. S. (2016). Using design thinking to improve psychological interventions: The case of the growth mindset during the transition to high school. *Journal of Educational Psychology, 108*(3), 374–391. <https://doi.org/10.1037/edu0000098>

