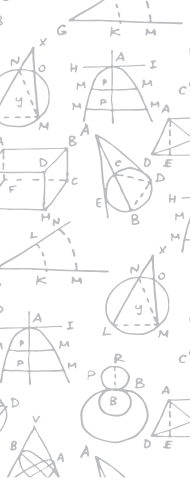




# BUILDING COMPARATIVE METHODOLOGIES AND INDICATORS to Measure the Use and Impact of ICT IN THE CLASSROOM





# Building Comparative Methodologies and Indicators to Measure the Use and Impact of ICT in the Classroom\*

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**Information and Communication Technologies (ICT) are dramatically changing our economic, political, and social systems.** We are now in an era of atomization, constant connectivity, accelerated change, and work flexibility (Schwab, 2016). Due to this transformation, skills and competencies needed in the knowledge economy are changing as well. Labor markets are every day in more need for workers with critical thinking, problem solving capabilities, adaptation to change, digital literacy, and teamwork skills, among others (Abbott, 2014; WEF, 2015; Greenhill & Martin, 2014; Trilling & Fadel, 2009; Binkley *et al.*, 2012).

**ICTs in primary, middle, and high school represent an important tool to develop fundamental skills in mathematics, languages, and science as well as 21st century skills (S21).** In fact, over the past 10 years, the vast majority of Latin American countries have made significant progress in terms of internet access infrastructure and purchase of digital devices (computers, tablets, XO, etc.). Internet use has also been widespread as a result of public and private investments in infrastructure (UIS, 2011). Similarly, Latin American countries have developed a number of programs, such as “Computers for Education” in

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Colombia, “One Laptop per Child” in Peru, “Ceibal Plan” in Uruguay, or “Enlaces” in Chile, with the goal of integrating ICT into teaching and learning.

After years of evaluations however, the results on the effect of ICTs on student learning are ambivalent. On the one hand, in some countries ICTs showed a positive relationship between the use of computers and the score obtained by students in math, science, and language (Wagner *et al.*, 2005). On the other hand, recent impact evaluations in OECD and Latin America showed no effects of ICT on student learning (OECD, 2015; Barrera-Osorio & Linden, 2009). Studies indicate that the effect on learning does not depend on the mere introduction of technology. They must include instead programs of guiding use, which define the target subject, as well as software to use and how much time would be devoted weekly on its use (Arias, Ortiz, & Cristia, 2014).

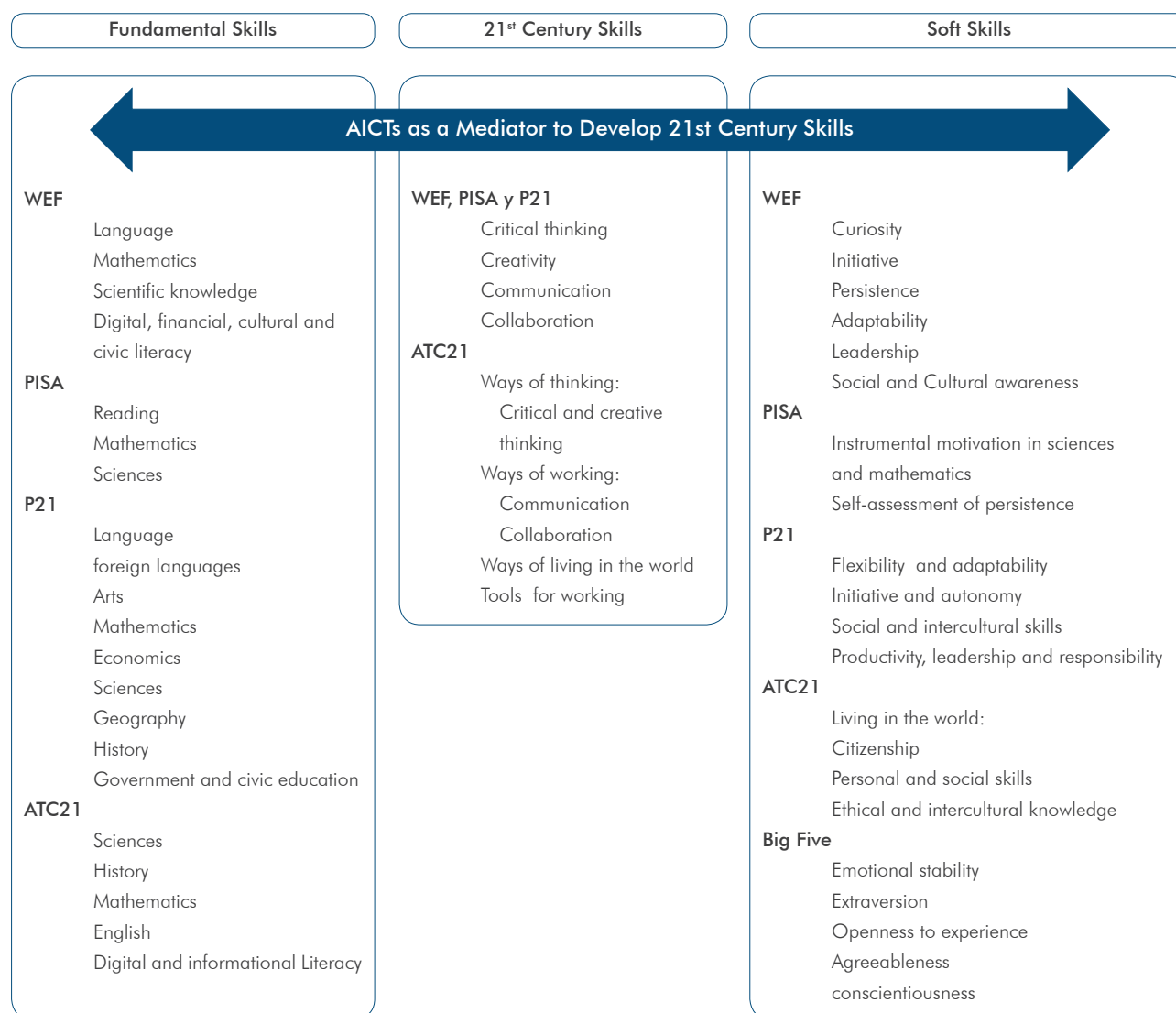
Such ambivalence can be explained by three factors. First, education policies have focused more on access to ICT, rather than providing a guided and integrated pathway into curricular guidelines usage, as well as teacher training (Claro, 2010; Arias, Ortiz, & Cristia, 2014; Barrera-Osorio & Linden, 2009). Second, there are few studies in Latin America that allow understanding of how ICTs are mediating the skills development in the classroom, as well as studies that consider learning gaps by socioeconomic status, geographic location, gender, or the disability status of students. Third, in addition to the limited access to literature in the area, it is necessary to note that the indicators and variables currently available in the region measure only the minimum conditions of access to digital infrastructure (Arias, Ortiz, & Cristia, 2014). This highlights the need to develop methodologies, indicators, and teaching and learning standards that are comparable internationally to assess the impact of ICTs in teaching and learning.

Most indicators, variables, and methodologies currently available in the region measure access to digital infrastructure (Arias, Ortiz, & Cristia, 2014). This is why mixed methods, and the use of analytics in educational software, can be instrumental to understanding the complexity of the process of teaching and learning using ICTs. Furthermore, there are currently limited methodologies, standards, and internationally comparable indicators to assess the impact of ICT in the classroom. It is also a challenge to build a theoretical framework defining what to measure (skills, abilities, competencies, and performance). It is therefore essential to start a regional and collective debate of the skills that need to be developed and measured through ICTs. Movement in this discussion and reaching a collective agreement can be an important step for the development of indicators and methodologies to measure the impact of ICT in learning, teaching, and development of the S21 in Latin America.

The main conceptual frameworks reviewed take into account that the development of the S21 is a comprehensive process that also includes an ongoing relationship with fundamental and soft skills (Figure 1). Given the high interaction with electronic devices, both educational and in social life, ICTs are an important tool and mediator to develop fundamental skills, S21, and soft skills, and to measure their development and progress. As shown in Figure 1, the definition and grouping skills vary according to different frameworks studied: ATC21S, PISA, the Partnership for the 21st Century Skills (P21), and the World Economic Forum (WEF).

Because of the complexity in the use of terms, this crucial collective construction at the regional level develops definitions of skills and core competencies, S21, basic skills, how to measure, and how they may be developed through ICTs.

➤ **Figure 1.** Comparison of Conceptual Frameworks that Define Fundamental Skills, S21, and Soft Skills



Source: Compiled by author in WEF, 2015; Greenhill and Martin, 2014; Trilling and Fadel, 2009; Binkley et al., 2012; Bassi et al., 2012.

**The objective of this document is to discuss methodological approaches for measuring the use and impact of ICTs as mediators in the teaching and learning of basic skills and S21.**

This document is part of the regional project “Building comparative methodologies and indicators to measure the use and impact of ICT in the classroom”, led by the Colombia Think Tank, Fedesarrollo - and sponsored by the International Development Research Centre (IDRC). The main objective of this project is to create a common regional indicators framework for

Latin American countries. The first component of the project is research, which includes a literature review, a diagnosis of available indicators and databases containing information on ICT and education, and the collection of qualitative and quantitative data to validate the proposal resulting from the research. The second component is the creation of a network of education ministries and relevant institutions in Latin America that would allow debate and adoption of locally relevant indicators and methodologies for measuring the impact of ICTs in teaching and learning.

The first part of this document discusses the most relevant social and work skills in the knowledge economy, and how ICTs can impact their development. In the second part, the document illustrates the need for innovations in the way we measure and evaluate the use and impact of ICT in education. To do this, in the first section, we call for the need to measure the digital divide in terms of equity, through the analysis of how ICTs are mediating learning and development of certain skills among students according to their

socioeconomic status, their geographical location, gender, and disability conditions. In the second section we discuss the advantages of using mixed methods to understand the process and challenges faced by students and teachers in the use of ICTs in the classroom.

Finally, the document discusses the advantages of using Big Data and Analytics in education, to better understand the use and impact of ICT in the educational process.

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