

Information and Communication Technologies, ICT, for learning

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The United Nations Educational, Scientific and Cultural Organization, UNESCO, has received the mandate from their Member States to address the key topics, the tensions, and the possibilities for the public policies to use the potential of Information and Communication Technologies, ICT, in favor of education and development. The current document is part of a series of reflections that have been carried out in the region (of Latin America) and in the rest of the world upon this topic.

Context

Information and Communication Technologies have seen an explosive development in the last part of the XXth century and in the beginnings of the XXIst century, to such an extent as to shape what is known as the “knowledge society” or “information society”. There is almost no sphere of human life that has not been touched by this development. Consequently access to knowledge multiplies faster than ever and is distributed instantly. The world has become a smaller and interconnected place.

The ubiquity of the ICTs poses both an opportunity and a challenge, imposing an urgent task to make sense of them and to use them in a way to promote the development of more democratic and inclusive societies, strengthening

collaboration and creativity, with a fairer distribution of scientific knowledge contributing to a more equal and high quality education for all. For all those reasons, the use of the ICTs in education should be part of the efforts to guarantee the Right to Education, that is, the right to learn with everyone, with pertinence, relevance and free from discrimination of any kind.

Despite the region of Latin America and the Caribbean showing dynamism in the last years, leading to the fastest growth in the world and the highest rates of incorporation into the technology and connectivity (BID, 2012), there is still a long way to go to ensure a universal and equilateral access. Until now it has not been easy to connect the huge investment and advance with a greater and fairer development, or in the case of the educational systems, with better learning results by the students.

It is key to understand that the ICTs are not only simple tools, but that they constitute new conversations, aesthetics, narratives, relational bonds, modalities to build identities and perspectives about the world. One of the consequences is that **when a person is excluded from access and use of the ICTs, there are ways of being in the world that are lost, and the rest of the humanity loses those contributions.** In the XXIst century it is essential to know how to use the technologies (OECD, 2011), that the students take ownership of these resources and thus they can participate actively in society and be part of the job market. In many countries of the region the access to technology and connectivity is already considered as a basic good.

In this framework, the concept of “digital literacy” describes the basic skills needed for the use of the ICTs that every person should know not to be socially excluded. At the same time, by extension, gives a foundation from which it is possible to develop new skills and competences facilitated by the access to ICTs. To the classic skills related to reading, writing, and math, the students should add skills that allow them to feel comfortable with collaboration, communication, problem resolution, critical thinking, creativity, productivity, besides digital literacy and responsible citizenship (Vogt et al., 2011).

A great part of the countries initial efforts was concentrated in providing those basic skills to students and also to the adult population. In any case, this necessary and fundamental step has been insufficient. To understand the logics and basic functioning of technology use is not enough to make

the most of it, which implies the opening of new opportunities and paradigmatic changes in the ways of relating, and in the way we acquire, build and communicate knowledge. Replacing the notebook by a text-processor, the traditional blackboard by an interactive board, the paper registers, by electronic spreadsheets or databases is useful only if we develop new and effective practices that are less difficult and useful with a wider scope.

The ICTs in education

Education has been considered for a long time the rock that articulates cultural integration at large, coupled with social mobility and productive development (Hopenhayn, 2003). However, despite the efforts made during the last decades, the educational systems of Latin America still face the important structural problems that obstruct the attainment of quality education with extended coverage within its countries. Almost 50% of the population between 5 and 19 years old in Latin-American countries -estimated by the CEPAL more than 150 million by 2005 - are outside the formal educational systems and with a preparation that does not allow a full integration in the modern economy. Furthermore, this leaves them at risk of being part of the segment below the poverty line (CEPAL).

In addition, there are growing criticisms to the educational models and the contents of the school curriculum. The dramatic changes of the contemporary societies question what should be taught and how learning occurs.

There was a lack of efficacy of the educational systems to convene, maintain

and give the students the fundamental tools to their societal participation. The changes in the society, many of them strengthened by technological changes, impose many serious questioning and challenges to the way that education has been provided hitherto.

The new generations of students live intensely within the ubiquity of the digital technologies, to the point that this could even be modifying cognitive skills (OECD-CERI, 2006). In fact, the youngsters that have not experienced the world without internet and the digital technologies are mediating great parts of their experiences: they are developing some distinctive skills. For example: they access to a great amount of information outside of the school, they take quick decisions and are used to have almost instant answers from their actions, they have a surprising capacity of parallel processing, they are highly multimedial, they access digital information and not only printed material; they enjoy animated images and music accompanying text; and finally, they obtain knowledge processing of discontinuous and non-linear information.

The school systems are facing the need of a mayor and unavoidable transformation: evolve from an education that served an industrial society to another one that prepares individuals to manage themselves in the knowledge society. The students should be trained to perform in jobs that does not exist nowadays and should learn to renew continuously an important part of their knowledge and skills, they should acquire competences that are coherent to this new order: abilities to manage information, communication, problem resolution, critical

thinking, creativity, innovation, autonomy, collaboration, team work, among others (21st Century Skills, 2002).

For many youngsters of Latin America and the Caribbean, the school is still the main space where they access knowledge and is also a relevant mechanism of socialization; it is also a preferential place for many that have no access to computers and the internet, and thus to the ICTs. For this reason, the school is a privileged space where many efforts should be made in the public policy so children and youngsters achieve significant learning, pertinent, and of quality.

However, this transformation is not easy. The schools that has been traditionally institutions destined to preserve and transmit costumes, knowledge, abilities, and values, develop traditional educational practices that are also vertical, from the “one who knows” to “the ones who learn”, based on memorizing contents and data, more than developing skills. **Likewise, this is carried out in rhythms centered in the curricular mandate whereby the teacher features, rather than centered in the needs of the students.**

The school as a formal space of education, with their courses, classrooms, spaces/ times for teaching and learning, requires a transformation to be more permeable and dynamic. The culture(s) of knowledge society obligate(s) to have the necessary opening to think of education in a different way. Rethinking the architecture of the school, the learning environment (that could be with different modalities of virtuality), the power is then bestowed on the distribution of knowledge. How can

we generate more horizontal relationships between learners and educators in the school? How can our educational systems be more open to diverse social actors? How could our learning and teaching features be enriched by collaboration as a way of social construction of knowledge? (Cobo & Movarec, 2011).

The introduction of the ICTs in the classrooms shows evidently the need of a new role definition for students and teachers. The formers, because of these new tools, can acquire more autonomy and responsibility in the learning process, obligating the teacher to move away from the classic role as a unique source of knowledge. However, this generates uncertainty, tensions, and fears; a reality that requires a creative redesign of the school institution (Lugo, 2008).

Within this logic, talking about education and ICTs, more than talking about equipment, computers, devices, systems and/or computational programs; it is the opportunity to reflect upon how are we think about education and how people teach and learn.

As a precaution regarding these new possibilities, in the Latin American and Caribbean region it is essential to consider the deep inequalities that characterize it. The main differences are still analogic and the new digital uses could end up generating or increasing the inequalities. Some studies (OECD, 2011; Nussbaum et al., 2009) show how the simple introduction of digital devices could improve the learning performance of the students of higher income areas, while diminishing the results of low income sectors. Thus, it is urgent to find efficient,

effective and pertinent solutions that consider these restrictions and conditions.

As stated by the follow-up report of “Education for All” in 2010: “the inequalities, the stigmatization and the discriminations emanated from the income level, the inequalities between sexes, the race, the language, the address, and the disabilities are delaying the progresses towards Education for All” (UNESCO, 2010). This statement should be taken into account when using ICTs in education, with the aim of reducing the gaps and support their elimination.

The paths in Latin America

There have been important efforts in Latin America to incorporate ICTs into the education systems. It is possible to distinguish four “waves” of initiatives that have led these efforts with different focuses and aims.

The first wave was displayed by the end of the 80’s under the premise of training students in basic knowledge of technology and programming, having in mind the need to count with workers and professionals prepared for a world in which technologies emerged with a growing presence in the work places. Examples of this type of initiative are “REUNA” in Chile, and the “Plan of educational informatics” of the Omar Dengo Foundation in Costa Rica.

A second effort carried out in the 90’s, oriented to democratize the access to technology, considering the digital literacy as an essential aim in the training of teachers and students. These programs were characterized for the installation of “informatics labs” in the schools, together with courses to master text processors, spreadsheets, presentations, and since mid 90’s email and web navigation. Emblematic projects in this line are “Enlaces” program in Chile, “Red Escolar” in Mexico, “ProInfo” in Brazil and the “Programa de Conectividad Educativa” in Uruguay.

The third wave was centered in the educational digital content. The generalized evaluation found only the mastery of generic software and the basic skills were not sufficient to produce the expected educational impact. What was required was digital content specially designed

to support the curricular implementation through applets and resources in Spanish, properly classified and disposed for their use in the school. Consequently, the national educational websites were born: “Educ.ar” in Argentina, “Educarchile” in Chile, “Huascarán” in Peru, “Colombia Aprende” in Colombia. All of them were reunited and expanded in 2004 with the creation of the Latin American Net of Educational Websites (RELPE). Another representative project of this moment was “Enciclomedia” in Mexico, a huge project that installed servers with educational contents, interactive boards and computers in more than 60.000 classrooms.

These three first waves of investment in educational informatics that took almost 20 years, were mainly based on an act of faith. The political and educational leaders that embraced them, considered that it evident that the incorporation of new technologies into the classrooms and the schools was to transform the educational practices, and consequently, have a positive impact in the learning outcomes in the measurements of the region: international assessments (PISA, TIMSS, SERCE), national tests (in Chile, Brazil, Colombia, Uruguay, Peru) or administrative data of school registering, graduation, and progress. Those tests showed that the results of the students remain stable.

Another illustrative element of this “act of faith” was that none of the initiatives were subject to any kind of impact evaluation, thus, there is little objective and technical evidence to defend or criticize its implementation. Would the learning outcomes be the same, worse or better if the countries would not have invested resources in all these?

Finally, since 2007 the last movement for the incorporation of technologies in education

started: a digital device for each student. The rationale behind this effort sought to address the lack of impact in the educational outcomes of the previous investments. The low impact assessment was related on the one hand with the insufficient availability of devices, because the students had few minutes per week to access them. On the other hand, it was recognized that the previous initiatives did not have impact in the educational practices, thus, teachers and schools were doing more than less the same than before the investments.

The proposal launched by Nicholas Negroponte from MIT in the World Forum of Davos (2006) was to change this panorama by a portable device for each student, posing the initiative One Laptop per Child, OLPC. From an educational point of view, the initiative was based in the “Constructionism” proposal of Seymour Papert, another researcher of MIT that promotes autonomous learning without the context conditions or the specific support of the teachers. From this perspective, the “pressure” posed on the students, all of them with a digital device connected to the internet, would obligate to necessary change of practices by the teachers.

The pioneer effort of Uruguay with the “Plan Ceibal” was followed by “Una computadora por Niño” from the Foundation Paraguay Educa, “Una laptop por niño” in Peru, “Un computador por

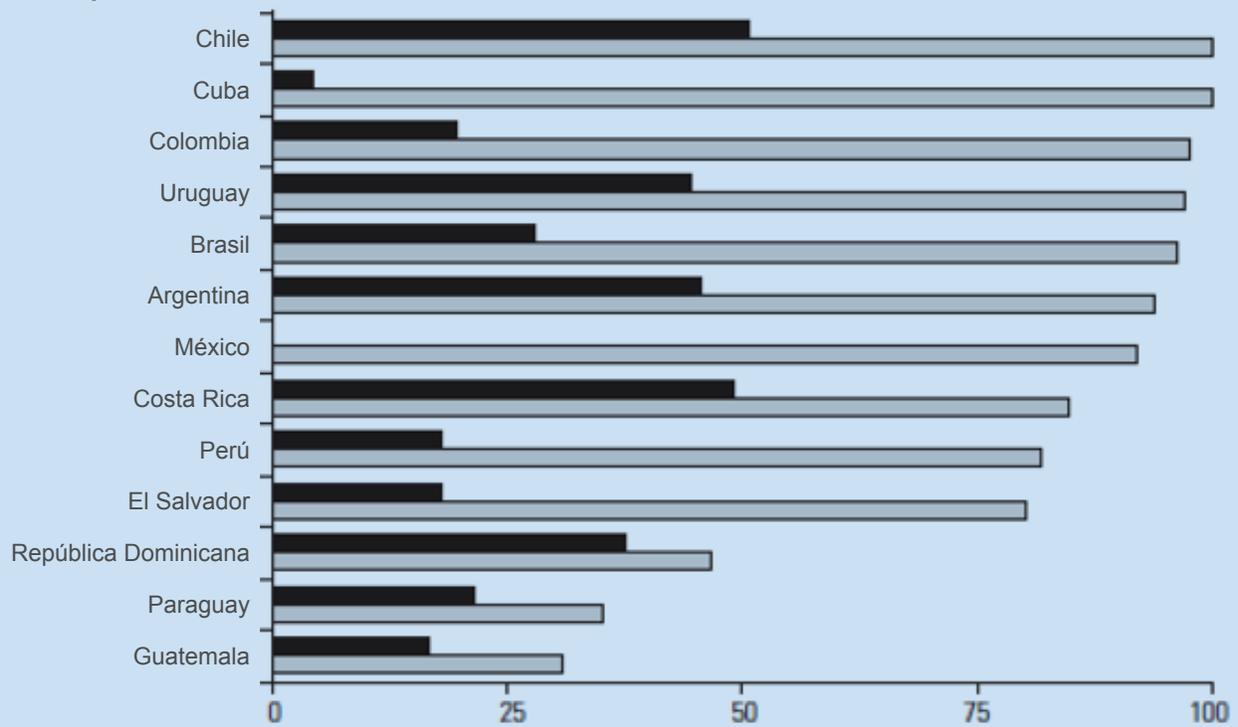
alumno (UCA)” in Brazil, “Proyecto Canaima” in Venezuela, “Habilidades Digitales para todos” in Mexico, “Laboratorios Móviles Computacionales” in Chili, “Educatrachos” in Honduras, “Conectar Igualdad” in Argentina, just to mention the more larger scale examples¹.

All these initiatives have implied huge economic efforts for the countries of our region, and thus, the need of more solid evidence regarding the impact and cost-effect has increased. With the support of international organizations as the World Bank, the BID, the OECD and the UNESCO, an important research work has been developed in the last seven years. This research has shown important impacts to the reduction of the digital gap, ensuring access to many students and families that would be otherwise excluded from access to ICTs. There are also interesting results in the development of cognitive and non-cognitive skills.

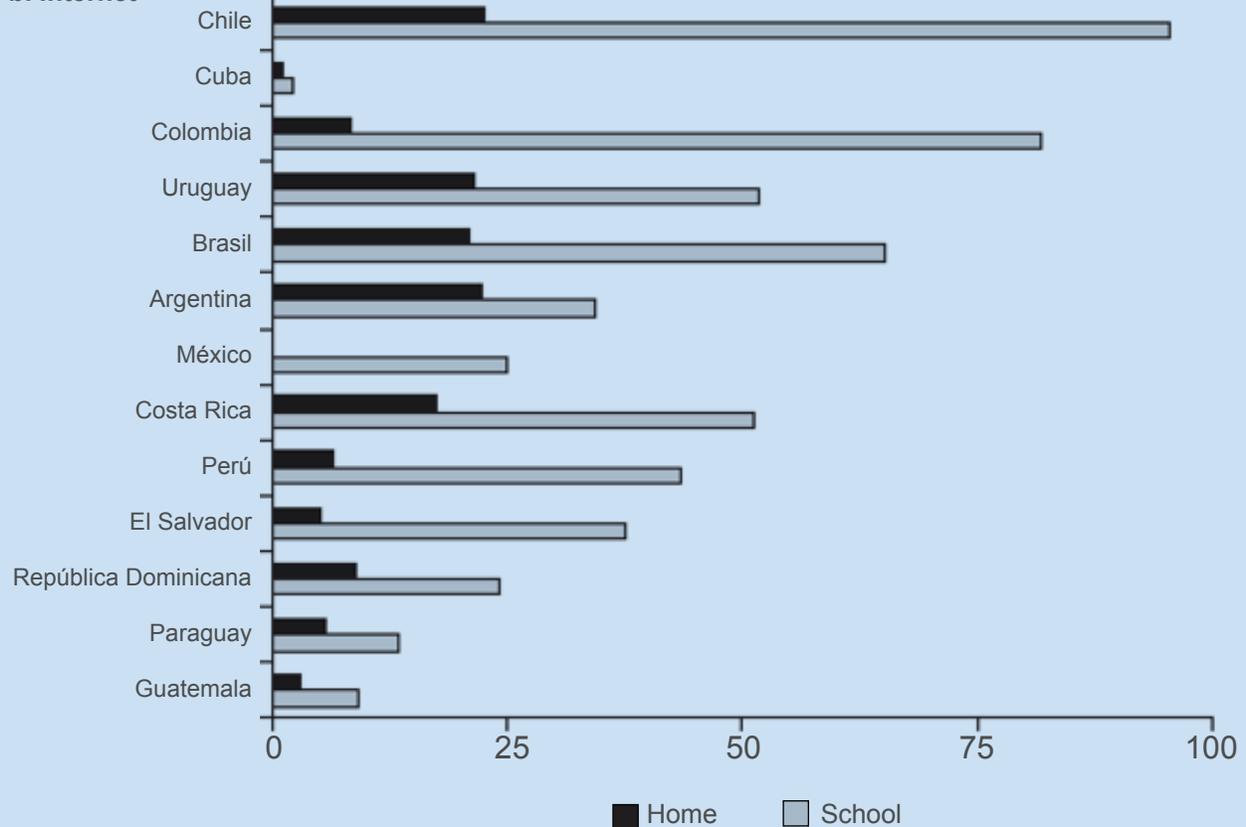
¹ Only the mentioned initiatives sum about 10 million of devices already distributed to the students. If we add up the massive distribution plans proposed by many of those countries in the next months, it is possible that by the end of 2015 there would be close to 30 million of devices distributed to the students of Latin America. Considering that the TCO (Total Cost of Ownership), according to the calculation of Severin and Capota (2011), that would imply that the educational systems of the region would have invested around 12 million dollars in these type of initiatives.

Availability of Computers and Internet in school and home (2008)

a. Computers

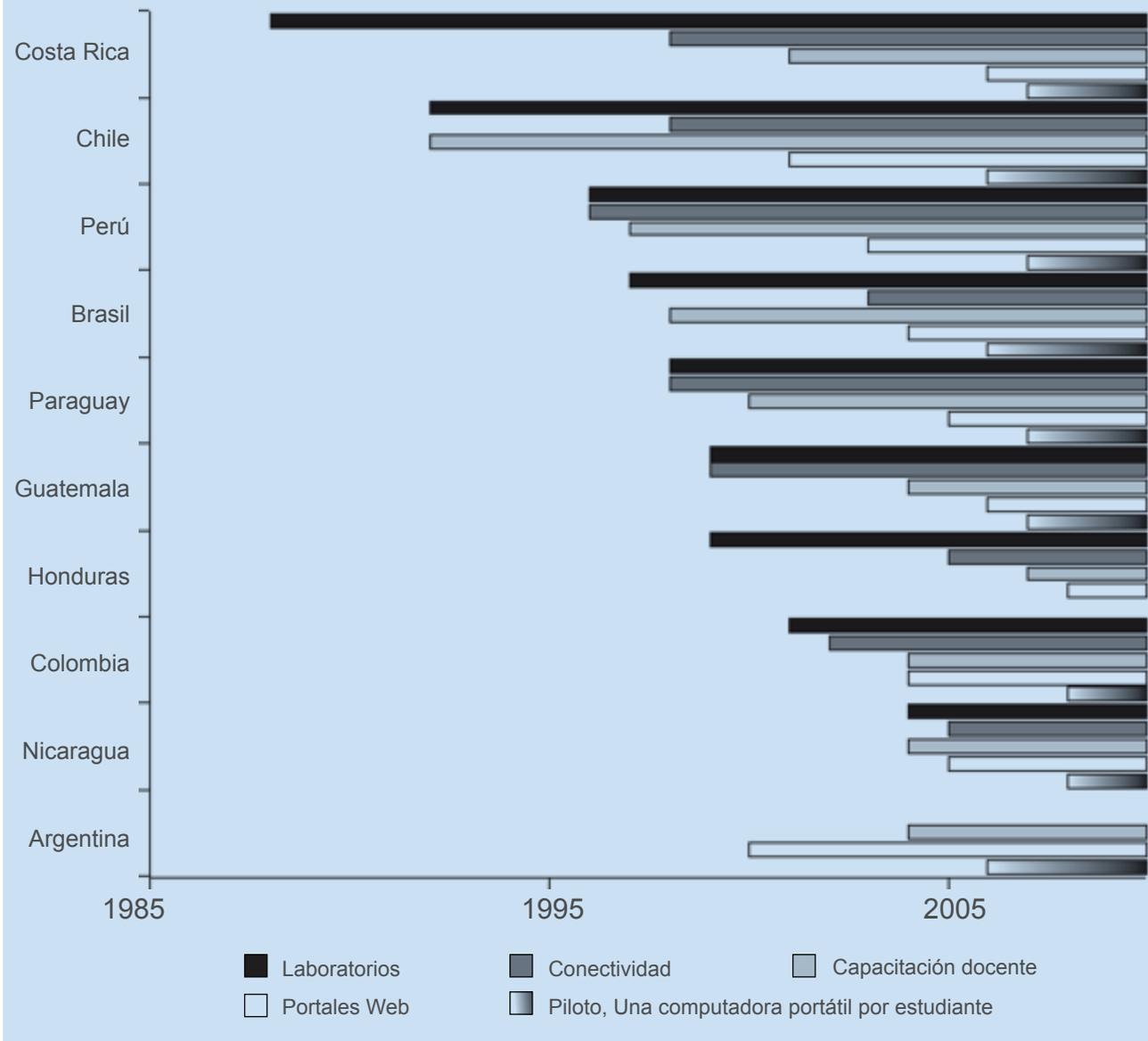


b. Internet



Source: Calculations of the authors based on the data of LLECE (2008)

Chronology of the ICT Projects in Latin America



Source: Alvaríni and Severín (2009)

The evidence shows that the effect of the digital technologies on learning depends on how the educational experience with the support of the technologies is adjusted to the initial level of ability of the students. Banerjee et al. (2007) studied an assisted learning program in India, in which the innovative element is that the software is adjusted to the level of knowledge of each student.

The results showed that performances improve with a greater impact among weaker students.

Fang He and Linden (2008) analyzed a teaching program in which children are provided with a machine called PicTalk, where they can signal figures with a style and listen to the pronunciation of the word

in the machine. Contrary to Banerjee, their results showed that the stronger students got more benefit from the self-imposed teaching while the weaker students got more benefit from the teacher. The authors highlighted the relevance of the software in the potential of the program on the students. They stated that the software should consider the heterogeneity of skills in the classroom. Many studies have found that the computers provide an efficient way of accessing information by the user and consequently this is used to improve their academic results (Mark R. Lepper and Jean-Luc Gurtner, 1989, and Marilyn Heath and Jason Ravits, 2001).

The effect of the TED projects (digital technologies) also depends on the resources that are proposed and the implementation strategies, considering technologies as a complement or a supplement of other supplies of educational processes. If they are implemented as a substitute, then the evidence is mixed. If TEDs are implemented as a complement, then the evidence shows a positive effect.

The discussions about ICTs should go beyond the topics of availability of equipment and connectivity. It is necessary to move towards the issue of the uses and the impact on learning.

Having basic digital literacy, is nowadays needed not only to achieve better learning processes in the students in different courses, but also to obtain more tools in the working area and moreover to exercise our citizenship in the context of the ubiquity of the technologies. But it is insufficient if the access and training does not promote the

development of innovative uses and new learning experiences. The public policies should take responsibility not only on the purchase and distribution of equipment and networks, but also to invest in new ways of training and formation, in innovative educational resources and in the systemic articulation of the rest of the public policies in education to make possible the changes in the educational practices that impact the quality of the learning process.

Teachers and new educational practices

The educational systems are challenged to start paradigmatic changes in their current configuration, and this process would be facilitated and speeded up by the support the ICTs given their development.

The construction of a new educational paradigm is an effort to update the sense of education and the ways in which this is developed, to connect it with the needs and demands of the XXI century and with the interests, needs, likes and abilities of each student. This paradigm is based on the comprehension of each member of the educational community as learners. There is not a unique and consolidated knowledge, transmitted from the teachers, owners of the knowledge and the teaching process to the students as passive receptors. Nowadays it is about a community of people that search, select, construct and communicate knowledge collaboratively.

This change is perhaps proposed as a movement from an education oriented exclusively to improve academic results of the students, to one where the center is in

each member and the teaching is conceived as an accompaniment and collaboration between learners. It is going from a process of “standardized quality” to one of “high standards of quality”, where more than responding to contents and to a structured curriculum, the evaluation systems are understood as ways to obtain relevant information to achieve goals and aims stated for each one, with clear and transparent information that acts also as a way of connection and adhesion of the families and communities to the project.

The role of the teachers is key², as they have to be the first promoters of this new educational paradigm starting from the implementation of renewed educational practices, to make them more pertinent to the demands of the knowledge society.

From this perspective, there are six teaching practices that are proposed, from the daily exercise of the teaching-learning process in the schools and with the support of the ICTs, could contribute to make this paradigm possible. These six innovative practices for learning constitute the basic and concrete nucleus from which the support for a new paradigm is initiated, under the perspective that the changes should be visible in the teaching actions. The implementation depends, certainly, of the well prepared teachers that could perform in adequate working conditions. But it is required, more

than all, the existence of comprehensive policies, because the success of the educational change does not depend and cannot depend exclusively on the effort of the teachers, but of the complete and aligned educational systems and of interventions and systemic action programs.

1. Personalization

The educational innovations should strengthen the learning processes of each student, recognizing different contexts, interests, characteristics, and likes, so that the maximum potential is developed in each student. This means that education in the XXI century should be able to incorporate the life project of each student as a constitutive and fundamental part of the educational experience. From the interests, personal characteristics and passions of each student, the significant learning experiences are constructed.

Put the students in the center of the learning process to make the protagonists of the search, the construction and the communication of knowledge implies a new role of the teachers as mediators, facilitators and architects of training timetables to the development of new educational experiences. These new experiences allow strengthening of the differentiation, to support new ways of knowledge and learning, with activities

² In the document “Antecedentes y Criterios para la Elaboración de Políticas Docentes en América Latina y el Caribe” (OREAL /UNESCO 2012) some characteristics of the teachers of the region are identified. Particularly, aspects as the low quality of the initial training programs for teachers, the scarce opportunities of professional development and promotion within the teaching work in the classroom, the little relevance and articulation of the teaching and curricular models, and the little consideration of the reality of the school and the collaborative learning. These problems should consider ICT as a key part of the solutions.

and rhythms differentiated to attend to the needs of each student.

The technologies permit to each student and their teachers an accurate and differentiated register of the learning process, to count with personal teaching schedules, with teachers with new roles and more information to perform, and students that can develop complementary strategies of investigation, exploration and self-learning.

2. Focus in the learning results

The main and final aim of each of the innovative education projects is to produce better learning outcomes in the students. This refers to the curricular contents and also to the development of wider skills. Learning is not anymore the mere acquisition and memorization of predetermined contents but to learn how to create, manage and communicate knowledge in collaboration with others.

The technologies offer opportunities to access available knowledge, to communicate it faster in more efficiently and to measure better and with lower costs the learning results, including opportunities for formative evaluation and also to support the development of differentiated strategies from the results obtained in the process.

3. Expansion of the times and spaces for learning

The educational innovations should contribute to overcome the school limits of space and time to offer educational experiences available in any time and

place, for all students collectively and individually, through the creation of social nets of knowledge. This expansion offers the complementary opportunities to work in the school, but also to self-learning regarding individual interests.

The technologies facilitate the ubiquity of the educational experiences, through the available and accessible platforms from different devices, places and moments.

4. New learning experiences

The educational innovations should facilitate the development of new learning experiences, through the incorporation of new logics, strategies and educational resources that facilitate development of individual working plans, the collaborative work with others through shared-interests work groups and the work in the classroom and the school. Strategies of “blended learning” - learning based in projects and personalized learning environments - will allow the incorporation of games, social networks, online platforms, videos and other digital resources widely distributed, to facilitate the access even to students of low resources.

The technologies reduce the cost of production and distribution of quality educational resources, and also permit to integrate innovative experiences better connected to the expectations and experiences of the students of the XXI century.

5. Collaborative construction of knowledge

The discovery and development of new learning is enriched when is carried out with others. The perspective and diversity brought by the shared work allow the students not only to improve the results of their actions, but also to go further in their knowledge and convictions.

The educational innovations should connect better the learning experience with the life in community in which each student and schools are inserted, creating spaces for permanent learning through the life of all their members. The technologies facilitate the communication networks and improve the bond of the family, the schools, the students, and other local organizations, about common aims.

6. Management of teaching based on evidence

The development of a new educational paradigm requires that the educational systems and all their actors develop an important skill to register, understand and use the data that these systems produce to support the decision making at every level, including the process in the classroom, from the available evidence.

Technological systems that register the actions and progress of each student and teacher could recognize patterns, styles, rhythms, and profiles, and in turn could support importantly the development of more efficient educational systems. The political management of the educational systems, the leadership inside each school and the

knowledge management that each teacher can develop with his/her students would be benefitted with these new instruments.

Action proposals: The ICTs for the Post-2015

The experience of incorporating the technologies to the educational systems in Latin America and the Caribbean in the last 25 years has shown little effect in the quality of the education. Part of that is explained because the logic of incorporation has been the “importing” without previous clarity regarding the exact teaching aims to be followed, what strategies are the appropriate to achieve them, and only then, with what technologies these could be supported. The result has been that the technologies ended up as a relatively a minor place in the educational practices that are still very similar to the ones carried out before the investment.

For that reason, some actions guidelines are proposed based on the presented diagnose and aligned with the interests and characteristics of each student and the demands of the knowledge society.

Recommendations for the public policies

The public policies in education and ICTs should be based in integrated and contextual approaches:

- Consider the access to technology and internet as a right of every student, so the State(s) should assume the duty to ensure

access to those who cannot achieve this by their own means.

- Ensure that teachers and families will access elemental training in the use of digital technologies, to accompany the access of the students more appropriately.
- Develop initiatives that are socially responsible, considering the training and the necessary mechanisms to guarantee the right to privacy and intimacy of everyone, especially the young. To foster respect to authorship rights, the care and promotion of the local cultures, recycling equipment, amongst others.
- Recognize and compile good educational practices with the use of technology and favor the access to educational resources of good quality for all the schools and students.
- Favor the collaboration between pairs and the development of networks and learning communities that contribute to developing respect to diversity and a culture of peace.
- To take advantage of the potential of technologies to strengthen a quality education for all, the permanent education and the development of diverse talents, associated to the demands of the XXI century society.
- Improve the management of the educational systems with the support of the ICTs, to improve their efficiency, opportunity and capacities, with the aim of incorporating the educational communities in the relevant decisions.

Recommendations for the development of new educational practices

The development of new educational practices that put learning in the center and that allow alignment of educational experiences with interests, characteristics and conditions of each student, in coherence with the demands of the knowledge society:

- To support the development of new learning experiences, centered in the students through differentiated and personalized teaching processes, starting from teaching decisions based on evidence.
- To strengthen the collaboration in the classroom, in the educational centers and between teachers and students in the whole region, strengthening the development of learning communities and offering educational actions that widen the time and space (environment) for learning beyond the school.
- Value the knowledge of the students in the ICT topics as an opportunity of generating mutual learning spaces in the schools.
- Promote a culture of peace and respect to the cultural diversity in the frame of the ICTs use.
- To promote the inclusion of the use of the ICTs with teaching aims in the curriculums of initial teacher training.
- To strengthen the pre-established teacher training to promote personalized training systems, that are continuous, collaborative and within a network, incorporating the generational approach and the gender

perspective in the analysis of the ICT uses from teachers, and from there, develop training session according to their needs.

- Support the creation of an exchange network to strengthen the articulation of the teaching and curricular models existing in the region.

The ICTs in the discussion regarding the Education and Development Agenda Post 2015

2015 will be an emblematic year for the world's agenda. That year the countries will report their advances regarding the Millennium Development Goals (MDG) and also regarding the Education For ALL (EFA) goals. The United Nations agencies are contributing to organize the world's debate to generate a common agenda to orient the actions towards human development. To fight inequalities in all their dimensions is the center of the world's efforts in all the areas of development.

UNESCO, as the leader of the world's agenda of compromises in favor of EFA has followed the goals in a systematic way. Thus, in the recent reunion in Muscat, Omán, in May 2014 the aims that need to be pursued to advance in the guarantee to the right to

education post- 2015 for all countries, has been defined.

In the frame of the "Sustainable development goals" that the countries will approve in the general assembly of the United Nations in 2015, and also in the educational goals that UNESCO pursue to support the world's aim, ICTs will have an unquestionable prominence.

Proposal of the Open Working Group about the Sustainable Development Goals, 19th July, 2014

The universal aim of the agenda of the Sustainable Development Goals will refer to ensure inclusive and equitable education of quality and to promote the learning opportunities through life for all. In this frame, and among other 9 specific aims, it is punctualized: to ensure that all girls and boys complete equitable primary and secondary education of quality, that leads to learning achievements that are effective and relevant; to ensure to all the students the acquisition of knowledge and the necessary capacities to promote sustainable development (...) for what (...) information and communication technologies will have to be included. It is also explicit the need of (...) increasing the quantity of qualified teachers, including the international cooperation for teacher training.

Final Declaration, World Meeting of EFA 2014, Muscat (Omán), 14th May 2014.

In the Oman Declaration it is stated that the education agenda should adopt an integrated approach, and also a life lasting view, giving multiple ways of learning through innovative methods and the information and communication technologies. At the same time, some aims were agreed, among others: (...) for 2030, all the boys and girls will finish an elementary school of quality that is also free and compulsory, of at least 9 years and will acquire the corresponding competences; for 2030, all the students should acquire the knowledge, competences, values and attitudes that are needed to build sustainable and peaceful societies, through, among others, the education for the world's citizenship and the education for sustainable development (...); for 2030, all the governments will achieve that all the students receive teaching by qualified teachers, with teacher training, motivated and supported accordingly.



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