Challenges of Information and Communication Technologies (ICT) in education from the perspective of experts in Uruguay

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Abstract

This study addresses the topic of Information and Communication Technologies (ICT) in education, in Uruguay, from the perspective of three experts from teacher education and training centers, University of the Republic and Plan Ceibal. This investigation is part of a research agenda of the Smart Ecosystems for Learning and Inclusion (SELI) project (ERANet17/ICT-0076 SELI. http://project-seli.herokuapp.com/). Respondents were selected based on the following sampling criteria: they hold positions in the Uruguayan educational system, in educational management, program implementation, teacher education and/or research. They are recognized in the Uruguayan context for their knowledge or achievements in these areas, and they are currently part of the institutional display of public formal education. A qualitative approach with structured questionnaires was applied. Interviews focused on challenges of digital literacy, integration of ICT to the educational system and digital inclusion. Three dimensions are addressed in content analysis: ICT availability, implementation strategies and policies developed. Respondents seem to agree on some opinions: great achievements in terms of overcoming digital exclusion are acknowledged, although all respondents agree that there is still room for further improvement. They believe that effectiveness in technology integration is tied to teacher involvement, collaborative work, sharing and building community. Another core shared idea is that innovation resides in what people do as they appropriate technology and not in the technology itself.

Introduction

As these lines are written, the world is undergoing the Coronavirus crisis, an event with huge impacts at all levels. Educational systems of the world take quick actions to shift their educational processes to the virtual world, and teachers, experts in educational technology and teacher educators, joggle multiple balls in the air in an effort to design and implement overnight solutions to teach online or get as close as possible to that notion. It seems like a particularly sensitive moment to think of educational technologies in our country. Massive empirical data show how challenging and demanding the task of integrating technology to education can be.

Evidently, even overnight solutions, based on emergent and urgent needs, cannot exist without considering at least the following: a) technological infrastructures, devices and tools, b) pedagogical foundations and implications for the integration of technology, c) demands to implementation processes. Also, when time comes for reflection, overwhelming implications in terms of the underpinning principles that support choices made, would also need to be considered.

It is in this context, that this topic is addressed. This work is part of the second year of the SELI project (ERANet17/ICT-0076 SELI. http://project-seli.herokuapp.com/). The purpose of the study is to answer the following research questions, in each of the participating countries: What ICT-based solutions are most frequently and most effectively used by trainers and teachers? What is the greatest obstacle to introduction of ICT-based solutions? How can we use technical and human potential to further increase the effectiveness of ICT-supported education? How does the business sector support ICT-based learning and integration? Which innovations can be considered significant?

Methodology

Three interviews were made between January and March of 2020. The three respondents were selected based on the following sampling criteria: they hold positions in the Uruguayan educational system, in educational management, program implementation, teacher education and/or research. They are recognized in the Uruguayan context for their knowledge or achievements in these areas, and they are currently part of the institutional display of public formal education. Since they have been selected as qualified informants due to the prominent positions they hold and their relevance and visibility in the Uruguayan educational system, anonymity was neither an adequate option, nor a possible one. Inter-

viewees are identified with their names and they have read and agreed to the publication of this paper.

Each open interview lasted approximately one hour and it was based on a guideline with the following set of questions:

1) What ICT-based solutions do trainers and teachers apply the most in their educational activities in our country? What worked the best and why?

2) What is the biggest barrier to the implementation of the modern ICT-based solutions in our country?

3) How can we use the hardware and human potential of our country to further increase the effectiveness of ICT-supported learning?

4) Which innovations can be considered significant?

5) How does the business sector support ICT-based learning and integration?

Interviews were recorded, transcribed and coded using Qode, an open application tool for qualitative content analysis and data visualization[1].

The variables analyzed in reference to challenges of digital literacy, integration of ICT to the educational system and digital inclusion are shown in Table 1:

[1] https://qodeapp.herokuapp.com/

Table 1: Variables and dimensions analyzed in the interviews

technical resources and devices used (infrastructure)	internet access appropriate equipment
software solutions	proprietary software open— sources solutions
institutional barriers and obstacles	teacher's promotion system curriculum and curricular changes role of technologies in the curriculum
other barriers and obstacles	practical obstacles cultural barriers
the teacher	teacher's reactions and attitude (openness vs. resistance, frustration, cooperation, etc.) teacher's profile digital literacy (including safety, personal data and knowledge of licenses)
implementation strategies	plans for implementation innovation processes territory
institutional policies	The State and its public policies choices and principles business companies corporate social responsibility
inclusion	open access resources e-learning challenges vulnerable groups digital inclusion

It is important that the limitations of this research be clarified. The study is based on three interviews of national referents in the area addressed. They have been selected as qualified informants considering both their key positions in nation-wide relevant institutions that display public policies and their knowledge of the subject matter, supported by experience and research. However, this sample of referents by no means intends to be a representative sample that would account for all educational policies in reference to education and technology in Uruguay. Referents' accounts, perceptions and opinions, have individual value in as much as they are provided by subjects who have witnessed, led and studied some of the most influential policies in the area. Although the three of them work with teachers, they do not represent the opinion or perceptions of Uruguayan teachers in general, nor do they provide an evaluation of actions implemented in the country in teacher development towards ICT integration. In that sense, the value of this work is to provide initial data as an exploratory study of a field that is both vast and complex: challenges of ICT in education in Uruguay. It is an opportunity to identify challenges and issues that will require further studies. It also

provides an opportunity to develop hypotheses about ICT and education policies implementations and results.

Background information

The educational system in Uruguay is organized in subsystems, centralized by the National Association of Public Education (ANEP), an autonomous entity, responsible for the planning, management and administration of public education in Uruguay. It comprises pre-school, elementary, secondary, technical schools and part of the higher education programs offered in the country. There are two public universities: University of the Republic (UDELAR), which is also autonomous in its governance and it has 77% of university students of the country (MEC, 2017). The other is Technological University (UTEC), created in 2012 and active since 2013. Pre-service teacher education in Uruguay is under the responsibility of the Education Training Council (Consejo de Formación en Educación, CFE) which is part of ANEP. The CFE is in charge of teacher education and training of school teachers, highschool teachers, teachers at technical schools and social educators. All these careers are organized in a variety of institutions created at different historical and political times (Tomczyk et al. 2019). Even if these institutes provide a higher education degree, none of them has a university status, but they have signed agreements with UDELAR and other universities for cooperation, research activities and the development of postgraduate study programs.

Plan Ceibal, a connectivity plan, implemented in 2007 following the "one laptop per child" model, was created with the objective of introducing ICT in public education at primary and secondary public schools. It mainly started as a digital inclusion plan, rather than as a teacher development or ICT integration to teaching program. Plan Ceibal was implemented as a presidential project, led by the Technological Laboratory of Uruguay. (LATU), which has been in charge of definition and implementation policies (Severin, 2016). The central coordination and implementation of Plan Ceibal is carried out by Ceibal Center. It is directed by a board whose members are the President of the Center, who is a representative of the Executive Power, a representative of the Ministry of Education, a representative of ANEP and a representative of the Ministry of Economy and Finances.

As for formal education teaching practices, all systems develop face to face educational models with the integration of technology in a variety of technology enhanced learning models. Hybrid and blended teaching only take place in some of the higher education teacher training programs. This model has become particularly important in the interior of the country, due to its high demand among students. By the end of January 2020,

the demand for hybrid teacher training programs had doubled in reference to previous years. Distance education has not been implemented in formal Uruguayan education, except for some attempts to virtualize teaching and learning processes, which have taken place throughout the past two weeks, due to the extraordinary contingency plan carried out as a consequence of the coronavirus spread.

Three referents were interviewed, Claudia Brovetto from Pan Ceibal, Virginia Rodés from University of the Republic and Enzo Puglia from the Teacher Education and Training Centers. The following information about these institutions and particularly some of their plans and programs, will provide necessary background about the issues addressed by the respondents.

Plan Ceibal has been developed throughout the last ten years, in such a way that today it encompasses a variety of programs. Among these programs, there are: Ceibal in English, Laboratory of Digital Technology, Youths into Programming, Red Global de Aprendizajes -part of the global alliance called New Pedagogies for Deep Learning (NPDL)- and the systematic use of platforms CREA (Learning Management System on Schoology™) for curricular classes and PAM (the adaptive learning system for maths Bettermarks™). Plan Ceibal also facilitates the availability of devices to pre-service teachers in their last years of education.

Claudia Brovetto, from Plan Ceibal is a Linguist, with an MSc and a PhD in Linguistics and a background in research and in educational management. She is the Manager of two main educational programs: Red Global de Aprendizaje (RGA) which is the Uruguayan name for the program New Pedagogies for Deep Learning network of countries, and Ceibal en Inglés (CI). She has been working in Plan Ceibal since 2011.

In the University of the Republic, ICT related policies in reference to higher education teaching practices, is the responsibility of the Virtual Learning Environment Program (ProEVA), coordinated by the Department of technological and Academic Support (Departamento de Apoyo Técnico Académico, DATA), which is part of the Educational Commission (Comisión Sectorial de la Enseñanza, CSE). This program has promoted the use of open licensing, open and free (free as in freedom) software, inspired in the principles of accessibility, lifelong learning and open education. The Moodle platform has been used since 2008, as the principal component of the open digital ecosystem developed and managed by ProEVa (Virtual Environments Program).

Virginia Rodés is a graduate in Communication Sciences, she holds a MSc. in Higher Education Teaching and a PhD in Equity in Innovation and

Education. She is currently an Associate Professor in the DATA, UDELAR. She is in charge of developing institutional policies in reference to implementation and teacher training and use of technologies at university level. She is also a researcher and co-founder and coordinator of Núcleo REAA, a group of interdisciplinary studies in Open and Accessible Educational Resources.

In reference to pre-service teacher education and its approach to technology, the Department of Digital Technologies and Teacher Education was created in 2016, with the objective of coordinating the integration of digital technologies in teacher education and training programs. The task was to organize and manage technological media and human resources, develop research and take teaching initiatives in the whole country.

Enzo Puglia, from the Department of Digital Technologies and Teacher Training (Departamento de Tecnologías Digitales y Formación en Educación Del CFE) is a graduate elementary school teacher, with a degree in Education Sciences and a MSc. in Education and postgraduate studies in Education and Technologies. He is the general coordinator of that department, and is responsible for teacher training programs at the level of primary and secondary school, technical schools, social educators and preschool teachers.

Results

What follows is an analysis of the content of the interviews, organized in three general aspects that allow the composition of a unified perspective of a process that is complex, to say the least. The way ICT has been integrated into educational processes in Uruguay is currently the result of an uneven development, which involves a variety of social actors and institutions, in the context of a complex governance structure, unfolding with different timing and pace.

The option has been to identify the following three components that intend to build the general picture: ICT availability, ICT implementation and ICT policies. The first one refers to the infrastructure the country counts on, in terms of connectivity, technical resources, devices used and software choices made. The second, refers to plans for implementation, choices made in terms of steps, strategies and programs developed to install and deploy ICT for education. The third, refers to the policies, understood as value-oriented institutional choices that ponder political consequences.

Information and communication technologies available: connectivity, technological resources and software

All three respondents say that there is an infrastructure that provides the technology for digital inclusion, broadly speaking, both in terms of connectivity and in terms of technical resources available in order to access the Internet and work online. However, all of them consider that there is still room for improvement in terms of individual accessibility. "... the digital divide has not been breached, but it has been overcome to a great extent, in terms of devices and connectivity" says Enzo Puglia.

In pre-service teacher education, needs seem to have been considered, from the point of view of institutionally provided technology. "In the majority of the centers there are multimedia devices, TV sets, audio equipment, rooms with more or less updated PCs ... and there are devices provided by CFE and by Ceibal", says Puglia. Also there is other equipment used to support specific career needs, such as robots and sensors.

On a more analytic perspective, considering pre-service teachers, there are 32 teacher training and education centers in the country. Puglia states that it is a varied universe, in terms of equipment maintenance, upgrading of equipment, connectivity, building infrastructure, for example. Also, if accessibility is considered exclusively from the point of view of the individual and his or her own equipment, some students may have access exclusively from their cellphones, in case they are away from their institutions.

Brovetto, from Plan Ceibal states that "Before Plan Ceibal, only one fifth of Uruguayan families had a computer at home" She states that "Plan Ceibal provides everything to schools: connectivity, hardware, software, teacher training and evaluation" Talking about technical resources for educational solutions, she concludes that Ceibal has provided "solutions to problems that will not be solved without technology" Technology, -meaning hardware, software and communications- was of relevant importance, for example, to reach all students with English classes, regardless of the availability of human resources -teachers of English— on site. Ceibal introduced videoconferencing and today there are classes with distant teachers of English at 70% of rural schools. Brovetto explains: "At the same time Uruguay was investing in fibre optic and Ceibal was introducing video conferences and facilities in all schools".

Virginia Rodés, from UDELAR, points out that "Uruguay has a lot of technological solutions" and she asserts "Technology, there is plenty" She believes that Uruguay reaches a high level of both technological and human resources. But Rodés is careful to signal that the software choices

made respond to both open source "Practically everybody uses Moodle" and proprietary, such as Schoology™, promoted by Plan Ceibal.

ICT implementation: institutional strategies and programs

When it comes to the implementation of ICT, it is necessary to highlight the fact that there are a variety of institutions involved in the scope of the three interviewed referents. This implies that there are also a variety of situations to be considered.

The teacher is addressed as a principal actor to focus on, in all implementation processes. Three dimensions of the teacher's life and role are considered: teacher training and education, teacher in-service professional development and teacher's practices. All of them have profound implications when it comes to devising implementation strategies.

Puglia refers to teacher education and training, pointing out that the teacher who educates future teachers lacks the level of digital literacy required. "The teacher of teachers is a model", says Puglia. "If teachers and educators do not include technology, then the models trainees ... see are not the most adequate to the competencies we want them to develop" As for teachers' in service, Puglia refers to a more personal dimension: teachers' feelings and attitudes associated with the use of technology. Frustration in the use of technology may lead to discouragement and resistance. At the same time, there are new students' needs to develop competencies that were not required thirty years ago. Puglia seems to picture a reality which is much more challenging than having and using technology at hand. It refers to building a new mindset to approach a reality with profound generational and cultural changes for some of the most experienced professors.

Brovetto also addresses the lack of digital literacies as one of the big challenges to be faced: "We face the lack of teacher´s literacy on digital pedagogies" She points out another barrier: a tendency to work in isolation from other colleagues. She says "That is a barrier. Because in any innovation and especially if it requires technology ... you either work together with others, or it is very hard".

Now, when it comes to strategies to approach the complexity of teacher development, respondents refer both to unfulfilled needs for which institutions have no answer and to specific strategies being carried out. Rodés states that leaving competency development purely reduced to spontaneity is ineffective. "There have to be specific programs", she says. "It does not take place spontaneously. Specific objectives are needed". The main choices addressed by the three referents are collaborative work

among teachers, reflective practice and allowing for synergic processes to take place among teachers and among institutions.

Collaborative work is conceived in many ways. Puglia refers to generating room for teachers with a technological background to work side by side with pedagogy teachers, so as to create synergic reactions that would generate new knowledge, therefore new practices. Brovetto explains the strategy used by Ceibal in English, switching roles between students and teachers: "The basic dichotomy between teacher and the student ... is no longer valid. But when your students are teachers, they also have a lot of knowledge from their initial education and from their practice". She also narrates the strategy developed by Plan Ceibal in the two programs she directs. There is an agenda of topics: digital citizenship, data protection and responsible navigation. She highlights the importance of shared reflective practice. "We are much more interested in reflections, discussions and readings that are related to our practices and situations and can enrich those that we do in our practices".

In terms of how teachers' practices, they are supported by the institutions, all three respondents refer to educational resource development as a fundamental pillar of teacher practice. All three of them agree on the fact that it is generally overlooked and undervalued. It is not considered relevant when it comes to pondering promotion merits, and there are no systematic policies supporting educational resource development. Brovetto expresses: "Teachers create very rich and interesting resources, but they have no place to show or share them". Puglia points out the lack of institutional strategies while saying "we need to start generating certain actions and policies for recognition, like when we recognize a publication, we need to recognize the development of open educational resources". Rodés coincides with these needs, as she refers to some of her recent research results: "There is another level of institutions and that is recognition policies, making resource development visible as part of teacher's practice. This is usually naturalized. But teachers have no specific education, training or technical support for this". She specifically refers to the need to develop collaborative environments, built on trust and cooperation, where teachers feel safe and contained to share and create collaboratively. In her role as coordinator, Rodés has led a variety of initiatives in UDELAR focusing on formative actions with teachers of both middle and higher education.

Resource development is tied to the creation of repositories. This is a topic that springs up in the three interviews: the need for repositories, and the lack of instances to share experiences of educational resources development. Research about repositories currently available reveal the following: Plan Ceibal repository would be more accurately defined as a navigation and not as a repository. UDELAR has recently launched

the "Repositorio Institucional de Recursos Abiertos", RIdAA (Institutional Open Access Repository).[2] It was an initiative of the Library Network of the Education Training Council and it was implemented by the Repository Creation Commission. The repository has three categories : academic and scientific production, educational resources (production related to teaching) and transparency (resolutions, regulations and agreements). RIdAA adheres to the Open Access Initiative that upholds the principle of free availability of information and academic production through the public Internet (Budapest Open Access Initiative, 2002). RIdAA also adheres to the National System of Digital Repositories program, which will gather the production of the national repositories and will provide data to regional and global aggregators.

In terms of systematic teacher development education programs, such as postgraduate studies, Puglia refers to cooperation programs with public and private institutions, fostering these synergies referred to above. Some of the participating institutions are national universities (public, privates) and also foreign universities and also FLACSO (Latin American Faculty of Social Sciences), an international organism. They all participate in different post graduate education programs and courses addressed to teachers. Telefónica, -the international telecommunications company - has open source virtual classrooms. It supports the development of teaching with technology in Uruguay, as part of its corporate social responsibility program. However, the Uruguayan education system has no part in it. Likewise, Rodés refers to the existence of a centralized program, led by CSE, which aims at teacher development displaying a variety of formative actions, although not as far reaching and systematic as the needs would require. Also, there have been inter-institutional initiatives, for example the one between UDELAR and the Federal University of Rio Grande do Sul, in Brazil, which resulted in an inter-institutional PhD program in educational technologies.

Another variable addressed in reference to implementation is territory and the challenge of reaching the whole country. Both Plan Ceibal and CFE are organizations that intend to reach every one of the nineteen departments of the country. Ceibal has lately reached rural schools and works with teacher mentors who get involved in the local realities and work side by side with resident teachers. CFE copes with a great difference in institutional backgrounds, organizations and human resources that are deployed throughout the 32 teacher training centers. UDELAR, on the other side, is undergoing a decentralization process that has not

[2] Consejo de Formación en Educación. https://www.google.com/url?q=http://www.cfe.edu.uy/index.php/informacion-institucional/organigrama/78-novedades-institucionales/3671-cfe-presento-su-repositorio-institucional-de-acceso-abierto&sa=D&ust=1585700042465000&usg=AFQjCNGoRmTyA-iXDz_LKJI3Vh7dDmcYFQ

reached the whole country yet. These topics will be further developed in the following section about policies.

ICT policies: the challenge of institutional policies

Implementation processes reflect institutional choices and policy design. The three referents interviewed explain the details of implementations and also comment on the principles and values that inspired those institutional choices that later become "the policies" to be implemented. They also state their personal perspectives on those policies in a more or less critical fashion. Some core concepts that seem to structure and organize these perspectives are innovation, inclusion, making informed institutional choices and the policy design in reference to other stakeholders.

The topic of innovation, unfolds interesting developments in all three interviews. In the case of Brovetto, it is related to teachers' attitude in a continuum between openness and risk-taking on the one hand and resistance and isolation on the other. To Brovetto, innovation is tied to a pragmatic level where practice meets theory. It develops by "...working on this gap, providing support and elements to bridge this gap between theory and practice". In this context, having an action plan that involves collaboration and mentorship becomes a key element.

Brovetto expresses that Ceibal in itself comprises innovative processes. She supports that idea by exemplifying with Ceibal in English.

"Instead of having a teacher that comes to class every week to teach English we have a remote teacher. It is a teacher who teaches through technology. However that's only part of it. The most interesting innovation is from a pedagogical perspective".

She reflects on innovation as a change that takes place in the field. It consists of practices that undergo change and emerge from actual interventions that involve collaboration. She goes on to develop the pedagogical change reflected in the new practice: "One is a remote teacher who is the expert in English. But the other one is the one who knows the students, the way they work, the way they learn. ... for many teachers it was very innovative to work with a remote teacher who is perhaps Uruguayan or perhaps not".

Brovetto also identifies innovation in a shift of perspective in the curriculum.

> "Our education system focuses primarily on content, disciplinary content, and curriculum content, and although teachers are familiar with creative

> and critical thinking, their focus is typically not on teaching critical thinking or creativity. And that is what Global Network invites teachers to do. We are going to focus on creativity, critical thinking and citizenship".

Puglia, on the other hand, takes the word innovation with a bit of suspicion. "...innovation is sometimes taken as a desired objective and if you are not innovative, your practice is wrong. I don't think so. There are many inclusion processes that are good and they are not innovative per se". He goes on to assert that Innovations have to be sustainable in time. He provides an example he considers innovative in the use of videoconferencing in hybrid teaching courses.

> "...students ... started having video conferences in synchronic face to face encounters that would have been impossible otherwise. The improvement was in the access, quality time with the teacher ... it is a practice that has been incorporated... There you have an innovation that has been incorporated".

Rodés also starts questioning the notion of innovation in itself, depending on what is meant by it. When asked "how innovations are used", she reacts: "Well ... that is a wrong start. Because it seems that innovation comes from abroad and innovation is technology". She later expresses that in education, the innovation is in the educational process itself, not in the technology used. She makes a clear cut with the notion of adoption. "We adopt the technology, but the innovation is not in the adoption. It takes place in what people do with the technology, in pedagogical terms".

Turning to the topic of inclusion, Brovetto explains that inclusion has always been in the agenda of Plan Ceibal. "Ceibal's identity is inclusion and equity", she says. She clarifies that initially, Ceibal was not an educational program, but rather a digital inclusion program. When asked about specific excluded groups such as people who are territorially excluded or people who suffer certain cognitive, visual or psychomotor disabilities, she responds that all of them are somehow considered. "Resources were thought wide enough to include all students. The main theme is how teachers use them. Remember that we do not work with students directly". Later she develops the idea that the answers to inclusion are related to using accessible, adaptive platforms. This means that inclusion is supported by developing more and more adaptive material and software designed with the idea of Universal Design.

When referring to inclusion, Puglia highlights how territorial exclusion has been tackled by developing hybrid teacher training and education programs for future secondary education teachers. Those who live in the interior of the country, where there are not enough human resources to

create a full scale face to face program, can take all the common subjects with future primary school teachers, and the specific ones referred to their discipline, completely online. This is both territorial and social inclusion of economically vulnerable groups. Puglia informs that the hybrid program has had an exponential growth in the registration for 2020.

Rodés offers a different perspective, referring to the development of inclusive educational resources. She refers to one particular experience called BIDYA, developed by the Interdisciplinary group of Accessible and Open Educational Resources of UDELAR. BIDYA, which is an acronym for BIblioteca Digital Y Accesible (digital and accessible library) allowed a series of resources to be adapted to the blind. Rodés explains that it did not involve just making resources available, but it requires competency development by these excluded groups. Again comes adoption in her words: "It has to come along with a strong adoption strategy, actions in education, actions in communication, actions in implementation and actions in promotion, that go hand in hand with the adoption process". She explains that this process requires working together with the specific target communities (the association of blind people in Uruguay), their families and closer people, who usually conform pretty tightly to interwoven communities with few external connections.

In reference to institutional choices and policy design, issues addressed bring along perspectives on values that inspire those choices and also on stakeholders involvement.

Brovetto, expresses that Plan Ceibal works with a variety of institutions in the private, public and business sectors. She stresses the leading role of importance of State actors in the receptiveness to initiatives to conform Ceibal's agenda. She does not make any further reference to implications of the policies designed or how Ceibal should relate to these different sectors. Her discourse focused mainly on practical issues and educational principles related to implementation.

Puglia refers to the need to have unified policies, supporting each other towards a common objective. He expresses that at a national level, many different institutions should work in synergy. For example, in reference to creating a policy towards educational resources he points out that Ceibal has its policy, UDELAR has its policy and CFE institutions have their own. He talks about the importance of an inter-institutional open education group called "Working Group on Open Education in Public Education", within the framework of the Coordinating Commission of the National System of Public Education of the Ministry of Education and Culture of Uruguay. This group drafted the document "Guidelines

for an Open Education Policy in Public Education in Uruguay" [3] which is part of a broader agenda to be promoted by the Working Group on Open Education in Public Education. The working group is composed by Rosita Angelo Director of Education, María Noel Hernández and José Mignone (MEC), Miguel Álvarez (ANEP-CODICEN), Virginia Rodés (UDELAR) and Juan Marrero and Juan Mottola (UTEC). He highlights the fact that it is interdisciplinary and interinstitutional. *That*, unified perspective, he believes, would be an adequate strategy. It means pondering political issues when it comes to regulations, in order to provide adequate advice to institutional decision makers that influence at a national level.

Rodés, whose position is more tightly related to policy development, both in management roles and in research activity, holds a stronger and more detailed opinion about the implications of policies to the place and the way stakeholders and business sectors get to be involved. She believes that institutions have not developed awareness of the relevance of expert advice when it comes to making policy decisions. She expresses that decision makers should be advised in political issues related to technology. She refers to issues of privacy, personal data, safety and copyright. She questions decisions that are made under an assumption of a supposed technological neutrality. In her words: "...there we have a huge problem, because people are being object to commercialization". Rodés develops the idea:

> "Platform capitalism has permeated issues of access, not only in the technology itself, but also in sources of information. That means putting personal data at stake, added to access barriers due to copyright issues... For educational institutions, it has become harder and harder to evade the magical commercial solutions... It is harder to compete from a position of adequate and sovereign development".

Rodés makes a point on an issue that she places beyond education. "We are on an edge between what is positive and what is extremely harmful, not just for education, but for the individual and for society". This notion comes to expand and enrich the idea of digital literacy, into the universe of digital citizenship. This reflection places not only students and teachers in a need to acquire it, but also researchers and decision makers.

Using the visualization facility of the codification tool Qode, we produce radar graphics on the topics addressed by interviewees. From graphic on Image 1, it is observed that Puglia focuses more on institutional management, institutional policies, strategies and the relevance of infra-

[3] http://www.nucleorea.ei.udelar.edu.uy/lineamientos-para-una-politica-de-educacion-abierta-en-la-educacion-publica-de-uruguay/

structure, connected to the variety of centers and territorial contexts. Image 2 shows that Rodés focuses on policies and institutional choices. The other main semantic area that structures Rodés's discourse is the notion of innovation and how it connects to policy choices and resource development strategies. On the other hand, Image 3 shows that Brovetto´s interview revolves more around how digital literacy development and inclusion issues are tied to institutional implementation strategies, availability of technological resources and changes in the curriculum.

Image 1. Enzo Puglia content analysis graphic representation

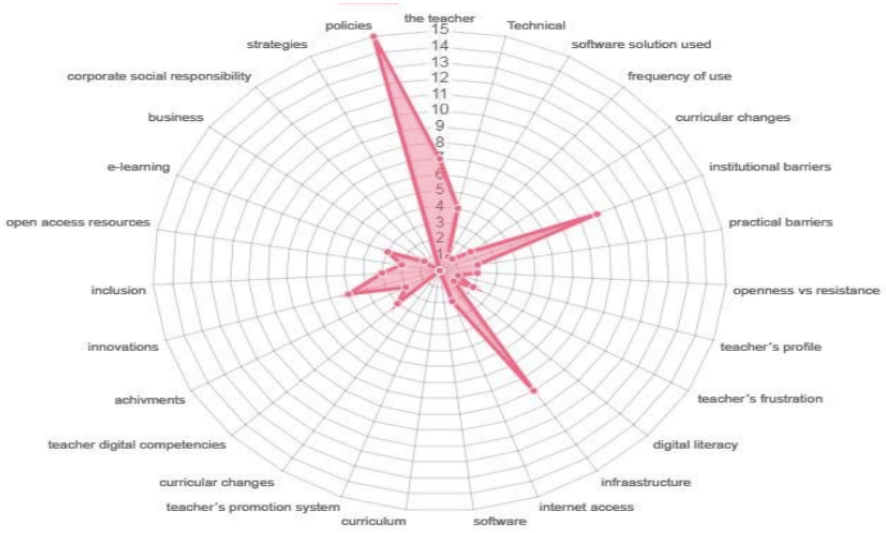


Image 2. Virginia Rodés content analysis graphic representation

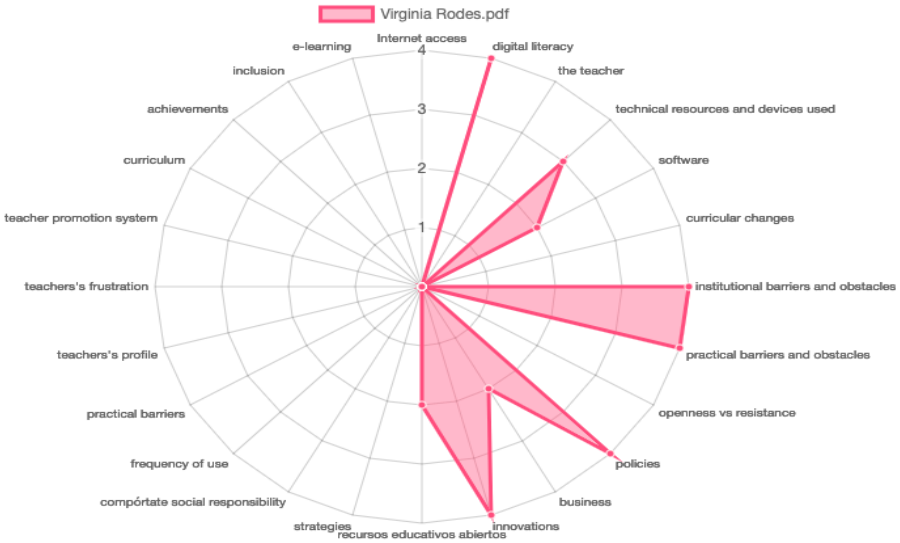
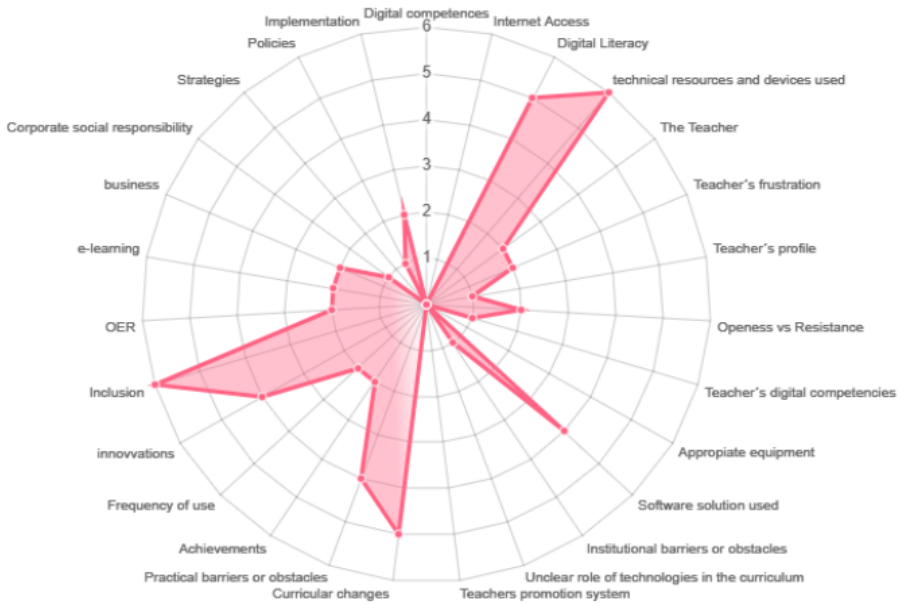


Image 3. Claudia Brovetto content analysis graphic representation



Discussion

Three very prominent institutions in Uruguayan educational context are represented by these three referents: UDELAR is the biggest and oldest public university in the country, CFE is the organization that nucleates all public teacher training and it is present in all the country. Plan Ceibal is undoubtedly a referent in and outside Uruguay for its national reach and ambitious objectives. Together, these three referents provide a perspective of the development of ICT integration in Uruguayan formal education.

Availability of technology is clearly not a problem in our country and a great achievement in terms of overcoming digital exclusion is acknowledged, although all respondents agree that there is still room for further improvement, particularly in terms of availability of individual devices beyond the cellular phone. This is consistent with a national context of public policies displayed in Uruguay throughout the last fifteen years. Some of the policies that fostered digital inclusion were Plan Universal Hogares, Plan Ceibal and Plan Ibirapitá. All of them have been effective in reference to digital inclusion (ITU, 2018).

Implementation has been carried out in a variety of ways, following different plans and programs. All of them have been touched by the characteristics and challenges of its particular institutional context and territory. In those contexts, institutional governance, territorial variables and the ability to generate inter-institutional synergy, are paramount.

Diving into the subject related principal terms used and how they picture the situation ICT in education in Uruguay, some specific references need to be made. Notions that are abundantly used throughout the interviews are digital divide and digital literacy. Digital divide refers to a distinction between those who have access to the Internet, being able to access quality services through the World Wide Web, and those who do not. It would be initially related to having connectivity and devices such as laptops, tablets or cellphones. More recent revisions of the concept would argue that the term does not account for the variety of situations that could be considered, in what seems to be a continuum of situations between "having and not having" access to the benefits of the World Wide Web so as to see your life positively affected by it (Helsper, E. J., & Reisdorf, B. C. 2017; Van Dijk, J. A., 2017).

The term digital literacy was first introduced by Paul Gilster as "the ability to understand and use information in multiple formats from a wide variety of sources when it is presented via computers" (1997, p. 6). This concept has also evolved in its meaning.

> "Definitions of the term now range from simply being technology fluent to the ability to apply information literacy skills (e.g., locating, extracting, organizing, managing, presenting and evaluating information) in digital environments to broader, more complex conceptual frameworks that encompass a wide variety of skills, understandings, norms and practices" (Meyers, E. M., Erickson, I., & Small, R. V.,2013, p 356).

The fact that these are slippery concepts that keep evolving, makes the implementations of digital divide bridging and digital literacy development strategies, even more demanding. Moreover, digital literacy is not enough, it is applying it to the teaching profession that really makes the difference. However difficult this appears to be, respondents seem to agree on some opinions: Empirical evidence as well as personal experience shows that effectiveness is tied to teacher involvement, particularly in programs that imply collaborative work, sharing and building community. The teacher becomes the center of all implementations that aim at technology appropriation processes. Teacher's profile, teacher's background, teacher's attitude and teacher's involvement, seem to be determinants of success.

Exploring some dimensions of teacher's acquisition of digital technologies, interviewees talk about practice teaching and about educational resource development. Each one requires its specific strategy. But there is a strong emphasis on the relevance of creating the conditions for community building and collaborative work. There seems to be a need to reconsider institutional frameworks and policies, because the teaching profession seems to have outgrown its original model in order to work in a digitalized world and a new social reality. Institutional and organizational structures and strategies seem to need more than a few changes, as far as respondents discourse goes. Some mechanisms that are claimed for are, for example virtual legitimate spaces to develop and share educational resources; also, institutionalized mechanisms to make those new collaborative practices matter and count when it comes to merits and recognition.

Innovation appears like a central issue, with different perspectives, both in terms of its theoretical background and also in terms of word usage implications. Educational innovation has been defined in the literature of the profession as a process that responds to needs and intends to produce an improvement in the learning outcomes, being sustainable and transferable beyond the immediate environment (García-Peñalvo, F. J., 2015). Aguerrondo, (2002) observes that innovating implies changing the paradigm, understood as a change in ways of doing, ways of thinking, valuing and perceiving. (Viñao Frago, 2002) adds the notion of school cultures, a dimension that helps in the understanding of how profoundly rooted in culture educational practices are. He refers to a school culture

built throughout time, as a set of ideas, norms of behavior, rituals, habits and practices, and all that a culture entails. This is the underlying foundation for the way the school is perceived and considered and reproduced by teachers, students and all people involved within the institutional boundaries and even beyond. This culture is the one that changes, even if partially, when a real innovation takes place. This is the notion of innovation that respondents seem to adhere to. That is why there are so many references to innovative processes that take place in the community.

An example of this innovation as a social process is the following: Brovetto talks about Ceibal in English and all the unprecedented practices such as a remote teacher who is actually a native speaker of English, cooperating with a local teacher who knows the group but does not know English. This practice, for example, comes to change many rules in the game of teaching. These are "...new frameworks of co-teaching and collaboration between in-person instructors and remote instructors connecting from anywhere in the world " (Kaiser, 2018, p.76). This changes not only the usual roles -the teacher as the one and only "know-it-all" but also changes the relationship with students, when they see that their regular teacher is also learning. Rodés refers to the same process when she insists on the fact that "We adopt the technology, but the innovation is not in the adoption. It takes place in what people do with the technology, in pedagogical terms".

This idea of innovation residing in what people do and not in technology itself, questions the notion that innovation can be located within the technology, in a reification process. That is to say, using a certain tool, gadget or software in education, does not necessarily mean getting involved in an educational innovative process. If this were the notion, then technology would be considered from an instrumentalist or from a deterministic view. However, empirical data as well as research shows that teachers' assumptions matter and condition the way they perceive, react and act towards technology (Adell, 2018).

As for policy development, two of the respondents (Puglia and Rodés) are particularly keen at observing the political implications beyond the immediate needs for technological solutions. They both point out different impacts of institutional decisions and how the rest of the educational system and the society are affected.

As a reflection, the challenge is evident and given the current circumstances under which this paper is being written, it is also overwhelming. The following words from Tony Bates picture questions that seem to be relevant to educators of all levels, not only teachers who work with future graduates.

> "...teachers and instructors are faced with a massive challenge of change. How can we ensure that we are developing the kinds of graduates from our courses and programs that are fit for an increasingly volatile, uncertain, complex and ambiguous future? What should we continue to protect in our teaching methods (and institutions), and what needs to change?" (Bates, 2018, p.15)

Further studies

Going back to the title and considering the results of this exploratory study, it can be concluded that the following three topics are the main challenges of ICT in education, identified in this study. These topics should be the object of further studies.

Teacher development in reference to technology integration to teaching practices, seems to be an extremely relevant issue, both at pre-service and in-service levels. The "when" and "how" of technology integration in pre-service educational programs and its implications for curriculum design seem to be at the heart of the matter. The question comes again for in-service teachers, although more answers seem to have been found by ongoing programs, particularly those initiatives that implement collaborative learning opportunities.

Secondly, there is the issue of teachers and educational resources. Selection, creation, authorship and licensing, are all tied to how resource development practices are considered, recognized and integrated to the teachers career, merit and promotion systems. This topic seems to connect practices to institutional regulations in such a way that it seems impossible to work on one without affecting the other.

Institutional policy definitions, experts' advice and political implications also constitute a core matter when it comes to ICT integration to education. What lies beneath, is the fact that technology is not neutral. Which educational technology is selected? Who develops the educational technology that is used in the country? Under what conditions is it acquired and appropriated? Answering these questions requires making decisions that should ponder matters of national sovereignty versus dependence, just to name one of the challenges faced. This topic does not seem to have reached the status of public issue in the current Uruguayan educational agenda.

Finally, going back to the special circumstances due to Covid 19 and how educational processes have been affected, it is fair to say that all of the referents' answers, refer to a state of the art that is previous to this ongoing contingency of being forced by the circumstances, to teach

online. How will appropriation processes evolve? Will these events and conditions affect the way teachers perceive technology applied to teaching and to learning? Institutions in Uruguay, as well as in many parts of the world, have had to devise quick solutions, resorting to both known and new tools and strategies. There should come a time for evaluation of impact, results and changes caused by these interventions and reactions "on the spot". There is no doubt that this is a necessary topic for future studies.

References

Adell, J. (2018). Más allá del instrumentalismo en tecnología educativa. *Cambiar los contenidos, cambiar la educación*. Madrid: Morata.

Aguerrondo, Inés (2002). Escuelas del futuro en sistemas educativos del futuro. Qué es innovar en educación. En: AGUERRONDO, Inés, XIFRA, Susana: *Cómo piensan las escuelas que innovan*, *Papers* Editores, Buenos Aires.

Bates, A. T. (2018). Teaching in a digital age: Guidelines for designing teaching and learning. BC campus. Vancouver: Canada

Budapest Open Access Initiative. (2002) BOAI. https://www.budapestopenaccessinitiative.org/boai-10-recommendations

Consejo de Formación en Educación s.f http://www.cfe.edu.uy/index.php/informacion-institucional/organigrama/78-novedades-institucionales/3671-cfe-presento-su-repositorio-institucional-de-acceso-abierto

García-Peñalvo, F. J. (2015). Mapa de tendencias en Innovación Educativa. Education in the knowledge society, 16(4), 6-23.

Gilster, P. (1997). Digital literacy. 56-65 New York: Wiley.56-65

Helsper, E. J., & Reisdorf, B. C. (2017). The emergence of a "digital underclass" in Great Britain and Sweden: Changing reasons for digital exclusion**.** *New media & society*, 19(8), 1253-1270.

International Telecommunications Union. (2018) Measuring the Information Society Report.

Kaiser, D. J. (2018). Observations of Ceibal en Inglés: A SWOT Analysis and the Strategies of Stronger Uruguayan Teachers in English Classrooms. Encuentros Cercanos con lo Remoto en la Creación de una Comunidad Educativa, 61

Knobel, M., & Kalman, J. (2016). Teacher learning, digital technologies and new literacies**.** *New literacies and teacher learning: Professional development and the digital turn*, 1-20. Peter Lang: New York

Langley, P., & Leyshon, A. (2017). Platform capitalism: the intermediation and capitalizationn of digital economic circulation. *Finance and society*, 3(1), 11-31.

Meyers, E. M., Erickson, I., & Small, R. V. (2013). Digital literacy and informal learning environments: an introduction. *Learning, media and technology*, 38(4), 355-367.

MEC. (2017). Anuario Estadístico de Educación 2013.

Severin, E. (2016). Building and sustaining national ICT/education agencies: Lessons from Uruguay (Plan Ceibal). World Bank.

Soca, C, Camou, S & Urruty, N. (2018.). Qode : herramienta para el análisis cualitativo de datos. Tesis de grado. Universidad de la República (Uruguay). Facultad de Ingeniería. https://www.colibri.udelar.edu.uy/jspui/bitstream/20.500.12008/18681/1/tg-soca.pdf (Last access 28/03/2020)

Tomczyk, Ł., Muñoz, D., Perier, J., Arteaga, M., Barros, G., Porta, M., & Puglia, E. (2019). Ict and pre-service teachers. Short case study about conditions of teacher preparation in Dominican Republic, Ecuador, Uruguay and Poland. *International Journal*, 32(1) , 2019.

Van Dijk, J. A. (2017). Digital divide: Impact of access. The international encyclopedia of media effects, 1-11.

Viñao, A., & Frago, A. V. (2002). Sistemas educativos, culturas escolares y reformas: continuidades y cambios (Vol. 10). Ediciones Morata.