

[Cierre de edición el 30 de agosto del 2024]

<https://doi.org/10.15359/ree.28-1.18429>  
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# Uses and Appropriation of Technologies in Initial Teacher Training Centers: A Comparative Study in Uruguay and Chile

*Usos y apropiación de tecnologías en centros de formación inicial docente: Estudio comparado en Uruguay y Chile*

*Usos e apropriação de tecnologias em centros de formação inicial de professores: Estudo comparativo no Uruguai e no Chile*

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Recibido • Received • Recebido: 01 / 06 / 2023  
Corregido • Revised • Revisado: 19 / 06 / 2024  
Aceptado • Accepted • Aprovado: 24 / 07 / 2024

## Abstract:

**Objective.** This article aims to compare the use and appropriation of digital technologies (ICT) by faculty in initial teacher training centers in Uruguay and Chile. **Methodology.** This research employed a mixed, sequential exploratory, quantitative-qualitative approach and data analysis, including two stages: (I) an online questionnaire administered to directors of centers in Uruguay and Chile; (II) interviews and discussion groups with members of selected centers in each country. **Results.** Results show that Chilean teachers most frequently use laptops, followed by cell phones. In Uruguay, the order is reversed. Concerning the use of ICT for pedagogical or professional development purposes, including videoconferencing, the creation of professional learning communities, and content creation, Chile is better positioned. Nonetheless, because of the pandemic and the adoption of other techniques, Uruguay has begun to increase its use of ICT for pedagogical purposes. Likewise, teachers have been identified both as facilitators of digital inclusion, thanks to their motivation, and as obstacles, due to fears, advanced age, and training. **Conclusions.** These findings show the relevance to keep intervening at the level of teacher education as a key focus to improve digital inclusion for pedagogical and professional development purposes.



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**Keywords:** Information and Communication Technologies; teacher education; educational technology; Uruguay; Chile.

**SDG:** Quality education.

**Resumen:**

**Objetivo.** Este artículo tiene como objetivo comparar el uso y apropiación de las tecnologías digitales por parte del profesorado en formación inicial docente, en centros uruguayos y chilenos.

**Metodología.** Se llevó a cabo un enfoque mixto, exploratorio secuencial, cuantitativo-cualitativo y análisis de datos en esta línea, que comprendió dos etapas: (I) aplicación de un cuestionario en línea a personal directivo de centros en Uruguay y Chile; (II) entrevistas y grupos de discusión con personas de centros seleccionados de cada país. **Resultados.** Los resultados muestran que, para el personal docente chileno, los dispositivos más utilizados son las computadoras portátiles, seguidas de teléfonos celulares. En Uruguay, el orden es inverso. En cuanto al uso de tecnologías digitales con fines pedagógicos o de desarrollo profesional, respecto al uso de videoconferencias, creación de comunidades profesionales de aprendizaje y creación de contenidos, Chile está mejor posicionado. No obstante, por la pandemia y junto con el uso de otras técnicas, Uruguay comienza a incrementar el uso de las tecnologías digitales con fines pedagógicos. Asimismo, el personal docente es identificado como facilitador de la inclusión digital por su motivación, pero también como obstáculo, refiriéndose a los miedos, la edad avanzada y la formación. **Conclusiones.** Estos hallazgos muestran la relevancia de seguir interviniendo a nivel de formación docente como enfoque clave para mejorar la inclusión digital con fines pedagógicos y de desarrollo profesional.

**Palabras claves:** Tecnologías de la información y la comunicación; formación de profesorado; tecnología de la educación; Uruguay; Chile.

**ODS:** Educación de calidad.

**Resumo:**

**Objetivo.** Este artigo tem como objetivo comparar o uso e a apropriação de tecnologias digitais por professores em formação inicial em centros uruguaios e chilenos. **Metodologia.** Realizou-se uma abordagem mista, sequencial, quanti-qualitativa e análise de dados, compreendendo duas etapas: (I) aplicação de um questionário on-line aos diretores de centros do Uruguai e Chile; (II) entrevistas e grupos focais com membros de centros selecionados em cada país. **Resultados.** Os resultados mostram que, para os professores chilenos, os dispositivos mais utilizados são os laptops, seguidos pelos celulares. No Uruguai, a ordem é invertida. Em relação ao uso de tecnologias digitais para fins pedagógicos ou de desenvolvimento profissional, bem como ao uso de videoconferências e à criação de conteúdo e de comunidades de aprendizagem profissional, o Chile está melhor posicionado. No entanto, devido à pandemia e ao uso de outras técnicas, o Uruguai começa a aumentar o uso de tecnologias digitais para fins pedagógicos. Da mesma forma, os professores são identificados como facilitadores da inclusão digital por sua motivação, mas também como um obstáculo, devido a medos, idade avançada e formação. **Conclusões.** Estes resultados mostram a relevância de continuar a intervir ao nível da formação de professores como uma abordagem fundamental para melhorar a inclusão digital para fins de desenvolvimento pedagógico e profissional.

**Palavras-chave:** Tecnologias de informação e comunicação; formação de professores; tecnologia da educação; Uruguai; Chile.

**ODS:** Educação de qualidade.



## Introduction

The ubiquity of ICT and digital devices, especially in the educational context, has been a factor related to the development of specific inclusion policies in almost every part of the world. These policies have tried to mitigate the impact of the ICT access gap, contributing to social inclusion (Reisdorf & Rhinesmith, 2020). In the case of Uruguay and Chile, programs regarding the integration of technologies in education date back to the end of the 20<sup>th</sup> century, going through different models and classroom configurations (Lugo et al., 2020). In these systems, Ceibal and Programa Enlaces are worldwide relevant and recognized (Andonegui & Samaniego, 2019) as policies that have consolidated digital inclusion in education in Uruguay and Chile, respectively.

These policies understand digital inclusion as a key component of social inclusion, and it is in this sense that the reduction of the gap in access to devices and the internet, together with the development of competencies and skills for the use of digital tools, becomes especially relevant in the educational context and, specifically, in the field of teacher education (Lozano-Díaz & Fernández-Prados, 2019).

Nevertheless, and beyond the encouragement of digital inclusion policies in the studied countries (Instituto Nacional de Estadística [INE] & Agencia de Gobierno Electrónico y Sociedad de la Información y del Conocimiento [Agesic], 2020; Martínez Mancilla et al., 2021), in general, the use and appropriation of ICT has had a different impact. Previous research in the field of initial teacher training accounts for the processes and results of these policies.

For instance, studies carried out in Chile, state that a huge proportion of the syllabi lacks digital inclusion –even minimum or basic– and that the initial teacher training centers should ensure better performance of future teachers about digital competencies (Cabello et al., 2020; Silva Quiroz & Miranda Arredondo, 2020). However, evidence shows that when teachers use strategies supported by educational technologies to encourage learning, these methodologies foster the acquisition of specific skills, professional competencies, and a higher degree of autonomy for future teachers' performance.

Along the same lines, studies carried out in Uruguay insist on the fact that there is a weak point in teacher education plans and syllabi since they propose a traditional approach and do not enable the development of digital competencies for digital inclusion in the professional practice (Cabrera et al., 2018; Morales et al., 2020). On the other hand, the use future teachers give to the devices provided by Ceibal is limited, and those who do use these devices, do so for the search of information or communication, and to a lesser extent, for matters related to pedagogy (Cabrera Borges et al., 2019; Marcelo et al., 2020).

Comparative studies like the one from Silva et al. (2019) analyze the case of Uruguay and Chile, establishing an instrument to measure the digital competence of student teachers. Results show that in both countries, the level of digital competence is basic, registering the lower level of competence in future primary school teachers. The authors conclude that there is a need to strengthen digital inclusion policies in teacher education in both countries.



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These results are in keeping with studies from different countries, where evidence shows a low level of use of digital competencies, and consequently, there is little use of ICT for pedagogical purposes in teacher training by students and teachers (Amhag et al., 2019; McGarr & McDonagh, 2021; Ortega-Sánchez et al., 2020), to name some of the most recent ones.

On the other hand, some studies are dedicated to validating instruments that measure the teacher's digital competence, according to different frameworks, as is the case of the works of Cabero Almenara & Martínez Gimeno (2019); Usart Rodríguez et al. (2021). These studies confirm that incorporating technologies into teaching practices requires competency standards that answer to the changing demands of the 21<sup>st</sup> century (Silva et al., 2019), and results raise the need to revisit and modify the educational systems and adjust the associated digital inclusion policies, in a constant spiral.

In the case of Uruguay and Chile, digital inclusion policies (Ceibal, n.d.b; Centro de Innovación. Ministerio de Educación, 2023) have consolidated the possibilities of access to devices and connectivity and have developed or adapted the digital competencies standards (Ceibal, n.d.a; Ministerio de Educación. Enlaces, 2011), associated to the exercise of the digital citizenship as a macro competence (Agencia de Gobierno Electrónico y Sociedad de la Información y del Conocimiento [Agesic], 2024; Ministerio de Educación, n.d.).

Nevertheless, the constant evolution of ICT presents challenges for teachers and students and generates the need to adapt to new teaching scenarios. One of the most dramatic challenges has been the health emergency caused by the COVID-19 pandemic, whose impact at the educational level has meant an increase in the digital and social gap all around the world. According to the International Telecommunication Union (ITU, n.d.), nowadays, half of the worldwide population has internet access, while for the rest there is no access, increasing inequality.

This situation, together with the health emergency and structural inequalities, has demanded other changes at the educational level throughout the world, noting the need for greater inclusion of ICT in classroom practices, and increased flexibility of the traditional teaching models (Lugo et al., 2020). These changes have a direct impact on the initial training of teachers as articulators of the flexibility of teaching practices and fall on the teacher trainers to transcend and accept the role of the facilitator of learning and development of people (de Dios Alija, 2020).

In this line, it is worth contextualizing that during this research, the fieldwork was influenced by the pandemic. The first stage of data gathering (during 2019) makes visible the state of the initial teacher training centers, before the development of emergency remote teaching models (Hodges et al., 2020), when the level of inclusion of ICT for teaching was not a determining factor in educational continuity thanks to in-person learning.



However, the start of the pandemic and the suspension of in-person instruction at the beginning of 2020 (United Nations Educational, Scientific, and Cultural Organization [UNESCO], 2021) marked a before and after in the need for digital inclusion for initial teacher training. In this sense, the realities of the studied countries show the needs for innovation that have been raised, especially concerning digital inclusion for teaching at all educational levels, considering both the distance and hybrid learning models (Andonegui & Samaniego, 2019; Ministerio de Educación [Mineduc], Centro de Estudios, 2021; Vaillant et al., 2022).

To move towards more flexible teaching models and adapted to the current or future contextual needs, like the ones marked by the pandemic or greater digital inclusion, it is worth delving into the use and appropriation of ICT by the staff that trains future teachers. The comparative studies between Chile and Uruguay have sought to measure and evaluate the teacher's digital competence, e.g., the study led by Silva et al. (2019). Nonetheless, most results are focused on students of initial teacher training, and little has been investigated regarding the uses trainers make of technologies, and the level of appropriation or competencies when teaching with ICT.

This research has proposed to compare the way in which these initial teacher training centers from Uruguay and Chile incorporate strategies of digital inclusion to favor the learning of future teachers. In this sense, two questions guide this research:

- What is the level of use and appropriation of ICT by the teaching staff of the initial teacher training centers in Chile and Uruguay?
- Which are the facilitators and obstacles that the initial teacher training centers from Chile and Uruguay identify to achieve digital inclusion?

## Method

The investigation was developed based on a mixed, sequential exploratory, quantitative-qualitative approach. During Stage I, between August-December 2019, a self-administrated online questionnaire was designed and applied to directors of 32 centers in Uruguay (all the public centers) and 21 in Chile (all the Universities of the Board of Deans of Chilean Universities). The questionnaire, previously tested by deans not part of the study, was answered by 42 centers in total (27 from Uruguay and 15 from Chile) and provided data about the characteristics of each center, the use and appropriation of technologies by the trainers, the use of ICT for pedagogical purposes, and the used devices.

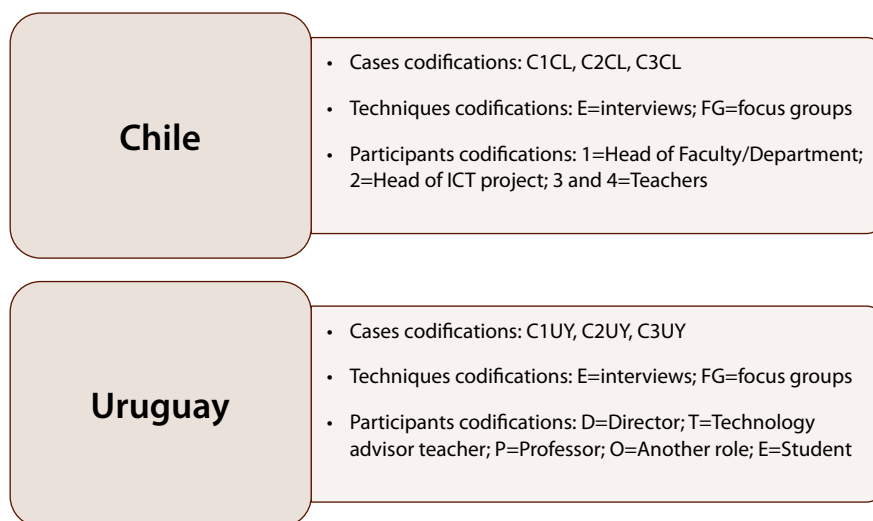
The data collected were analyzed in a descriptive manner and led to the selection of three case studies in each country according to the level of appropriation of ICT (high, medium, or low). These centers participated in Stage II of the study, where semi-structured interviews and focus groups were applied, to learn in detail the views of the teachers themselves. These data were gathered between May-December 2020, in the context of the suspension of in-person instruction in the centers. The interviews and focus groups had to be carried out completely online, using videoconferencing platforms and digital consents.



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The details regarding the number of participants per technique and country are the following: 24 participants in interviews (15 Uruguay and 9 Chile); 33 people involved in the focus group (19 Uruguay and 14 Chile). **Figure 1** describes the coding used considering cases and techniques.

**Figure 1.** Used codification in the study's Stage II, by country



**Note:** Own elaboration.

The analysis strategy in Stage II consisted of the thematic analysis of the transcripts according to categories of interest. The categories followed the line of inquiry of Stage I, complemented by: a general assessment regarding the incorporation of ICT to initial teacher training, and advantages, facilitators, and obstacles for the incorporation of ICT in initial teacher training.

## Results

To answer the research questions, the results of this study are organized in two sections that compare the evidence collected in both countries. On one hand, the view of directors and teaching staff from the initial teacher training centers about the use and appropriation of ICT and, on the other hand, perceptions regarding advantages, obstacles, and facilitators for the inclusion of ICT for pedagogical purposes.

### Use and Appropriation of ICT

This section refers to different aspects related to the use and appropriation of ICT based on the analysis of the answers in each country. To organize the information, different aspects were considered about the type of device used, the reasons for using them, and which facilitators and obstacles are faced to incorporate ICT in teacher training.



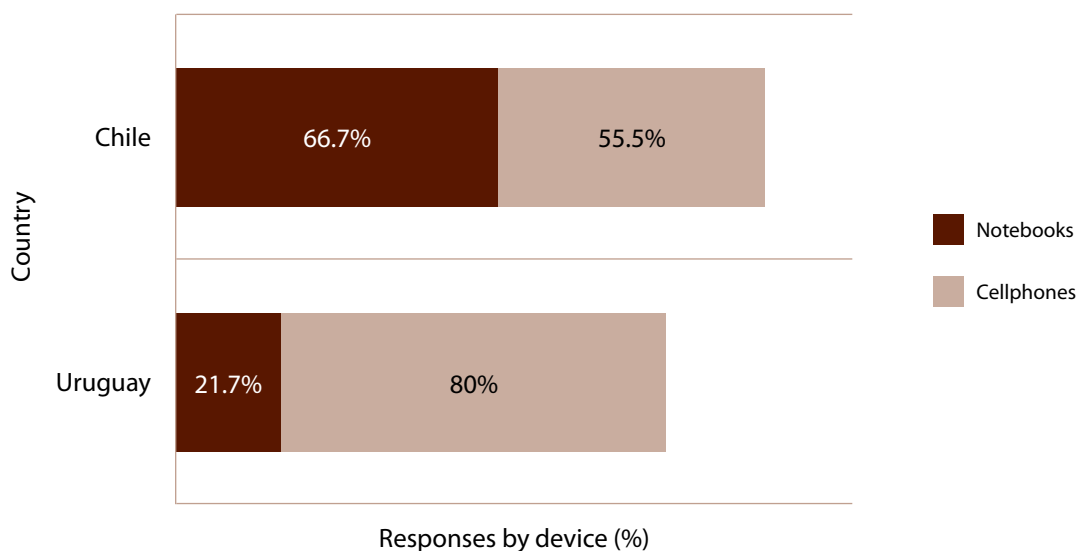
### a) Devices used by teacher trainers

Regarding the use of devices by the trainers, it is possible to observe that there are some differences and coincidences in both countries.

The data analysis from Stage I corresponding to the surveys applied to directors of Teacher Training centers shows that for trainers in Chile the most frequently used devices are notebooks, with 66.7% of answers expressing that all academics use them, and 33.3% expressing that most use them (Figure 2). Cellphones are next in terms of relevance, for which 55.5% of responses indicate that all academics use them and 22.2% referred to the majority using them. In Uruguay, even though there is a coincidence in having both devices in the first place, the order is inverted. The most frequently used digital device is the cellphone, with a very high percentage of answers referring to how it is used by all teachers (80%) and increasing even more if one considers answers that refer to how it is used by the majority (16%). This finding is in keeping with results from the study carried out by Cabrera et al. (2018), which states that student teachers in Uruguay also have a clear preference for this device. The predominance of cellphone use by student teachers in Uruguay is also expressed by the interviewees in Stage II of the study, as it can be appreciated in the following quote: *The cell phone, the cell phone, the cell phone practically 90% [of students uses the cell phone]* (C3UY\_EO1)

On the other hand, although notebooks are highly preferred, the percentages of use by all teachers are significantly lower (21.74%) in comparison to the ones from Chile, a value that increases in the answers of most teachers (60%).

**Figure 2:** Usage of devices in percentages by country



**Note:** Own elaboration.



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Another aspect worth highlighting is related to the use of videoconferencing; while in Chile the percentage of use by many teachers is high (44.4%), in Uruguay the same figure was obtained (44%), but very few teachers use this resource. It may be noted that, while this study was conducted before the pandemic, all initial teacher training centers in Uruguay have specific videoconferencing devices to carry out this type of communication. In this respect, the data analysis from the focus groups conducted during Stage II shows a substantial change as from 2020 in the intention to promote the use of tools that facilitate the synchronic exchange among students:

*The poor use of the tool prevents one from seizing its potential and I believe this is what was attempted this year, for teachers to be able to make the most of videoconferencing tools (...) to really establish a synchronic communication with students at this moment and, let's say, as similar as possible to a class. (C3UY\_FG)*

### **b) What do they use technological devices for?**

When asked about the type of use they make of these digital devices, the comparative analysis shows that, regarding the incorporation of technologies in the conformation of communities, both countries coincide in that the percentage of answers that involve all teachers is low. Nevertheless, it is interesting to mention that while in Chile, 33% of answers refer to most of the teachers, in Uruguay that answer only reaches 9%. What is more worrying is that, in addition to the above, 60% of the answers state that very few teachers use ICT for those purposes.

Regarding what they are used for, answers that refer to content creation are also interesting, since they correspond to one aspect of the teacher's digital competence. In this regard, the difference once again is unfavorable towards Uruguay, as it was found that 76% of the answers state that they are used very little by teachers, an answer that only reaches 22% when the case of the Chilean universities is analyzed.

It is worth mentioning that during Stage II, data from Uruguay illustrate a change regarding the assessment of content creation. The change of Stage implies a change in the techniques and, of timing – in terms of when the gathering of data was conducted. It is because of this that it could be inferred that the change may have been strongly influenced by the arrival of the pandemic, which marked the context of the data collection for Stage II. The following quotes illustrate how content creation is valued as a contribution to the use of ICT:

*That they are able to create, not only be consumers, and that the copy-paste is frequent, right?, but to be prosumers, to be those who actually create. (C1UY\_ET)*

*The creation of resources that we are doing involves a lot of work, but it is a powerful task. (C3UY\_ET)*





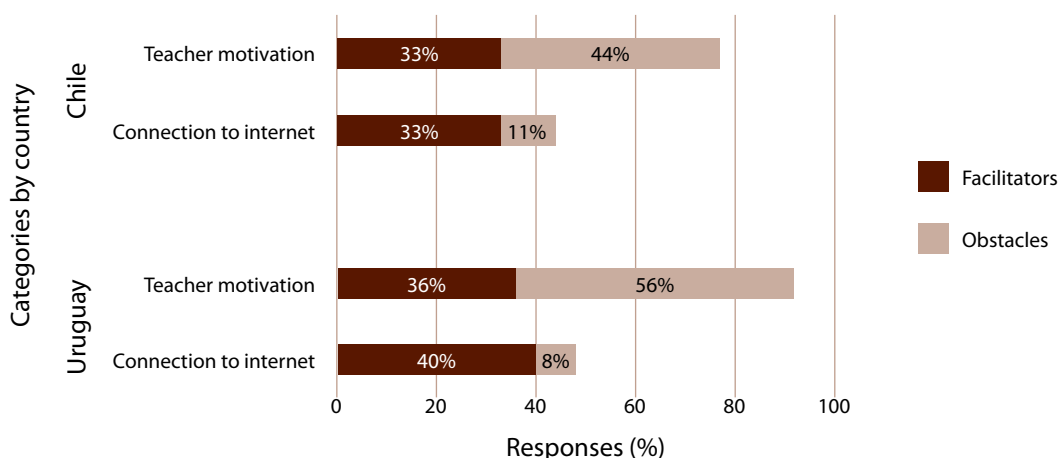
### Advantages, obstacles, and facilitators for the inclusion of ICT

Regarding the advantages identified by the directors referring to the inclusion of ICT, it is appreciated that in Uruguay, 68% of the answers refer to favoring collaborative activities, followed by contributing to knowledge management (56%). In Chile, the percentage of answers that values collaborative activities is quite lower (44.4%) and is also lower the number that refers to knowledge management (33%).

On the other hand, there are coincidences between the two countries regarding the identified facilitators and obstacles (Figure 3). Teachers' motivation is mentioned as a facilitator by 36% in Uruguay and 33% in Chile. What is paradoxical in this is that in both countries, teachers are also seen as a possible obstacle, as 56% of answers in Uruguay and 44% in Chile refer to teachers' resistance to change as a possible barrier to the inclusion of ICT.

In addition to the abovementioned, the quality of the connection appears as a facilitator in both cases, although with a little more weight in Uruguay (40%) in comparison to Chile (33%). Even though this aspect is also mentioned in the obstacles, unlike what was mentioned above, the percentages are very low in both cases (8% in Uruguay and 11% in Chile).

**Figure 3:** Facilitators and obstacles by country y percentage of responses



**Note:** Own elaboration.

In addition to what was previously stated, it is interesting to mention that the facilitator with the highest percentage in Uruguay arising from the data from Stage I refers to the commitment of authorities, with 52% – a number that is much lower in the Chilean case (33%). Based on this, it may be possible to interpret that there is an influence given by the implementation of Ceibal since 2008.



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Stage II confirms ideas that emerge as facilitators and obstacles in Stage I, and new contributions also appear. [Table 1](#) and [Table 2](#) show some evidence that illustrates both categories.

**Table 1:** Evidence associated with facilitators

Category	Facilitator
Collaborative work	<i>...how we can strategically use technology and the computer as a tool to work collaboratively and there you have peer support, right? Peer-work, among colleagues, to be able to scaffold those who start falling behind. (C1UY_ED)</i>
Cellphones	<i>Even though, now the cellphone, that practically has all the features of a computer, that also helps the teacher to be encouraged to use them a bit more. (C2UY_ET2)</i>
Support from directors	<i>...the support from directors and the trust they have in what you are going to develop, and to support you all the time in what you are doing, is fundamental. (C2UY_ET2)</i>
Ceibal	<i>Students from the third and fourth years can already have one, they are assigned one laptop for their use. This is thanks to Plan Ceibal. (C3UY_ED)</i>

**Note:** Own elaboration.

**Table 2:** Evidence associated with obstacles

Category	Obstacle
Accessibility to devices	<i>...the first barrier that is mentioned is 'Teacher, I don't have internet access. I don't even have a cellphone' (C3CL_E1) ...sometimes, they don't have the "ceibalita", they don't have the device. (C3UY_ED)</i>
Willingness and heterogeneity of students	<i>...the diversity of students we have in terms of knowledge, appropriation, and adequate use of technologies, that I recognize, is not only privative academically wise. (C1CL_FG)</i>
Time	<i>Planning with them is much more time-consuming, involves more dedication, and many times, we teachers have a certain number of hours, and it is not enough time. (C2UY_ET2)</i>
Syllabi	<i>The obstacles, (...) are the syllabi of Computer Science and Digital Technologies, that there are two subjects that are taught, are approached in second and third. (C1UY_ET)</i>
Ideological	<i>There are ideological concepts that associate the use of technology with certain movements, with certain trends they want to impose, it is then when individualities act, offering resistance. (C2UY_ED)</i>
Multiple Employment	<i>The main obstacle is the multiple employment situation. (C2UY_ET)</i>

**Note:** Own elaboration.



Evidence from Stage II shows that teachers may be identified as a potential obstacle to inclusion, and in that sense, it is indeed mentioned in the interviews from both countries. The causes attributed to student teacher trainers for not being prone to including ICT vary; some refer to fears, advanced age, and training.

Some obstacles and facilitators appeared because of the pandemic. Among the facilitators, the following are highlighted: peer support and technical support to students and teachers. Regarding obstacles, the following are mentioned: classes entering homes during the exclusive online teaching stage, and the attitude of many students of not turning their cameras on during the synchronic exchanges.

### Appropriation level summary

As a way of closing the section referring to the use and appropriation of ICT, it is worth analyzing the results that emerge from calculating the ICT incorporation index presented in Table 3 (Stage I). Values illustrate that, according to the directors from the initial training centers from Uruguay, there would not be centers with a low appropriation of ICT, a bit more than a third would have a medium level of incorporation, while two-thirds would be at a high level. When analyzing the answers of the Chilean directors, it is striking that, differently from what happens in Uruguay, some identify low incorporation of ICT (9.1%) at the level of the institutions in charge of teacher training. This is complemented by a great difference in the percentages referring to high levels of appropriation, which for the Uruguayan survey respondents is 65.4%, and for the Chilean ones, 72.7%. The analysis offers a different distribution in both countries, characterized by a distribution in the three ranges for one, and only in the two highest for the other. These findings may lead to the interpretation that, in the view of the directors, there may be a greater heterogeneity in the level of appropriation of ICT in the Chilean training institutions in comparison to the Uruguayan ones.

**Table 3:** ICT incorporation index, % within the country of origin

Country	Uruguay	Chile
Levels of ICT incorporation Index (%)	Low	0,0%
	Medium	18,2%
	High	72,7%
<b>Total</b>	100%	100%

**Note:** Own elaboration.



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## Discussion and conclusions

It is interesting to organize the discussion around the research questions and the identified categories, but also, to seize the opportunity given by the research process that took place before (Stage I) and during (Stage II) the COVID-19 pandemic. Results show how during the pandemic, decisions have been made and/or conditions have been generated which seem to have an impact on the results obtained in the Stage I gathering of this study, accounting for greater use of ICT in terms of quantity and quality.

The starting point for both countries concerning digital inclusion, as it has been pointed out in the introduction, has been important – policies like Ceibal and Programa Enlaces have an impact on this (Andonegui & Samaniego, 2019). Nevertheless, this study, like others (INE & Agesic, 2020; Martínez Mancilla et al., 2021), shows that the impact of such policies on the use and appropriation of ICT is diverse.

The greater use of notebooks in Chilean initial teacher training centers (100% among all and the majority uses them) compared to the greater use of cellphones in Uruguayan initial teacher training centers (96% among all and the majority uses them) seems to be directly related to the type of use they are given. It is also important to note that, in the case of students, these are also the most frequently used devices (a finding that has been stated by other studies from Cabrera Borges et al., 2019). For these stakeholders, the findings seem to illustrate difficulties related to connectivity in a higher percentage in Chile, in comparison to Uruguay.

In general, during Stage I of the study, before the pandemic, Uruguay has high general indexes of use of ICT, but with less use for content creation and videoconferencing, which are more frequently used in Chile.

After the pandemic, according to the accounts of those involved in Stage II, the use of videoconferencing in Uruguay intensified, and the creation of resources as a powerful activity for learning and the exchange with students starts to be valued. This aspect is highlighted by other studies, illustrating the direct impact on initial teacher training (de Dios Alija, 2020; Lugo et al., 2020).

One must not forget that some structural aspects may be having an impact in the fact that these elements are more present in Chile, since teacher education happens at universities and in Uruguay, even though there is the conviction that teacher education requires greater hierarchization, it still takes place in centers that conduct activities related to extension and research but are at the non-university tertiary level.

However, when more ambitious objectives are set regarding the use of ICT, in both countries the percentage of use of ICT to support the conformation of professional learning communities is low, although Chile is slightly above Uruguay (33% in comparison to 9%).

Regarding the advantages of including ICT, the main answers (around half of the survey respondents in both countries) refer to collaboration and knowledge management (with greater weight in Uruguay in comparison to Chile). The most interesting aspect related to



this category is the one referred to teachers' motivation, representing a facilitating factor as well as an obstacle factor (the latter with more weight). This element is highly relevant for the development of policies considering that these are initial teacher training centers, therefore with a capacity for strategic multiplication towards the system in terms of promoting digital citizenship competencies to foster learning (Lozano-Díaz & Fernández-Prados, 2019).

Even so, as it is mentioned by the interviewees and the participants of the focus group, training facilitates the use of ICT. However, the appropriation seems to be related to other aspects associated with planning (C1UY\_ET2), overcoming obstacles of an ideological nature about the technology itself (C2UY\_ET2), or related to the training programs and student knowledge (C1CL\_FG; C1UY\_ET) and to the will required to implement actions leveraged by technology beyond the training received regarding its use (C1CL\_E1; C2UY\_FG; C3CL\_E2).

Therefore, based on the information provided by Stages I and II of this study, we can confirm that in both countries the importance of using ICT for educational practices, facilitating learning and collaboration, is recognized. The level of use and appropriation of ICT, comparatively, presents some differences: in Uruguay, there would not be centers with a low level of incorporation of ICT, which does happen in Chile in about one-tenth of all centers. On the other hand, the level of appropriation of ICT is a bit higher in Chile in comparison to Uruguay. In the latter, the use seems to be more associated with collaboration and information, and in Chile, there is a greater representation of a deeper level of generation of resources for educational activities.

These findings show the relevance of continuing to intervene at the teacher training level as a key focus to improve digital inclusion with pedagogical and professional development purposes.

### Authors' contributions

Authors declare the following contributions: **M. Q. T.** contributed to the writing of the article; the management of the research process; obtaining funds, resources and technological support and the development of the research. **A. T. T.** contributed to the writing of the article; the management of the research process; obtaining funds, resources and technological support and the development of the research. **C. C. B.** contributed to the writing of the article; the management of the research process; obtaining funds, resources and technological support and the development of the research.

### Funding Statement

The investigation that originates the results presented in this publication received funds from the National Research and Innovation Agency of Uruguay (ANII) and Ceibal Foundation for the Study of Digital Technologies in Education under the code FSED\_2\_2018\_1\_150773.

### Availability of data and materials

Preprint available at <https://hdl.handle.net/20.500.11968/6664>



<https://doi.org/10.15359/ree.28-1.18429>  
<https://www.revistas.una.ac.cr/index.php/educare>  
[educare@una.ac.cr](mailto:educare@una.ac.cr)

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