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Digital divide in education: an analysis of how it relates to the technological capital of teachers

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ABSTRACT. This article presents the main results of a study that analyzed the existing digital divide in education, and how it relates to the technological capital (TC) of secondary school teachers in a suburban area in Buenos Aires (the San Miguel district, province of Buenos Aires, Argentina). A qualitative methodological design with non-probabilistic sampling and a semi-structured questionnaire were used as data collection instruments. To understand the acquisition of TC, we addressed the trajectories and practices of teachers as well as the public policies for distributing institutionalized technological capital. The results show that the digital divide is especially linked to institutional and public policy factors. In this sense, university institutions (UN) dedicated to teacher training were some of the more dynamic environments that acquired TC during the initial training stage, a stark contrast to non-university higher education institutes (ISFD). At the same time, private schools tend to be more inclined to promote educational practices with digital technologies (DT) than public schools do. Lastly, universal public policies, such as providing teachers and students with personal computers (*netbooks*), significantly contributed to teacher acquisition of TC, and allowed for more innovative DT practices in teaching and learning, thus helping to bridge the digital divide in education.

Keywords: digital inclusion; technological capital; digital technologies; educational policies.

Brecha digital educativa. Un análisis de su relación con el capital tecnológico del profesorado

RESUMEN. Este artículo presenta los principales resultados de una investigación, cuyo objetivo fue analizar las brechas digitales existentes en el sector educativo y su relación con el capital tecnológico (CT) disponible entre docentes de nivel medio del conurbano bonaerense (Partido San Miguel, provincia de Buenos Aires, Argentina). Se adoptó un diseño metodológico cualitativo, con muestreo no probabilístico y cuestionario semiestructurado como instrumento de recolección de información. Para comprender la adquisición de CT, se abordaron las trayectorias y prácticas de los docentes, así como las políticas públicas involucradas en la distribución de CT. Los resultados muestran que la brecha digital está vinculada de manera significativa, a factores institucionales y de política pública. En este sentido, los establecimientos universitarios (UN) dedicados a la formación docente, se presentaron como los ámbitos más dinámicos para la adquisición de CT institucionalizado durante la etapa de formación inicial, en comparación con los institutos superiores no universitarios (ISFD). A su vez, las escuelas de gestión privada constituyen espacios más predispuestos para promover prácticas educativas con tecnologías digitales (TD), en comparación con las escuelas públicas. Finalmente, las políticas públicas universales, como la distribución de computadoras personales *(netbooks)* entre docentes y estudiantes, contribuyeron fuertemente a la adquisición de CT objetivado por parte de docentes, y permitieron el despliegue de prácticas innovadoras con TD en los procesos de enseñanza y aprendizaje, favoreciendo de este modo la disminución de la brecha digital educativa.

Palabras clave: inclusión digital; capital tecnológico; tecnologías digitales; políticas educativas.

Brecha digital na educação. Uma análise de sua relação com o capital tecnológico dos professores

RESUMO. Este artigo apresenta os principais resultados de uma pesquisa cujo objetivo foi analisar as brechas digitais existentes no setor educacional e sua relação com o capital tecnológico (CT) disponível entre os professores do ensino médio no conurbano bonaerense (distrito de San Miguel, província de Buenos Aires, Argentina). Foi adotada uma metodologia qualitativa, com amostragem não probabilística e um

questionário semiestruturado como instrumento de coleta de dados. Para entender a aquisição de CT, foram abordadas as trajetórias e práticas dos professores, bem como as políticas públicas envolvidas na distribuição de CT institucionalizado. Os resultados mostram que a exclusão digital está significativamente ligada a fatores institucionais e de políticas públicas. Nesse sentido, constatou-se que as instituições universitárias (UM) de treinamento de professores são os ambientes mais dinâmicos para a aquisição de CT durante o estágio inicial de treinamento, em comparação com as instituições de ensino superior não universitárias (ISFD). Ao mesmo tempo, as escolas particulares têm maior probabilidade de promover práticas educacionais com tecnologias digitais (TD) do que as escolas públicas. Por fim, políticas públicas universais, como a distribuição de computadores pessoais (*netbooks*) para professores e alunos, contribuíram fortemente para a aquisição de CT pelos professores e permitiram a implantação de práticas inovadoras com TD nos processos de ensino e aprendizagem, favorecendo assim a redução da exclusão digital educacional.

Palavras-chave: inclusão digital; capital tecnológico; tecnologias digitais; políticas educacionais.

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Introduction

Since the early 1990s, discourses on the need to incorporate Digital Technologies (DT) into the teaching and learning process have been gaining ground in the educational field.

This challenge has also resulted in a demand for teacher professionalization. As a knowledge society, there is great emphasis placed on education in the 21st century: teachers are expected to create learning environments that facilitate the use of DT for educational purposes, and gradually acquire increasingly sophisticated skills in order to increase their job opportunities (Morillo & Vera, 2005; Viñals Blanco & Cuenca Amigo, 2016; Silva et al., 2019; García et al., 2023; Sánchez Vera, 2024).

Similar to other countries in Latin America and the Caribbean, Argentina also implements programs and actions to incorporate digital learning into education. It is a heterogeneous country with strong socioeconomic inequalities which are evident throughout its regional spaces. These particularities are apparent in the country's educational system, which is also unquestionably unequal. This is why incorporating DT into teaching is such a challenge, as it contrasts with the heterogeneous and unequal educational system in the country's provinces and municipalities, ultimately generating gaps in teaching practices. There are some institutions where teachers are able to fully use DTs, but there are many other institutions where teachers only have limited access, or even none at all. These inequalities are even noticeable among teachers who work in the same geographical area but in different schools.

The challenges to incorporating DT into education became even more pronounced during the global social and health crisis of the COVID-19 pandemic, which began in early 2020 with the Mandatory and Preventive Social Isolation (ASPO) in Argentina. In-person classes were cancelled and many schools and higher education institutions shifted completely to online teaching which, obviously, meant there was a great need for digital technology. While some teachers were able to maintain their classes online through the innovative use of digital technologies, others found themselves completely limited, not only by their own circumstances but mostly by those of their students.

The conditions mentioned above are what make up the term known as the educational digital divide. This digital divide occurs in several ways, with issues surrounding the availability of technologies being the most prevalent; however, there are other cognitive and cultural factors at play here. To better understand some of these factors, we adopt the notion of technological capital (hereinafter referred to as TC), defined as

> [...] a skill set of knowledge, expertise, and practical know-how used in the learning process (similar to how ICTs are used in school). Possessing them is an attribute that differentiates individuals and allows them to compete better in a wide variety of fields and social spaces (Casillas Alvarado et al., 2014, p. 31).

Analyzing the digital divide in relation to the distribution of TC among teachers from four secondary schools in the Greater Buenos Aires area (Argentina) was the objective of the research in this article[1]. To do this, we looked at the different dimensions of TC and their relationships with teaching trajectories and practices, as well as the public policies for teacher access to TC.

[1] The research was conducted as a final project for a Master's Degree in Technology-Mediated Educational Processes (National University of Córdoba, Argentina). The project, entitled "The New Gap between Secondary School Teachers in Greater Buenos Aires: Technological Capital as a Principle of Differentiation," was presented by Master's student Verónica Mansour in 2022, under the mentorship of Susana Morales. It met all the scientific and ethical requirements for approval according to Resolution 318/16 of the Honorable Superior Council (HCS).

A few conceptual tools

This work was conceptually based on four main themes: digital divide, technological capital, teaching trajectories, and teaching practices.

Dijck (2016) argues that the term digital divide began to be used in the mid-1990s in the United States, appearing for the first time in an official publication of the National Telecommunications and Information Administration of the United States Department of Commerce. Dijck explains that, at that time, the term was specifically used to refer to physical access; to a person's ability to access digital media hardware and software and internet connections. González Gartland (2013), however, points out that the term digital divide was first used in 1978 by UNESCO. Aside from the differences regarding the term's origin, Gartland also states that early debates on the digital divide were limited to the consequence of one single factor: access. These debates, although mainly descriptive, denoting a static idea of the term, did lead to analyses being conducted on the topic, making it one of the main issues since the end of the 20th century. The first empirical studies on the digital divide between Internet users and non-users concluded that this separation was based on race, gender, educational level and income, for example, young, white, educated and economically privileged males were the individuals who primarily used the Internet (Katz & Aspden, 1997).

As such, the digital divide could be characterized as a new social inequality insofar as it generates inequalities between different social groups (and countries) with relation to access, knowledge, or the skills required to use digital technologies, and in terms of the meanings and symbolic experiences these tools provide (Géliga Vargas, 2006; Crovi-Drueta, 2008; Fernández del Moral, 2012). The problem with the digital divide in education is therefore closely linked to digital inclusion. It is in this sense that González Gartland (2013) makes a distinction between limited digital inclusion and increased digital inclusion. Limited digital inclusion relates to instructions being provided for operating *hardware* and *software* so that the user will be able to access the digital environment as a content consumer on the market. Increased digital inclusion, based on the possession and use of digital resources, relates to individuals who act, produce content, and interact based on their own interests and objectives.

Continuing this line of thought, Cabero Almenara and Ruiz Palmero (2017) point out that the problem with the digital divide is not only related to the incorporation of DTs (even if they are highly adapted and very close to the subjects) but also to the possibilities for training and digital literacy that enable individuals to make the most out of them. Pioneering research in this field has demonstrated the importance of the use and development of digital skills in the school environment (Area Moreira, 1990; Serna, 1998; Hoffman & Novak, 2000). This is why the digital divide was considered a matter of public policy, particularly the role it plays in education, which started with the World Summit on the Information Society (2003-2005). During the Second Phase of the Summit (2005) Nicholas Negroponte even presented a prototype for laptop computers, developed by the Massachusetts Institute of Technology (MIT, that could be distributed in developing countries, that was the basis for the project called 'OLPC' (one laptop per child). In Uruguay, this initiative was called the Ceibal Plan, and in Argentina it was called the Connect Equality Program (Morales, 2015).

It is important to note that the concept of TC was inspired by the concept of cultural capital proposed by Bourdieu (1987). According to Bourdieu, cultural capital refers to specific habits or skills that are only acquired and incorporated into the individual after long periods of socialization, presenting itself as a principle of differentiation as strong as economic capital. It is also important to note that, according to Bourdieu, cultural capital determines the possibilities for actions individuals can take within the social space, differentiating individuals and allowing them to compete better or worse in a wide variety of fields and social spaces. Cultural capital can also be separated into three states: embodied, objectified or institutionalized. The embodied state refers to long-lasting dispositions of the mind and body, often acquired by socialization within families, with other individuals, and at school. It can be observed in a person's habits, tastes, and perceptions. The objectified state is observable through forms of cultural goods individuals possess, such as books or magazines. It refers to objects with properties that exert—through their mere possession—an educational effect on agents. Lastly, the institutionalized state refers to the formal recognition of titles and degrees.

TC is a new type of capital, a digital one, which emerges by advancing the incorporation and use of DTs in the educational field (Casillas Alcarado et al., 2014; Casillas Alvarado & Ramírez-Martinell, 2018; Salado-Rodríguez & Ramírez-Martinell, 2018; Guzmán Games, 2020). As per Casillas Alvarado et al. (2014), TC can be analyzed in its three states: the incorporated state, which refers to the appropriation of technological

culture (familiarization with digital tools and the 'domestication' of DTs[2]); the objectified state, which can be observed in the technological objects that teachers own and the way they access them; the institutionalized state, which is expressed through a set of diplomas, degrees, and certificates issued in systematized training processes, as well as access to knowledge and skills in institutional contexts. The three forms of TC are fundamental for analyzing the current digital divide among teachers.

Regarding careers, the process of becoming a teacher and acquiring the necessary knowledge to teach involves different stages. It begins with one's personal school experience and continues throughout the professional career (Señoriño & Cordero, 2005), from initial training to insertion and professional development as a teacher. What's more, teachers' career paths are influenced by a variety of factors such as gender, cultural and relational capital, socio-family background, training institutions, the time period in which they received their training, and the continuing education opportunities available to them (Jiménez Vásquez, 2009). Lastly, educational reforms and public policies aimed at educational change have also had their mark on teaching careers (Moreno Doña, 2021). In this case, each teacher's journey is closely linked to their personal, institutional, and public policy opportunities for consolidating their TC, enabling them to navigate the challenges of the digital divide in education within their teaching practices.

In conjunction with Fierro et al. (2000, p. 21), we understand teaching to be

> [...] an objective and intentional social praxis, in which the meanings, perceptions, and actions of the agents involved in the process—teachers, students, educational authorities, and parents—intervene, as do the political, institutional, administrative, and regulatory aspects that, according to each country's educational project, define the role of the teacher.

This approach highlights the complexity of the teaching role and the factors that influence it: personal relationships, social and institutional constraints, and its relationship to knowledge and public policies. Teaching is a truly unique experience and very different from a purely technical practice; it requires a significant degree of autonomy on the part of those involved in real and complex teaching and learning processes (Davini, 2015).

Thus, in this study, we highly value understanding how the teachers we interviewed use the available digital technology in their teaching and learning practices, in a context where bridging the digital divide and acquiring digital skills define the possibilities for educational and social inclusion.

Methodology

This study was conducted in two phases. The first phase involved a documentary review of public policy plans and programs that incorporate DTs in education, as well as previous scientific literature on the topic, in order to build the conceptual foundations upon which the data collection instruments and data analysis categories were developed.

The second phase involved the fieldwork. We used a qualitative methodology to understand the complexity of the issue under study, prioritizing the interpretation participants give to their practices, memories, events, and interactions experienced within the institutions where they teach (Sabariego Puig, 2009).

We conducted interviews with teachers who participated voluntarily. All interviews were recorded with their consent. Additional safety measures were taken to protect individuals and their personal data.

Considering the objectives of the research and the accessibility to the participants, a non-probabilistic sample was defined using the snowball method (Sabariego Puig, 2009), taking into account the following diverse teacher profiles needed to conduct the research: a wide range of gender, age, and seniority in the education system, the institution where they received their training, the teaching area, and the schools where they teach. Based on our selection criteria and method, we collected a sample of 24 teachers from four secondary schools in the San Miguel district, Buenos Aires Province (two schools in the central area and two in the peripheral area - one public and one private from each area).

A semi-structured questionnaire was used as an information collection instrument and conducted virtually.

Results and discussion

Digital divide and education: children and adolescents in the Greater Buenos Aires area

According to data from the National Institute of Statistics and Census of Argentina, the ownership of computer equipment in the homes of children and adolescents in the Greater Buenos Aires area (which

[2] In the sense that Silverstone (1999) gives to the expression domestication of technologies.

includes the Autonomous City of Buenos Aires and the Buenos Aires metropolitan areas) was a factor that heavily influenced the availability of virtual classes in 2020 after in-person school classes had been cancelled due to the COVID-19 pandemic. 75.9% of households with a PC, notebook or tablet participated in virtual classes at the secondary level. On the other hand, for households that did not have this equipment, participation in virtual classes at the secondary level was reduced by half, at 39.8%. According to the same study, there is an access gap for ICTs depending on whether people attend public or private educational institutions. 60.5% of households with adolescents attending public secondary schools had at least one computer, and 81.6% had an internet connection. Meanwhile, 90.8% of households with adolescents attending private schools owned this equipment and 95.1% had internet access. This data does not discriminate by region and the data from the 2021 Population Census3 clearly shows that the Buenos Aires metropolitan areas is significantly more disadvantageous. 90% of households in the Autonomous City of Buenos Aires own computers, *tablets* and other devices, while only 58.9% of households in the San Miguel district own these technologies, a situation echoed in many of the districts in the metropolitan area.

These divisions in access to technologies do not show any improvements from studies conducted prior to the pandemic. According to data from the Argentine Social Debt Survey from the Observatory of the Argentine Social Debt (ODSA, 2018) conducted by the Ombudsman's Office of the Province of Buenos Aires and the Observatory of Social Debt in Greater Buenos Aires, a significant proportion of children and adolescents between 3 and 17 years of age do not have access to a computer at home (47.9%) and/or do not have internet access (53.6%). This situation worsens when comparing social strata where, as the social stratum decreases, the deficit in both resources increases. While 100% of children and adolescents between the ages of 3 and 17 from upper-middle income brackets have access to computers and the internet, only 30.8% of those from very low income brackets have access to computers and/or 25,7% have internet access. 64% of children and adolescents in vulnerable housing areas do not have a computer at home, and 73.2% do not have internet access.

The data demonstrates the importance of public policies for distributing technological capital in the education sector— among both teachers and students. This is an aspect we look further at in the following section.

Public policies for distributing equipment (objectified TC) and teacher training (institutionalized TC) 1990-2020

As previously mentioned, objectified technical knowledge refers to the technological objects teachers own (or have access to), while institutionalized technical knowledge refers to diplomas, degrees, certificates and/or other types of institutionalized training. Public policies for distributing TCs are essential to fostering equitable access to TCs.

The policies implemented in Argentina at different time periods relate to a broader Latin American regional context where DT incorporation programs in education were part of regional educational strategies aligned with global policies - mainly economic and technological ones (Morales, 2015).

The more significant initiatives that were implemented in Argentina can be grouped into three time periods, roughly corresponding to the different time periods of the governments that led the country. In most cases, these initiatives took place in the form of policies promoted by the central government which extended throughout the country. There were many cases where a province or district adapted national programs to address their specific issues, and other cases where projects were designed and implemented by local governments.

The first period of national policies occurred during the 1990s, when objectified TC was introduced into schools for the first time. While they were an important start, the policies were fragmented and tended to focus on a few specific institutions and territories, ones that were determined by the funding sources, most of which were international credit organizations such as the Inter-American Development Bank (IDB) or the World Bank (WB). Therefore, the inclusion of the first computers into Argentine public schools did not come close to achieving homogeneous levels of coverage, training, and technological resources, and instead led to differences among schools and, consequently, among their teachers.

The second period began around 2003 and extended until the end of 2015. During this period, a number of public policies were implemented toward distributing objectified and institutionalized TC in schools, for both teachers and students, and also in initial teacher training settings. The political foundation of these initiatives was the democratization of access to digital technologies and digital inclusion in education.

[3] Instituto Nacional de Estadística y Censos (2021).

As shown in Table 1, the public policy initiatives for reducing the digital divide were numerous and diverse (only the most significant ones for our study are detailed here). They were important and had an impact on how TC was distributed among teachers and students in the Buenos Aires metropolitan area.

Table 1. Public Policy Initiatives for Incorporating DT in Education. Argentina 2003-2015.

Ano	Initiative- Public Policy	Target Audience
2004	National Digital Literacy Campaign	Teachers in initial training and in practice, trainers of trainers, managers, students of all levels and unemployed, underemployed and young people who had dropped out of school with little or no ICT training
2005	Founding of the National Institute for Teacher Training	Teachers of all levels
2006	Digital Education Inclusion Plan	Teachers and students
2007	Pedagogical Strengthening Program for Schools of the Comprehensive Program for Educational Equality (FOPIIE)	Teachers, managers, supervisors and jurisdictional representatives
2007	Educational System Improvement Program (PROMSE)	Teachers, managers and administrative personnel
2010	Connect Equality Program (PCI)	Managers, teachers and students
2015	National Educational Inclusion Plan	Teachers and students

Source: Mansour (2022).

The proposals implemented in schools during the 2003-2015 period were the first state policies for integrating DT with digital inclusion objectives, which guided and established the agenda for all the country's educational institutions, the goal of which being to reduce the digital divide (Vacchieri, 2013).

Lastly, the third period began at the end of 2015 and extended until 2020. Although this stage did see certain DT inclusion policies in the educational field being promoted, the reduction in public spending on education - among other things - setback the progress that had been made in previous years (Morales, 2021). A few initiatives aimed at incorporating digital learning into schools were implemented, but they were far removed from an inclusive approach aimed at bridging the digital divide.

Teaching careers and the role of training institutions in the distribution of TCs

In addition to analyzing public policies, it is also important to recognize the paths teachers follow for acquiring TCs. One of the key stages toward shaping a teacher's career is initial training. In the Greater Buenos Aires area, there are two institutions responsible for teacher training: the Higher Institutes of Teacher Training (ISFD) and the National Universities (UN). Although both institutions are regulated by the National Institute for Teacher Training (INFoD), they do present differences that are reflected in the educational trajectories of their respective graduates, in relation to the distribution of TC.

These differences are perceived through the speeches of the study participants. As one interviewee pointed out, learning to use digital tools and skills is included (albeit elementary) in the courses offered by the university.

> [...] there was a class in the entrance course, a tools workshop... to learn how to use Internet Explorer and Word and basic computer functions, (although) formally there was no training in digital tools. It's true that some courses... used virtual classrooms, so you had the experience of participating in a virtual classroom, but there was no course that trained you in digital tools (E24, professor who graduated from UN in 2011).

A similar situation occurred with regards to the objectified TC: university training institutions offer minimal access to technological equipment, there are a few areas with computers for general use and *tablets* that students who do not have their own devices can borrow. This is how another professor who completed his initial training at the university level described the situation:

> [...] the university has a lab with desktop computers... we use the lab to incorporate other tools for statistics. We studied a specific software for data analysis and we used the lab, but also in geometry classes, you could bring your own computer or tablet. And I also remember there were tablets on loan (I think they must still be available). ... in addition to the classic equipment, projectors, etc. (E22, professor who graduated from UN in 2017).

Regarding the situation of the ISFDs, it is worth mentioning that the Connect Equality Program (PCI), implemented between 2010 and 2015, distributed *netbooks* to public secondary school students as well as to practicing teachers and teachers in training at the ISFDs. The program also tried to incorporate IT equipment into ISFDs, promoting updates in the professional, pedagogical, and administrative use of DTs. Even still, while the teachers we interviewed did acknowledge the fact that the equipment was provided in the ISFDs,

there was no training offered on how to use DTs to help them acquire institutionalized TC, much less in training practices. To this point, one of the teachers we interviewed said:

> [...] I remember there was a TV, but it wasn't actually brought into the classroom. I never, ever saw a TV in the classroom. There were stereos, but in our area, we used books and the library, we didn't use digital or technological tools (...) there wasn't a single subject that included ICT. Sometimes, teachers would bring in some technological tools, like showing videos or PowerPoint, but it was on their own initiative and not because the area required it (E21, teacher who graduated from ISFD in 2020).

Another interviewee held a similar opinion:

> [...] ICTs weren't part of the program or the curriculum for my degree. The only ICT inclusion I can recall was when they gave us computers (at that time, from the National Connect Equality Program). But we never used them in any course [...]. I did use them, yes, in my personal time to do a project or write up a document, but it wasn't included in the curriculum for in-person courses, we never used them. ICT training was extremely lacking (E14, teacher who graduated from an ISFD in 2013).

The program clearly played a key role in the distribution of targeted TCs with the goal of reducing the digital divide. However, outside of distributing *netbooks* during the initial training period, any other initiatives related to institutionalized TC (for example, systematic learning spaces in the ISFDs where students were trained to use digital resources in educational practice) were severely lacking.

We know that the trajectories of teachers who graduated from the UN differ from those who graduated from the ISFD. On the one hand, university institutions are more limited in relation to objectified TC as technological equipment for training is almost non-existent, while ISDFs have access to public policy programs that provide greater availability to said equipment. On the other hand, universities provide greater access to institutionalized TC for teachers in training when compared to ISFDs. While universities do offer some DT training at the beginning of their programs and provide technological equipment, ISFDs were less active in terms of distributing institutionalized TC (training how to use DT) to their teachers-in-training. These results could be related to results reached in other studies, such as Amado (2022, p. 151) who, when analyzing the appropriation and use of DTs in an ISFD in the Buenos Aires suburbs, concludes that "[...] access to equipment and knowledge for the use of DT is a central problem in the first years (of initial teacher training), which is why it must be taken into account by the educational system." That is to say, for the case analyzed "[...] we see that the training teachers receive for managing technologies is insufficient for the challenges involved in thinking about the implementation of DTs in a pedagogical sense" (Amado, 2022, p. 154).

Teaching practices with DT

Embodied TC refers to the appropriation of technological culture, the familiarization and domestication of DT, and is used in DT teaching practices. According to Salado-Rodríguez et al. (2014), teachers possess a series of tools and skills related to digital technologies that allow them to measure embodied TC in the following ways: using internet search tools, using office tools, digital skills, file or folder management, communication, using institutional resources, and using tools to prepare lessons.

DT teaching practices were analyzed, in a relational way, based on the availability of objectified TC because when teachers have access to technological objects—either in the schools where they work or personally at home—they are able to appropriate and familiarize themselves more effectively with DTs. Likewise, the institutional context conditions the practices related to the use of DTs in teaching processes in such a way that it acts either as an obstacle or promotes this incorporation (Morales, 2010).

Thus, in our study, we found that teachers identify two types of institutional initiatives that favor the use of digital technologies in teaching practices and, therefore, the incorporation of digital technologies: a) availability of digital technology resources in schools (objectified digital technologies) and b) training/education opportunities on the use of digital technologies (institutionalized digital technologies). This has implications for c) classroom practices with digital technologies.

Availability of digital technological resources in schools (objectified TC)

One of our interviewees expressed:

> [...] the school is fully equipped, so there's no problem. You arrive at school, go to the library, check out a computer, and take it to each classroom where you can use it. We have 18 laptops available, one per classroom. If you, as a

> teacher, have an hour to spare, you can go and ask for one and work; and if you want to print something out, as long as it's not a large quantity, the school will print it for you. All classrooms have projectors and there's a special multipurpose room with a projector, which we use as a conference room (E13, private school teacher).

This experience contrasts greatly with that of another teacher who works in a public school:

> [...] at my school, I think there's only one cart (with computers), I'm not sure. To tell you the truth, we had a meeting this year or last year where they told us, 'Teachers, you can take the cart, but if a computer breaks, you're responsible for it.' I don't think that's right [...] Don't tell me, 'If it breaks, you pay for it.' [...] The message is going to be to use it, but if you send me that message, it's contradictory. You're not supporting me in using the technology. We have a projector here, and we can't use it because of theft. I know it's kept at the principal's house, and she brings it personally to the school. So, you have to request it well in advance, and pray that you don't lose anything (E4, public school teacher).

Another teacher spoke in a similar manner:

> [...] I wasn't lucky enough to work with technology here [...] the cart (with computers) is an issue because the school suffered a lot of theft, [...] which meant the school took more and more security measures and always kept everything under lock and key, behind bars, anything you can think of. Then they delegated a person in charge, so when you need things, you have to ask for them in advance and make sure that that person (who is in charge of opening and closing and providing you with the materials) is there the day you are going to teach. I was never able to do that (E3, public school teacher).

In this case, the assessment is that school technological resources (objectified TC) are not available for teachers to use. At the same time, school directors' messages are inconsistent regarding the conditions for using the technological equipment, which is why the institutional message ends up discouraging teachers from using the school's technological resources.

Training/capacity building spaces on the use of DT in schools (institutionalized TC)

Embodied TC is also acquired through learning processes, both formal and informal, so training and/or capacity building opportunities on the use of DT in teaching and learning processes in educational institutions are essential. When speaking about this, one of our interviewees said:

> [...] at the Institute, we were told that we were going to use the Santillana educational platform next year [...] The trainer would choose certain topics, and once every two months you would learn how to upload a file, how to do a little bit of editing, they would give you all the tutorials and you would have direct access to the trainer to learn how to use the platform, but they left it at that. Later, management recognized the mandatory nature of the platform. They would monitor the number of hours you were accessing the platform and, based on that, they would call you and ask you, 'What's going on, what don't you know how to use, what's wrong with you, why don't you use it, why do the kids tell us you never use it?' (E13, private school teacher).

Basically, according to the interviewed teacher, although the school was responsible for providing basic training on how to use the virtual platform, 'they left it at that.' There were no subsequent institutional initiatives that explored the pedagogical use of digital technologies more in depth, and this evidently had an impact on the teaching profession.

In this sense, if we look at public schools, we can see that while the PCI was highly valued by teachers, it was limited because it focused primarily on the distribution of computers. As one interviewed teacher noted:

> [...] I think one of the flaws of the Connect Equality Program is that us teachers weren't encouraged to get more involved with digital tools. Because from that point on, from those fruitful years where each of us had our own netbook, [...] today I see people who went through that whole process with me, who can't attach a grading sheet, can't complete it, don't know how to do it. So I think what was missing was that teachers were pushed a little more or forced—I don't want to use that word—imposed, motivated a little more so that we could rise to the occasion, having computers like the ones we had (E3, public school teacher).

The PCI was defunded (and then discontinued) in 2016, which had a significant impact on teaching conditions during the pandemic. Thus, during the ASPO, teaching was full of challenges and tensions, inequality being one of them. In many cases, neither teachers nor students in public schools had the technological resources and/or conditions to provide pedagogical continuity. For teachers, we observed that while some had their own computers (objectified TC) they could use to give online classes, others only had their cell phones. As detailed, the possibility of investing in targeted technical training depended on the

financial means and/or personal interest of many teachers because, pre-pandemic, there was a significant lack of investment in technical training, which led to serious limitations and an inadequate response to the pedagogical challenges during the ASPO.

The experience recalled by one of the teachers we interviewed demonstrates the importance of having appropriate technological devices to facilitate learning and breed familiarity with digital tools that can improve both the teaching and learning processes:

> [...] I limited myself to what I had, but at one point during the pandemic I said, 'Well, I need to buy another one.' I bought a new computer, and a friend told me, 'Look for this video on YouTube and you can install it.' I honestly didn't know what I was doing, I was coming from a pen drive [...] but everything went well. I installed the Office suite, Adobe, and I gained that confidence that I could do it. Because the truth is that I was not very tech-savvy, and now it's the opposite. I feel like I learned a lot, and it made my teaching job much easier. The pandemic was a learning period in a way (E6, public school teacher).

Classroom practices with DT (embodied TC)

The differences in educational practices that use DT are notable when there is a public policy or institutional condition that promotes them opposed to when there is not. We use as an example the implementation of the Connect Equality Program (PCI) and its discontinuation in 2016.

While the PCI was in force

> [...] there was full participation. Today, I feel and see the privilege of every student having their own computer, and it was—I was going to say a luxury, but it shouldn't be a luxury—it was a beautiful right. So, even the students who had more difficulties, there was always a classmate who was a little more capable that could help them. It wasn't just my presence; there was always someone else willing to teach: 'Look, press this,' 'Save it like this,' 'Put it on the flash drive like this.' Perhaps that doesn't happen in traditional teaching because it's hard for one kid to correct another in traditional ways. On the other hand, in digital teaching, it was, 'I don't know how to do it,' 'Okay, come here and I'll explain it to you.' That happened a lot; it wasn't just me who was needed (E3, public school teacher).

Another teacher said:

> When we had netbooks, we would connect. I would give them the material in the classroom. They would connect, we would form groups, they had to make a video, a PowerPoint presentation, and I would always explain if they didn't know how to use it [...] I've applied technologies and I continue. You have to look for information. Those who have a cell phone [...] I tell them, 'Look at this page, this app.' I've always tried to apply it, I think I should do even more, but you do what comes to mind (E10, public school teacher).

On the contrary

> When we were able to use the small PC with the kids, it was all about PowerPoint presentations, bringing them videos, and setting up the class. Later, that was discontinued, and we went back to using the TV and DVD, and now that's it (E3, public school teacher).

In private schools, the situation is more favorable in terms of technological availability, both at the institutional level and the personal level of teachers and students:

> [...] I remember a class I taught [...] where we had to work with episodes from Netflix documentaries. And so we asked for the computer and connected it to the classroom monitor [...] we watched the documentaries in class and discussed them while we were watching them, in class. We were directly connected to the internet and were watching Netflix directly from the computer... instead of sending the kids to watch the documentary at home [...] (E24, private school teacher).

This story coincides with reports from another one of our interviewed teachers of when she gave an assignment to the students:

> [...] In geography class, I had created a Google Form with short questions, multiple-choice answers, and images in which they had to identify specific geographic features (landforms, for example). I sent them the form via email, and they had a set amount of time to complete it (E20, private school teacher).

These results do align with prior studies such as Mancebo (2018) who, when analyzing the uses and appropriations of digital technologies in private schools in the Buenos Aires suburbs, states that

> [...] teacher training is provided through in-person meetings led by the technology advisor [...] who is available at the institution several hours a week to answer questions. Many teachers appreciate this and feel they are supported by the advisor and the administration as any complaints or concerns they may have are attended to (Mancebo, 2018, p. 138).

Conclusion

Firstly, our study shows that the digital divide is associated with the planning and implementation of national and provincial public policies that have occurred over different time periods. Thus, policies that have heterogeneous characteristics and/or are discontinued result in unequal distributions of objectified and institutionalized technical knowledge among teachers in the Buenos Aires metropolitan area, favoring or adding to the current digital divide.

At the same time, there are a number of teaching trajectories that do not have the same access to TC in their objectified and institutionalized states during training. In the words of our interviewees, ISFDs appear less willing to offer equipment for classroom activities, as well as to generate proposals for specific training on how to use digital tools for pedagogical purposes. On the other hand, teachers who completed their training at UNs report elementary contact with DTs and only a few instances where they could use these digital tools pedagogically. We were able to identify that the career gap between teachers who trained in one place and those who trained in another is what leads to an unequal distribution of TC at that stage of their careers.

Educational institutions play a key role with regard to teachers using DTs in their schools as these institutions can either promote or discourage teaching practices that make use of DTs. Schools can distribute, to a greater or lesser extent, technological knowledge either by making technological objects available (objectified TC) or by enabling their teachers to learn how to use technological knowledge (embodied TC). In our study, private schools are more advantageous than public schools in terms of developing practices that incorporate DT into teaching. In other words, teachers adapt their levels of demand, development, and commitment to the rules according to their interpretation (or view) of the institution they work for, taking into account the management style, the quantity and quality of resources at their disposal, the possibilities available for the students based on their social situations, etc. All of this constitutes a "floor" and a "ceiling" on how each teacher is able to educate at an institution. In the case of our study, this floor and ceiling are related to higher institutional expectations regarding the use of DT in the classroom, but also to institutional support or accompaniment (technological resources and training) that are more in line with those expectations.

In turn, teachers had a positive assessment of the Connect Equality Program (PCI) and its ability to provide technological equipment (objectified TC) to public educational institutions, their teachers, and students. This was much more established in private schools. This program served as a catalyst for classroom practices despite the limited support and guidance from management, the limited use of existing technological equipment, and the almost nonexistent training opportunities that would allow teachers to acquire institutionalized TC. This is why many of the pedagogical initiatives that incorporated DT depended primarily on the individual commitments and efforts of teachers. As noted earlier, this is in contrast with the experiences reported by teachers in private schools where there is a strong demand for teachers to use DT in their classrooms, although it is sometimes compulsory.

Thus, another observable factor among teachers from the Buenos Aires metropolitan area who participated in the study that affects the digital divide is institutional conditions, which either encourage or discourage DT teaching practices.

It is clear to us that in order to meet the current demands of incorporating DT into teaching we cannot place all expectations and responsibility on the teachers, even if their efforts far exceed their professional commitment. What is needed are public policies aimed at equitable distribution of TC so that it can reach even the sectors of the population that are disadvantaged in terms of access and appropriation.

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