Chapter 2

Educational Technology as School Reform: Using Actor-Network Theory to Understand Recent Latin American Educational Policies

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2.1 Introduction

In the last decade, most Latin American countries carried out programs that massively distributed computers or tablets to school children—among them, *Aprende.mx* in Mexico, *Plan Ceibal* in Uruguay, *Conectar Igualdad* in Argentina, and *One Laptop per Child* in Peru and Paraguay. These programs sought to “solve” the digital gap by distributing digital devices and training teachers to use them as part of digital literacy strategies and as ways of promoting more attractive, engaging pedagogies.

The programs were based on a diagnosis of the inefficacy of the school system and also of the exhaustion of the traditional school form (Vincent 1980), the failure of simultaneous pedagogy, whole-class lesson, and memorization and repetition as didactic strategies (Cuban 2008). Confronting what was perceived as a hopeless panorama of schooling, digital devices were presented as guarantees of educational change, as they produce personalized learning environments, mobilizing teachers and students with more relevant and up-to-date methods.

However, it should be kept in mind that each new technology has been accompanied by similar promises. Allow me to take a short detour through the history of technology to discuss these promises. As works done by historians of science such as Langdon Winner (2004) and others show, for over two centuries, technological novelties have fed the pedagogical imagination and utopias to design learning environments that require no effort or study and could be adjusted to the needs of each learner.¹

¹ A study of cinema’s precursors found traces of a significant event. Marie Antoinette, the famous French Queen, asked an inventor of her time, the Count of Paroy, to use new teaching methods on I. Dussel (✉)

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An example of this type of promises can be seen in some utopias that emerged with film as a visual and social technology. Among others, the “educational prophecy” of David W. Griffith, the director of “The birth of a nation” (1915)—considered as the first US movie—predicted that films would completely change the modes of access to culture:

Imagine a public library of the near future, for instance. There will be long rows of boxes of pillars, properly classified and indexed of course. *At each box a push button and before each box a seat.* Suppose you wish to ‘read up’ a certain episode in Napoleon’s life. Instead of consulting all the authorities, wading through a host of books, and ending bewildered without a clear idea of exactly what did happen, you will merely seat yourself at a properly adjusted window in a scientifically prepared room, *press the button and actually see what happened...* There will be *no opinions expressed.* You will merely *be present at the making of history* (DW Griffith, “Five Dollar ‘Movies’ Prophesized” (1915), quoted in Friedberg 2005: 242–243, my underlining).

In Griffith’s prophecy, there can be seen some elements of his own time (the library, the window, the history of Napoleon as relevant cultural knowledge) as well as others that were newcomers: the objectivity of machines, the button or switch device that opens up a new experience, and the possibility of being there at the very moment that history is being made, a strong promise of film in its beginnings (Daston and Galison 2007; Doane 2002).

What is striking is that, save some details, the screen or box with buttons is quite similar to today’s YouTube. YouTube is, like the pillars’ library, a gigantic archive of videos accessible through a single click, whose classification and indexation is delegated to algorithms (Snickers and Vonderau 2009). Griffith’s box and Google’s video platform share the expectation that technologies will end any mediation: simultaneity will allow time travels, not as in a time machine but through making the past coetaneous to the present of the spectator or the player so that s/he can at last “be there,” freed from the intermediations of books, existing authorities, or others’ opinions. Another element that connects the futurism of Griffith to this present is the promise of the “taylor-made” and the “just-in-time” learning experience for each viewer, which is being exacerbated and amplified by the increasing individualization of platforms and screens (Sadin 2017). The sedentary scene of watching and reviving history through a window or screen is another similarity, even though it should be noted that in the last years spectators have stood up and started moving, taking their portable devices as bodily prosthesis and producing quick and fragmentary experiences of seeing and reading in transit, consistent with the acceleration of the rhythm of life that demands that each moment is a productive one (Crary 2013; Valialho 2017).

his child, who showed no interest in studying. Paroy was funded to produce a magic lantern that had several scenes of the history of France and of the Bible. The argument of the Count was that most children in their rooms have their minds captured as a result of obscurity, [but] they are suddenly illuminated by a great disk that frames the painting as a medallion. The curiosity charges their imagination, that gets wthe details of the object represented with enthusiasm.” However, few months after this proposal the Royal family was jailed and the Dolphin never saw this pedagogical innovation (Mannoni 2000, pp. 84–85).

Thus, the box-with-buttons imagined by Griffith is not just a curiosity in the history of the technological imagination of educational futures; it speaks of a long-dating imaginary that, together with the overwhelming advertising campaigns of technological corporations, states that “the future is here” and that the technological change of education is unstoppable. This rhetoric of inevitability (Nespor 2011) includes the celebration of those who share the optimism of the US filmmaker, encouraged by the uncritical adoption of the “technological solutionism” of every social problem (Morozov 2014) and also the pessimism of those who believe this is the end of literacy and the beginning of a new dark era.

Against this rhetoric of the inevitability of technological change in education, seen as a seamless, unidirectional movement toward progress or decay, this chapter intends to present some reflections based on research done on Latin American programs that point to the ambivalences and inconsistencies of these strategies for digital inclusion, related to the complexities in which technologies are enmeshed. As digital media studies and Actor-Network Theory (ANT) studies show, technologies are inscribed within heterogeneous networks made of people and objects. I am interested in analyzing these technology programs as strategies for school reform and in studying them as networks that bring new actors and dynamics into educational systems, based on a stronger awareness of the role played by artifacts and objects and on new discursive configurations around educational change. By doing it, I want to counteract the power of the narratives of school reform that put unconditional faith in the introduction of technologies as motors of change. I also want to point to the heterogeneous temporalities that these reforms carry along, bringing long-dating imaginaries about the present and the future that affect the ways in which technologies operate in contemporary politics.

2.2 Dismantling the Rhetoric of Educational Change Through Digital Technologies: Theoretical Standpoints²

Digital technologies are currently presented as “the” kernel of change and reform in education and are thus surrounded by “hype, hope and fear” (Selwyn 2014). They promise a new model for education that will undo the wrongs of the educational system and promote its democratization through openness, flexibility, and customized programs. These reform programs generally see schools as industrial, Fordist systems that are presumably outdated; in this view, the old institutions of schooling, including universities, will be replaced with technologically rich, user-friendly, and economically accessible environments.

There is a certain irony in the fact that digital media vow to end centralized, one-size-fits-all models of education, and yet, they have become, in several countries,

²This section and the next one expand the arguments presented on a previous text on educational technology as global educational reform (see Dussel 2018).

the nucleus of centralized state programs to promote digital inclusion and transform schools. They have entered a complex set of relations and regulations that, for example, considers the level of schools as that of implementation and that includes and relies on traditional agents such as school inspectors and principals; they also operate through the spread of discursive rules about what constitutes good practice in ways that are similar to older reform programs.

I would like to propose a different take on this irony, one that problematizes the opposition between digital media and schooling and instead looks at how they become connected in the reform network that is taking place in these technology-driven reform programs. My approach is grounded on Actor-Network Theory (Latour 2005; Law 2009), a historical and political sociology of educational reform (Popkewitz 1991, 2008) and an anthropological and materialist view of local practices (Das and Poole 2004; Burrell 2012; Fenwick 2012; Appadurai 2013). In this approach, reforms are not bounded strategies but movements or forces that have multiple trajectories of participation (Nespor 2002: 366). This means that, contrary to what the global jargon of educational technology says, the links between a particular reform, its enactment in schools, and the global or transnational trends toward digitalizing schools cannot be seen as a one-way, sweeping movement toward digital inclusion; on the contrary, these connections have to be studied and “flattened out” in a particular cartography that emerges out of a close study of how this reform is taking place (Latour 2005).

The analysis of local practices is not set to “capture of the exotic” (Das and Poole 2004: 4) or as another example of what is going on in the “Global South,” but as an analysis of the specificities of a locality where, such as in Argentina until recently, a politically radical agenda for education in schools prevailed (McGuirk 2014, for a more general view of this process). This radical agenda is not a script in the background but is weaved in the actors and forces that are mobilized in the reform network. In this approach, “local practices” are nodal points in a network that are distinct in their scale and scope. The network might or might not include what is usually perceived as the global or the transnational: the global, in this case, technological devices and expert knowledge produced by transnational corporations, becomes important in the network as far as it is brought up and mobilized by some actors in each network.

My take on ANT theory follows John Law’s assertion that it is less a coherent set of principles than a “diaspora that overlaps with other intellectual traditions” that share “a sensibility to the messy practices of relationality and materiality of the world” (Law 2009: 142). It can also be described as “an empirical version of poststructuralism,” with a posthumanist stance on the social and a concern with “the strategic, relational, and productive character of the particular, smaller-scale, heterogeneous actor networks” (p. 145). Broadly speaking, ANT theory is concerned with the connections, the associations, the translations, and the transformations as forces move through space and time.

I find this framework particularly useful for studying educational reforms. School reforms and change are to be understood as “the ways school practices are made mobile, and what and how they connect as they move” (Nespor 2002: 368). This has

at least two consequences. One is a singular concern with movement and spatiality; it is a framework that does not consider the social as a given or fixed entity, but as a continuous becoming, open, and unpredictable (Latour 2005). The second is that ANT method calls for a myopic or oligoptic (the opposite of a panoptic) view, a closer look at the how, the when, and the minutiae of the connections that make up social change; it bears a resemblance to what Foucault called the “gray, meticulous and patiently documentary” task of genealogy (2003: 351). Once the researcher has traced these connections and “its tracers” (all connections leave a trace, however faint or difficult to see), its modes, and its mediators, then she can move to a different scale, but only if the connections show that movement. It is through tracing these actions that the researcher can decide whether a connection was effectively made to another set of practices that can then be called the global or the national level. Analyzing educational reforms from an ANT perspective does not imply separating the realm of design and practice, but understanding the different registers that organize educational practices at different scales. It has close links to anthropology and to history; reforms produce effects that might be diffused and felt later on and that might be experienced in other layers of the school system than the ones expected.

In the next sections, I would like to take this approach to produce a “flat cartography” (Latour 2005: 171ff.) of a particular educational reform in Argentina and analyze it as a network that mobilized specific artifacts, agents, and forces in order to massively introduce digital media in secondary schools. From an ANT perspective, the program *Conectar Igualdad* can be understood as an important policy vector (Strathern 2004) that disseminates technological artifacts and knowledge through different educational scales, such as national, district, school, and classroom networks (Nespor 2004). A policy vector is a connector that allows knowledge (understood as a set of practices) to travel across different scales or levels. This travel (referred to as “impact” by other theoretical positions) needs particular entanglements and conditions that connect expert knowledge and social opinion (Strathern 2004: 28–29).

Thus, I think of this program as a policy vector that mobilizes some discourses and priorities from the national level and even from the transnational sphere of technological corporations and edu-business rhetoric, in relation to teachers’ practices. In my approach, the scale of the classroom is not to be considered as a separate layer—of graduated size—but as a certain arrangement of temporality and spatiality that is defined, among other characteristics, “by the way in which participants ‘calibrate’ school-based events to events elsewhere” (Nespor 2004: 312). The actions of connecting to and contextualizing within outer events are thus part of what defines a particular network such as the school and the classroom. That is why “[n]o description of teaching can be complete without a description of the spatial and temporal orders of the worlds to which it is calibrated by teachers and students” (Nespor 2004: 313). While I will not analyze classroom practices in particular in this text, I will point to the many actors (including artifacts and people) that are connected and hold together this reform network, from the transnational and national scale to that of the classroom. This is the trajectory that I would like to trace in the following sections of this text.

2.3 Reform Networks in Action: The Case of Conectar Igualdad in Argentina

I will proceed first with a discussion of policy documents and strategies that took place at the central level of the policy, which, as will be shown, was far from homogeneous and univocal. The Argentinean government launched *Conectar Igualdad* in 2010 as an extensive program to reduce the digital gap and transform public schooling.³ Focusing on secondary schools, it promised to deliver three million netbooks to every student and teacher in public institutions in a 3-year period (2010–2012), but by the end of 2015, over five million had been distributed. Also, connectivity and electric wiring and plug-ins had to be provided for over 13,000 schools throughout the country. The program was closed in 2018, in the context of a new government that is prone to budget cuts and less social expenditures. However, the experience remains interesting both for its massive scale and reform intentions and for its social inclusion orientation, not so typical in these times of neoliberal rhetoric and neo-populist chauvinism.

The presidential decree that created the program in 2010 framed it as part of the recognition of education as a public good and of the personal and social right to a high-quality education. The language of reform was centered on citizenship and social rights and also on the State's responsibilities, and there was almost no presence of buzzwords like individualism, liberal freedom, and economic competitiveness that are so common elsewhere. Egalitarianism, democratic participation and entitlement, pedagogical innovation, and state-centered policies instead of market-driven strategies were some of the traits that characterized Argentinean social policies in the years that went from 2003 to 2015 and that made them an interesting laboratory for radical politics until very recently.⁴

Whereas other Latin American experiences, notably Uruguay and Peru, focused on primary schools (Pérez Burger et al. 2009; Cristiá et al. 2012), Argentina's ICT educational policy focused on secondary education, targeting all public schools nationwide (over 13,400 secondary schools).⁵ One interesting feature of *Conectar Igualdad* is that it included a loud-and-clear pedagogical call to make public schools stronger and more appealing for young people, renewing its pedagogies and bridging in- and out-of-school cultures, particularly for the new comers who perceive secondary school as elitist and too academic. If ICT policies in education have generally embraced an anti-school program of reform (Selwyn 2011), Argentina's program was inclined to readjustment and reconstruction: the emphasis was put on making schools perform better in terms of their contribution to public knowledge

³ See Dussel et al. (2013) for a more detailed discussion of the program.

⁴ I take the notion of "laboratory for radical politics" from Justin McGuirk's analysis of urban policies in Latin American (McGuirk 2014).

⁵ The program later expanded to include teacher education institutions and also schools for children with special needs. In several provinces and districts, it was accompanied by other programs that targeted primary schools.

and social democracy and to increase the engagement and participation of the “new comers” in school activities and knowledge, who were mostly received in the public institutions that were targeted by the reform program. The rhetoric of *Conectar Igualdad*, then, did not endorse an uncritical celebration of new technologies but calibrated them to political priorities of inclusion and participation. *Conectar Igualdad* was presented as another step in a long-term strategy of improving schools, particularly public schools, as significant learning environments within a context of abrupt changes (Ministerio de Educación de la Nación Argentina 2011). Netbooks were not seen as substitute teachers or books; access to knowledge and literacy practices was a goal that had to be updated, but not abandoned.

This kind of rhetoric is different from what is prevalent in the UK and the USA, where ICT programs are brought predominantly by the business sector and are dominated by the goal of producing a competitive global workforce and a digitally literate global citizenship (Selwyn and Facer 2013). They also include the “promise” of a closer surveillance of students’ work and activity and the production of data that can be used to increase the accountability of educational systems.⁶ In that respect, the Argentinean program stands out as an example of how local forces mobilize global vectors and artifacts in particular ways and connect them to local strategies and fields. The program produced a problematization of secondary schooling that focused on its undemocratic, rigid structure and curriculum; digital media were included in a set of strategies and social relations that promoted inclusion of social groups and knowledge that had hitherto been excluded from secondary schools. The rhetoric was not one of delivering flexible or customized content in liberal terms, but one that focused on the expansion and renewal of curricular and cultural content and on developing a seductive strategy that would ensure that the new students successfully participate in and engage with school activities. It is noteworthy that the notion of “digital natives” was frequently mobilized to legitimize the introduction of the netbooks as devices that were more familiar to the new comers and that would make them more attentive and responsive to teachers’ demands; the possible contradictions of the new attention economy of the screens and social media and the curriculum requirements was not addressed, assuming a natural continuity between modes of learning and a high degree of engagement on the part of the students.

2.3.1 Mobilizing the Connectors: Transnational Business and Governmental Actors

Besides this general discourse and political strategy, the decision to implement a policy with the scale, costs, and dimensions of *Conectar Igualdad* affected many actors and agencies. First of all, the concurrent goals of producing and buying netbooks, establishing connectivity to the schools, providing teacher training for over

⁶ See “No Child Left Untabled,” New York Times Magazine, Sept. 9th, 2013.

400,000 teachers and school principals, and producing educational software implied a massive mobilization of resources and people. To achieve these goals proved in itself an organizational and administrative challenge that was hard to meet, and the strategy was to involve several state agencies in the administration of the initiative, thus distributing tasks and responsibilities. One of the effects was that the program was run by multiple agencies with a complex arrangement of responsibilities and division of labor, i.e., a centralized agency, attached to the President's Office, that distributed the netbooks and trained teachers, and the Ministry of Education departments that overlooked content and teacher education. This led to a duplication of responsibilities and a degree of rivalry between these agencies.

Among the many actors involved in the process, there were transnational corporations that were significant shadow players, somewhat obscured by the prominence of the State and also by the popular-national rhetoric of the administration. The hardware for the netbooks was developed by a pool of 10 international companies, based in China and assembled in Argentina. The resulting netbook device was designed to run both on Windows and Linux and other free software programs and applications and included a wide range of educational software and multimedia tools for producing and recording sound and video. Reportedly, Microsoft granted full license of Windows Office at \$3 per netbook. Also, Intel was a key partner in outsourcing the production and selecting software and content. As Lingard et al. say, "[i]n the world of network governance, government is understood to be located alongside business and civil society actors in a complex game of public policy formation, decision-making and implementation" (Lingard et al. 2014, p. 29).

As a sort of side note, it is interesting to observe that the presence of private companies became increasingly uncomfortable in 2013, in the context of a political climate that called upon a nationalistic rhetoric (i.e., nationalization of the oil company, conflicts with hedge funds over foreign debt, resurgence of the Malvinas/Falklands claim). At that time, an open-source and free operating system was launched, Huayra Linux, that took the Quechuan name of wind (Huayra) to signal that there were "winds of change" that would promote technological sovereignty and national independence from transnational corporations. Yet, this was the first step in 3 years taken toward open-source politics, an issue that had remained surprisingly silent at the launching of the program (see Venturini *in progress*). It is helpful to keep in mind that, as Jan Nesper says, "reforms are contingent effects of struggles and negotiations in which groups try to define themselves and their interests by linking up with other relatively durable and extensive networks" (Nesper 2002: 366).

In the netbooks themselves, there was a wide offer of software and content. There were over 5000 educational resources for teachers in the netbook's "desktop" space—mostly produced in previous years by the national educational portal, Educ.ar, and also provided by private publishing houses, again showing strong links with the private sector and also with the nonprofit developers such as the case of GeoGebra.

Connectivity was among the top challenges of this program, considering that there had been many years of underinvestment in infrastructure and that a strong flow of resources was needed. The goal of the initiative was to install a “technological floor” (i.e., establishing adequate plug-ins and electric wiring) in each classroom, so that 20–30 netbooks could be connected simultaneously. However, this was extremely expensive and difficult to achieve, and the distribution of netbooks progressed more quickly than the wiring of schools. Despite this failure to get connected, teachers and students found creative ways of dealing with the lack of connectivity, working offline in classrooms and online at home or at Internet cafés. As one teacher reported in an interview in 2012, a side effect of this situation was that students developed considerable knowledge on which networks were open or on how to get access to or hack the closed ones (see Dussel 2014).

Another relevant connector of this reform network was technical support and maintenance of the equipment. Related to repairing and maintenance, in recent research on classrooms, this appears as a weak link: in some classrooms, there are only three or four netbooks that work, and most of the devices are broken or blocked (Haedo 2015). On the other hand, the policy underestimated the relevance of the human actors that were needed to make the program work at the school level, particularly with teachers. From its inception, *Conectar Igualdad* proposed the creation of a new staff member in schools who would be in charge of equipment and connectivity. This agent was called “Technological Referent at the School” (Referentes Tecnológicos por Escuela, RTE) and was supposed to help teachers with technical problems. However, these profiles proved difficult to fulfill—there was a shortage of technical graduates and, in a time of low unemployment rates, educational salaries were not competitive. Thus, several school districts had to divide the RTEs between several schools at once, and this made them unavailable for everyday troubleshooting. It can be said that the weakness or absence of relays to make travel and connections possible was a significant feature of this reform network, and it is telling of the difficulties it faced to be held together.

2.3.2 *Mobilizing Knowledge: Experts and Pedagogies*

Pedagogy and pedagogical content was also an important connector in this network. Given the program’s strong pedagogical appeal to transform schools and renew their curriculum and cultural content, teacher training and curriculum policies were privileged strategies. However, these strategies require different time frames than the distribution of devices or the allocation of new staff members: as a Spanish educational historian has said, educational systems move at a slower pace than the anxiety of reformers (Viñao Frago 2002). But teacher training was also slowed down because of the several agencies that were running the programs and sometimes even competing among them: during 2011, there were as many as five public agencies

offering similar training programs in any given district.⁷ The centralized program *Conectar Igualdad* promoted regional and national meetings with school principals and inspectors to discuss strategies and steps in the adoption of the new technology. These meetings were supplemented with online courses for teachers and curriculum materials that gave criteria and examples of teaching units. According to different reports, a large amount of teachers received some kind of training, although this training includes self-assisted courses (i.e., prepackaged activities) as well as tutored ones.⁸

Overall, the teacher training documents and materials produced by the program promoted the centrality of teachers in educational change, but they provided only general advice, with a strong appeal to teachers' initiative and creativity—a common tenet of Argentinean teacher education policies in general. The documents took great care to stress that there would be an array of levels of involvement and were careful to include novice and less-trained teachers. Yet the final point of arrival of the training seemed to be defined as an experienced teacher who could move competently across platforms and use different languages; there were scattered references to what can be called “curricular content” (language, history, mathematics) or to curriculum and cultural renewal. Instead, the emphasis was placed on learning how to use these resources and keep students' attention and motivation, in line with what was referred before as the challenges of getting “new” students to engage and participate in school activities. “Social inclusion” seems to have acted as a significant belt through which what happened in classrooms was to be calibrated to outer events, particularly with the emphasis and strategies of educational policies.

In this arrangement, digital media appeared as a resource to make content more appealing to new comers, which, as said before, was perceived as a main challenge for a reform oriented toward greater inclusion and participation in secondary schools. The guidelines conveyed a somewhat simplistic trust in the affordances of digital technology and made no reference to potential conflicts between new media use and traditional classroom practices. For example, they stated that in order to make the most of the presence of digital technologies in the classroom, teachers could either use digital content (i.e., use the Internet as a set of educational resources), social media, multimedia materials, blogs, or projects or collaborative assignments (Ministerio de Educación 2011: 19). These options were unproblematic and envisioned only positive outcomes; for example, the program's guidelines were presented as clear-cut and neutral options to use Facebook or Google as ways

⁷These agencies were as follows: the National Ministry of Education, Educ.ar, ANSES/Conectar Igualdad, Provincial Ministry of Education, and Organization of Ibero-American States (OEI), an intergovernmental agency that has had prominence in this area, training over 60,000 teachers since 2010.

⁸According to the evaluation report done by 11 national universities for the National Ministry of Education, 472,242 people (including principals, inspectors, teachers, families, and students) attended training courses during 2010 and 2011 (Ministerio de Educación 2011). Ros et al. (2014) also give similar numbers about the large extent of teachers who received training for the program. The total number of teachers in the country is around 850,000.

“to replace and improve old communication systems” (Ministerio de Educación 2011: 22).

Interestingly, transnational businesses enter the network not only through the devices but also through software and pedagogical content such as the one presented above. Internet companies, and particularly social media—which are now “the king” of digital media—are claiming to be open spaces and neutral arenas of participation that make room for people’s participation and creativity, fulfilling democratic as well as self-realization ideals. As José van Dijck claims (2013), the corporate ideology promoted by Zuckerberg and others is that everything must be social and that a “truly open and connected space” has to be built. In social media as Facebook and Twitter, the imperative of sharing and annotating all life experiences online so that people become more popular has on its grounds the push to make all data available to all parties.⁹ The policy documents and curricular orientations enforce this corporate ideology and mobilize cultural production in the same direction. In a recent research funded by the government, a student said he valued the program because now “we can all have a netbook, we can all have Facebook” (Ministerio de Educación 2013: 12). Democratization implies becoming a client and consumer of social media, which now seem to define social and cultural participation (Isin and Ruppert 2015). It is surprising that this went unchallenged in the midst of a radical political rhetoric that denounced imperialism and greedy capitalism.

2.3.3 *Evaluation as Reform Discourse: The Production of a New Agent in Educational Reform*

The last set of agents that I would like to analyze in this flat cartography of an educational technology program is its evaluative component. Evaluation has become a “distinct cultural artifact” in recent times, combining personnel, resources, and particular moralities with their own rituals and hierarchies (Strathern 2000: 2). In educational reforms, evaluations have become more and more prevalent, mobilizing the rhetoric of accountability and transparency that makes them a dominant piece in contemporary political strategies.

The evaluation components of educational technology programs in Latin America are noteworthy for what they say about them and how they construct change and value around the use of technology in schools. Considering that these programs have implied large public expenditures, they have been the object of several evaluations, some of them international (Warshauer and Ames 2010; Lagos Céspedes and Silva Quiróz 2011; Severin and Capota 2011; Cristiá et al. 2012) and others done at the national level (Benítez Larghi and Winocur 2016). These evaluations had their

⁹“Apps, like people, are connectors that boost overall data traffic so all companies can benefit from the “massive value” generated by expanded connectivity” (van Dijck 2013, p. 58).

peak in the first years of the programs, 2010–2012, and were central to the construction of analytic indicators and diagnosis about the massive programs of technological equipment in schools. The indicators included the proportion of personal computers (netbooks or laptops) per student, the coverage of connectivity in each school, the frequency of use of the digital devices in the classroom, teachers' training, and the impact of digital devices on students' learning. Also, surveys were done on teachers' perception of digital culture and students' motivation and interest in schooling. These indicators had to be quantified; thus, training was measured through surveys on teachers that asked about specific ICT courses, and frequency of use was counted upon teachers' report on daily or weekly use of the devices; students' learning was measured through students' performance in standardized tests.

This first wave of international evaluations sketched a less-than-optimistic panorama, showing that the initial expectations were not being fulfilled. They constructed a fairly negative diagnosis on the cost-benefit relations, arguing that the programs were expensive and were not achieving significant gains for students' learning. They pointed out the connectivity problems and the deficits in the repairing and maintenance of the devices, thus curtailing the possibility of effectively having one computer per student configurations in classrooms. The studies found positive outcomes in students' enthusiasm with the programs and in the spillover effects of equipment distributions for the lower-income families. Most importantly, these evaluations were successful in producing a discursive equivalence between pedagogical impact of the digitization of classroom and two indicators: students' performance in tests and frequency of use in classrooms. While increased motivation was a positive impact of the programs, it was not seen as having the same weight than academic performance in achieving social inclusion and efficient use (Cristiá et al. 2012).

In these research frameworks, open and unpredictable phenomena such as the introduction of new technologies to institutionalized settings were turned into quantifiable indicators that sought for cost-benefit analysis of the kind of "value for money" (Strathern 2000: 287) and considered mostly individual variations in learning. In this evaluative research, conceived as part of an audit process, only certain operations count and have to be accounted for (Strathern 2000: 2). A clear example of this reduction is the measuring of pedagogical impact through frequency of use in the classrooms or performance in tests, which leaves unquestioned how these devices are used and whether the tests are taking into account the skills and knowledge that digital devices are mobilizing. While this reduction is coextensive to any evaluative research, which always reduces complex phenomena to particular indicators, in this first wave of evaluative study, the simplification was extreme, and there were almost no methodological reflections about what was left aside and how the evaluations could include how the digital artifacts were and are changing ways of knowing and the knowledge that is valued. The evaluations seem to be taking the promises of educational change at face value and concluded that these promises were unfulfilled and unrealistic but could not present other arguments about other effects that the reform strategies were having, including the set into motion of the evaluation machine.

At the same time that these international evaluations were being carried out, there was a second group of evaluations at the national level, most of them closely connected to the programs themselves. The case of Uruguay is particularly noteworthy, as it looked at changes not only in classrooms but also at home (Pérez Burger et al. 2009; Pittaluga and Rivoir 2012).¹⁰ An evaluative study was commissioned to Michael Fullan in 2013, which brought in systemic indicators about school reform: school government and administration, school climate, teachers' autonomy, teachers' working conditions, available support and resources, and degree of support by the community (Fullan et al. 2013). The commissioned report made a critical diagnosis of the implementation of the program, pointing to its shortcomings in terms of pedagogical transformations, and produced a series of recommendations. Interestingly, this critique did not undermine the support of the population of the program, which continues to be high to this day.

If in the Uruguayan case a critical report such as Fullan's could be absorbed by the program as an input to reorient the strategy, in the case of Argentina, the program, inscribed in a context of political confrontation, enjoyed less consensus and was always subjected to heavy public scrutiny by the media. The evaluations, thus, carried the weight of producing legitimacy for the program, which is evident in the indicators chosen and the ways in which results were communicated, usually with haste and fanfare. In *Conectar Igualdad*, there was an early intention to measure the degree of social inclusion produced by the digital devices, although this proved difficult to quantify (Ponce de León and Welschinger Lazcano 2016). It is remarkable that the authorities took distance from the international protocols of evaluation, taking advantage of the political and financial independence or even isolation of the then-ruling government of Cristina Kirchner from international agencies such as the World Bank or OECD/PISA. The Argentinean evaluations deployed "local repertoires of evaluation" (Lamont and Thévenot 2002), that is, particular forms and hierarchies of value in which societies measure and distinguish the actions of schools. In this local repertoire, social inclusion was ranked first, and the baseline was defined considering complex and multidimensional scenarios of inequality¹¹ that were supposed to be followed and monitored throughout some years in order to see the effects of the program in each setting. Unfortunately, due to changes in the policy and the personnel of the evaluation team, this research project did not continue after the baseline study.

A different line of evaluative research was developed by a consortium of 11 and later 15 public universities funded and supervised by the National Ministry of Education, which produced several studies between 2011 and 2015. A first batch of studies, produced in 2011, focused on attitudes and perceptions of educational and community actors (school principals, teachers, students, families, civil associa-

¹⁰ In particular, Winocur and Sánchez Vilela (2016) provide an in-depth study of uses and effects of the program in low-income families and neighborhoods in Uruguay.

¹¹ It included 11 different scenarios of social and educational inequalities, considering the interactions between rural/urban, geographical distance from the center of the country, gender, income, school performance, and institutional profiles, among others.

tions), mostly through semi-structured interviews and observations (Ministerio de Educación 2011, 2013). Between 2013 and 2014, a second round of studies was produced using a common research design in different sites, which evaluated different scales: institutional impact, teacher training and practices, uses and perceptions of students, and uses in families and communities (Kisilevsky et al. 2015). In these studies, the argument that was built pointed to the different levels of appropriation of digital technologies by schools, from “initial” to “transforming,” and to the great acceptance and adhesion to the program. In parallel to these studies, the program itself, a distinct state agency, developed a large survey of the beneficiaries of the program in 2013–2014 (Kliksberg and Novacovsky 2015) that asked about the perceptions and frequency of use of the netbooks at school and at home, including the subjects in which the netbooks were more frequently used and whether they were assigned any value for the employability of young people.

These studies, produced by different state agencies, show the confluence of evaluative research and policy legitimation and the extent to which the conditions of production of evaluations impact on what can be studied and shown. The first evaluation done by the universities, developed in 3 months in 2011 and communicated days before the presidential election, almost exclusively focused on positive changes in perceptions and attitudes of teachers and students toward digital culture. The second study by the universities, developed in a 2-year lapse, had a broader scope, but their results were not published until the end of the administration and as part of showing the clear achievements of the program, understating its shortcomings. Argentinean evaluative reports, despite the fact that the official rhetoric of the program tried hardly to resist the promise of the “magic bullet” of technology for educational change, ended contributing with a celebratory tone to the idea that the inclusion of technology was an unstoppable, positive force and that the main measure to value its impact was how far in a single scale of progress had each school gone. The methodological individualism of international studies was shifted from the student to the school, seen as a unit that should follow a similar pattern: the adoption as a gradual advancement toward improvement, equated to higher and more constant use of digital technologies in classrooms and a greater adhesion to the values of digital culture. Despite all the progressive, left-leaning rhetoric of the government, the rationale was no different than the one advocated by technological corporations. It failed to show the bumps, obstacles, and detours of the transnational technologies in heterogeneous spaces (Appadurai 2013; Burrell 2012), flattening out the specificity of the interactions of technologies and bodies in these particular spaces.

An exception to this evaluative rhetoric is a research project developed by the National Institute of Teacher Education (INFD), with a qualitative design that followed five teacher education institutions throughout 1 year, looking closely at what some selected teachers and students could do with digital media (Ros et al. 2014). This is among the few evaluative projects that looked at classroom practices without a learning metrics framework; it was less concerned with legitimating the policy than with building an open perspective on what could be done with the new devices in classrooms, attentive to the ambivalences and challenges of these uses in several

dimensions (disciplinary and pedagogical knowledge, relations, participation). The research teams included local and external researchers, all trained with an ethnographic sensitivity.¹² In that respect, the study was less preoccupied with what the program was producing than with larger changes in the materiality of knowledge and in the kinds of interactions that these new materialities produce; it stood aside and somehow interrupted the logic of evaluation that have been started with the first round of evaluative studies of the program.

2.4 Concluding Remarks

Throughout this chapter, I have intended to produce a “flat cartography” (Latour) of the reform network that was organized by a technology-intensive program in Argentina. *Conectar Igualdad*, launched in 2010 and closed in 2018, had the dual goals of digital inclusion and school change. Designed as a one-netbook-per-student program, it tried to bridge the digital gap through distributing devices to secondary school students (among whom a significant portion come from low-income families) and teacher education institutions while at the same time renewing and expanding curricular and cultural content so as to facilitate the engagement and participation of these students in school activities. My interest in the Argentinean program was also to see how a different rhetoric, in this case of social and cultural inclusion and participation, came together with the promises and imaginaries of technological change and of the rhetoric of the technological corporations, as well as with institutionalized actors—such as school agents or evaluative personnel—that brought their own weight and history to this encounter.

This analysis assumes that reforms can be understood as movements or forces that put together multiple trajectories, producing a new spatiality that is different from the idea of the “complete reversal” or “more of the same” arguments about the introduction of technologies in schools. Classrooms with technologies are not simply or solely “expanded classrooms”; they are inscribed within complex networks

¹² This study shed light on the complex web of practices in which digital media were being mobilized. Instead of demarcating clear ruptures or continuities in classroom practices, the study shows that classroom configurations were reshaped, but not reshuffled. There was no evidence of “flipped classrooms” or a decentered, horizontal organization of teaching and learning; teachers still have a say in providing a script for the classroom, bringing in resources and promoting conversations about digital media. Despite the lack of connectivity in most institutes, the use of digital media was taken as a given: Internet searches or use of audiovisual material were the norm, and they might happen in or outside the classroom, depending on the availability of devices. The time of the classroom was used for discussion and collective work, and tasks were given that are to be completed at home, where connectivity and material conditions might be better to fulfill them. The inclusion of digital media seemed to be happening, but not in the form that it was imagined, that is, with the simultaneous presence of the same, centrally distributed digital artifacts; instead, in these classrooms, there was an interaction with knowledge intensely mediated by digital devices that were present before, during, and after the class (Ros et al. 2014).

that have to be carefully and dutifully assembled. In this respect, Latour's telling example of the many connectors and mediators that are needed to produce the space of the classroom can be brought in to highlight this heterogeneity. Latour wrote:

Fathom for one minute all that allows you to interact with your students without being interfered too much by the noise from the street or the crowds outside in the corridor waiting to be let in for another class. If you doubt that transporting power of all those humble mediators in making this a *local* place, open the doors and the windows and see if you can still teach anything. If you hesitate about this point, try to give your lecture in the middle of some art show with screaming kids and loud speakers spewing out techno music. The result is inescapable: if you are not thoroughly 'framed' by other agencies brought silently on the scene, neither you nor your students can even concentrate for a minute on what is being 'locally' achieved (Latour 2005: 195, his emphasis).

Following his lead, in my analysis of *Conectar*, I tried to visibilize the agents—human and nonhuman—that silently operate to produce the reform network: the political rhetoric of social inclusion; the computers; the plugs, cables, software, and platforms; the booklets and material of the program; the walls and desks of schools; the teacher trainers, teachers, students, and principals; the funding; the technological assistants; the diverse state agencies; and the evaluation rationales and personnel, among many others. Mainstream studies on school reforms pay little or no attention to these agents, yet, as shown previously, it is evident that they play a significant part in the assembling of the reform network and in shaping its effects.

Finally, and coming back to David Griffith's educational prophecy, it can be seen through this case that the dreams of technological change in education remain alive and strong, and in many ways unquestioned, in today's technological and educational landscapes. Many politicians from different sides of the political spectrum buy the promises of the transformative power of digital devices in schools. Yet, as this study shows, the forces that are set in motion by educational technology reform programs are much more complex than they imagine and include fairly known agents and others that are new and that go in unpredictable directions. Thus, it seems necessary in our studies to move beyond the global talk of educational reform and start looking at the contingent and precarious ways in which reform networks are assembled, which make them much more heterogeneous and unstable than what the rhetoric of inevitable and unstoppable technological change presumes.

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