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The informational life of the poor: A study of digital access in three Mexican towns

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ABSTRACT

This paper seeks to contribute to the debate on the impact of the adoption of information technologies (ICT) in poverty reduction by understanding how the poor obtain, share and use ICT on their everyday life – what we call the informational lives of the poor. It identifies the opportunities and challenges regarding ICT adoption in three rural communities with different levels of marginalization and connectivity in Mexico. Using "before and after" studies we attempt to identify and understand mechanisms through which ICT (and broadband, in particular), may have an impact on poverty alleviation.

Using a combination of the Capabilities Approach and Livelihoods Perspective, this research shows that mobile broadband access (as opposed to fixed shared access) and effective training through the role of infomediaries enables low-income communities to develop new skills, to engage in new practices and to find useful applications for old and new abilities, needs and interests. A specific finding that has not received attention in the literature is the productive role of immediate family members as infomediaries; the weight of family networks plays a crucial role in learning about ICTs. These networks fuel a sense of confidence required to handle knowledge and practices that are initially alien in this sector.

We found that ICT adoption changes the pattern of information seeking and enhances informational capabilities and existing assets of low-income communities. Through our control case, that did not have any connectivity, we identified the high transaction cost people face as well as the business opportunities the digitally excluded forego.

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1. Introduction

The technological optimism that began in the 1990s with the expansion of information- and knowledge-based economies not only promised to promote economic growth, but also to reduce social exclusion. This optimism was fueled in academic circles where the sub-discipline known as ICTD (*Information Communication Technology for Development*) arose.

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From this perspective, information communication technologies (ICT) are conceived as a disruptive innovation and a revolutionary step towards development, which Manuel Castells has called the "Information Age" (Castells, 1998).

Since then, however, this optimism, particularly in academic circles, has declined. Advances in ICTS have undoubtedly had a significant impact on the lives of the poor. The phenomenon of mobile phone adoption has facilitated communication, thereby decreasing transaction costs and strengthening the social capital of the most vulnerable population. However, the expected quantum leap in the "information age" for marginalized groups has yet to take place. The first lessons regarding the lack of success of initiatives seeking to spread the adoption of ICT in marginalized communities indicate that they tend to focus on technology rather than community needs (Heeks, 2002).

Today, a new impetus has arisen due to the diffusion of broadband as a general-purpose technology that has the capacity to deliver applications with access to services with a high development potential impact such as e-health, e-government and e-commerce. This has given rise to a second generation of universal access policies. In Latin America, as well as other regions, several countries are developing National Broadband Plans, which, through large public or private investments, will deploy new ICT infrastructure networks. Behind these plans there is clear optimism that access to broadband will have a positive impact on development. In this context, it is relevant to explore the impact of broadband access on marginalized communities and to identify the mechanisms through which it may contribute to the achievement of development objectives.

This research will explore if and how the adoption of broadband and other ICT (or lack of) changes the livelihoods of members of marginalized communities. Can these changes be tied to development outcomes? Going beyond the techno-centric perspective, the combination of the Livelihoods approach and Capabilities perspective represents a new generation of literature in the area of ICTD, which views information acceded by ICT as a tool for strengthening a broad range of economic, social and political assets owned by the poorest population. The core question is whether ICT access enhances the capabilities and human agency of members of low-income communities.

This paper offers a case exploratory study of three rural communities with different levels of connectivity. The first case, the community of Las Margaritas, a remote rural locality, lacks ICT access and displays the lowest level of development among the communities studied. This constitutes a fertile case that identifies the costs associated with the exclusion from ICT access. The second case, the rural indigenous community of Santiago Nuyoo, Oaxaca, has fixed connectivity and shared access through a public telecenter, Internet Cafés and, recently, a local mobile service that enables residents to access mobile banking. The third case, three communities close to San Miguel Allende, combines fixed and mobile access through an intervention led by DIRSI with the support of a local NGO and the donation of tablets by Nextel, with unlimited Internet access. Within this village, three semi-rural, sparsely populated communities were studied: Cruz del Palmar, Estancia de Canal and Los Torres. As a result of the intervention, at least one family in each of these communities has access to unlimited broadband connection through a mobile device. The direct beneficiaries were students that were initially trained in the use of search engines and how to become instructors to their immediate family.

The comparison of communities with different modes of access highlights the effectiveness of mobile broadband access accompanied by training through infomediares. We found that the role of family members as infomediaries was particularly valuable; it fulfilled needs and interest that went beyond the initial conceptions individuals have of their benefits. Overall, we identified an increasing demand to acquire digital skills, that when met allowed a more fluid, permanent communication with primary social ties, as well as in the creation of contacts with institutions, service providers and authorities that enhance their human, social capital through the development of informational capabilities.

This paper is organized as follows: it begins with a presentation of the analytical framework used which examines the links between ICTs and poverty reduction. Secondly, it explains the methodological strategy adopted. Thirdly, the reader is located in the context of the three locations with regard to their socioeconomic and connectivity conditions. Section 4 analyzes the evidence yielded by this research in the form of testimonials from members of the communities examined. Finally, the main research findings are summarized with the aim of orienting policy makers in the mechanisms through which ICT access and broadband in particular may contribute to alleviate poverty.

2. Analytical framework: ICTs from livelihood to capabilities

The central concept in the literature on information and communications technology for development, known as ICT4D, is *development*. This concept has been explored by a number of scholars from different fields, each perspective having different interpretations of what this means and therefore how it can be achieved. It comprises a wide range of interpretations related to "progress" and is the subject of a broad debate on ways to achieve this.

It is not the purpose of this study to discuss this concept; suffice to say that understanding development as a process rather than an outcome is at the center of all ICT4D activities. From this perspective, ICTs are a mechanism for achieving the goal of the equitable development process of society to reduce social exclusion. The conception of ICT for development perceives the role of these technologies as a disruptive innovation and a revolutionary step in the history of mankind. One of the main reasons behind this optimism is the possibility of a quantum leap in development through the use of technologies such as the Internet that would increase productivity and give rise to the knowledge society (Unwin, 2009). Internationally, this perspective has been reflected since 2000 in the inclusion of ICTs in the Millennium Development Goals designed to eradicate poverty.

Since then, however, optimism, particularly in academic circles, has declined (e.g. Warschauer & Ames, 2010; Kleine & Unwin 2009; Heeks, 2002). The numerous criticisms of the idea of ICT4D identify two types of failure: a) the fact that projects do not work in the particular way in which they are implemented, in other words, they are not adopted by the communities they are intended to serve or become unsustainable for economic or technological reasons, and b) projects fail because even if they function as planned, the main social and economic objectives of ICT4D, in other words, alleviating poverty, improving education, reducing mortality rates and so on are not met or reflected in a specific set of social and economic indicators.

The first lessons about the lack of success of these initiatives indicate that they tend to focus on technology rather than community needs (Heeks, 2002). It is also suggested that the failure of ICT4D initiatives may be due to inadequate tools and a lack of understanding of problems due to weak theoretical foundations (Kleine & Unwin, 2009).

A growing number of scholars have addressed this weakness by building analytical frameworks to implement and evaluate ICTD initiatives. For example, a branch of the ICTD community has focused on the concepts of "knowledge" and "communication," based mainly on Castells and Habermas, to develop a conceptual framework (Kleine & Unwin, 2009). Kleine and Unwin (2009) uses Amartya Sen's analytical framework, the capability approach, which is basically "a process of expanding the freedoms we have reason to value" (Sen, 2000). According to this vision, the concepts of functioning and capabilities are substantial to understand the human development processes. From this perspective, ICTs become very relevant, as they are part of the functioning of the poorest groups. By giving a repertoire of resources and through individual and collective agency– meaning a skillful and meaningful use of these–ICTs contribute to human development of these social groups, understood in Sen's terms as the possibility to expand each person's freedom to do or be what they value.

In order to operationalize Amartya Sen's capability approach and to apply its theoretical framework to the evaluation of the impact of ICT, we use Gigler's framework. Gigler's central question is whether and under which conditions the improved access to information and knowledge facilitated by ICTs can enhance the human capabilities of the poor to better achieve the lifestyle they value. (Gigler, 2012).

Gigler (2012) introduces an *Informational capabilities* concept "which refers to a person's capability, or ability (i) to use ICTs in an effective manner (ICT capability); (ii) to find, process, evaluate, and use information (information literacy); (iii) to effectively communicate with family members, friends, and professional contacts (communication capability); and (iv) to produce and share local content with others through the network (content capability)." (Gigler, 2012: 8)

While the concept of Informational Capital refers to the set of resources and assets that each person has in terms of information and the concept of ICT capabilities concentrates on the abilities and competences to manage these recourses –a certain hardware, software and digital apps, the concept of *Informational Capabilities* relates the role of information with the capacity to process and classify it according to the particular socio-cultural context of each person.

Related to this perspective, other lines of study have imported central concepts from the "Livelihoods" literature into the field of ICT4D (Duncombe, 2007, Sundén & Wicander, 2006). This literature identifies the assets and activities required for the poor to achieve a better quality of life through the empowerment of their own resources.

According to Scoones (2009), Livelihoods begins by identifying the means of subsistence (resources and activities used) of different peoples in different places. These include occupations (agriculture, livestock, fisheries), social differences (gender, age), directions (means of subsistence, trajectories) and dynamic patterns (sustainable or resilient livelihoods). One of the features distinguishing this approach is the use of the term "asset," which refers to the means used by the poor to survive. This perspective offers a way of understanding the complexity of people's lives and the various dimensions of a person's life: their strategies, achievements, opportunities and constraints.

A livelihood is sustainable when it can cope with and recover from shocks, stress and crises, maintain or enhance skills and assets and provide sustainable livelihood opportunities for the following generation. It also helps benefit the livelihoods of other individuals both locally and globally.

For Bebbington (1999), the Livelihoods approach focuses on access to five assets (human, natural, financial, physical and social capital). These assets are combined and transformed in the construction of livelihoods so that people can expand their own base of assets through participation with other actors in society.

Both perspectives have been used as working definitions for the development of knowledge of poor people's assets and capabilities. The poor have access to a set of resources mobilized through specific activities conditioned by the context in which they occur. This is the social space in which coping strategies are deployed by the poor.

Livelihoods view ICTs as a tool for strengthening these assets so as to contribute to the construction of more efficient structures and processes in the lives of the poor. The Livelihoods approach seeks to understand the role of information and its uses in various everyday activities, including its role in subsistence strategies. It is therefore possible to identify the mechanisms by which ICTs can make a difference for individuals, families and communities living on the social and geographical margins of contemporary society.

In short, ICTD is an area of research that has been driven by the optimism of ICTs in addressing old, unresolved scenarios of underdevelopment. The weaknesses of traditional approaches have created new analytical frameworks, giving rise to more coherent, consistent work. To study the impact of the ICTs in the life of poor populations, the capabilities approach (Sen, 2000, 2008) adapted and combined with the Livelihoods perspective (formulated by Gigler, 2012 and Sunden & Wincander, 2006) allows us to better capture the complexities of this process. Moving us from a techno-centric perspective it focuses on the information and the capacity of the person to transform different types of capital, resources and assets in human agency to achieve –with freedom– what they want to be or do according to their contextual appropriation of ICTs.

3. Metodology

The methodology is one of a multiple case study (Marradi, Archenti, y Piovani, 2007). The cases chosen satisfy the selection criteria that lead to maximize what can be learned for each case. We studied three low-income communities according to the measurements provided by CONEVAL; all of these rural communities share a high level of poverty or marginalization. The differences concerning the diverse connection and disconnection modalities between them were privileged and will be the subject of a further comparison.

Fieldwork was carried out in three low-income communities in Mexico: Las Margaritas in Catorce, San Luis Potosí; Santiago Nuyoo in Tlaxiaco, Oaxaca and three communities near San Miguel de Allende, Guanajuato (Los Torres, Cruz del Palmar and Estancia de Canal). In the first two cases, the work involved observing and analyzing intervention projects led by a nonprofit in Las Margaritas and the Federal Government in Santiago Nuyoo. In San Miguel de Allende, the team designed an intervention model whose intermediaries were three young university students with high academic achievement, who trained their family members (mostly adults) to use tablets with broadband connectivity.

Through field observations and in-depth interviews, we analyzed whether the availability of broadband services changed the patterns of information searching and the structure of information networks (for example, who talks to whom about what) among local residents, and whether these changes can be linked to relevant development outcomes (such as the increased access to public services).

Through the combination of the Livelihoods perspective and Capabilities approach, we adopt the notion that individuals have their own portfolio of assets and strategies to cope with their vulnerability (Duncombe, 2007, 2012, p. 83). However, poverty alleviation depends on their own abilities or capabilities to transform these assets into opportunities to change their livelihoods (Sen, 2000, 2008; Gigler, 2012). In the same vein, the study by Gigler (2012) and that by Sundén and Wicander (2006) serve as a framework not only in terms of the notion of Capabilities (Empowerment through ICTs framework) and of Livelihoods (sustainability frameworks) respectively, but also offer subcategories and indicators with a qualitative approach that have been taken as the basis for the interpretation of results. Although these approaches are innovative and useful, the comprehensive approach generates a risk of losing focus. Thus, we adapted these subcategories to work with a more manageable set of indicators and to simplify the interpretation of results in the field. In this context, the channels and mechanisms through which ICT use may contribute on poverty alleviation are the development of:

1. ICT Capabilities and Information Literacy as an ability to transform Human Capital including the acquisition of skills, knowledge and cultural variables (self-esteem, social power) into human agency
2. Communication Capabilities as a mechanism to accumulate Social Capital.
3. Content Capability, as the capacity to produce and share local information, including the mobilization of resources, actors and enhancing capacities for participation in the public sphere.

Pre-existing conditions in the communities studied meant different ICT access in each of the towns. A trained team conducted field work that included 30 in-depth interviews (10 in each community), field observations, diaries and visual records with key community members. The case selection criteria for the in-depth interviews followed the principles of theoretic sampling (Glaser & Strauss, 1967). Criteria such as gender, family composition, educational level and occupations were taken into account. Thus, we were able to observe the behavior of those with continuous Internet connection and those who have it by time intervals. We were also able to observe the information needs of those who are not yet connected.

4. Three localities explored

4.1. Las Margaritas

Las Margaritas, located in the state of San Luis Potosí,[1] is a remote rural community that lacks any kind of ICT connection. It forms part of the Huiricuta natural sacred site[2] and is a cultural heritage for the indigenous tribe, the Huicholes. It is a very small community of 54 people as most of its original residents have migrated to the north, given the limited employment opportunities as well as the ongoing drought. Their main economic activity is the production and sale of goods produced by the Flor del Desierto Cooperative. Various organizations arrived in the community to undertake rural voluntary work and decided to create a website that would promote merchandise from their cooperative. However, as there is no connectivity, there are foregone opportunities to commercialize its products (Fig. 1).

[1] San Luis Potosi is set in an area linking the south and north of the country. The state is made up of three natural regions: the highland region, the Intermediate region and the Huasteca region.

[2] Huiricuta is the Huichol name of the region adjacent to the historic town of Real de Catorce north of San Luis Potosí. It is a cultural heritage site as well as constituting a nature reserve for the Huichol indigenous group; it is one of the most important sacred landscapes and crucial to their cosmogony.

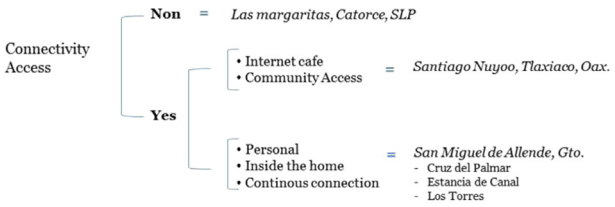

Fig. 1. Las Margaritas.

4.2. Santiago Nuyoo

Santiago Nuyoo, is located in the Oaxacan Mixteca Alta, and has a population of 403 people, 45% of which are of school age (INEGI Census, 2010). It is an indigenous rural community with a high rate of marginalization (Coneval, 2010), where the dynamics are based on traditional system of indigenous laws. Unlike Las Margaritas, in Nuyoo, residents not only have access to television, radio and satellital telephony (through booths set up in two shops), but they have a Community Learning Center (CCA, for its acronym in Spanish) with seven computers connected to the Internet operated by members of the town hall who have basic information on technology skills.

In February 2012, through a partnership between Telecomm-Telégrafos (public entity), commercial banks, the Banamex Foundation and the municipal government, a pilot project was implemented to provide local calls and bank transactions using mobile telephony. Telecomm set up an office so that residents could handle cash (*cash in, cash out*) since the closest bank branches are located over three hours away from Nuyoo. Also, satellite technology was used to equip the community with mobile communication, thereby enabling mobile banking services. Radio-base technology was selected to provide inhabitants with access to low-cost mobile devices. A crucial feature of this pilot project was the training for tools undertaken by at the Banamex Foundation using specially-designed educational tools.

4.3. San Miguel de Allende

In San Miguel de Allende, Guanajuato, the research team analyzed the communities of Cruz del Palmar, Estancia de Canal and Los Torres. There is access to television, radio as well as fixed and mobile phones. However, there is usually no Internet connection, except when people obtain the service through a wireless modem that connects via USB.

Despite the fact that these localities are very close to San Miguel de Allende, an urban city with high levels of international tourism– they share socio-demographic characteristics that are similar to those of Santiago Nuyoo and Las Margaritas in terms of poverty. [3]

In collaboration with Jóvenes Adelante [4], a nonprofit organization that offers college scholarships to high school graduates from surrounding communities to San Miguel de Allende, three of these college students were selected and given tablets with unlimited connectivity donated by Nextel Foundation. They underwent a training course on how to teach their parents and siblings' basic use of the Internet as well as searching methods for useful content related to their community needs.[5]

5. Results. Livelihoods, Informational Capability and ICT: the heterogeneous world of appropriation

Following the Capabilities approach and Livelihoods perspective, this paper's aim was to identify the contribution of Internet access to human and social capital.

An interesting observation made was that people have preconceptions about the uses of the Internet; people construct certain conceptions about the specific, potential and imaginary uses of ICTs, regardless of the availability of access to fixed or mobile Internet. The evidence gathered identifies the role of social representations and the influence of friends and relatives on the approach to and socialization of ICT.

[3] The poverty indicators as measured by the *Consejo Nacional de Evaluación de la Política de Desarrollo Social* (CONEVAL), a public entity that measures poverty levels in Mexico, classifies the communities around San Miguel as marginalized. These communities do not have paved streets or piped water, children need to walk one hour to get to school. This is a common phenomenon in developing countries where marginalized and very poor communities exist close by to prosperous cities.

[4] Jóvenes Adelante (JA) is one of the most comprehensive university scholarship programs in San Miguel de Allende, serving an area of more than 100 rural communities that have both traditional public high schools and video high school districts. Jovenes Adelante, A.C., is a student-focused organization that provides a platform for higher education and development of life skills for talented, disadvantaged Mexican youth through scholarships and other essential means of support. JA envisions itself enabling young Mexicans facing economic adversity to acquire the academic and life skills necessary to foster positive social and economic change in their society.

[5] To see a video of the training process: http://youtu.be/pnUhYVY_mi0

> If they teach me, I would learn how to use the computer so that I could work; they are going to need someone to operate the Internet, aren't they? It does not scare me [Interview, María, 45, member of Flor del Desierto Cooperative, Las Margaritas, 07/09/2012].
>
> My children have left because there is no work and also their children have to go to school. I have not seen one of them for fifteen years, but when we talk she says: Mom, we are better off here, and the children already know how to use computers. [Interview, Ángeles, 52, Flor del Desierto Cooperative, Las Margaritas, 07/09/2012].

The prevailing idea is that those who can reap the most benefits from the new technologies are children and youth. Thus, knowing how to use the Internet is experienced as a requirement imposed by schools and, at the same time, as a hope placed in children as a vital instrument for social mobility through education.

> Little kids who go to school need computers. They need to do their homework on computers and because there are none here, they stay on at school. [Interview, Mary, 45, member of Flor del Desierto Cooperative, Las Margaritas, 07/09/2012].
>
> The truth is that I just studied up to junior high school but that is not enough and yes, I find it very difficult with my daughter because things are not the same as they used to be. Before it was different, and I took a course because I cannot help my daughter with her homework anymore. They give them very difficult homework and it is wonderful to learn how to use a computer and have one; it is essential for children nowadays." [Interview, Eulalia, 50, housewife, Santiago Nuyoo, 24/11/2012]

A similar reflection is put forward by Winocur (2007). He argues that the poor see Internet as part of a social mobility strategy; it is a material and symbolic engine that revolves around education. But according to this imaginary, it is young people who can best achieve this. For adults in low-income communities, computers represent a completely alien world for which they feel that they are not trained for and of which they cannot take advantage. The testimonials gathered during the fieldwork in San Miguel reflect this first moment when the young beneficiaries of tablets question their parents' ability and need to use and take advantage of computers. Mothers have grown up with the idea that education is not for them, a representation they extend to digital skills.

> At the moment, there is no point in [my mother] getting into the computer just to open a Word page or an Excel spreadsheet, a computer. Why would she need to get into a computer except to see a movie? [Interview, Omar, 20, grant holder, San Miguel, 24/03/2013].

As Winocur concludes, "Thus the computer is installed as a need projected towards the young and children, insofar as they remain the custodians of the aspirations for progress and social mobility" (Winocur, 2007: 210). This is where the link between access to ICTs (mainly Internet) and skills acquisition plays a crucial role. In terms of skills, the impact of ICTs do not imply a direct, immediate link between increased access and improved livelihoods (Gigler, 2012). One of the conclusions provided by exploratory studies involves making the link between ICT and access to knowledge more complex, since passage between the two is certainly not automatic. As numerous studies (e.g. Gurstein, 2003; Duncombe & Heeks, 2005) have pointed out, the positive impact on human capital requires a training process. The following section explores the results of this study in terms of the link between training and enhancing of human capital, ICT Capabilities and information literacy.

5.1. The role of Infomediation in the enhancement of Human Capital and ICT Capabilities

There are high expectations about the potentialities of ICTs to stimulate access for the most disadvantaged social groups by promoting a democratization of knowledge and symbolic cultural and educative goods. These promises create great expectations, thus it is important to review what solid information there is to understand the way in which the access to these technologies can or cannot result in an improvement of cultural and educational abilities for low income communities. One of the main conclusions brought out by these exploratory studies was the importance of constructing a more complex link between ICTs and the access to knowledge.

> *Despite earlier beliefs that ICT access results in disintermediation, giving individuals direct access to information and* knowledge*, it is now accepted by most practitioners that intermediaries are often needed to translate this information for users.* (Gigler, 2012: 6)

This emphasizes the role of infomediaries, those who facilitate, promote and guide the search and processing of information and knowledge by people who do not yet have the skills to do so themselves. A long-term study, the *Global Impact Study* (GIS) dedicated one of its in-depth studies conducted in Ghana to the role of infomediaries. The importance of infomediaries is greater when the community has less knowledge about ICTs. (GIS, 2013: 89–91). In the words of a grant holder from San Miguel:

> For example, in elementary school, when I was there, there was none of that, there was no Internet and only computer teachers used it. We did not have access to them. So the little I learned before entering high school was from my older brother. Since he had already finished, he knew a bit more. He was the one who taught us and so we think we have

> been taking turns to play the role of instructor: my older brother taught me and I taught my younger brother and my younger sister; that is how we have learned. [Interview, Isela, 23, grant holder, San Miguel, 24/03/2013].

In the case of Santiago Nuyoo, the role of Banamex Foundation in providing financial education through specialized tools for the use of mobile banking was crucial in achieving the financial inclusion of community members. But in this study we will highlight their importance in the social capital derived from the results. This case shows the efficiency of horizontal training, in which the majority of the community was invited and chose to participate. This system, combined with the incentive of enabling a practical tool for everyday life (mobile banking) yielded positive results not only for the adoption of mobile phones, but also in the practice of remote banking transactions and new strategies for trade negotiations at the local level. This project, despite not having broadband, promoted different web consultations from those already used in the Learning Community Center, which does have access to broadband.

> Even I said I'd never learn … I could not even imagine having a phone in my hand … and I learned to dial and text and now I say, that's good. I can also send payments, not many because we don't spend much but there are some. [Interview, Agustina, 47, housewife Nuyoo, 25/10/2012].

In San Miguel de Allende, we found that promoting training and the adoption of broadband through the use of instructors belonging to the first family circle yields positive results. Instructors with previous experience in handling ICT skills boost their skills by detecting their own fields of opportunity and pass on their knowledge; training parents and siblings encouraged learning and trust within the family, since members share possible benefits of new information for common assets.

The experience of grant holders as infomediaries generated a transformation of the initial conceptions of mothers who excluded themselves from technological issues. After the first weeks during which youngsters trained their parents, housewives and sisters reacted most enthusiastically to the exercise. On realizing that they were able to operate the tool, gain access to new information resources and convey them to other members of their community, they felt a sense of empowerment and social distinction:

> I thought this was only for those who are young. "We are here in the kitchen and looking for something to eat, but when they taught me, I realized that I can learn. I liked it because I can see things I like and I told my neighbor: "I can do things now."I was pleased to boast about it." [Interview, mother of Leontina, 43, San Miguel, 04/04/2013].

In the adoption and strategic use of information, self-esteem and confidence are undoubtedly important not only for using the equipment, but also for accepting the fact that data obtained from digital media are as reliable as knowledge they have obtained from experience (for example, knowledge associated with agricultural processes). San Miguel mother's experiences show a clear example of enhanced ICT Capabilities (Gigler, 2012) while info-mediation promotes the acquisition of abilities and competences to manage new recourses – in this case the tablets – and, moreover, overcome digital, social and gender gaps.

Beyond the central role of infomediaries, the studies conducted allow us to draw comparisons between strategies for the acquisition and socialization of skills developed in Santiago and San Miguel Nuyoo respectively. In both contexts, self-learning and learning by doing predominate. At the same time, both public access areas (Santiago Nuyoo) and individual use of tablets (San Miguel) allow the implementation of knowledge acquired at school.

> What little I learned about the Internet was through practice. They teach us at school, but by using it you eventually understand by doing your homework. [Interview, Jesús, 16, student, Santiago Nuyoo, 25/11/2012].

However, the quality and nature of the device used enables different practices and intensities. Whereas in Santiago Nuyoo self-learning combines with the training provided at the Community Learning Center, in San Miguel, accessibility via mobile devices extends and intensifies learning by doing as well as the possibility of extending these skills to parents and siblings.

The literature shows that those who use the Internet, for whatever purpose, acquire new skills, interests and motivations that subsequently expand their opportunities in the labor market. The findings of this research validate these arguments. First, the training experience of mothers and fathers by grant holders in San Miguel de Allende reinforces the importance of infomediation in the socialization of ICTs among the adult population at the base of the pyramid. Although access is individual and mobile, within the home, instances of collective learning are reproduced. Second, the findings reinforce the idea that ICTs become socially relevant once people explore them for their own purposes. In both Nuyoo and San Miguel, those who use Internet for their own needs manage to develop new skills and discover new interests. Thus, the results confirm that so-called "non-instrumental uses" promote "instrumental uses" involving new digital skills and human capital.

In short, a channel between Internet access and use, the development of ICT Capabilities, the digital poverty reduction[6] and its consequent potential contribution to poverty alleviation in general has been identified. The route is as follows: diachronic and synchronic interaction of various elements such as abstract learning of knowledge in school, reinforcing this knowledge through computer courses offered at shared access centers, self-learning by doing, transmission of access and

[6] The term refers to either lack of access, knowledge or information through digital technologies (Barrantes, 2009).

adoption of ICTs knowledge between family and friends, yields intermediate results such as increased confidence and self-esteem, which strengthens the processes of job searching and/or re-entry into or continuity in the education system.

Given the importance of social networks in terms of access strategies and informal learning, the following section further explores the link between Internet ownership, sociability and social capital accumulation.

5.2. Information literacy and social capital and communication capability.

The massive rise of ICT that took place almost three decades ago generated important debates around its impact on human sociability. The most apocalyptic views foreshadowed the end of personal relations as we know them with the argument that electronic communication would displace face-to-face encounters, confining individuals to their private sphere. The most optimistic, on the other side, argued that digital technologies would become a crucial factor to increase social capital and empower people to face the challenges of social life. The pessimists prophesy from the first group does not seem to have become a reality. Indeed, far from replacing human relations, ICT has contributed to it multiplication and reinforcement (Castells, 1998, 2007, y 2009). What still remains a question is learning about the mechanisms that explain how the incorporation of these technologies may be contributing or not to the accumulation of social capital and the empowerment of the most vulnerable and disadvantaged sectors. Even though there is still much research to be undertaken, available evidence suggest that the link is, in any case a complex one and to understand it completely, technology must be a variable removed from the center of the analysis. In its place, the interaction between human actors and devices must be the center of the analysis.

This research shows the process of how context and communication uses form part of the everyday dynamics of communities. Thus, initial resistance, created by both the self-exclusion of adults with low educational attainment and the prejudice of youth gives way to interest and curiosity. Once offspring teach adults basic skills, parents begin to experience greater interest in ICTs insofar as their everyday needs and interests are challenged by the potential of the Internet:

> I asked her what she wanted to find out about and she mentioned several things, including knowing about breast cancer. She said she had always been curious to find out what it is and what causes it. [Diary, Leontina, 23, grant holder, San Miguel, 27/03/2013].

This last story reveals the way in which the broadband connection habilitates the access to certain relevant information – information that would otherwise be very difficult to access– increasing information literacy. Through the role of info-mediaries played by her daughter, Leotina's mother can now be more aware of cancer symptoms and has more informational recourses for early prevention. It is clear that only access to this information will not guarantee a reduction in poverty. However, access to a broadband connection did contribute to enhance the necessary conditions for this woman to act and decide about her health through more information.

From another perspective, research detects how lack of access to broadband Internet and a shortage of skills for appropriating it, makes it difficult to create the contacts required for the sustainability of business ventures. This is the case of a housewife and occasional saleswoman in Santiago Nuyoo seeking to improve her income. To achieve this, she went into partnership with her older brother, who lives in Texas, with the aim of formally commercializing a US brand (Forever). Although mobile phone use (such as for bank payments) has been useful in certain transactions, she realizes that her lack of Internet skills has limited her growth horizons insofar as she is unable to establish fluid contacts, a condition that excludes her from crucial information circuits for her business:

> They use the phone to notify me of any of the products they need or tell me that my brother called me at the local telephone booth … but the Internet is important because I only completed junior high school but that is not enough. I find it hard because it is not the same any more. You have to find out about things and have more communication because you do not know what's going on outside. They have Forever in Oaxaca but I don't know what is going on because there is no way to find out; you get left behind. *[Interview, Eulalia, 50, housewife, Nuyoo, 25/10/2012].*

This testimonial is of great interest for two reasons. On the one hand, it allows one to differentiate between the advantages of mobile telephony and broadband in creating social and economic capital. By the woman's account, more fluid contact through Internet (both with her brother and the US firm) would enable her to be included in a communications network within which information that is inaccessible by mobile phone circulates. On the other hand, experience has shown how social capital and income generation are closely linked, as pointed out, among others, by Donner (2009) and Duncombe (2007).

Another significant form of increasing social capital is through the possibility of everyday communication between community members and their relatives who have migrated. In Mexican communities, Internet access acquires enormous significance, becoming almost a natural part of family routines. Thus, email, social networking sites and video calls appear at the center of users' motivation.

> I have a brother who lives in Culiacán, Sinaloa. He went there to study and stayed. He spends a lot of time on the Internet and I can see him on Facebook and see how his daughter has grown. Communication with the family is an advantage. Yesterday we had a case in which my wife's brother, who is studying in Veracruz, needed a document and so she sent it to him on the Internet [Interview, Carlos, 32, merchant, Nuyoo, 24/10/2012].

> Because what I taught is the use of email, I think this tool could be employed to send and receive emails to my sibling currently in the United States. Also, my mom could send and receive photos to her family and share special moments. With this too, communication will become more efficient and effective within my family. [Diary, Leontina, 23, grant holder, San Miguel, 24/03/2013].

In San Miguel de Allende, access to broadband allows family to seek information that strengthens family assets. Internet connection permits both access to relevant information and the generation of new contacts, which subsequently translate into an increase in participation in public life. It also provides ease of communication with migrant relatives, who share moments of everyday life, strengthening emotional ties and a sense of belonging as well relevant information. In sum, evidence from San Miguel shows how people can gain ability to achieve various valuable functionings as a part of living (Sen, 2008: 271). ICTs can enhance their communication capability to better achieve the lifestyle they value while they can effectively communicate with family members, friends, and professional contacts (Gigler, 2012).

5.3. Local context and content capability

A large number of studies (Castells, 2007, 2009, León, Burch, y Tamayo, 2005, Rheinghold, 2002, Diani, 1999, between others) have analyzed the links between ICT and political change, arguing that it offers capacities to resist and fight authoritarian regimes and promote collective action.

In our research, a first observation is the negative impact of the lack of interaction with the government. The case of the virtually isolated community of Las Margaritas and the lack of connectivity coupled with social dynamics shows that this impoverishes and reduces access to key information on local government actions and the provision of public resources. Here, one of the residents centralizes all the state information and functions as a true gatekeeper (Castells, 2009), filtering the news that deserves to be disseminated and concentrating knowledge about subsidies and social benefits.

> *He is the person who taught us to make the Cooperative products; he also brought electricity and flattened the main road. The truth is that we owe* him *and his wife a lot; without them, we would not have these orchards.* [Interview, María, 43, member of the Flor del Desierto Cooperative, Las Margaritas, 07/09/2012].

This centralization of information allows this person to gain authority and legitimacy while most of the community remains dependent on his actions in the absence of a strong presence of the state.

The opposite happens in the communities of Santiago Nuyoo and San Miguel where, despite being much more populated, they have more efficient communication with the authorities. In the first case, the greatest efficiency is achieved through a combination of traditional and modern media, which helps offset the centralization of information in the municipal delegate.

> *When there is an important official matter to be dealt with by the authorities, they make an announcement by microphone, these open-air loudspeakers. For example, they have just announced that a Commission is going to arrive to check the floors. Those who wish sign up, which is how people move. All those in the Internet Café are informed that it has just arrived, and they are told that tomorrow there will be a meeting on a particular subject.* [Interview, Carlos, 32, merchant, Nuyoo, 24/10/2012].

However, communication continues to be mediated by political figures and when the need arises to resort to other government agencies, remote access to them (Internet) is only possible through the office and among local government actors. Conversely, in the case of San Miguel, the unlimited connectivity of the grant holders who received the tablets made them realize that they were entitled to directly access federal assistance programs. Although here, as in Santiago Nuyoo, there is a smooth flow of information between the community and the authorities, grant holders stand out and benefit due to their level of Internet access and the skills they have acquired through training. They can therefore find out about the functioning and key events of their municipality; which leads to greater commitment to public community life.

> *At night we took some time to explore the Tablet. One of the pages we visited on that occasion was the municipality website to see what is going on here, in a place that seems close but in certain situations appears alien because of our ignorance about it.* [Diary, Isela, 23, grant holder, San Miguel, 28/03/2013].

Grant holders' skill and ability to connect to the Internet in San Miguel appear to alter the directionality of communication and change the power relations and dependence present in Las Margaritas. Government delegates and officials often approach grant holders to access, process, generate and convey key information, as evident from the following accounts:

> *Now, [with the tablet] it will be easier for me when my delegate calls me to help write e-mails or whatever. [As] I'm the only one in the village who knows how to use the Internet, [that] is an advantage* [Interview, Isela, 23, grant holder, San Miguel, 24/03/2013].
>
> *The bossy one [the delegate] already told me: "Hey, you, come and send these documents by Internet." They think that since I have the tablet, I can be there all the time* [*Interview*, Omar, 20, grant holder, San Miguel, 24/03/2013].

Community	Physical Capital (ICT connection)	Human Capital	Social Capital	ICT Uses
Las Margaritas	No	They believe that students could access academic information, women from Flor del Desierto could market their products and people in general could communicate with relatives living outside the village if they had connection.	They cannot market their products on the websites offering them. They cannot socialize their activities.	Due to its location and a very small population, it does not have network services for mobile services or broadband communication.
Santiago Nuyoo	Fixed and community	Access to education	They found that access to information was useful and said that due to broadband, access they were able to increase communication with people from elsewhere Access to communication outside their communities	Initially, young people were the ones with knowledge of how to use the Internet and the different contents available. In this sense, the young generation was transferring to adults the benefits that Internet could offer to useful contents for them, such as finding a remedy for a skin rash or the possibility of communication with family abroad. The main uses of Internet, in the CCA, were searches related to education and personal development, as well as to communication with friends and family abroad and to online trainings (e.g. English courses, sowing techniques, etc.). Internet Cafés were the most used by the younger generation,; they could freely access any content in the web. They were particularly interested in communications and media content, such as music and videos. Searches related to education or training were not observed.
		They think the CCA is only useful for academic activities.	Consultation limited to certain services and information on their productive activities	
	Mobile and Personal	They stated that they regularly use mobile banking services to engage in commercial transactions	Inclusion and financial training	Inclusion and financial training.
		They did not find any association between access to Internet and mobile banking or mobile services.	Local communication without broadband.	**
Los Torres, Cruz del Palmar, Estancia de Canal.	Mobile and community	They perceive that the tablet with connectivity is a useful family asset for their information needs.	Access to academic information, financial services, social programs and links with the authorities. Planning of productive projects Link with the authorities among the actors who have received tablets	Infomedieries: Their main uses of Internet were as a resource for homework and social media, and to explore the possibility of getting funds to either initiate or strength their local SMEs. For the rest of the people the use of Internet was rather limited. There was no general interest for Internet access developed among adults. The adults that wanted certain kind of information, asked infomedieries to look and process it for them.
		They think it is necessary to extend this benefit, either as a business provided by the beneficiaries or by donating more equipment with the same training model.	Limited to three families.	

Fig. 2. Comparative table of results.

As one can see, grant holders' social position changes because of their assets and skills in appropriating the Internet. This is a process of empowerment, still in its infancy, of these youths who have begun to be recognized and appreciated in the community both because of their connectivity and because of the knowledge they have acquired to exploit the information

available on the Internet. Thus, in the case of San Miguel, it is possible to observe a certain degree of tension between the community hierarchies since, at least in some respects, those who have always possessed knowledge –and therefore power- now depends on younger members who have the physical and cultural capital (equipment and skills) to achieve swifter, smoother communication with federal government agencies.

Moreover, evidence from this research provides indications about the ways in which access to broadband could influence the processes of political clientelism. In Las Margaritas, one resident conceals useful information from the community. This partly offsets the absence of the federal government and at the same time becomes a privileged mediator who is highly valued by the villagers themselves. A very different process is observed in San Miguel as the lack of mobile access and the lack of ICT skills among government officials partially alters the direction of power between the latter and the students who were trained to maximize the benefits of Internet access. Thus, research findings links the literature on ICTD with the phenomenon of political clientelism and posit the following hypothesis: availability of unlimited Internet access, coupled with knowledge management to exploit it would appear to be factors capable of creating tension among the hierarchies and the dynamics of existing clientelistic relationships in the community.

In sum, San Miguel's experience is a clear example of Communication and Content Capabilities development through ICT appropriation: students could effectively communicate with family members, friends, and professional contacts (communication capability) and produce and share local content with others through the network (content capability). The adoption of ICT through mobile broadband generated a virtuous cycle that the mobilization of resources and actors that enhanced capacities for participation in the public sphere. The results of the San Miguel intervention offers evidence that support the hypothesis provided by other studies on the potential of ICTs to promote more efficient and higher quality public services (Reinikka & Svensson, 2004; Bjorkman & Svensson, 2009).

6. Conclusions

One of the first results this research shows is the fact that people have strong pre-conceptions about the specific, potential and imaginary uses of ICTs, regardless of the availability of access to the fixed or mobile Internet. Among the poor, children are the main repository of the hopes and expectations concerning the potential of ICTs. The Internet is socially significant in terms of social mobility.

Fig. 2 provides a summary of the perceptions of community members about the value associated with ICT access. In this study, it is clear that, in general, community members found value in access to ICTs when they obtained information that supported their homework, or were able to communicate with family members outside their communities. This happened regardless of whether connectivity was fixed or mobile. Also, people in San Miguel de Allende valued access because they were able learn more about the benefits of public services, particularly those associated with social programs. For those who had already had experiences in Internet cafés, the mobility of the device was also important because it made it easier for training and information queries to take place without being restricted to a single space.

The comparison of communities with different modes of access highlights the transformative role of training in altering previous conceptions. The results of this research show how as training advances with individual broadband availability offered by tablets and the initial instruction of San Miguel team (unlike what happens with public access in Santiago Nuyoo), people discover new possibilities and find that certain information via the Internet can contribute to their everyday tasks and in achieving some of their life goals.

This study also identifies the growing demand for training from members of low income communities to expand the use of information. It also highlights the crucial role played by infomediaries and particularly the role of family networks in learning about the use and appropriation of ICTs. Likewise, "learning by doing" and "learning by watching" is especially important in ensuring that ICTs have an impact beyond the youths who attend school and constitute the majority of community center (telecenters) and Internet café users.

Furthermore, this research suggests what many studies find; sharing an Internet connection is useful as an introduction to broadband uses, but its impact is limited because access and use are constrained by the rules imposed by each community center. An individual or community mobile connection creates a greater impact because it depends directly on the dynamics of users and therefore has a greater impact in its appropriation.

Finally, testimonials from the town of Las Margaritas, the control case without connectivity, reflect the costs associated with isolation. The main activity of the community, the Flor del Desierto Cooperative, already has a demand for its products on a website which members are unable to access.

Since the three projects are still at an early stage of development in terms of ownership, further study is required to measure the scope of training regarding new uses in greater depth. However, the findings at this stage of the research suggest that unlimited access to broadband and constant,intensive training that involves learning by doing enables poor communities to develop new skills, engage in new practices and discover useful applications and functionalities for old and new needs. Thus, individual, mobile access and unlimited Internet connection contribute to transform traditional capabilities into new life possibilities.

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