

Research Article

Policies on Access to Information Technologies: The Case of e-Mexico

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Abstract

This article examines the ICT-for-development program implemented by the Mexican government during the early 2000s, the “National e-Mexico System.” It focuses on the connectivity component of the program, which created shared access to ICTs. Little is known about the beneficiaries’ perception of the Digital Community Centers (DCCs), or about the use they give to these tools. In order to obtain an assessment on the benefits to users of these centers, we conducted an exploratory survey in a sample of 23 DCCs. The results of our study indicate that this program has a positive, albeit limited, impact. Mostly, benefits reach young students by supporting their schoolwork and offering recreational activities. The fundamental weaknesses of the program reside in its limited scope, its lack of training, and the very low quality of broadband that is offered.

Introduction

Poor and marginalized people face numerous obstacles in their daily lives, and as Stavrou (2001) asserts, they require access not only to resources, but to information, knowledge, and skills that could assist in improving their livelihood. Information and communication technologies (ICTs) provide a key tool for diminishing these obstacles. Empirical studies have identified ICTs as tools for productive uses—in finding a job, in the growth of small business activities, in contributing to a better integration among remote rural communities, and in facing emergencies. These technologies offer opportunities for marginalized groups to insert themselves into modern, productive processes (Galperin, 2005; Galperin & Mariscal, 2007; Waverman & Roeller, 2001; Zainudeen, Samarajiva, & Abeyuriya, 2006).

However, these opportunities are not always readily available. As is commonly the case with the introduction of new technologies, market and access gaps lead to unequal adoption between different social and economic groups that, in effect, increase the knowledge gap between them. As a way to diminish the perils of digital exclusion, governments around the world have implemented ICT-for-development programs to offer those who are digitally excluded the increasing range of opportunities provided by ICT. This article examines the connectivity component of the ICT-for-development program implemented by the Mexican government during the early 2000s known as the National e-Mexico System. The program’s impact on improving the inclusion of the marginalized population into the information age, as with other programs around the world that provide shared access to the Internet, is limited by its very nature.

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More than a decade after its implementation, numerous resources have been spent, and Mexico still faces a significant level of digital exclusion in its population. Indeed, the nature of shared access solutions only focuses on a limited range of obstacles, and they are not created to achieve the level of scope required to successfully address the problem at a national level. The complexity of the obstacles faced by non-users is magnified by an infrastructure deficit in the country, as well as by the widespread lack of digital abilities in the population.

Even though the e-Mexico program was proposed as an integral solution to incorporate ICT tools in key sectors of society, it did not address the lack of high-quality Internet access for the majority of the population, nor did it include an effective capacity-building strategy to educate non-users. It did, however, provide access and some useful content to numerous communities in Mexico.

The program did integrate three components—systems, content, and connectivity—that can provide the necessary tools for society to become active users of ICT services. Systems integrate the content, making it friendly and accessible to the population. There was an important effort to create valuable content that included data, knowledge, information, and services. The content was divided into four themes: e-learning, e-health, e-economy, and e-government. Information on these four areas, including such diverse topics as health advice, government processes, taxes, and tourist locations, were incorporated into the e-Mexico Web page. The Web page has offered numerous government online services, such as downloading the unique population card (CURP in Spanish), or inquiring about the distance between two cities in the country. In terms of distance education, the content component created the CapaciNET portal, which offered distance courses (Gil-Garcia & Luna-Reyes, 2009). According to the results of the survey carried out for this study, the e-Mexico portal is a very popular website; around 70% of people who were interviewed are familiar with it and consider it to be useful. However, most of the content is attractive only to young, educated users.

Connectivity, which is the objective of our analysis, was pursued by the Digital Community Center program (DCCs) through the creation of spaces of shared access to computers and Internet. These centers have provided connectivity to numerous com-

munities around the country, and they are mainly located in schools, libraries, hospitals, and other public places. However, little is known about the beneficiaries' perception of the DCCs, or about the use they give these tools. The DCCs, under the e-Mexico System, have received a level of investment by the Mexican Government without precedent in its recent history. There are close to 7,200 DCCs across the country, whose main objective is to impact the quality of life of communities through access to meaningful content. Who has benefited from this investment? What are the benefits they have received, and what are the users' perceptions of this program?

Approximations of these questions were asked through an exploratory survey in a sample of 23 DCCs directed at users and promoters. Improving our knowledge of the DCCs' activities not only matters as an evaluation of the impact of a Mexican public policy, but it also offers lessons to the many organizations involved in these efforts—multilateral consortia, governments, and NGOs in other developing countries. While many studies have analyzed the provision of these programs, fewer have looked at the demand side through the identification of users and their perception of the benefits of these programs.

The results of our study indicate that this program has had a positive, albeit limited, impact; efforts are focused on benefiting young students by supporting their schoolwork and offering recreational activities. Given the operational structure of the DCCs, their activities are not relevant to a greater scope of the population. First, the DCCs' average schedule is from 8:00 A.M. to 6:00 P.M., which is very limiting for adults who work. Second, just 5% of the managers/promoters teach a formal course on how to use the computer. Even more, these managers do not carry out efficient promotion of the DCCs in their communities. Additionally, almost 30% of managers and users agreed that Internet connection in the DCCs is extremely slow. Within the context of this program, the scope—in terms of the age of beneficiaries, of the activities performed, and most important, of digital skills education—must expand in order to transform it into an effective mechanism for economic and social development of the communities it serves. However, the nature of this program does not address crucial obstacles for the digitally excluded, such as the

significant infrastructure deficit in the country that requires a national-level strategy to improve the quantity and quality of ICT use in the country.

Background: Digital Exclusion and Policies to Address It in the Latin American Context

While the information society puts forward opportunities for growth and economic development, it also presents the challenge of bringing the benefits of new technologies to marginalized groups. This disparity increases the risk of amplifying existing differences between rich and poor countries, as well as within the countries themselves, between populations with more resources and those that are marginalized (Keeny, Forestier, & Grace, 2002; Servon, 2002; Van Dijk, 2005). Limited access to ICTs can be explained by an enormous range of factors, though a low income and geographical isolation are two decisive variables.

This digital exclusion not only refers to being connected to an ICT network or not, but also to whether it is used effectively (Gil-Garcia, Helbig, & Ferro, 2006; Servon, 2002; Villatoro & Silva, 2005). Nevertheless, the first step in addressing this exclusion is to offer connectivity. The digital divide, understood simply as access or non-access to ICTs, can be broken down analytically into two gaps considering their underlying cause: the market gap and the access gap. The market gap refers to the difference between the level of access to ICTs and that which could be reached under peak market conditions. The access gap, on the other hand, refers to the limitations of the market itself, given that there is a profitability frontier in economic terms for a certain population group that cannot be reached, even in more efficient markets (Navas-Sabater, Dymond, & Juntunen, 2002).

The market gap reduces as the efficiency of a market increases. Competition is a key tool for achieving efficiency and development in the sector; it is viewed as a proxy for increased efficiency. On the other hand, the access gap has been tackled by social policies that bring services to low income groups or populations that live in isolated areas, although such policies can make it unprofitable for

private companies to offer ICT services. These policies can include imposing universal access obligations on suppliers, offering incentives to companies to service these areas, or creating digital centers in isolated communities. In Latin America, digital centers have been used extensively as an ICT access policy (Maeso & Hilbert, 2006; Villatoro & Silva, 2005).

One of the most successful experiences with centers in Latin America took place in Chile, which managed to connect some of the most isolated regions in the country through its Network of National Info-centers.¹ Financed by a fund governed by a central authority, these telecommunication centers are operated by several organizations that range from regional or local public entities to private companies and nongovernmental organizations. Chilean centers are open to the general public, and they provide computer services with Internet connection, as well as training in the skills required to use these technologies.

Another noteworthy experience is Colombia's COMPARTEL,² which began in 1999 and provides public telephony to almost the entire country. In 2000, a social Internet program was launched under the same policy, with 905 digital centers installed in municipalities throughout the country. In 2005, COMPARTEL widened the scope of these programs through specific strategies, such as *Comunidad Señal de Cultura y Diversidad* (Community Signal of Culture and Diversity), which seeks to promote and recover cultural and traditional values, as well as Colombian ethnic minority languages, through the use of technology.

Although digital centers achieved varying levels of success in different countries, evaluations carried out have identified limits of this model. The study by Jaramillo and Castellón (2002) in Argentina, Chile, and Peru concluded that individuals use these access points primarily for recreational purposes and schoolwork (electronic mail, 27.3%; chat, 20.9%; and homework, 15.1%). Still, Hilbert, Bustos, and Joao (2003) and Maeso and Hilbert (2006) agree that shared access programs (whether public or private) have contributed to the popularization of ICT access among societies in the region. However, the impact that these policies have had on different

1. <http://www1.universia.net/Cataloga/XXI/pub/ir.asp?idURL=164017&IDC=10010&IDP=ES&IDI=1>

2. <http://www.compartel.gov.co>

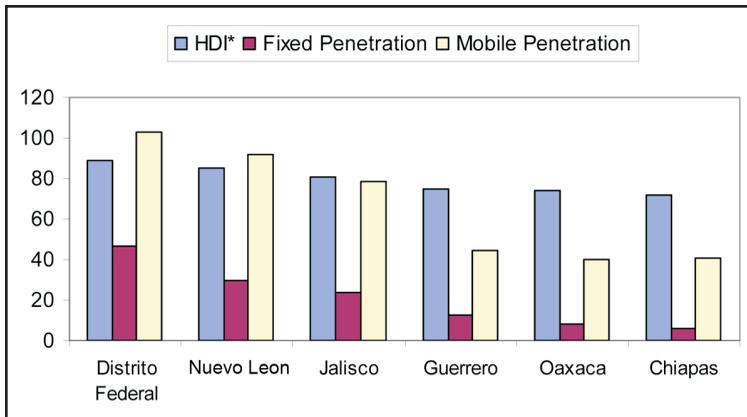


Figure 1. Density of Fixed and Mobile Telephones (2007) and HDI (2007) for Several States.

Source: COFETEL (2009) and PNUD (2007).

*HDI has been multiplied by 100 in order to have a similar scale for comparison.

groups in the majority of these countries is still unknown.

Some studies have emphasized the importance of acknowledging users’ ICT skills and abilities in order to design more user-oriented programs (Ferro, Gil-Garcia, & Helbig, 2007). ICT skills can be seen as a set of stairs that will have to be climbed by users, where the first step is considerably higher than the next ones. Users can be categorized in three groups regarding their previous ICT skills and their facility to acquire new abilities: *athletes*, *the laid-back*, and *the needy*.

Athletes are very keen to adopt technology, and they use ICT in their professional and private daily lives. To a certain extent, policy makers should not be concerned about them, since they enjoy keeping pace with technological evolution. The laid-back are those who have the intellectual capacity to acquire ICT skills, but are reluctant to do so. This can be attributed to the few potential benefits they perceive; therefore, they make very basic use of the Internet. Adoption can be incentivized for them by either offering examples of specific benefits from Internet use, or by a coercive policy which forces them to use it more in schools or workplaces. Finally, the needy are those who, regardless of their willingness to use IT, do not have the skills or cultural background to use it in an effective manner, and to thus add value to their daily lives.

An ICT-for-development program can achieve a

higher degree of success by understanding and identifying the needs and particularities of its objective population. This exploratory study aims to contribute to that objective by analyzing the user’s perspective, and by identifying the attendance, the uses and perceptions, and the skills and complexity of DCC beneficiaries in Mexico.

Mexico: Brief National Examination on ICT Sector

In Mexico, as in many other countries, there is a clear tendency for technology to be located in areas where social

development is higher. For example, fixed telephony penetration is poor in Mexican states where the human development index scores are lower than 70 (Guerrero, Oaxaca, & Chiapas). The penetration of mobile telephony is much more dynamic than it is for fixed, but it reinforces the tendency toward disproportionate access to technology. As seen in Figure 1, states such as the Distrito Federal, Nuevo León, and Jalisco have greater levels of mobile penetration, close to 100%, while states whose HDI is low, such as Chiapas, Oaxaca, or Guerrero, have penetration levels close to 40%.

A clear example of the unequal distribution of access to ICT is the percentage of Internet users by socioeconomic level. As can be seen in Figure 2, approximately 37% of Internet users belong to the upper- to high-upper-middle-class socioeconomic levels (Levels ABC+). In comparison, only 15% of Internet users are from that part of the population that belongs to the lowest socioeconomic levels (D/E).

These disparities in access to ICT between groups of differing socioeconomic levels represent a social problem, given that ICTs, when adopted effectively, are a key tool for addressing the economic and social exclusion of marginalized communities. It is also in these same disparities where programs like the DCCs established under the e-Mexico System become more relevant, since they provide connectivity to groups excluded from access to ICT.

Table 1. CAPTs in Latin America (2006).

Country	Government CAPT	Private CAPT	Total CAPT	Overall Proportion of Government CAPT	Net Users for Each CAPT*
Argentina	9,555	20,647	30,202	32%	889
Chile	2,476	587	3,063	81%	3,454
Brazil	9,976	1,178	11,154	89%	8,143
México	10,034	50,164	60,198	17%	1,300
Costa Rica	484	715	1,199	40%	2,238
Peru	1,171	18,765	19,936	6%	1,017
Guatemala	54	20	74	73%	2,423

*The net number of users can be calculated using the following formula:

$$\text{Net users} = \frac{\text{Total population aged between 5 and 65 years} - \text{User Population}}{\text{Total number of CAPT}}$$

Source: Maeso & Hilbert, 2006.

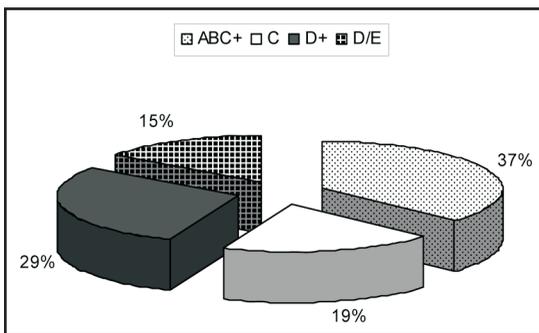


Figure 2. Internet Users by Socioeconomic Level % (2008).

Source: Authors, with data from the AMIPCI 2009 survey.

One of the ways in which different social groups have managed to gain access to ICTs has been through shared access points, particularly cybercafés, government community centers, and those operated by NGOs. Official statistics state that close to 27% and 42% of Mexican computer and Internet users, respectively, make use of this technology through some form of public service (INEGI ENDUTIH, 2008).

According to Maeso and Hilbert (2006), there are

close to 60,000 public access centers (CAPTs in Spanish)³ in Mexico, 17% of which are governmental. This differs from access in other countries, where more than 50% of CAPTs are provided by government (see Table 1). The authors also estimate the number of potential users of CAPTs. Their estimations show that Mexico has only 1,300 users per CAPT, whereas, in Costa Rica or Brazil, the number of users is 2,238 and 8,143 per CAPT, respectively. It appears that unmet demand is higher in Mexico.

Setting the Stage: Digital Community Centers Under the e-Mexico System (DCCs)

Digital community centers were created within a program branded as the “e-Mexico System,”⁴ which is a policy whose underlying objective is to integrate Mexico into the so-called “society of knowledge and information.” This is defined as a society where “knowledge and information constitute the fundamental sources of well being and progress” (SCT, 2001, p. 262).

This policy was conceived during President Fox’s administration, which initiated a very ambitious

3. “Public centers that provide society with access to ICTs, as a whole, with or without connection to the Internet” (Hilbert & Maeso, 2006, p. 14).

4. The National e-Mexico System is a public policy resulting from cross-coordination between Mexican government institutions in order to comply with international commitments related to the Information Society and Knowledge, generating synergies, integrating and fostering projects that encourage the use and exploitation of information and communication technologies for the benefit of the population. It emerged from a presidential initiative, on December 1, 2000, during the oath of office of the constitutional president of the United Mexican States, Vicente Fox Quesada. See <http://www.sct.gob.mx/e-mexico/sistema-nacional-e-mexico/>

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strategy to promote the digital Mexican society. Various government agencies have been involved since the initial steps of the e-Mexico policy. The Ministry of Public Administration took on the challenge of promoting the inclusion of ICT in all government processes, the Ministry of Economy was in charge of encouraging the creation of an IT industry in Mexico, the Ministry of Public Education collaborated with deployment of DCCs in schools and public libraries, and the Ministry of Health created all the health care-related content and facilitated the digitalization of hospitals and other health care centers. All of these efforts were coordinated by the Ministry of Communications and Transport, where e-Mexico Coordination⁵ has its central offices (Luna-Reyes, Gil-Garcia, & Cruz, 2007).

All funding is provided by the federal government through a public trust. There is little information available about the e-Mexico budget, but according to the president's report (President's Office, 2003), in 2002, the government transferred US\$65 million to the e-Mexico public trust, money that was mostly used for building the infrastructure of CCDs and developing the initial content. E-Mexico can be classified as an umbrella initiative that integrates and coordinates numerous efforts originated in some government agencies (Luna-Reyes, Gil-Garcia, & Cruz, 2007). The fundamental objective of e-Mexico is to:

offer the community access to a collection of content on the subjects of education, health, commerce, tourism, government and other services, in order to contribute to improvements in the quality of life of individuals and families, open opportunities for companies based on their joining the new economy and, above all, to promote accelerated and equitable development amongst the different communities and regions in our country, with special attention to the most marginalized areas. (SCT, 2001, p. 263)

The main assumption of this policy is that ICTs may offer new opportunities for economic growth, social development, and the improvement of government services. The e-Mexico strategy was

designed not only to alleviate digital exclusion, but to create social and economic impacts through the access to information and public services. Even more, this policy was intended to contribute to knowledge-building through the creation of a main portal⁶ and several sub-portals based on particular interests of diverse Mexican communities,⁷ reaching 80% of the Mexican population through the 20% higher-impact services (Luna-Reyes, Gil-Garcia, & Cruz, 2007).

As mentioned before, the central themes under which this policy was conceived were connectivity, content, and systems. Connectivity refers to the supply of integrated communications systems for communities within the country, and it is achieved through the DCCs. The objective was to provide not only connectivity, but appropriate training to the communities where the DCCs were installed. Content refers to the task of providing "digital content which, to the population, represents data, information, knowledge and services that translate into obvious benefits, and of course, improvements in the standard of living" (SCT, 2001, p. 264). Finally, systems would integrate "the contents and their applications; in other words, the databases and similar technology, together with connectivity and access, which can be made available to the general public through the use of information technologies" (ibid.).

DCCs are formally defined as public spaces where any person could enter in order to improve his or her education and cultural exposure, and to increase his or her possibilities of personal development (Ministry of Communications and Transport, 2001). There are four basic services provided by DCCs: computers and software use, Internet access, file printing, and diverse training on ICT basic skills. Each DCC has a promoter or manager who is a person in charge of supporting the use of the Internet and the computers. This person is able to help people with no ICT background and is responsible for the administration and maintenance of the respective DCC.

Specifically, as the DCC network was rolled out,

5. *E-México Coordination went through a rebranding process, and now it is known as "Coordinación de la Sociedad de la Información" [Coordination for Information and Knowledge Society]. For more information, visit <http://www.sct.gob.mx/coordinacion-de-la-sociedad-de-la-informacion-y-el-conocimiento/>*

6. *See, for example e-Mexico website at www.e-mexico.gob.mx*

7. *Communities such as elderly people, students, migrants, women, or children had presence on the e-Mexico portal.*

the growth trend was intended to be distributed across three phases during the six-year period. The first phase would cover all municipal administrative centers in Mexico (2001–2002), the second stage was aimed to cover the 10,000 communities where 75% of the population lived (2002–2006), and the third phase would seek to cover the remainder of the country (2006 onward) (SCT, 2001). Regarding the operational model, e-Mexico has followed the operational model of other Latin American strategies, like those of Brazil and Peru. The e-Mexico system started using a satellite network (PANAMSAT) and situating DCCs in established public spaces, such as libraries or centers for adult education, but mainly in elementary and medium-high schools (about 6,000 out of the 9,200 DCCs are located in schools) (Luna-Reyes, Gil-Garcia, & Cruz, 2007).

In 2007, the number of DCCs under the e-Mexico System had reached 9,200, distributed across 5,691 locations. As shown in Table 1, DCCs were mainly placed in states with the greatest levels of social and economic backwardness throughout the country. Close to a quarter of all DCCs are located in Chiapas, Guerrero, Oaxaca, and Tabasco, which are states that face high index of marginalization scores (see Table 2).

The public policy implemented by the government to provide Mexican society with technology is a first step; however, there are a number of pending issues that must be met for these programs to consolidate and increase their scope. This section presents both the main challenges and the progress made by DCCs under the e-Mexico system, in order to understand both the challenges the system faces and its key contribution to the social development of the communities it serves.

Research Methods Note

This study is based on an exploratory survey administered by *Beltrán y Asociados*, February 11–18, 2008, to users of ICT in DCCs, as well as to those in charge of operating them. The objectives of this survey were the following: (1) Contribute empirical information of an exploratory nature on Mexico's progress in terms of the information and communication society among frequent users of this technology in DCCs; (2) ascertain the perceptions of those in charge of the centers, and of frequent users, in terms of the conditions of the infrastruc-

ture and use of ICT in DCCs; (3) investigate the way and extent to which those in charge of operating the centers and the users have appropriated ICTs to carry out activities in their personal lives; and (4) identify the main benefits these publics receive from ICT, as well as knowledge relevant at both the personal level and the level of the activities they undertake.

The survey was conducted in the cities of México, Torreón, and Tuxtla Gutiérrez, and the target populations were individuals in charge of operating the DCCs and their users. In light of the difficulty in carrying out a probabilistic study at the national level of the different publics that already access ICTs, a study was undertaken to explore the perceptions and levels of satisfaction among DCC users and those in charge of running the centers.

The study was carried out through 116 face-to-face interviews. Of the 116, 23 were with individuals in charge of 13 DCCs in 13 districts of the Distrito Federal, as well as 10 more, which corresponded to five individuals in charge of centers in each of the chosen cities (five in Torreón and five in Tuxtla Gutiérrez). At the same time, 93 interviews were conducted of users in 23 DCCs. The table below shows the approximate distribution of the DCCs where the questionnaires were applied. In DF, centers were not operating in three of the districts (see Table 3).

The Case of e-Mexico System's DCCs

DCCs under the e-Mexico System have received a level of investment by the Mexican government without precedent in its recent history. There are close to 9,200 DCCs across the country, all with the main objective of impacting the quality of life of communities through meaningful content. Who has benefited from this investment? What are the benefits they have received, and what are the users' perceptions of this program?

According to the survey that served as the basis for this research, the main occupation of users is that of student (73%), and that category is gender-divided into 42% men and 58% women. The socioeconomic level is diverse, but it does have a clear tendency toward lower levels, which is consistent with the objectives of the e-Mexico System in

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Table 2. DCCs by State and Marginalization Index.

State	Total Number of Locations with DCCs, 2007	Number of DCCs by State, 2007	Marginalization Index (CONAPO, 2005)
Aguascalientes	54	100	-0.95
Baja California	49	89	-1.25
Baja California Sur	30	50	-0.71
Campeche	94	161	0.55
Coahuila	75	149	-1.14
Colima	27	46	-0.73
Chiapas	285	433	2.32
Chihuahua	137	209	-0.68
Distrito Federal	14	51	-1.50
Durango	108	187	-0.018
Guanajuato	120	216	0.091
Guerrero	193	315	2.41
Hidalgo	282	447	0.75
Jalisco	199	437	-0.77
México	257	430	-0.62
Michoacán	228	344	0.45
Morelos	53	76	-0.44
Nayarit	78	107	0.19
Nuevo León	95	183	-1.32
Oaxaca	551	930	2.12
Puebla	364	562	0.63
Querétaro	98	145	-0.014
Quintana Roo	58	108	-0.32
San Luis Potosí	200	299	0.65
Sinaloa	167	253	-0.015
Sonora	441	717	-0.74
Tabasco	353	505	0.46
Tamaulipas	108	166	-0.68
Tlaxcala	121	184	-0.013
Veracruz	544	739	1.076
Yucatán	158	288	0.43
Zacatecas	150	274	0.16
National Totals	5,691	9,200	

Source: The authors, with data from the e-Mexico Coordinating Office (2008) and CONAPO (2005).

respect to bringing the Internet to marginalized areas (See Figure 3).

The majority of users are between 10 and 23 years of age, followed by individuals between 24 and 36 years old. Furthermore, most users have had previous experience using ICTs; in fact, 53% of DCC users confirm that they have a computer at

home, and 54% said they have been using a computer for more than a year. Thus, most of the digitally excluded continue to be excluded (See Figures 4 and 5).

Even when DCC users come from various socioeconomic levels, the frequency of attendance remains unequal. Figure 6 shows that D+ and D/E

Table 3. Distribution of Interviews.

	Distrito Federal	Torreón	Tuxtla Gutiérrez
Person in charge of DCCs	13, 1 in each Delegation	5	5
Users (on average, 4 per center)	13 Centers 53 Users	5 Centers 20 Users	5 Centers 20 Users

Source: Authors, with data from BGC (2008).

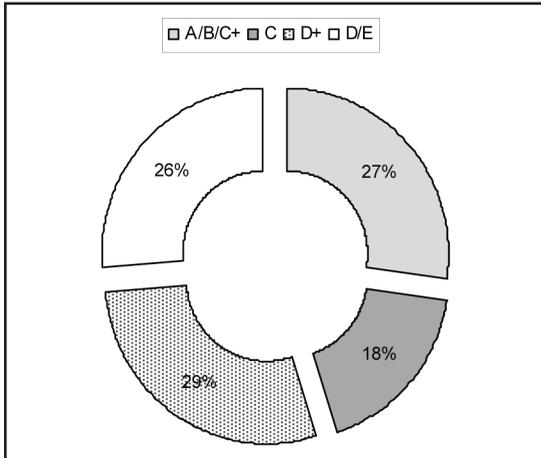


Figure 3. DCC Users by Socioeconomic Level % (2008).

Source: Authors, with data from BGC (2008).

users attend less frequently. In fact, more than 22% of these users say they come to the center either “some times in the month” or “rarely.”

With respect to the use that DCC users make of the connectivity that is available, they are focused on schoolwork and certain entertainment activities.

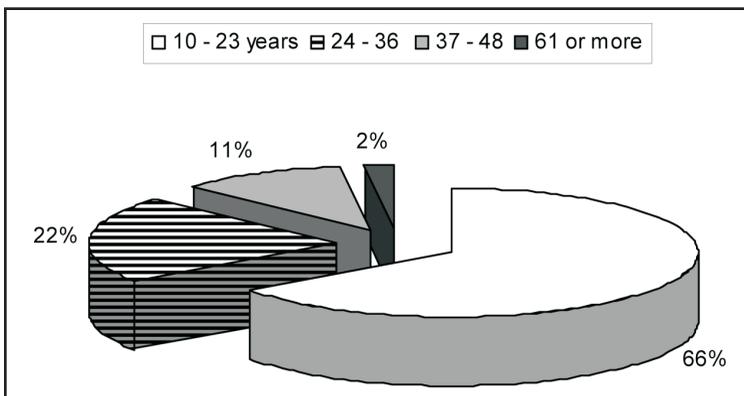


Figure 4. DCC Users by Age Group % (2008).

Source: Authors, with data from BGC (2008).

In addition, this use is growing in complexity, as a high proportion of users have begun to combine voice, data, image, and audio (see Figure 7).

These results are consistent with the fact that 73% of users are young students, since the majority of beneficiaries take advantage of these centers to prepare projects and other schoolwork. However, a differentiated use is present at DCCs. As shown in Table 4, users who belong to lower socioeconomic levels exhibit less complex use of the Internet. When asked if they have visited pages like Google or Hotmail, which require very basic Internet skills, more than 50% of all socioeconomic levels answered “Yes.” On the contrary, when users were asked if they had accessed more complex pages like Wikipedia or YouTube, it became clear that those individuals with low socioeconomic status had less expertise using the Internet.

With regard to the complexity of use, broadband connections are very poor at these centers. As can be seen in Figure 8, approximately 28% of the users surveyed stated that the Internet connection was bad or average. It is extremely important that the DCCs are able to offer broadband services in order to increase the penetration of applications with a certain degree of complexity.

DCCs are considered a useful tool that impacts positively on users’ lives, especially with regard to their education. As shown in Figure 9, the assistance that DCCs provide for learning new things and improving academic performance is held in high regard by users.

Similar to the differences seen in Internet use according to users’ socioeconomic levels, we found different perceptions of benefits received from the Internet and computers according to socio-

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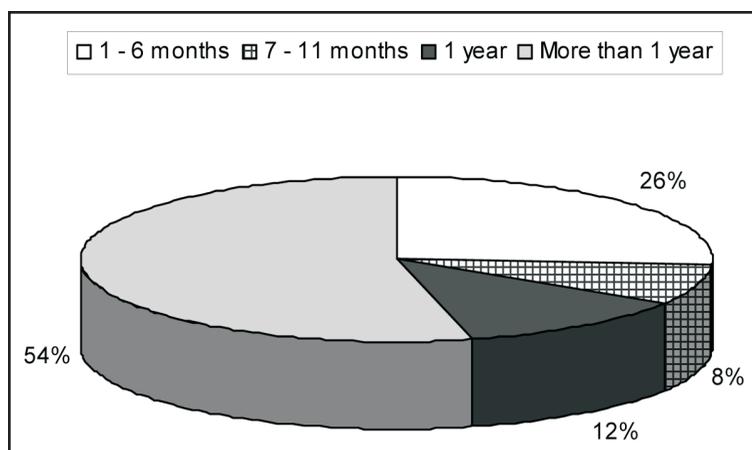


Figure 5. DCCs Users by Previous Experience on ICT % (2008).

Source: Authors, with data from BGC (2008).

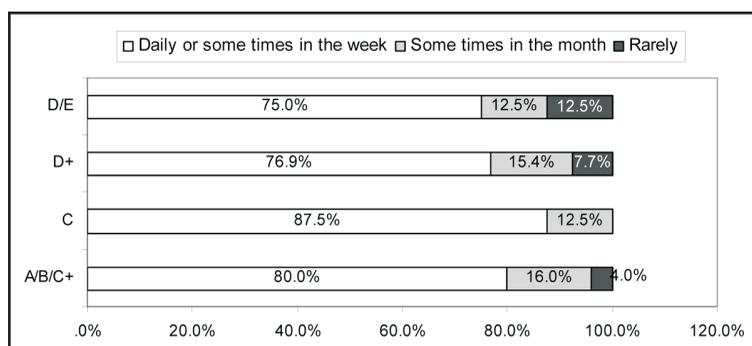


Figure 6. DCC Users' Frequency of Attendance % (2008).

Source: Authors, with data from BGC (2008).

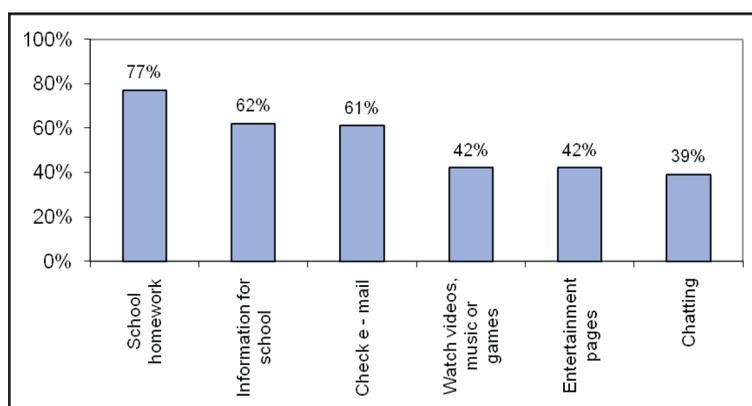


Figure 7. DCC Users by Type of Use % (2008).

Source: Authors, with data from BGC (2008).

economic levels. As Figures 10 and 11 show, 72% of D/E users believe that the Internet has been important in their education. On the other hand, close to 90% of users from the higher socio-economic levels confirmed such an importance. This perception gap is similar when users are asked about health information.

As we have mentioned, promoters/managers are responsible for the administration, maintenance, support, and promotion of their DCCs. We conducted a survey of the promoters in order to inquire about their real activities, their perceptions of users' activities, and the main challenges they face in their activities. First, we find that no promoter/manager works on DCC promotion among their communities, and that very few teach formal courses, even when these activities are necessary for the effective running of the center. They only focus on administration and maintenance activities (see Table 5).

Promoters at 17 DCCs reported that students are the main users of the centers, while in three others, the most frequent visitors are workers or employers. As can be seen in Table 6, the promoters also reported that users' principal activities are to write with Word or use Excel, connect to the Internet, and learn how to use a computer.

Most of the promoters also confirmed that the greatest benefit users extract from DCCs is support for their homework, and they followed that by stating that users can learn faster by using a DCC. It is important to note that, in those DCCs where the main users are workers and employees, perceived benefits are different

Table 4. Complexity of Use by Socioeconomic Level % (2008).

Socioeconomic Level	% Users who admitted they know these pages			
	Google	Hotmail	Wikipedia	YouTube
A/B/C+	88%	80%	48%	68%
C	94%	88%	69%	75%
D+	88%	88%	32%	48%
D/E	72%	67%	33%	44%

Source: Authors, with data from BGC (2008).

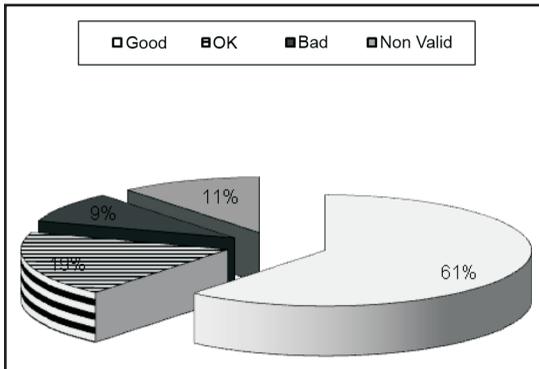


Figure 8. How Well Does the Internet Connection in This DCC Work? % (2008).

Source: Authors, with data from BGC (2008).

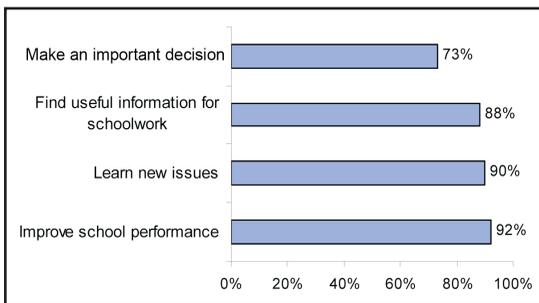


Figure 9. How Useful is the Internet for . . . ? % (2008).

Source: Authors, with data from BGC (2008).

from those where the main users are students. In these, the fact that computers and the Internet could provide a faster learning process and may encourage adults to use technology more deeply show that DCCs could potentially have a wider scope of impact, particularly among adults with no formal education (see Table 7).

In summary, the data shows that the majority of users are students (16–23 years old), and as such,

that a significant part of the demand for technology is for education-related activities. In addition, a large proportion of individuals are from low socioeconomic levels, which indicates that the target population (at least partially) is being reached. However, users from lower socioeconomic levels are both less frequent and less specialized than those from higher levels. They are not very familiar with computers and the Internet, and they give little importance to them in their lives. The age range is still very limited, as older generations have yet to take advantage of these centers. Also largely absent are those adults who may find the Internet to be a useful tool to enable placement in the labor market or to promote self-employment.

Conclusions

The DCCs under the e-Mexico System represent a significant advancement toward providing connectivity to numerous communities in the country. Close to 16% of shared access points fall under the e-Mexico System as part of the DCCs program. Moreover, there is a positive perception among Mexican users of these portals, as well as of the use of DCCs in the study undertaken during this research. However, as other shared-access models do, it faces significant limits, both in its scope, and in advancing a meaningful participation of beneficiaries. The fact that 73% of the users surveyed during this study are students, and that the activities they are engaged in are centered on education and recreation demonstrates a somewhat limited impact. The scope in terms of the age of beneficiaries, as well as in the activities performed, must expand for the program to be transformed into an effective mechanism for economic and social development in the communities in which these centers operate. A comprehensive strategy to train users in digital skills is a crucial

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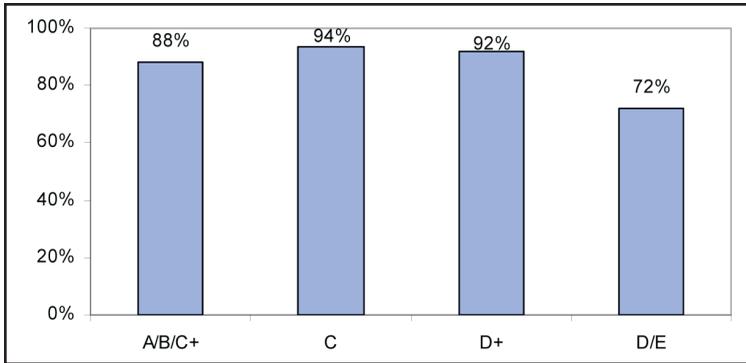


Figure 10. The Internet Has Been Important in My Education % (2008).

Source: Authors, with data from BGC (2008).

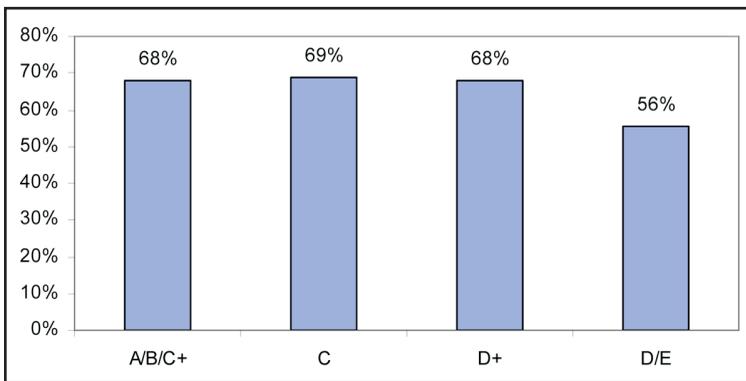


Figure 11. The Internet Has Been Important to Find Information About Health % (2008).

Source: Authors, with data from BGC (2008).

component that is currently lacking. To a significant degree, the weaknesses of the e-Mexico program are a consequence of its policy design, which followed a top-down, standardized model of implementation.

Evaluations in the literature highlight the importance of including beneficiaries in the implementation process of these programs, in the choice of technology, and in the development of content—all

in order to achieve significant adoption of ICT by communities. The identification and understanding of its target population are relevant to the success of its impact; these aspects matter because users are not homogeneous. Studies have shown that users have very differentiated needs and perceptions about ICT, perceptions that are influenced by gender, race, disability, class, location, or religion (Helbig, Gil-Garcia, & Ferro, 2009; Hung, Chang, & Yu, 2006; Jaeger, Bertot, McClure, & Langa, 2006; Shelly et al., 2004). Additionally, previous experience in the use of ICTs is critical to determine the opportunities to utilize them in the future. All these facts imply that poor and solely supply-side solutions will tend to produce poor results and a low impact of ICT programs.

Furthermore, as-yet-unexplored are schemes involving collaboration with other entities that already operate through concrete connectivity programs, as in the case of POETA under the Trust for the Americas.⁸ There is

evidence of the importance of NGOs in placing individuals from low socioeconomic levels in the competitive and highly specialized labor markets through training in ICTs and the creation of skills required in the labor market. This can be achieved by building strategic alliances with NGOs or private entities. These alliances could strengthen the operation of both DCCs and other entities by facilitating the sharing of experience, resources, skills, and capabili-

8. At the beginning of 2005, the Trust for the Americas Foundation launched its hemispheric program for Partnerships in Opportunities for Employment through Technology in the Americas (POETA) in association with Microsoft through its Unlimited Potential initiative. POETA was implemented in more than 10 countries, and it has more than 15 training centers that offer marginalized populations and persons with physical disabilities instruction in the use of software such as Excel, Word, and PowerPoint, as well as training for work. POETA centers also provide assistance to micro companies to develop their businesses and use information and communication technologies. The Trust for the Americas Foundation believes that this alliance with Microsoft will have long-term benefits for communities that have POETA centers. It is hoped that, by 2010, at least one POETA center will be operating in every country in the hemisphere. For further details, see <http://www.trustfortheamericas.org/spanish/poeta.html>

Table 5. What is Your Main Daily Activity in this DCC? (2008).

Administer area resources	7
Orientation	4
Check computers operation	4
Register users	1
Virtual courses	3
Teach classes	2
Administer internal network	1
Organize tasks	1
Total	23

Source: Authors, with data from BGC (2008).

ties, and thereby increasing the benefits that technology offers to underprivileged communities.

Moreover, cofinancing schemes would ensure the long-term sustainability of the programs. E-Mexico operates on limited government funding, and there is a significant demand for new technologies, such as the integration of audio, video, and data, which will require further substantial investment. Failure to meet this demand will threaten to make the technology that DCCs provide obsolete. The digital agendas launched by other countries can be taken as an example of the sort of successful creation of networks of public policy and cooperation between actors that will be necessary in order to adapt such cooperation to Mexican programs.⁹

A modern digital access program must go beyond the traditional schemes implemented during the 1990s and consider recent evidence and interna-

tional best practices. One option, although still in its infancy in our country, is the mobile application-enablement of government, commerce, and banking. The fact that the mobile telephone has penetrated Mexican society more than any other technology, and that it is a tool highly valued by marginalized groups for strengthening social ties and providing greater personal security, is a clear sign of the growing need to include mobile services and mobile broadband in the design and implementation of public policies aimed at social development (see Galperin & Mariscal, 2007). It is critical to recognize the importance of organizational, institutional, and environmental conditions in the implementation of ICT access programs in order to generate meaningful content for the communities they hope to serve.

Finally, even though the benefits that the DCCs have provided are generally positive and may be further improved, a more comprehensive national-level strategy must address the infrastructure deficit the country faces. There is only one commercial backbone available in the country, and it does not reach the entire population; it does not provide the bandwidth necessary to carry meaningful content, and it is still not affordable to the poor. Moreover, a significant weakness of the current program is the very low quality of the broadband offered. The e-Mexico program should coordinate private and public efforts to expand access with higher-quality broadband to public institutions that include schools, hospitals, and government offices. Of course, these efforts should include connectivity, but

Table 6. What Do Visitors Use the Equipment for in This DCC?

Who are the main users of this DCC?	Word or Excel	Connect to Internet	Check E-Mail	Learn How to Use a PC	School Activities	Solve Exams	Search General Information	Total
Students	12	2	0	1	1	1	0	17
Workers/Employers	1	0	0	1	0	0	1	3
Teachers	2	0	0	0	0	0	0	2
Did not answer	0	0	1	0	0	0	0	1
Total	15	2	1	2	1	1	1	23

Source: Authors, with data from BGC (2008).

9. One of the more noteworthy experiences, and perhaps the closest to our context, is Chile's Digital Agenda, which has helped to make Chile one of the most developed countries in Latin America in terms of increased penetration of technology. For further information, see <http://www.agendadigital.cl>

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Table 7. Main Benefit From Using Computers and the Internet (2008).

Main Benefit Perceived by DCC Promoter	Main users by DCC				Total
	Students	Workers / Employees	Teachers	Not valid	
Help in their homework	4	0	0	0	4
Faster learning	3	2	0	1	6
Help in school	3	0	0	0	3
Finish their high school	2	0	0	0	2
Get general information	2	0	0	0	2
Improve their knowledge	1	0	0	0	1
Check exams and prepare the grades	1	0	1	0	2
Learn how to investigate a topic	1	0	0	0	1
Encourage adults and housewives to use the technology	0	1	0	0	1
Necessary tool	0	0	1	0	1
Total	17	3	2	1	23

Source: Authors, with data from BGC (2008).

content and the capacities to appropriate the benefits of these technologies should not be forgotten, either.

P.S. In 2010, after this research was completed, the DDC's network was modernized. Although far from offering broadband quality, the local servers offer a connectivity of 200 kdps via satellite. They also implemented a capacity-building program, named Vasconcelos 2.0, which, through the Intel Club House model, relies on students to teach the community members the use of ICTs. ■

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