Reducing the digital gaps for the strengthening of social cohesion in Mexico

Reduciendo la brecha digital mediante el fortalecimiento de la cohesion social en México

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ABSTRACT. This document proves whether the Mexican government applies strategic models for technological policies in order to reduce the digital gap. First, it revises a theoretical framework and it analyzes the technological strategies and governmental actions in this field of subject. Finally we propose a new model for the reduction of the digital gap.

RESUMEN. : Los mecanismos de inclusión propuestos por los gobiernos nacionales, tendientes a la reducción de brechas digitales, son procesos que abogan para la generación de cohesión social. Por ello, este documento busca probar a través de un análisis de las acciones del gobierno del Presidente Enrique Peña Nieto en la búsqueda de la reducción de la brecha digital, si el gobierno mexicano aplica los modelos de estrategias para la política tecnológica. Se revisa en un primer momento el marco teórico relacionado con las estrategias inherentes para posteriormente, analizar los programas de gobierno propuestos para lograr el objetivo planteado. Finalmente, se propone un nuevo modelo de reducción de la brecha digital.

KEYWORDS: Technological policy, Digital gap, Poverty, Inequality, Social cohesion.

PALABRAS CLAVE: Política tecnológica, Brecha digital, Pobreza, Desigualdad, Cohesión social.

1. Introducción

In the last decades the world has changed drastically due to technological development. The era of communication has modified the way we understand the world, and due to technological advances the world as we know it could, in the next few years, be explained differently. Nowadays, people without access to technology are considered technologically illiterate. Therefore, educational policies have to promote the use of information and communication in order to solve the issue of lack of technology.

Some of the causes for the increase of the digital gap in Mexico are accessibility, equipment and connectivity, as well as cost increments due to Mexico´s winding landscape. The Mexican government has allocated a part of the federal budget for the implementation of technological policies, even though poverty has increased.

•In Mexico, according to data from the National Council of Social Development Evaluation (CONEVAL, 2015) in 2014, 11.412 million people, 9.5% of the population of the entire country, were reported to be living in extreme poverty.
•The educational lagging in the population between the ages 3 and 15 is 8.4%, a situation affecting close to 2.5 million Mexicans. The educational lagging in the population of age 16, or of those born before 1981 is 27.2%, affecting close to 14.1 million people (CONEVAL, 2015 B).

The National Institute of Statistics, and Geography (INEGI, 2014, p.10) conducted in 2013 a survey regarding the availability of technology, information, and communications in homes; its results show that 35.8% of Mexicans have computer access at home; 2 out of 3 do not have a computer; and almost 70% do not have Internet accessibility (p.10). This survey shows that the main reason for the absence of computers at home is its cost. The first survey, conducted in 2001, revealed that 70% of the households surveyed didn´t have a computer, while in 2013, 61.4% didn´t have one (INEGI, 2014).

Users aged 6 years and older, 46% of the Mexican population, declare having the necessary knowledge to use a computer and the Internet for educational purposes. In 2013, 75% of Internet users were younger than 35 years old. (INEGI; 2014, p.18). The population between 6 and 11 years old represents 14% of total computer users, and 11.7% of those that use the Internet. (INEGI, 2014, p. 18). In contrast, after the age of 45 the use of Information and Communication Technology (ICT) is unusual and barely constitutes 1 out of 10 users.

Internet usage is almost similar for both male and female users: 50% of men and 50% of women have access to internet. Nevertheless, there is a small difference in computer access, where 49.9% of men compared to 50.1% of women have a computer. (INEGI, 2014, p. 21).

The main place where users have access to ICT´s is at home; 58.9% use a computer, and 55.9% use the Internet at home. In second place come public sites, where 33% have access to a computer, and 37.2% have access to the Internet. At workplaces 22.7% have access to a computer, and 21.3% have Internet access. Finally, at schools 21.6% have computer access, and 15.8% have Internet access. (National Institute of Statistics and Geography, INEGI, 2014, p. 22).

The lack of Internet and computer access has a negative impact in social cohesion because it increases poverty, individualism, and inequality, undermining, therefore, trust towards institutions, and demotivating citizen's participation in democracy. (Cf. Paredes, 2012; Quartiero, Bonilla & Fantin, 2012).

In this paper we present a description of the existing relationship between the digital gap and social policies, using a theoretical framework based upon connectivity, training, and infrastructure.

2. Social cohesion and its relationship with Mexico's social policy

Faced with the effects of a neoliberal model, in particular high rates of poverty, inequality, discrimination, and exclusion, social cohesion shows up as an answer to minimize vulnerability and as a response to generate the mechanisms that fortify the social network. For this paper we used the definition of "social cohesion" proposed by the Economic Commission of Latin America, and the Caribbean (CEPAL, 2007):

…The dialectic between the mechanisms instituted of inclusion-exclusion, and the reactions, perceptions, and reviews of the citizens to the modalities in which such mechanisms operate … Social cohesion permits to identified three components that interrelate to generate processes, and specific results of cohesion. These components are i) distances, or gaps ii) the institutional mechanisms of inclusion and exclusion, and iii) the sense of belonging (Ottone & Sojo, 2007, p. 16).

In Mexico, social cohesion has been a decisive factor for the planning of a national social policy during the last ten years. Democratic participation and the overcoming of poverty are the axis of social policy. Therefore, social cohesion has been turned into a fundamental objective of public policy, for it implies to actively incorporate members of society in the search of an equitable economic development. Social policy in Mexico generates social cohesion, equal opportunities, and capabilities for the eradication of exclusion.

Social exclusion has its origins in the inequality of opportunities. It limits citizen activism and participation, and it also neglects human rights. In contrast, social inclusion allows people to develop physically and intellectually, in order to be a key factor in the economic development of their community and their country.

Along these lines, the accessibility of technology generates social inclusion because it represents a better access towards information and improves social decisions. According to data from the National Institute of Statistics, and Geography (INEGI, 2014), 64.3% of the Mexican population used the Internet as an informational resource; 42.1% used it for personal communication (email, chatting, etc.); and, 36.2% used the Internet for entertainment related activities such as watching movies, playing games, and videos.

According to data from the Federal Commission of Telecommunications (COFETEL, 2014), in 2009 in Mexico 25 out of 100 habitants had access to a computer; in 2010, 30 out of 100; in 2011, 34 out of 100, and in 2012, 40 out of 100.

Year	Internet subscribers	Internet users
2000	134,987	5,057,533
2001	1,883,638	7,097,172
2002	2,096,415	10,718,133
2003	2,444,367	11,883,041
2004	3,191,324	13,983,492
2005	3,881,896	17,966,001
2006	4,805,939	20,564,256
2007	5,847,561	22,104,096
2008	8,235,315	23,260,328
2009	10,124,297	28,439,250
2010	11,874,945	34,871,724
2011	12,748,231	40,605,959
2012	13,524,168	45,708,785
2013	13,537,061	51,160,541

Table 1. Historic data of Internet Users in Mexico. Source: Based on data from the Statistics Division Market Data, (COFETEL, 2014), (INEGI, 2014).

Nowadays, ICT´s play an important role in combating exclusion because they open an opportunity threshold for the government to reduce the digital gap through the use of social policy. In Mexico, reducing the digital gap is a responsibility of the technological policy of education.

3. Strategies for technological policy

In 2005, the World Bank published a report titled "Closing the gaps in education and technology" where it demonstrates evidence that prove that "Any country can have a successful economy if it has the capacity to improve its educational and technological policies, and adapt them to particular conditions. If education is increased but the policy does not adapt to promote the accessibility to new technologies, there will be a decrease in intellectual brains, and thus no growth" (Gill, et. Al, 2005, pg. 8).

Currently, publications about strategies for technological policies are scarce. UNESCO released information that establishes that "…improvement in technology and skills results in major productivity, better economic performance, and in the long term a better quality of life for individuals" (UNESCO, 2009, pg. 8). For this reason, ICT´s applied to education will shorten the gaps between the socioeconomic realities, and the quality of the educational system (ERT, 1997; in UNESCO; 2009, p. 11).

Haddad and Draxler (2002) guarantee that ICT´s can contribute powerfully in the extension of learning opportunities for a wider and more diverse population, as well as to transcend culture barriers, and tear down physical restrictions imposed by educational establishments and geographical boundaries.

As ICT´s infiltrate progressively into the educational system, the indicators utilized to monitor the advances in implemented policies evolve over time. In the bibliographic revision there are two models that are distinguished: the first one is applied to technology policy regarding its implementation, a model that incorporates three phases: A) Connectivity; B) Training; and, C) Infrastructure. This model has been replicated at a federal level in Latin American governments, where technological policy finds gradual progress.

Meanwhile, UNESCO (2009, Pg. 21) proposes a strategy that is based on the integration of three levels: A) e-digital ability, which implies the access and use of basic ICT´s infrastructure; B) e-intensity, which contemplates the development of content managed by ITC´s and innovative teaching management, development of new vocational abilities based on ITC's, and the expansion of studies related with ITC's; C) e-impact, which contemplates the use of ITC´s in the long term in our lives, for example, student success, the progress of students certified in ITC´s in the labor market, TIC4E framework, and economic productivity.

As can be seen, the second model is focused on learning while the first one is focused on the implementation of technological policy. Both models contemplate training as a main axis for the correct application of technological policy.

4. Mexico: Educational Policy towards the reduction of the digital gap

Society has always been organized by economic models that propose the way in which countries function. With the combination of politics, society, and market, each factor adapts itself to the economic model in an individual relationship. In Mexico political and social factors are part of a fundamental economic model, even though neo-liberalism proposes its reduction.

In México, the reports given by the administration of President Enrique Peña Nieto (2013) mention that:

In comparison to 142 countries, Mexico occupies the 63rd position of the nations that have been trained, to have the knowledge to take advantage of ITC´s in all kinds of environments, therefore it is urgent to take advantage of its potential for modernization and government efficiency. (2013, pg. 30).

As a result of such report, the National Development Plan for 2013-2018 aims to:

•Develop human potential of Mexicans with a high quality education;
•Guarantee inclusion and equality in the educational system;
•Increase the access to knowledge in order to increase citizen participation;
•Achieve scientific and technological development as the pillars for innovation, economic progress, and sustainable society.

In order to achieve this, the total investment of the federal government in education was $1,082,763.30 Mexican pesos in the first year, and in the second year it was $1,128,505.20 Mexican pesos (Presidency of Mexico, 2014, web), part of which was used to attend infrastructure and connectivity aspects. The use of technology is one of the educational pillars of the federal government, for which its objectives are to:

•Promote education as a shared responsibility;
•Increase the support of children and youth in vulnerable, and disadvantageous situations;
•Have an adequate infrastructure and to preserve the cultural patrimony of the country;
•Link the investment sector with other productive activities, and, at the same time develop a digital agenda for the subject;
•Promote public and private investment in development and innovation;
•Promote the competitive advantage of our national workforce

During the first year President Enrique Peña Nieto's administration,he offered topromote permanent training to elementary and middle school teachersin order to improve the comprehension of the new educational model, itsdidactic practices, and the use of technology applied to education. The result of one-year worth of work was: 5,765 technical teachers and 15,048 elementary and middle school teachers trained and certified in the use of ICT's in all thirty two states of the country (First Government Report for the Administration of President Enrique Peña Nieto, 2013, web).

One objective of Enrique Peña Nieto's administration was: "to modernize the infrastructure and the equipment of educational centers". In the next table we present some of the results of the technology policy compared to the levels proposed by UNESCO (2009):

Strategy	Objective	Implemented programs, and main results during the first year of administration of the federal government	Implemented programs, and main results during the second year of administration of the federal government	Results of the technology policy compared to the model proposed by UNESCO(2009).
Promoting the use of ICT´s in the teaching and learning process.	Basic education	"Escuelasdignas" program Depends on a budget of $2,621.6 million pesos.There were 46 educational institutions attended in five states of the country benefiting 5,888 students.	"Dotación de equipos de cómputoportátiles" programaimed towards children that are enrolled in public schools, and that are in the 5th and 6th grades.There were 240,000 portable computers distributed in 3 states of the country: Colima, Sonora, and Tabasco.	e-digital ability: This programimproves the access, and the use of infrastructure in elementary schools.
	High school	"Fondo concursable de Inversión en Infraestructura para Educación Media Superior" program. Itsmain objectives are to support the construction, application, rehabilitation, and the equipment of public educational spaces dedicated to high school. 1.2 million pesos investment..	"Mexico conectado" program. The objective is to provide students, and teachers with high speed broadband internet. The program called "RedAcadémica" is designed to give universal internet access to all schools, in addition to the updating and expanding of the development of a platform to identify, and reproduce high school related videos. There are currently 5,264 videos online. ASystem of Management and Administration for online courses was developed using the free access software platform Moodle.	e-digital ability: This programimproves the access, and the use of infrastructure in high schools. e-intensity: This programimproves the learning mediated by ICT´s;it managesinnovation based upon ICT´s, and it expands the fields of study in these areas.

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Promoting the use of ICT´s in the teaching and learning process.	College	**"Fondo de Apoyo de Infraestructura de las Universidades Interculturales" program.** During 2012-2013, close to 118 millionMexicanpesos were allocated for this fund. The projects developed include: the construction of classrooms, laboratories, providing of equipment, internet installation, and the construction of four headquarters. **"Fondo de Apoyo a la Calidad de los Institutos Tecnológicos" program.** In 2013 there were 63 decentralized technological institutions with an investment of 62.6 million mexican pesos, significantly impacting the quality of the educational degrees such as bachelor's degree, and post college programs. **"Apoyo al uso de las TIC´s" program**, through the use of the **Internet II**network,with the participation of 67% of federal technological institutions and 6% of decentralized institutions. In June of 2013 it operatedbenefiting276,630 bachelor's degree, and post grad programs. In 2012-2013, 4,000 desktop computers, 2,280 ultra-light terminals 228 servers, and 228 switches were distributed,benefiting 628 community spaces; this represents a 207.8 % increase in comparison to 2011-2012, were only 204 community spaces were benefited with 2,040 ultra-light terminals, and 204 servers.	This program benefited88 federal technological institutions with**Internet II**to promote the interinstitutional link, research on themed networks, and the collegiate work of the academy. The **"Programa Integral de FortalecimientoInstitucional" (PIFI)** supported 11 projects belonging to Public Universities. This program invested 15.1 million Mexican pesos; the whole purpose is to increase the infrastructure in order to improve education in the long term. For **technological innovation**this program supported 26 projects in 12 pedagogical Universities**(UPES),**with a budget of 25.9 million Mexican pesos,which contributes to the use of technology and information. The **"Programa para el Fortalecimiento a la CalidadEducativa en las UniversidadesTecnológicas"** in 2013 this program helped 64 institutions investing225.6 millions of mexican pesos, in order to offer technological programs with the latest technology. In August 2014 this program benefited 2,520 community spaces, which represents an increase since 2013 (2,456). Thiscommunity spaces offer integral service communities with the optimization of infrastructure and installed resources.	**e-digital ability:** This programimproves the access and usage of infrastructure in college institutions. **e-intensity:** This programimproves learning mediated by ICT´s; it manages innovation based upon ICT´s, and it expands the fields of study in these areas. **e-impact:** These programs are related tolong-term life lessons in ICST´s and with its usage comes economicproductivity improvement.

Table 2. Implemented strategies for the use and accessibility of ICT´s in Mexico 2013-2014. Source: Elaborated with data from President Enrique Peña Nieto's administration, 2013-2014.

As can be seen in Table 2, the use of ICT´sthroughoutthe different levels of education in México takes into account all three elements proposed by UNESCO: e-digital ability, e-intensity and e-impact. With these elements the technological policy tries to reduce the digital gap, through the investment in better conditions for infrastructure and training. These initiatives are generatedby the federal government and the programs are managed by the states andlocal governments.

5. Conclusions

Technological advancement currently represents an opportunity to reduce existing gaps in the Mexican population, and to contribute to the strengthening of social cohesion. A society where access to information equality is a daily strategy promotes social ties, democratic participation, and the practice of civic values like tolerance, for in the reduction of the digital gap, the distance that separates different groups that can actually access ICT´s is also reduced. As a consequence, current public policies must be aimed towards the incorporation of the different members of society, generating social cohesion through the equality of opportunities and abilities.

The current Mexican government sustains that ICT´s contribute to prepare important activities for the

economic development of any country, and it's also a lever for the economic development of many other countries (Presidency of the Republic, 2013, pg. 6). For this reason, we can observe that this administration is working to increase the conditions of students, updating teaching methods, training, reevaluation of public schools, and reduction of digital and social gaps amongst families and communities that integrate the country.

We can conclude that the Mexican government has implemented its technological policy in both levels of strategies that are mentioned in the theoretical part of this document, gradually obtaining progresses that allow a reduction over the long term in digital gaps.

We propose an analysis model for future research of technological policy. This model comprises these five indicators:

a)Connectivity;
b)Infrastructure;
c)Training;
d)Long term life lessons; and,
e)Development of academic content trough ITC´s

The limitations of this model are related to the urban/rural social contexts, for not all countries have the same geographical, educational advancement, cultural, political, and social conditions. For these cases adequate indicators should be defined for each strategy, considering their appropriate context.

Finally, it is worth incorporating into future analysis actions taken by civil organizations regarding the reduction of technological gaps, for there are several civil initiatives that have greatly contributed to the progress of social cohesion, tending towards the reduction of the digital gap.

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