Digital Divide in Latin America and Europe: Main Characteristics in Selected Countries

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Brecha Digital en Latino América y Europa: Principales Características de Países Seleccionados

Resumen:
Este artículo presenta las características de la brecha digital en los países de América Latina: Bolivia, Brasil; República Dominicana; Ecuador; Finlandia; Guatemala; Polonia. El propósito es mostrar la escala del fenómeno, los grupos más vulnerables (incluidos los determinantes de la brecha digital) y las prácticas que facilitan la inclusión digital. La comparación y el intercambio de buenas prácticas ayudan a una completa comprensión de las características de la brecha digital (independientemente de la ubicación de las personas afectadas) y a promover buenas prácticas. El documento es parte de las actividades dentro del proyecto SELI.

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Abstract — **This paper presents the characteristics of the digital divide (DD) in the Latin American countries on the example of: Bolivia, Brazil; Dominican Republic; Ecuador; Finland; Guatemala; Poland. The purpose of the text is to show the scale of the phenomenon, the most vulnerable groups (including the DD determinants) and practices facilitating digital inclusion. The comparison and exchange of good practices help to understand more fully the DD characteristics (regardless of the location of the people affected by DD) and to promote good practices. The paper is part of the activities within the SELI project.**

Keywords – digital divide; digital inclusion; inequalities; Internet access.

I. INTRODUCTION

Digital divide is the concept to present the inequality of access to and use of Information and Communication Technologies (ICT) between individuals, households, enterprises, geographical regions and countries [1]. It is connected with the intense development of the Information Society and digitalisation of services, which just few decades ago were typical for the offline world [2]. Inability on using ICT results is lowering the quality of life and limited social participation [3]. Thus, digital divide has become one of the types of social exclusion. However, we need to emphasise that co-occurrence of the digital divide and low quality of life is not a simple cause-and-effect relation. The DD phenomenon needs to be analysed with consideration to different dependent and independent determinants of ICT usage [4].

Coined by Warschauer [30] to describe an evident gap in terms of access to and usage of information and communication technology, DD can been analysed from different perspectives. Frequently, scientists attempt to describe this phenomenon by recognising its universal determinants. For example, the analysis by Lengsfeld [24], conducted in 25 countries, allows drawing new conclusions. Even though there are differences between the social and age groups, not all socio-demographic criteria identified as the universal DD determinants lead to digital divide. Factors like gender, income and place of living are ever frequently rejected as the main determinant factors of DD. The universal factors that divide people into online and offline in the global perspective, regardless of the geographical location, include education, age and main vocational activity [5]. More and more often, the studies into the DD point out to individual factors, like the attitudes towards the new media. In order to gain more comprehensive insights, we must look into the analysed process from individual perspective (e.g. biographical background of persons who do not use ICT) and consider the factors present in certain regions, countries or education systems and cultures. Besides, the digitalization is a key component for competitiveness in societies: there is a direct and positive correlation between the increase of the broadband and GDP [14].

In this sense, the main purpose of the paper is to show digital divide in the selected countries in Europe and Latin America. It is done by analysing the materials existing in

certain countries, chose in the context of SELI Project (Smart Environment for Learning and Inclusion). The composition of each sub-section covers the diagnosis of the scale of the digital divide and the characteristics of the most vulnerable groups and DD determinants. The analyses are complemented with the suggestions of solutions to minimise the digital gap. Thanks to the comparisons of the digital divide, we can understand the phenomenon better and present the universal and non-standard tools to remove the barriers for digital inclusion.

II. DIGITAL DIVIDE IN SELECTED LATIN AMERICAN AND EUROPEAN COUNTRIES

A. Bolivia

The last official publication on ICT in Bolivia presents information from 2011 to 2015, which for the 2015 indicates that the prevailing technologies for Bolivians are: television (82.7%), followed by radio (47.8%), computer (24.4%), fixed telephony (15.6%), and finally Internet access with 14.9%. However, the International telecommunication Union (ITU) presents an Internet access of 39.7%. The report of the Authority Telecommunications and Transport Regularization and Control indicates that the 11% of the Internet connections are fixed and 87% through mobile telephony of seven million connections [6]. Bolivia is divided into nine departments with uneven access to Internet among them. Internet penetration at the department of Santa Cruz is 16% and for the other eight departments does not exceed 10%, concentrated on the three largest cities (Santa Cruz, La Paz y Cochabamba) according to a strategic plan for social inclusion and ICT [7]. Internet access in urban area is 20%, but in rural areas is 4.2% for the year 2015 [8]. According to these indicators, with a range between 0 and 1, fixed telephony has a value of 0.13, mobile telephony 0.76, households with computer is 0.34 and households with access to the Internet 0.27; locating Bolivia in rank 112th of 176 countries worldwide and ranked 26th of 37 countries at the American continent. Thus, it is observed a low Internet access and Internet resources used by the population; this observation worsens observing very low access from rural areas against urban ones.

The 58% of population do not have access to a computer, including 38% of the population in poverty, therefore having limited access to the Internet [8]. The population who access Internet with mobile devices, uses it mainly to: contact friends (73%), access to social networks (62%), search for information (35%), watch videos and listen to music (26%), and for educational purposes (11%) [9]. Bolivia has vulnerable population groups related to digital divide: those living in rural areas, and those of socioeconomic status below the middle class. Rural population is included among the poor population but with the inability to access a computer and consequently the Internet. Poor population of peripheral urban areas mostly access internet from mobile devices, so use it to contact friends and social networking. There is a very low Internet use for educational purposes.

In order to increase the level of Internet access in rural areas and poor population, Bolivian government has been promoting, since 2009, several programs that aims for a better and greater Internet access for all Bolivians. These programs are framed in the access to Internet, as the program PRONTIS, whose main purpose is to increase the installation of radio bases for access from rural areas through mobile telephony to Internet. Besides, this project embraces the launching of the satellite Tupac Katari for linking remote communities through Earth stations; expansion of terrestrial telecommunications networks, and the provision of Internet service to educational units [10]. In addition, two One-To-One programs (only for public schools) are being promoted: the first, since 2011 gives teachers a computer, covering nowadays 72% of the teacher population, and the second, started in 2014 with the delivery of computers to students of public educational units, reaching 4.39% of the student population by 2018 [9]. Programs like PRONTIS and One-To-One for teachers and students are pointing to the vision of Bolivian National Plan of Digital Inclusion. which declares: "A society based on inclusion, consisting of the universalization of the use and application of ICTs for reduce the marginalization, social exclusion and anonymity of Bolivian citizens, in such a way to effectively and efficiently use information in their development processes" [9].

B. Brazil

According the Brazilian Institute of Geography and Statistics – IBGE, 74.9% of the permanent households had access to the Internet in 2017 being that in urban area the number reaches 80.1%, while in rural areas is 41.0% [11]. In recent years, there has been an increase in Internet access in rural areas due digital inclusion policies and network expansion.

However, considering the population over 10 years old, 69.8% used the Internet in 2017. Young people (from 14 to 29 years old) are the ones who use the Internet the most. The use of technologies, especially the Internet, has more rapid adherence among young people, but the rapid evolution of facilities for its use has increased and spread in other age groups of both genders, as in the older population, which there was a 25.9% increase in Internet use in the population aged over 60 years, compared to 2016. Educational attainment also influences the Internet use. Only 11.2% of the Internet access is made by people with low or no education [11]. The individual who has access to the Internet is informed and updated more and more rapidly, tends to value the environment even more; on the other side, the one who does not have access is each moment more distant from knowledge and has an increasingly steep learning curve to overcome [12].

The reasons for using the Internet in 2017 were: send or receive text, voice, or picture messages by applications other than email, mainly instant messaging ones or social networks (95.5%); chat for voice or video calls (83.8%); watch videos, shows and movies (81.8%); send or receive email (66.1%) [12]. The main device used for accessing the Internet were mobile phones, whose rate per capita in Brazil is over 100% (there are around 1.2 registered mobile lines per people). Given the costs for SMS, which used to be charged by companies, Whatsapp has become the "de facto" platform for communication, being used by 56% of the population, as well as Facebook, used by around 60%. However, these preferences also reflect Brazilians' limitations in using Internet-based resources, since being heavy users of social media does not

mean that people are taking advantage of the opportunities that this media offers, like the access to educational content, governmental services and so on.

Brazil is divided into 27 states, organized in five major regions: North, Northeast, Southeast, South and Midwest. The regions with the lowest percentage of Internet access are North (the less densely populated) and Northeast, with 68.4% and 64.0% of the permanent households, respectively. These regions are poorer and with the lowest educational level [12]. In rural areas, North has 27.3% of access and Northeast, 35.8%, which shows the digital divide in that regions. The main reasons reported by households that did not have access to the Internet were: lack of interest in accessing the Internet (34.9%), Internet access service was expensive (28.7%) and alleged incapacity for accessing the Internet (22.0%). Only 7.5% of the households indicated the Internet access service was not available in the area [11]. However, lack of interest in accessing the Internet could mean a lack of orientation regarding the use of computers, accompanied by uncertainty about its benefits [12].

There is a lack of reflexion on the nature of inequalities, especially DD. For people with disabilities, another group which are at the greatest risk of digital divide, there is a law for inclusion of the person with disabilities [13] that obliges schools to accommodate students with disabilities in regular education and to adopt the necessary adaptation measures without any financial burden being passed on to the fees. The Internet access is not a main problem that reflects in the digital divide in Brazil, but the lack of interest in accessing the Internet and the inability to use it reflects the digital divide, as well as the unawareness about educational resources available in native language, as stated by [44]. A possible solution would be to provide more relevant, local content and training teachers and community leaders in their usage, which could spark the interest of non-users.

C. Dominican Republic

For the Dominican Republic, the main indicators of connectivity and Internet access present an encouraging scenario where according to the [15], 96.5% of Dominican households have an ICT resource and/or service. Mobile phones are the predominant devices, with a penetration rate of 89% of the households, followed by televisions in 83.4% and radio in 51.2%. However, the rates for computers (27%), Internet access (25.2)% and landline (20.9%) are not so big. DD can be analysed within the Dominican Republic itself, given the characteristics of its population. According to [15], while 97.5% of the urban population has access to some ICT service or resource, only 93.6% of the rural population has. Although the above statistics may sound very positive, when analysing the access to Internet, obvious inequality is obtained: while urban residents have access to the internet at 29.8%, only 11.6% of rural population have it.

Other factors that influence DD in the Dominican Republic are the educational and socioeconomic characteristics [16]. Information gathered by National Office of Statistics shows that the higher the education level of household chief, the greater is the access to both Internet and some other ICT service and/or resource. Internet access passes from 6% for the group that has no education or only preschool versus their peers who have a university degree or higher (56%), a gap of 50 percentage points. From a socioeconomic perspective, only 3% of low-income survey respondents have access to the Internet at 3% versus high-income ones, with 83.9%

In 2017, the Dominican government launched "The Digital Republic" program, whose main goal is to reduce DD in the country. Five pillars sustain this program: Technology and education, Broadband for all, Digital Productive Republic, Transparent Government and Cybersecurity [17]. Since the beginning of the Digital Republic program until now, the penetration of technology has made significant improvement in vulnerable communities, with the implementation of 99 Community Technology Centres. Other actions involves education through the training of teachers and youth in ICT, as well as accessibility, placing 223 wi-fi points throughout the national geography, among others [16].

D. Ecuador

For the last decade, Ecuador has been setting goals and implementing projects to ensure access to Internet and telecommunication technologies for all of their inhabitants [18]. Aiming to reduce DD, the Ecuadorian government has outlined the National Plan of Telecommunications and Technologies [19]. The plan involves installing and promoting the use of telecommunication infrastructure, regulations and legislative reforms to include Information and Communication Technologies (ICTs) for the social and economic development of the country. As part of this plan, the government created Community Info-centres to guarantee access and encourage people's active involvement with ICTs, contributing to the reduction of the digital divide [19]. National access to internet has increased 14.7 percentage points in urban areas and 11.8 percentage points in rural areas compared to 2012. Slightly over half of the population (52%) over 5 years old has accessed or used a computer nationwide; approximately 60% in the urban areas compared to 36% in the countryside. Ecuador has the least expensive fixed broadband plans for the residential segments, offering above average speed with lower prices, when compared to other countries in the region. The prices of mobile data plans for smartphones are also below average and provide services such as WhatsApp, Facebook, and Twitter to mobile telephony users without having to pay for extra data use [20]. Similarly, 80% of the population has accessed or used Internet in the last year.

However, there is a tendency for individuals to be digitally marginalised, as they get older. 48% of young adults (35 - 44 years old) reported using computers, compared to only 35% of individuals between the ages of 45 and 54. The usage is less for older populations; 22% for individuals between 55 and 64 and only 6% for people older than 65. The same tendency holds for access or use of smartphones [19]. The percentage of computer usage is over 60% and is similar for younger individuals. The majority of the urban population accesses internet from their homes, only 5.4% from an educational institution, and 16.3% from Community Info-centres. In contrast, in rural areas the percentage of people who access internet from their homes drops to 38.2. However, the proportion of individuals who use educational institutions increases to 14.3 and the presence of

people at the community centres almost doubles to 33.1% suggesting a reduction in digital divide. The most common reason for use of ICTs is to obtain information: 42% in the urban area and 34% in the rural area. Communication is the second reason, approximately 30% for both areas. Education is the third reason with 28% in the countryside compared to 19% in the cities. Gender seems to have no impact on digital divide among the population when it comes to computer usage. Nevertheless, the percentage of females considered digitally illiterate is higher than it is for males.

In terms of DD, location seems to have the greatest effect among individuals between 15 and 49 years; 6% of the population is considered digital illiterate compared to 21% in the rural areas of the country [19]. Although the digital divide in Ecuador has reduced as far as costs, infrastructure, and frequency of use is concerned, the gap related to digital literacy continues [21]. For secondary school students, the use of internet is related to how skilled individuals are about internet and technological devices; how knowledgeable they are about valid and reliable sources of information; the ability to create digital content; academic use of internet, and physical access [18]. To date, however, little research has been done to examine the factors related to the digital divide in other groups, and especially in marginalized groups who may have different needs and aims.

E. Finland

Access and usage of smart devices and Internet have become commonplace in contemporary developed societies. Many essential services such as health, education, commerce, etc. are available through the internet in this modern era. Moreover, owing a digital device and accessing the Internet anywhere and anytime have become part of everyday life [22].

Digitalization is an essential component of government services in Finland as a welfare state. For example, government provides access to free of charge library services with internet connectivity and access to e-books in Finland. However, there are concerns whether all citizens, including people with disabilities, have equal access to these services and possibilities [22]. Digital divide exists in different perspective and contexts, such as education, ICT, race, financial, etc. [23] [24] [25] [26] [27]. Similarly, DD exists between people with disabilities and those without disabilities [28] [29]. Digital disability divide, used by [29] refers to a type of digital divide that is studied in the context of ICT, as an anomaly that tends to demonstrate people with disabilities not having equal access to digitalization. A framework to determine the situations that should be deliberated when designing solutions for those suffering from the digital disability divide comprises social, technological, financial, and motivational aspects [29]. This digital divide study will target specifically the people with disabilities. Today's advancement in ICT has not affected everyone equally, as there could be people without access to the internet at home. Moreover, existing research showed that people with disabilities suffers from the lack of adequate access to a computer or Internet at home than people without disabilities [29] [22].

Previous study revealed that almost one-third of the people needing disability services do not have access to Internet in Finland; i.e. only 69.9% are using internet among people who needed services for the disabled, compared to 86.4% of the respondents [22]. This lack of access can be associated with the level of education, marital status, age, employment status, and economic situation.

F. Guatemala

Nowadays the term DD was evolved to "digital inclusion" given that with a global mobile phone penetration practically every person in the country has access to a mobile device. In fact, in Guatemala with the data related to the population (16 million) [31] and the number of mobile lines (20 million) [32] there is an average of 1.25 devices per person. In this sense, it is important to take into account the "digital equity" definition by The Nation Digital Inclusion Alliance [33] coined as a condition in which all individuals in a country have the technology devices but more important the capacity, skills, and quality of services needed to a full participation in the society, democracy and economy. The main goals of the digital equity are to elicit the civic and cultural participation, employment, lifelong learning and access to essential services [33]

There is a hard work to achieve digital equity in the country. Guatemala is a predominantly poor country that struggles in several areas of health and development with a large indigenous population is disproportionately affected. However, it is positive that in Guatemala the population is young with more than 50% of the population under 24 years. In this sense, there is a great opportunity to promote digital literacy with educational programs using mobile devices. Additionally, it is worth to mention successful experiences related to the reduction of the digital divide in the indigenous population Patzún [34], an interesting pilot project that can be replicated in others cities. For this, digital inclusion requires intentional strategies and investments to reduce and eliminate historical, institutional and structural barriers to access and use technology [33].

In order to achieve a complete digital iInclusion, the different stakeholders involved in the creation of digital content must take into account the international guidelines prepared to produce accessible content. The preparation of accessible content is a benefit for all, but especially for people with disabilities. In Guatemala, there is a need to propitiate laws that promote the preparation of accessible web content, starting with the government institutions, private enterprises and educational institutions. At the same time, it is necessary to promote the culture of accessibility among the content creators.

G. Poland

More than a half (as much as 55%) of the young Poles declare their family members – parents, in-laws or grandparents as being digitally marginalised. The authors of the report emphasise that from the perspective of the young generation, grandfathers and grandmothers are the most excluded (opinions of 79% of the respondents), since they use the Internet the least frequently and have the lowest level of digital literacy. This evaluation is less common as for parents and in-laws. Almost half, as much as 49% (about 2.2 million) of the young people described their in-laws as digitally marginalised, whereas 39% (3.7 million) said that about their mothers and fathers [35]. Data of the Central Statistics Office

imply that in the recent years the percentage of the households with at least one computer has been regularly growing. In 2017, it was 81.8% and it was significantly higher for the households with children. In the years 2013-2017, the number of the regular computer users grew as well. In 2017, over 80% of the Polish households had the Internet access [36]. The data presented by the Central Statistical Office are compliant with the EUROSTAT statistics that say that 82% of the households in Poland have Internet access (the EU average is 87%) [37]. However, Internet access does not mean its users take advantage of the opportunities provided by the new media.

Groups which are at the greatest risk of digital divide in Poland are: old people (seniors), poorly educated (e.g. with only primary education), people who declare their financial situation is bad, unqualified workers, farmers, residents of rural areas with under-developed infrastructure [38]. Thus, the main causes of DD include: age, absence of other family member using ICTs, place of residence (mainly rural regions), poor education, social and vocational status, low income, family structure (e.g. absence of grandchildren), specifics of one's profession, limited access to the Internet (less and less significant), lack of adequate hardware, lack of services designed for the certain age groups (this factor is also becoming less and less significant), individual traits (attitudes towards the new media) and access to institutions providing life-long education [39]. At the initial stage of reducing the digital divide in Poland, which began almost twenty years ago, the digital inclusion practices involved mainly providing the proper equipment and Internet access to those who lacked them. Today, the technological aspect of the digital divide has become secondary. The minimization of the digital gap is advanced by raising awareness of the need to participate in the digital world and providing the necessary educational tools. The most popular solution addressed mainly to seniors is the Universities of the Third Age (U3As) [40]. Today, there are over 600 U3As in Poland and almost all offer trainings in using the new digital technologies. Other successful solutions are the initiatives originating from the concepts of social pedagogy, based on the voluntary movement. The flag example is the movement of the Lighthouse Keepers of Digital Poland of Equal Opportunities. During the recent years, they introduced almost 300,000 seniors to the complexities of the digital world movement [41]. Another important components of the system minimising the digital divide are cultural institutions (cultural centres), NGOs, bottom-up independent voluntary movements and training agencies. Reduction of the digital divide in Poland is mainly based on the non-formal adult education and self-education.

III. CONCLUSIONS

The digital disability divide can adversely upset people who are impaired in the society and as such may suffer the concerns of digital disability divide. Consolidated efforts are required to support people with impairments. Some of those measures to reduce the level of digital disability divide are: active effort to provide education and literacy to the impaired, incentives to motivate the participation of the impaired in the technology design process, raising awareness and providing technical assistance, improving legislation and policy to favour the disabled, and providing employment and income support to the impaired.

DD is a complex socio-technical construct. The brief overview of the determinants of this type of social divide in the selected European and Latin American countries confirms the complex nature of the overlapping factors which contribute to the failure to participate in the information society [42] [43]. This analysis is not sufficient to make clear generalisations (due to the inconsistent data used in comparisons and text limitations, among others). However, some general conclusions can be drawn. The European countries have a slightly higher percentage of citizens using ICT, while Latin America is highly diversified in this regard. In most of the countries, the place of residence (rural areas), low income and low level of education are the universal determinants of the digital divide. In some countries (e.g. Brazil or Bolivia) ICTs are used mainly for information, communication and entertainment purposes [45]. However, to draw unambiguous conclusions, the level of digital literacy should be subject to further detailed analyses and standardised measuring methods. The ways of using the new information technologies is equally important because it is the element of the information culture and it allows determining the level of DD. Internet access and navigating only through popular digital services do not guarantee full participation in the information society services, nor prove the high level of digital literacy. In many analysed countries, the governments have launched special documents (Finland – digitisation as one of the social policies; Poland –Ministry of Digitalisation and social projects financed from the EU funds; Brazil – strategies for digital inclusion; Bolivia – programmes focused on providing the Internet access; Ecuador – programmes focusing on increasing the access to digital services, showing the ICTs as the condition necessary to accelerate the social and economic development; Dominican Republic – government education centres). In the presented countries, the ICTs are the priority, which is visible in the official government narrative. What all the EU and LAC countries have in common, is the users' age. It is young people who are the motors of the information society, thanks to the digitalisation of their daily activities: education, communication, peer relations and access to information. In all the countries, digital divide affects mainly older people and varies depending on the region. Digital inclusion is equally often advanced by providing households and institutions with network access points and introducing educational programmes improving the level of digital literacy. It is expected that the scale of the DD in the LAC will decrease during the next few years thanks to the dynamic global processes associated with the developing information society.

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