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Digital Divide in Colombia: The Role of Motivational and Material Access in the Use and Types of Use of ICTs

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Many individuals are currently excluded from the benefits that ICTs might bring (Selwyn, 2004), as the differences in access to these technologies, known as the digital divide, can hinder individuals' acquirement of different resources (DiMaggio, Hargittai, Celeste, & Shafer, 2004). The first studies on the digital divide defined it as a lack of physical access to these technologies (Yu, 2006). That research interpreted this concept in terms of access to the infrastructure and content of the producers (Colby, 2001), and measured the concept as connected or not connected to the Internet (Selwyn, 2004).

Further conceptual developments (Di Maggio et al., 2004; Selwyn, 2004; Van Dijk & Hacker, 2003; Warschauer, 2002) advocated for a broadening of the concept, arguing that access should not be considered as a dichotomous variable and that physical access was just one of the stages in the process of access to ICTs. Such conceptualization argues that in the process of access, other additional aspects might influence the use and the type of use of these technologies. Van Dijk (2005) suggested the notion of motivational access, and that it can be considered as an antecedent in the process of ICTs use and adoption. The present study takes into account these considerations and examines, using a randomly selected sample of Colombian respondents, how different characteristics of material access, such as the speed of connection and the opportunities of access, as well as motivational variables, affect whether and how individuals use ICTs.

The relationship between material access and types of use is relevant in the Colombian context. Although the penetration of the Internet in Colombia has increased greatly, there is little scholarly attention regarding how ICTs are currently used in Latin America (Pick, Garcia, & Navarrete, 2007). Furthermore, starting in the 1990s and up until today, successive Colombian governments have implemented policies with the aim of increasing connectivity levels in the country. After the turn of the century, several government programs were designed to increase and improve people's access to the

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Internet, which included projects with the goal of encouraging the use of ICTs in education, businesses, and interaction with the government (Tamayo, Delgado, & Penagos, 2007, p. 38).

At first, these policies focused on the infrastructure, since material access to the technology is fundamental for any policy aimed at the popularization of the use of the Internet. However, although the different government programs aimed at offering public access to the Internet, such as cybercafés, public libraries, or telecenters, have played an essential role in ICT policies, the issue of access has started to become secondary to the problem of the use and types of use of this technology (Barón & Gomez, 2012).

Therefore, successive elected governments in Colombia have begun to combine different strategies to ensure access to ICTs and encourage their use. The current plan is to have, by 2019, all citizens connected to the Internet and using ICTs to improve the country's competitiveness and social inclusion (Paz Martinez, 2009). Therefore, studies that broaden the concept of access and relate it to the use and types of use of the Internet can provide worthwhile information for the assessment and design of government programs.

Literature Review

Motivational Access

The concept of motivation is defined in this case as the reasons that move an individual to access, use, and engage with ICTs. Some theories such as uses and gratifications (Palmgreen, Wenner, & Rosengren, 1985) have conceptualized motivations in terms of needs and gratifications, while others, such as Social Cognitive Theory (SCT) (Bandura, 1986), propose the notion of expected outcomes and behavioral incentives in place of motivations. In any case, motivations have been generally ignored in digital divide theory. It was assumed that people would actually want to use the technology and would naturally identify a need for using it. However, Van Dijk (2005) suggested motivational access as an antecedent for other dimensions of access, such as physical or material access and usage access. In this sense, motivational access would be one of the antecedents of the subsequent phases that take part in a process of access and use of ICTs.

According to Van Dijk (2005), several factors affect and shape the existence of motivations to use ICTs, some of which are a lack of interest, time, or money, low computer skills, or lack of self-confidence. Once an individual's motivation for using ICTs has been established, the next phases of the process can take place.

The present study examines motivational access as the value that individuals give to the Internet as a source of information, in other words, in terms of expected outcomes, much as Bandura's SCT proposes (1986, 1997). Other studies (Rojas & Puig-i-Abril, 2009) have examined antecedents to Internet access—including demographic factors—in Colombia. The present study explores the relationship between motivational access and Internet usage. The following research question is set forth:

RQ1: What role do expected outcomes play in Internet use?

Types of Internet Use

Several researchers have pointed out an important distinction between material or physical access and actual use of ICTs. Access to technology does not necessarily imply use of ICTs and, furthermore, there are different types of use of ICTs (Selwyn, 2004). According to Hargittai (2008), differences in the uses of ICTs have important implications for life outcomes. The examination of how ICTs are used among those who have "crossed the digital divide fault line to the land of the connected" (Hargittai, 2008, p. 939) is of central importance, since the interest of research on the digital divide is focused largely on inequalities regarding access and use of ICTs. An approach that examines the different range of activities, without distinguishing between "those who go on line for no more than checking sports scores or TV schedules, and those who use the medium for learning new skills, finding deals and job opportunities, participating in political discussions, interacting with government institutions, and informing themselves about health matters" (p. 939) will not be able to identify where the differences lie.

Livingstone and Helsper (2007) proposed an interval scale for the "use" construct, with gradations from non-use, to low, to frequent use, but they take into account the opportunities taken by users. The authors analyzed findings from a survey of children and young Internet users in the United Kingdom, and how the quality of access and use were related to inequalities by age, gender, and socioeconomic status. The study focused on inequalities in the take up of online opportunities. DiMaggio et al. (2004) also took into account the uses dimension, although they termed the concept as "variation in use," and differentiated between recreational and welfare, political, and social capital-enhancing uses. Hargittai and Hinnant (2005) approached the subject in a similar way. They suggested a distinction between recreational and capital-enhancing uses of the Internet, and argued that capital-enhancing activities online were more likely to offer users the possibility of social mobility.

Although it makes sense to distinguish uses that might enhance the human, social, and financial capital resources of individuals, it can be argued that all types of uses can bring positive life outcomes, as they might improve the skills of users and serve as entry points for a wider variety of uses. For example, Kolko and Putnam (2009) found evidence to suggest that playing computer games, a form of use for mere entertainment, was an entry point for using the Internet and acquiring computer skills. They studied how ICTs were first accessed, used, and appropriated by users of Internet cafés in Central Asia. Their findings suggest a process in which meaningful and entertainment uses interrelate and affect one another through skills and motivational access.

Rojas and Puig-i-abril (2009) found that the most prevalent activities of Internet users in Colombia were checking e-mail, consuming entertainment content, chatting with friends, and consuming news and information. The present study examines these activities, looking for common factors among the activities in order to identify the different types of Internet use in which people engage. The following research question is formulated:

RQ2: What are the different types of Internet use?

Physical Access

The first digital divide studies defined the concept as "having"/"not having" access to the Internet. The purpose of these studies was to determine the penetration levels of the Internet in the United States by tracking access at home. However, these studies did not consider other possible access points such as libraries, schools, or workplaces (Bertot, 2003).

DiMaggio et al. (2004) and Hargittai (2008) conceptualized access as "autonomy of use," and defined it as the freedom of choice to use digital media at the moment and place one decides to. Home access provides more freedom than having to access the Internet at a telecenter or Internet café. Likewise, having to access the Internet from a public library is qualitatively different from accessing it from home. People who access from a place different from home have to drive, walk, or use the public transportation system; compete with others for time on the Internet; and take into account other limitations (Hargittai, 2008). Therefore, inequality in autonomy of use is another dimension of access that should be considered when addressing the issue of information inequality. The following research question is posed:

RQ3: What is the relationship between autonomy of use and types of Internet use?

Another aspect related to physical access is the technical characteristics of the Internet, such as the connection speed. According to DiMaggio et al. (2004), previous research studies found that technical differences such as connection speed, quality, the version of the software, and hardware capacity are related to the benefits users get from their access to the Internet. Issues of accessibility to certain websites and experience during navigation can have an impact on people's use of the Web, with the result that they may spend less time spent online and have lower skills. For example, Warschauer (2003) found that in Egypt, although technology could benefit educational opportunities for the poor population, mere material access to computers and the Internet did not help advance educational opportunities. We propose the following research question:

RQ4: What is the relationship between technical access and types of Internet use?

Methods

Data and Sample

Data was collected between August 5 and 31, 2008, in 10 different cities across Colombia. Survey respondents were selected using a multistep stratified random sample procedure, representing the Colombian adult urban population. Households for each city were randomly selected based on the size of each city. Once the number of households for each city was identified, blocks were randomly selected, and then, from each block, households were randomly selected. Surveys were answered face-to-face. Individual respondents were randomly selected by asking for the person in each household who had most recently celebrated his or her birthday. Data was collected by researchers at the Universidad Externado de

Colombia and the University of Wisconsin – Madison. Response rate was 83% for 1,064 completed surveys. Participants were offered a style pen as compensation for their participation.

Variable Measurements

Dependent variables. Internet use was measured as a dichotomous variable by asking participants whether they had used the Internet or not during the past 12 months (Yes = 54.7%; No = 45.3%).

Type of Internet use was measured by asking respondents about how frequently they performed a set of 13 activities online, such as using e-mail to keep in touch with friends and family, using e-mail to discuss politics, making purchases online, reading news online, discussing news online with others, chatting in discussion forums, visiting political blogs, paying utilities, looking for entertainment, looking at government information, and making transactions with government institutions, among others.

Independent variables. Autonomy of use was measured as an ordinal variable by asking participants whether they had used the Internet at home, work, or in a public place. The variable was calculated by adding the values for the individual responses corresponding to each of the places from which people might have accessed the Internet. The higher the number, the more autonomy of access they had.

Technical access was measured as a nominal variable by asking respondents about the type of Internet connection they used when connecting from home. Options included high-speed Internet or dial-up connection (High-speed = 76.5%; Dial-up = 23.5%).

Expected outcomes were assessed with only one question that asked participants to rate on a five-point scale how much importance they placed on the Internet for getting information and news (M = 2.35, S.D. = 2.08).

Analysis and Results

Among the 1,064 respondents in the survey, 45.3% reported not having used the Internet during the last 12 months, while 54.7% reported having used it. The average age of the sample was 41.6 years old, ranging from 18 years old to 94 years old. Regarding gender, 48.3% reported that they were males, and 51.7% identified themselves as females. Concerning residency, 21.6% of respondents lived in a small or medium-sized city (<1,000,000 inhabitants), while 78.4% lived in larger urban centers. Regarding education, 10.9% reported having completed elementary school, 32.8% a secondary education diploma, and 13.4% a higher education diploma. For analysis purposes, the level of education was recoded into 5 levels, according to which not having completed elementary school was the first level, having completed at least elementary school was the second, having completed at least a high school degree was the third, having completed a college degree was the fourth, and having completed a graduate degree was the fifth.

The first research question, which asked about the role played by expected outcomes—measured in terms of the value given to the Internet for getting information—was examined through a logistic regression. In this way, we were able to understand the influence that the expected outcomes and a set of demographic variables had on using or not using the Internet.

Results of the logistic regression showed that the model explained 45% of the variance in the outcome variable. The analysis suggested that significant predictors of Internet use included living in a large city (☐ = .52, p < .05), education (☐ = 1.44, p < .001), age (☐ = –.056, p < .001), and expected outcomes (☐ =.487, p < .001). Living in a large city increased the odds of using the Internet by 69%. Individuals who had a higher level of education were more likely—odds increased by 324%—to use the Internet. Respondents who said they valued the Internet as a source of information and news had 62% higher odds of using the Internet. No significant difference was found between males and females in their odds of using the Internet.

Table 1. Logistic Regression Coefficients for the Effect of Age, Gender, City Size, Education Level, and Motivation on Internet Use (N = 1064).

	Internet use (1 = yes, 0 = no) Coefficient	Percentage change in odds	Sig.
City Size			
Large city	.526	69%	.016
Education level	1.445	324%	.000
Gender			
Male	.036	3.7%	.840
Age	–.056	–5.5%	.000
Motivation	.487	62%	.000
Constant	–2.915		.000
Log likelihood	806.64		
Cox & Snell R Square	.45		

The second research question was explored using an exploratory factor analysis. The scree-plot generated by the principal components analysis, and the results of this statistical test suggested the existence of three factors with eigenvalues larger than 1.0. The first factor explained 24.1% of the variance, the second 13.4%, and the third 13.1%. These three factors explained over 50% of the variance.

A promax rotation was used for the final solution of the factors structure. One item (maintaining a blog or website) was eliminated because it had a cross loading above .3 in two factors. A principal components factor analysis using promax rotation of the remaining 12 items showed that three factors explained 52.8% of the variance. Factor loading matrix for the final solution is presented in Table 2.

Table 2. Rotated Factor Solution of Types of Internet Use.

	Participation	Transactions	Social
Use e-mail to keep in touch with family and friends	−.078	.055	**.671**
Post videos on Google video or YouTube	.205	−.113	**.649**
Look for entertainment	−.100	.106	**.765**
Use the Internet to buy online	−.035	**.700**	.022
Make online bank transactions	−.027	**.770**	.075
Make transactions with government institutions	.136	**.688**	−.029
Use e-mail to comment on political topics and current events	**.645**	−.070	.182
Use the Internet to look for news	**.556**	.189	.048
Comment on the news in online news websites	**.794**	−.189	.072
Discuss in online forums	**.736**	.037	−.016
Look for governmental information	**.731**	.074	−.168
Visit political blogs	**.741**	.082	−.089

[a] Promax rotation with Eigenvalues > 1, specified three factors explaining the 52.83% of the variance.

The three factors that resulted from the analysis were labeled "Participation," which pertains to uses of the Internet that were related to political and civic engagement and that included activities such as online political discussion, retrieving of political and government-related information, and so forth; "Transactions," which is related to online economic or financial transactions with private organizations or government institutions; and "Social," which is comprised of activities such as posting videos online, looking for entertainment, and interacting with friends and family. Composite scores for each factor were created, based on the mean of the items that had the primary loading in each factor. Table 3 illustrates means, standard deviations, and alpha scores for each composite scale.

Table 3. Means, Standard Deviations, and Reliability for Participation, Transactions, and Social Activities Scales on the Internet.

	Mean	S.D.	Cronbach's alpha
Participation	1.20	1.15	.79
Transactions	.80	1.05	.60
Social	2.7	1.3	.52

The third research question, which asked about the relationship between autonomy of use—measured in terms of the places from which individuals access the Internet—and Internet activities, was explored through a set of OLS regression models. Table 4 shows the results. The coefficients are reported in terms of standardized beta coefficients.

Table 4. Regression Models of Autonomy of Use as Predictor of Types of Internet Use (N=582).

	Social		Transactions		Participation	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
City size						
Large city	-214***	-.205***	-.048	-.034	-.054	-.043
Education level	.095**	.070	.236***	.200***	.264***	.232***
Age	-.351***	-.317***	-.107**	-.057	-.150**	-.108**
Gender (Male)	.058	.045	.065	.046	.087	.071
Motivation	.211***	.187***	.146**	.110**	.247***	.217***
Autonomy of use		.104**		.201***		.172**
R^2	24%	26%	10%	13%	18%	19.3%

**: p <.001, ***: p <.05

The first model explained 26% of the variance in social uses of the Internet. The first block included size of the city (β= –.214, $p < .001$), education level (β = .095, b = $p < .05$), age (β = –.351, $p < .001$), and expected outcomes (β = .211, $p < .001$). However, no evidence for a significant difference between males and females was found. In the second block, education did not continue to be significant in the model. City size (b = –.205, $p < .001$), age (β = –.317, $p < .001$), expected outcomes (β = .187, $p < .001$), and autonomy of use (β= .104, $p < .001$), which is our variable of interest, were all significant. By including this variable the model increased 2% in the explained variance of social uses of the Internet, thereby suggesting that autonomy of use has an effect on this type of Internet use.

The second model explained a total of 13% in the variance of transaction uses of the Internet. In the first block, only education (β = .236, $p < .001$), age (β = –.107, $p < .05$), and expected outcome (β = .146, $p < .05$) were significant predictors of the dependent variable. In this model, city size and gender did not influence the type of Internet use that was examined. In the second model, only education (β = .200, $p < .001$) and expected outcome (β= .110, $p < .05$) continued to be significant. Autonomy of use had a significant effect (β = .201, $p < .001$), and increased 3% in the variance explained.

The third model predicted participatory uses of the Internet and explained 19% of the variance in this type of Internet use. Significant variables were education (β = .264, $p < .001$), age (β = –.150, $p < .05$), and expected outcomes (β = .247, $p < .001$). In the second model, the same variables remained significant, while autonomy of use (β = .172, $p < .001$) added 1% to the variance explained on participatory uses.

No significant difference existed among the subjects located in larger and less-populated cities regarding how they used the Internet, except for social uses of the Internet. Individuals who live in larger cities use the Internet for social purposes significantly less than individuals living in smaller towns. Education and age were important factors in all different types of use, showing that the more educated and the younger individuals are, the more ways in which they will use the Internet. The expected outcomes of Internet use, measured as the value given to the Internet as a source of information and news, also proved to be a significant factor when examining all types of Internet use. Although this variable only examined the value given to the Internet as a source of information and news, findings suggest that this particular attitude toward the Internet influences all types of use that were measured. Finally, those individuals who had more opportunities to access the Internet from different locations tended to use the Internet in more different ways. Results show that the autonomy of use increased with each of the different types of Internet use that were examined. Those individuals who accessed the Internet from more locations were more likely to use the Internet for social, participatory, and transactional purposes.

In order to answer the fourth research question, only those respondents who reported having used the Internet from their homes were selected. Table 5 shows the results of a set of OLS regression models examining how demographic, attitudinal, and contextual factors influenced how the Internet was used.

Table 5. Regression Models Examining Technical Access as Predictor of Types of Internet Use (N = 387).

	Social		Transactions		Participation	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
City size Large city	–216***	–.218***	–.049	–.050	–.057	–.057
Education level	.124**	.126**	.282***	.282***	.323***	.315***
Age	–.347***	–.344***	–.095	–.095	–.137**	–.143**
Gender (Male)	.054	.053	.058	.046	.078	.071
Motivation	.206***	.207***	.136**	.136**	.235***	.217***
Technical access		–.025		–.002		.172
R^2	24%	24%	11%	11%	20%	20%

**: p <.001, ***: p <.05

The first model explained 24% of the variance. However, technical access, which is the variable of interest in this analysis, did not have any significant effect on the outcome variable. The first block in this model showed that city size (β= −.216, p < .001), education (β = .214, b = p < .05), age (β = −.347, p < .001), and the expected outcome (□ = .206, p < .001) had a significant effect on social uses. When technical access was added, the variance explained did not change, and the coefficients did not change drastically.

The second model explained only 11% of the variance of transactional uses. In the first block, only education (β = .282, p <.001) and expected outcomes (β =.136, p <.05) were significant predictors. When including technical access—measured in terms of the speed of the connection at home—the variance explained remained unaffected. The variable did not have a significant influence over transactional uses.

The third model examined participatory uses of the Internet and explained 20% of the variance of this type of Internet use. The only significant variables were education (β = .323, p < .001), age (β= −.137, p < .05), and the value given to the Internet as a source of information (β = .235, p < .001). In the second model, the same variables remained significant, while technical access did not have a significant effect on this specific type of use.

In sum, results from the three previous models showed that education, age, and expected outcome were significant predictors of all types of Internet use. However, technical access (the connection speed used by individuals from their home to access the Internet) did not have a significant effect on the type of Internet use. No evidence was found that the type of connection, like high-speed connections such as broadband, influenced how individuals used the Internet. While having more opportunities of access influenced how the Internet was used, the speed of connection did not seem to affect how individuals used it.

Discussion

Based on the assumption that access to and use of the Internet can act as facilitators of economic, political, and social opportunities for individuals, this study examined the role that motivational variables, such as the value that individuals give to the Internet as a source of information, and variables related to the autonomy of Internet use—measured in terms of the opportunities to access these technologies from different places—and technical access (that is, the actual speed of the connection), play in the use and types of uses of the Internet. Findings suggest that motivations, defined as the expected outcome of using the Internet (getting information and news), acted as a significant predictor of whether an individual used the Internet or not. Additionally, this factor also influenced the three types of Internet use identified in this study through factor analysis. Motivational access also influenced not only whether but also how an individual might use the Internet.

Findings in this study that are related to the influence that motivational access had on whether an individual did or did not use the Internet open up a new aspect to consider in digital divide studies. While the concept of access has been traditionally tied to the idea of material access, the attitudes that

individuals have regarding a technology might also play an important role in their use of it. In this study, the perception that the Internet is an important source of information and news had a significant effect on the actual use of this technology. This might suggest that individuals who decide to use the Internet most likely believe that it will serve a valuable function as a source of news and information. If this is the case, the public's attitudes toward the Internet should be explored when the government implements policies directed toward offering opportunities of access to the public, especially when evidence that suggests that this attitude is also important for predicting all types of Internet use identified in the study.

Autonomy of use, which was measured as the number of places from which individuals accessed the Internet and which assessed the opportunities of access that individuals have, also seems to influence positively how the Internet is used. All types of use that were identified (that is, social, transactional, and participatory uses) are influenced by the number of places from which individuals can access the Internet. While those who have access from fewer places will employ the Internet less for each of the types of use, those who have more autonomy of access will employ it more for all three types of use. This points to an important research gap regarding how access to ICTs influences how technologies are actually used. Individuals who have more opportunities will expand more on the different types of use, and this might affect how people benefit from actual access to these technologies. While providing public access to the Internet in public libraries or telecenters can offer an improvement, the gap continues to exist when comparing those who have more opportunities of access. This divide suggests that while we assume that the Internet brings financial, educational, and social benefits to individuals, when we look at the amounts in types of use, more opportunities of access imply greater benefits.

Additionally, the influence of autonomy of use on how the Internet is used adds more evidence suggesting that access as a binary concept might not be enough to examine how the gaps in use are configured. An alternative to a "have/have not" dichotomy in the definition of the digital divide is the concept of autonomy of use. The results of this study might imply that while actual access to a computer might make a difference, more access translated into more autonomy can also have an important impact on how the Internet is used.

Findings regarding technical access, as measured in terms of the speed of connection that individuals have at home, offers a completely different view. Connection speed did not influence any of the ways in which the Internet is used. In other words, it did not make any difference whether individuals did or did not have a high-speed connection at home; they used the Internet in the same way. Or put another way, the different types of use are not connected with the speed of the connection that individuals have at home. A possible explanation can be offered when considering that the number of places from which the Internet is accessed does affect the types of use. When individuals have more places from which to connect, the speed of connection from home does not affect their use. It might be the case that they have faster access from other places, such as public libraries, telecenters, or workplaces. In this sense, a possible interpretation of these findings is that the efforts that have focused on offering public high-speed connections through broadband infrastructure in countries such as Colombia, might be benefiting mainly those individuals who have dial-up access from home or Internet cafés. Those individuals might already have the skills and motivation to use the Internet through broadband connections.

Limitations and Future Studies

This study is a first attempt to approach the problem of the digital divide in the Colombian context. As such, it does not answer the core question of how opportunity of access—offered for example through telecenters and public libraries as part of public policy initiatives—influences a person's decision to use the Internet. However, it is a first step in this stream of research. While the most prevalent types of use of the Internet were identified, a stronger and more reliable measure should be developed. Additionally, although the findings in this study suggest that actual use is related with motivational access, skills can be considered an important factor for use and type of use (Van Dijk, 2005). A more detailed study exploring the directions of causation among these variables should be undertaken. This study is cross-sectional and any claims of causal relationships are impossible to make.

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