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E-Government and Digital Inequality:
The Spanish Case Study

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ABSTRACT

The second-level digital divide is generated by a combination of two factors. Firstly, the adoption of advantageous internet uses is strongly related to internet users' material and educational resources. The higher the level of these resources, the higher the probability that advantageous internet uses will be adopted. Secondly, internet users' offline resources have an influence on their digital skills. On the other hand, and according to the third-level digital divide, advantageous internet use is not beneficial per se. In order to obtain tangible benefits from it, an adequate level of digital skills is required. In this paper, the Spanish case is used to study second- and third-level digital divides in relation to e-government. Results show the importance of educational and online resources, as well as higher levels of digital skills, in enhancing the probability of being able to use the internet to interact with the public administration and with government agencies. These results raise important questions in terms of digital citizenship and the democratic divide.

KEYWORDS

Digital Inequality, Digital Skills, E-Government, Internet

INTRODUCTION

Since the early stages of the spread of the internet, academics have been concerned about digital exclusion. They initially focused on the first digital divide, that is: "a technology gap between 'information haves' and 'information have-nots'" (Attewell, 2001, p. 252). Research on this topic analysed inequalities in internet access that were detrimental to traditionally disadvantaged social groups (Di Maggio et al, 2001). For many years, factors such as age, socioeconomic status, and race, were powerful predictors for internet access (Van Dijk, 2020). More recently, however, there has been a considerable increase in access to this tool in western countries.

Having observed the decrease in the differences between population segments in terms of access to the internet, academics began to study the second level of the digital divide, working in two new interconnected areas of research (Lutz, 2019). On the one hand, they analysed the differences between web users in terms of internet usage and, on the other hand, they studied the unequal distribution of digital skills.

Early research on internet usage focused on young people. The results have shown that, even though this population segment has a strong online presence, the type of use young people make of the internet varies considerably depending on the offline resources available to them (Hargittai and Hinnant, 2008). In fact, young people with greater educational and socioeconomic resources tend to adopt uses of the internet that allow them to increase their economic, social and cultural capital with

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greater frequency. In short, such uses provide young users with opportunities for upward mobility that other types of online activities, of a more recreational nature, do not (Lissitsa, 2015). These kinds of internet use are related to: online content creation, news consumption, health and educational information seeking, job hunting, and participation in online political actions. Latterly, the focus of research has begun to broaden, and not only have such differences in use begun to be considered in relation to young people, but also amongst web users of any age. As a result, it has been possible to show how internet users' level of education, socioeconomic status, frequency of use and internet expertise, have a positive effect on the adoption of advantageous internet uses. (Schradie, 2011; Choi and DiNitto, 2013; van Deursen and van Dijk, 2014; Buchi, Just and Latzer, 2015;-DeMarco et al., 2016; Büchi and Vogler, 2017).

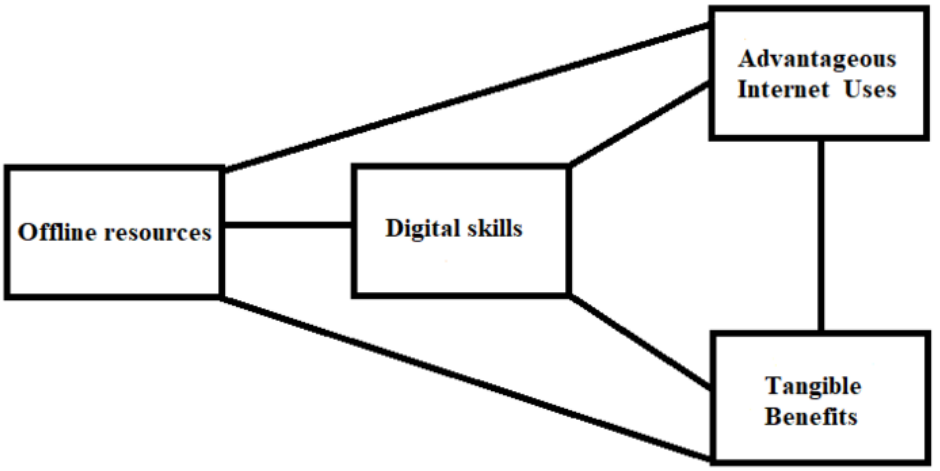
At the same time, a considerable number of investigations have focused on users' ability to navigate the internet (Di Maggio and Hargittai, 2001; Somerville et al, 2008). In this respect, Van Dijk (2006) was the first to explicitly speak of "digital skills", distinguishing between instrumental, information and strategic skills within the same construct. The first refer to computer and network hardware and software handling skills, while the second relate to the ability to search, select and process information. Strategic skills, in turn, allow the internet user to use the information obtained to achieve specific objectives. In 2012, van Deursen and collaborators introduced a fourth dimension; that of "formal" skills, which relate to the hypermedia structure on which the internet is built, and which requires navigation and orientation skills. Van Deursen, Helsper and Enion (2016) went on to add online communication skills: the ability to manage online social network accounts (content, contacts, privacy etc.) appropriately and effectively. Numerous studies attempted to build reliable tools for measuring digital skills while focusing on understanding how this type of competence is distributed within the population. In this way, they analysed the impact web users' material resources have on their acquisition of high levels of digital skills (van Deursen and van Dijk, 2010; 2011). Indeed, empirical studies have revealed that those internet users with a higher level of education and better socioeconomic conditions also appear to have higher levels of digital skills (van Laar, van Deursen and van Dijk, 2020).

In recent years academics have created a new interpretative framework linking the two sides of the study of the second level digital divide. This framework, called the third level digital divide, is grounded on the premise that advanced uses of the internet do not benefit the users who adopt them *per se*. Instead, web users must be highly skilled and strategic in the use of this tool. In other words, where the adoption of uses is the same, the difference in the benefits stemming from them depend on the web users' level of digital skills. Thus, the third level digital divide is articulated around the relationship between web users' material and educational resources, their digital skills, the advanced uses of the internet they adopt, and the benefits they obtain from these (van Deursen et al., 2017, Calderon-Gomez, 2020). The novelty here is the central role that digital skills play (Figure 1).

Socioeconomic variables remain crucial, as they determine web users' level of digital skills, and make it easier for them to adopt advantageous uses of the internet (Scheerder, Van Deursen and Van Dijk, 2017). However, it is the skills with which the tool is managed that allow some web users to obtain benefits from a certain usage that others do not obtain (Helsper, 2016; Dodel and Masch, 2018). In short, the role of digital skills is two-fold: they encourage the adoption of advantageous uses of the internet, and they generate tangible benefits from those uses.

This paper will study the second and third level digital divides in Spain. In order to do so, it will focus on online interactions with public administrative bodies, and the impact that socio-economic factors, online resources, and digital skills have on the adoption of such internet use.

Figure 1. *Model graphic representation of the third digital divide. Source: own elaboration from van Deursen et. al, 2017*



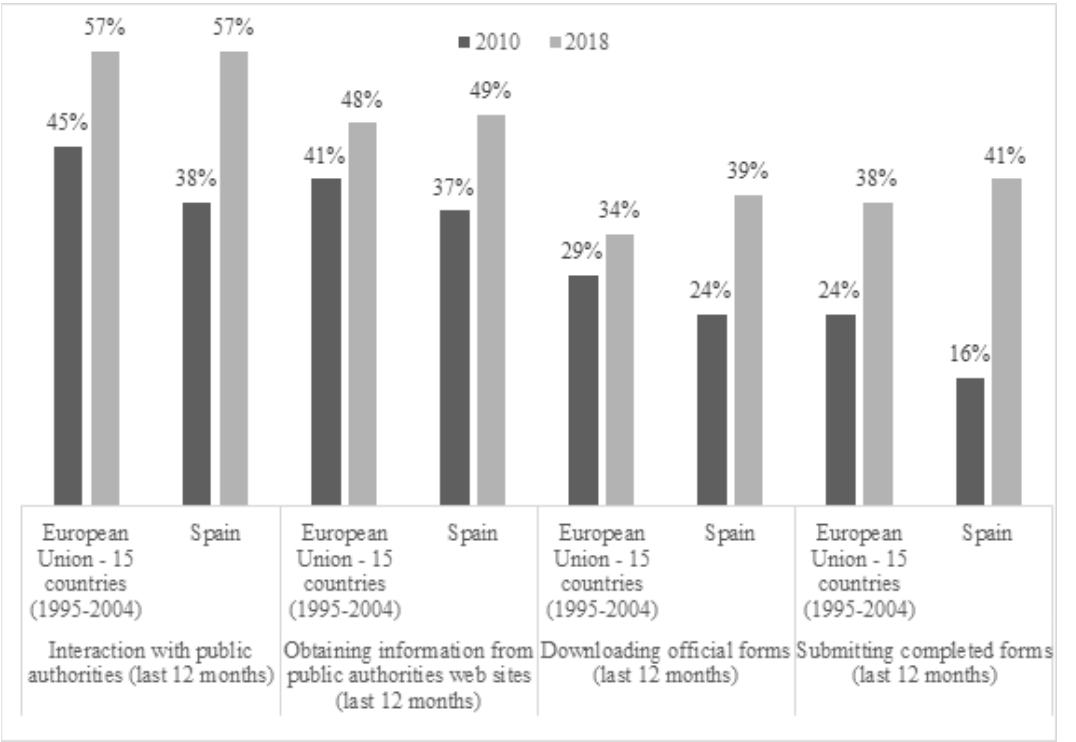
THEORETICAL BACKGROUND

One particularly important case of beneficial internet use is related to e-government, defined as "the use of technology to enhance the access to and delivery of government services to benefit citizens, business partners and employees" (Silcock, 2001, p. 88). Specifically, e-government is the use of new information and communication technologies (ICTs) by government agencies and the public administration, to provide information and services, manage public administration, and encourage citizen participation in political and administrative processes (García and Reyes, 2006). In addition, e-government improves two-way interactions between government and citizens, between government and private organizations (both non-profit and businesses), and between government and public employees, as well as between different governments. Another important characteristic of e-government is a shift in perspective with respect to the citizen who is no longer seen only as an individual with rights, but also as a "customer" to be satisfied (Silcock, 2001; Kumar et al., 2007). In fact, administrations find themselves interacting with citizen/consumers who are increasingly accustomed to obtaining products and services quickly and effectively thanks to the internet, which should translate into incentives to work more efficiently, effectively, economically, quickly and transparently (OECD, 2009). Along these lines, these authors consider that e-government can bring different benefits, both for society as a whole and for individuals. According to Kumar and collaborators (2007), the provision of government services through the internet could make for considerable savings in both time and money for citizens. This technology could also make it possible to personalize the online platforms providing the services, thus adapting them to the specific needs of each person and facilitating the completion of bureaucratic procedures. Lastly, the necessary increase in transparency, related to the digitalization of public administration, may help discourage potential corrupt practices. In addition to these possible benefits, authors such as Naser and Concha (2011), see potential for an improvement in accountability and greater citizen involvement in participatory practices. Yildiz (2007), in turn, considers that the "administrative potential" of the new ICTs may be reflected in increased interactivity between subjects (citizens, businesses and government), as well as in the decentralization of services, increased transparency, and in facilitating accountability.

It is no surprise, therefore, that e-government is one of the priorities on the European digital agenda and that, following the Malmo declaration in 2009, two e-government action plans have

already been implemented (2011-2015 and 2016-2020). These plans were aimed at promoting digital interaction between citizens and public administrations at all levels (city, region, country and EU), in order to empower citizens and businesses, promote efficient administration, and improve mobility within the single market. As a result, an increase in the spread of this use of the internet in European and Spanish populations has been discernible in recent years (Figure 2).

Figure 2. *Evolution of e-government indicators (2010-2018). 15 EU countries and Spain. Source: own elaboration based on Eurostat data*



Thus, analysing the period from 2010 to 2018, online interactions with authorities can be seen to have increased by an average of 12 percentage points in the 15 EU countries, and by 19 in Spain. In the same period, the use of the internet to obtain information from official public administration websites increased by an average of 7 percentage points in the EU-15, and by 12 in Spain. In addition, the download and sending of online forms increased by 5 and 14 percentage points respectively in the EU, and by 15 and 25 points respectively in Spain.

Notwithstanding these promising trends, many authors have sought to study factors that can help to spread e-government still further within the population. The first studies carried out in this field focused primarily on perceptions and attitudes that may facilitate or hinder the adoption of this use of the internet. This research is based on the technology acceptance model (Davis, 1989) and subsequent developments (Gilbert, Ballestrini and Littleboy, 2004; Lin, Fofanah and Liang, 2011; Rufin, Medina and Sanchez, 2012; Kurfali et al., 2017).

According to these models, perceived usefulness and perceived ease of use are the most influential factors when it comes to whether a person will adopt e-government-related internet uses. At the same time, these models also take into account the impact that variables such as trust and risk perception

have on the adoption of this use of the internet. Studies then went on to focus on the management aspect of e-government, analysing the potential impact of the digitization of the public administration on service delivery, cost reduction, human resources, organizational structures, processes, and staff performance (for a summary, see Gil-García, Dawes and Pardo, 2018).

However, more recently, authors like Helbig, Gil Garcia and Ferro (2009) have highlighted the need to incorporate the digital inequality approach into the study of e-government, analysing the importance of material and educational resources for the adoption of this beneficial use of the internet. Indeed, some studies have shown how younger people with higher incomes and a higher level of education are more likely to use ICTs to interact with government agencies and the public administration (Decman, 2018; Rosenmberg, 2018; Choi and Park, 2013; Robles et al., 2010; Robles et al., 2011). In recent years, empirical evidence has also begun to emerge regarding the important role that digital skills play in facilitating the adoption of this use of the internet (van Deursen and van Dijk, 2009; Ebbers, Jansen and van Deursen, 2016; Lee and Porumbescu, 2019).

All these studies seem to point to the potential existence of second and third level digital divides in relation to e-government. Were this to be the case, it would necessitate serious reflection on issues surrounding guaranteeing citizens' access to certain public services, regardless of their economic and educational resources or the level of their digital skills. In this respect, Mossberger (2009) raised the issue of how the concept of digital citizenship - the ability to participate in society online – brings with it the need for policy to promote the effective use of the internet by encouraging computer literacy and facilitating regular web access. This is because the unequal distribution of political uses of the internet, such as e-government, would be at the root of a specific form of digital inequality: the *democratic divide* (Norris, 2001; Min, 2010). Not only would this entail the unequal distribution of the benefits that political uses of the internet entail, it would also have significant consequences in terms of political equality. Indeed, this type of gap would lead to the exclusion of certain citizens from online social and political life, on the basis of their financial resources, education and level of computer literacy. Moreover, it would mean that certain less advantaged social segments would not be taken into account as "typical users" in the designs for the online participation platforms generated by public administrations (Norris and Curtice; 2006), thus making it even more difficult for them to be included in online participatory processes. As a result, digital interactions between citizens and government would no longer be governed by the principle of isonomy, i.e., the equality of citizens before the law, since the less advantaged would be excluded from this relationship. This, in turn, would divide citizens into two categories: those who benefit from the political opportunities provided by the internet and those who are excluded from online participation processes.

Despite the great relevance of this topic, there is still insufficient research to clearly establish the presence of a second and third level gap in relation to the use of the internet to interact with government agencies or public administration. Moreover, this lack is even more evident when we consider the Spanish case study. The aim of this investigation is to try to fill this gap, analysing the joint impact of web users' material, educational and online resources as well as their digital skills, on the adoption of internet uses related to e-government. To this end, data from the "Equipment and Use of Information and Communication Technologies in Households (ICT-H)" survey by the Spanish National Institute of Statistics (INE) for the year 2019 were used to perform three binary logistic regression models. Based on the results obtained, observations are then made in relation to the phenomenon of digital inequality and the democratic divide in Spain.

METHODOLOGY

Data

"Equipment and Use of Information and Communication Technologies in Households (ICT-H)" is a rotating panel survey in which a quarter of the total sample participates each year. The universe to which it refers is the resident population in Spain aged 16 and over, of both sexes, living in family

dwellings within Spain. To carry out the study, the INE implemented three-stage sampling with stratification of first stage units (census sections) based on the size of the municipality in which they are located. The second stage units are the main family dwellings, and, in each of these, a person aged over 15 is selected (third stage). If the variable "internet use in the last three months" is taken as a reference, the sampling error for the 2019 survey was ±0.27% using Jackknife method criteria and a 95% confidence level.

To stop factors relating to the first level digital divide influencing the analyses, the sample was restricted to internet users. That is, those people who had used the internet in the three months prior to the survey. Therefore, a total of 12,920 participants were included.

Analyses

To meet the research objectives, this study focused on ascertaining the impact of web users' resources and digital skills on the adoption of three uses of the internet related to e-government. To this end, three models of binary logistic regression were carried out using the indicators referred to as dependent variables in the previous section. The initial hypothesis was that people who have higher levels of economic, educational and online resources, and higher levels of digital skills, would be more likely to adopt the three uses of the internet. To test this hypothesis, all three models were implemented using the "inclusion of variables by steps" strategy, so as to attempt to isolate the effects of the different independent variables on the dependent variables. We know from previous research (van Deursen et al., 2017) that internet users' resources influence the acquisition of digital skills and advantageous internet uses. At the same time, we know that digital skills facilitate beneficious internet use. Consequently, the "by steps" analytical strategy should allow us to consider this concatenation of influences. In the first step, socio-demographic variables were introduced. In the second, the variables relating to online resources were introduced, and in the final step, the digital skills variable was incorporated.

Variables

Three dependent variables were chosen; one for each model implemented: obtaining information from public authorities' web sites (last 12 months), downloading official forms (last 12 months), and submitting completed forms (last 12 months). The three indicators are dichotomous indicators. The percentages for each of them can be seen below (Table 1).

Table 1. Dependent variable response percentages. Source: own elaboration based on INE data.

	Obtaining information from public authorities' web sites	Downloading official forms	Submitting completed forms
No	47.6%	60.9%	49.8%
Yes	52.4%	39.1%	50.2%

These variables are used by the United Nations to assess the development of "effective, accountable and transparent institutions at all levels", as part of a strategy to "promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable and inclusive institutions at all levels." (ITU, 2015, p. 16). These 3 indicators allow us to understand whether individuals use the internet to interact with, and obtain information from, general government institutions. Furthermore, these indicators show increasing complexity in patterns of online interaction with the public administration, running from a greater ease of information collection, to a more complex submission of forms. The latter, moreover, has a performative value, since it represents the beginning of a formal bureaucratic procedure (Yera et al., 2020).

As mentioned previously, the independent variables were grouped into 3 different blocks: socio-economic and demographic variables, online resources, and digital skills. All have been proved to have some kind of effect on the adoption of advanced internet use. Consequently, it is reasonable to expect them to interact in the same way with e-government. Among the socio-economic and demographic variables, indicators of internet users' educational achievement and their economic resources were included, due to the fact that literature on the second level digital divide has shown that these factors have a positive effect on the adoption of advanced internet use (Büchi and Vogler, 2017). Age has also been included in this this set of variables, since it has been shown to negatively influence the acquisition of advanced internet use (Francis et al, 2018). Finally, an indicator concerning sex has been included in this set of independent variables. Even if the role of gender in the digital inequality phenomenon has not been completely defined (Drabowicz, 2014), some studies show that a gender gap in relation to ICT use could appear, depending on a given country's level of economic and social development (Bhandari, 2019). Consequently, this has been included as a control variable. The second package of independent variables was related to internet users' online resources. On the one hand, these can be assessed in terms of technological resources for internet connection (Van Deursen and Van Dijk, 2019). On the other hand, online resources also depend on frequency of internet use, and the ubiquity of internet connections. All of these indicators have been showed to be positively related to advanced internet use (Peter and Valkenburg, 2006; Olson et. al, 2011; Lee, Park and Hwang, 2015; Buchi, Just and Latzer, 2015; Calderón-Gómez, 2019). Consequently, variables assessing frequency of use, the number of technologies used to connect to the internet outside the home, and the technologies available within the household, were included. The last of these was obtained by adding up interviewees' scores in the dichotomous items that measured the presence of different devices in the home: computers, televisions, landlines, mobile phones, radios, sound systems, mp3 or mp4 players, VCRs, DVD players and e-book readers. The range of this variable is from 0 to 10. The variable assessing the number of technologies used to connect to the internet outside the home was constructed from four dichotomous indicators: mobile phone use, laptop use, tablet use, and use of other devices. For each indicator with a positive response, a score equal to "1" was assigned. Thus, the variable ranges from 0 to 4. Finally, in the third step, digital skills were included. As stated above, previous research on this topic has shown that digital skills facilitate the adoption of advanced internet use, and, simultaneously, the obtention of tangible outcomes from it (Helsper, 2016). Thus, a variable was created to measure the digital skills of the people interviewed. The INE survey includes a battery of 10 items relating to instrumental skills (van Dijk, 2006), that is, those related to the use of software and programs of different types. Interviewees' responses to these items were added together to obtain a numerical variable from 0 to 10. All of the independent variables included in the model are described in table 2.

RESEARCH FINDINGS

The First Model

The dependent variable in this case was the indicator: "Obtaining information from public authorities' web sites". In the first step of the model, in which socio-demographic variables were introduced, the "level of studies" was seen to have a significant positive impact on the dependent variable (Table 3).

In fact, for each of the "level of studies" categories, there was an increase in the probability of using the internet to search for information from official websites when compared to the "no formal education" category. In addition, an increase in this probability was observed as the "level of studies" increased. As for "household income"; thishad a significant positive impact in the first two steps of the model. However, in the third step, only the category "from 2500 to 2999 euros per month" followed this pattern. In this case, therefore, the introduction of "digital skills" seems to have reduced the impact of the "household income level". Lastly, "age" and "sex" did not prove to have a significant relationship with the dependent variable.

Table 2. Variables included in the regression models. Source: own elaboration based on INE data

Variable Name	Type of Variable	Response Categories/Range
Sex	Dichotomic	1) Male 2) Female
Level of studies	Ordinal	1) No formal education 2) Primary school 3) First stage secondary 4) Second stage secondary 5) Post-secondary non higher education 6) Superior level - vocational training 7) University degree 8) Master of Arts / Sciences 9) PhD
Household income	Ordinal	1) Less than 900 euros per month 2) From 900 to 1599 euros per month 3) From 1600 to 2499 euros per month 4) From 2500 to 2999 euros per month 5) 3000 or more euros per month
Internet use several times per day	Dichotomic	1) No 2) Yes
Technology available in the household	Numeric, discrete	From 0 to 10
Number of technologies used to connect to the internet outside the home	Ordinal	From 0 to 4
Digital skills	Numeric, discrete	From 0 to 10

In terms of technology resources and internet use patterns, only "Number of technologies used to connect to the internet outside the home" was found to have a significant relationship with the dependent variable. This relationship, which is positive, can be seen in three of the different types of technology used to go online from outside the home. The "use of internet several times a day" and the "technology available in the household" stopped being facilitators for the use of the internet to consult official web pages, at the point at which the "digital skills" of the web user were included in the model.

Digital skills had a significant positive relationship with the dependent variable. That is, the higher the level of digital skill, the higher the probability of using the internet to obtain information from the online websites of public authorities.

In relation to the model's capacity to predict the dependent variable, it must be noted that in the course of the three steps, precision in estimating the subjects' responses increased. The overall percentages of correct classification, in fact, went from 69.2% in the first block of variables (49.2% true negative) to 74.5% in the third (63.7% true negative). Furthermore, the Cox and Snell R^2 and the Nagelkerke R^2 went from 15.8% to 25.2% and from 21.4% to 34%, respectively, thus revealing an increase in the scope of the effect of the model as the independent variables were introduced.

The Second Model

To implement the second logistic regression model, the dichotomous indicator "downloading official forms in the last 12 months" was used as a dependent variable (Table 4). Once again, the results show the non-significance of the relationship of the variables "age", "sex" and "household income" with the dependent variable. It should also be noted that income, as in the previous model, was shown to have a positive influence on the probability of downloading forms online in the first two steps. However, the introduction of "digital skills" in the third step made this influence insignificant yet again. On the other hand, the "level of studies" turned out to have a positive relationship with the dependent variable. Indeed, the probability of downloading forms online was shown to increase where web users' level of study increased.

Table 3. First model regression coefficients. Source: own elaboration from INE data.

	STEP 1			STEP 2			STEP 3		
	B	**S.D.**	**Exp(B)**	**B**	**S.D.**	**Exp(B)**	**B**	**S.D.**	**Exp(B)**
Age	-0.02***	0.002	0.98	-0.017***	0.002	0.983	0.003	0.002	1.003
Sex – Female	0.08	0.048	1.083	0.052	0.049	1.053	-0.109	0.052	0.897
Level of studies (reference "no formal education")									
Level of studies – Primary	0.57	0.297	1.775	0.489	0.299	1.631	0.396	0.306	1.486
Level of studies – First stage secondary	1.197***	0.284	3.309	1.042***	0.287	2.836	0.938***	0.294	2.554
Level of studies – Second stage secondary	1.974***	0.284	7.199	1.707***	0.287	5.515	1.32***	0.295	3.744
Level of studies - Post-secondary non-higher education	1.806***	0.403	6.086	1.534***	0.408	4.639	1.084*	0.422	2.957
Level of studies – Superior level vocational training	2.167***	0.288	8.735	1.86***	0.291	6.422	1.314***	0.3	3.721
Level of studies – University Degree	2.563***	0.289	12.975	2.228***	0.293	9.281	1.6***	0.301	4.955
Level of studies - MA or University Degree lasting 4-6 years	2.819***	0.289	16.767	2.426***	0.293	11.313	1.668***	0.301	5.304
Level of studies – PhD	3.262***	0.391	26.114	2.826***	0.397	16.883	1.936***	0.407	6.932
Household income (reference less than 900 euros per month)									
Household income - 900 to 1599 euros per month	0.15	0.072	1.165	0.057	0.074	1.059	0.04	0.077	1.041
Household income - 1600 to 2499 euros per month	0.458***	0.077	1.582	0.268***	0.08	1.308	0.147	0.084	1.158
Household income - 2500 to 2999 euros per month	0.768***	0.102	2.155	0.513***	0.106	1.671	0.327**	0.111	1.387
Household income - 3000 or more euros per month	0.7***	0.096	2.015	0.34***	0.101	1.404	0.172	0.106	1.188
Internet use several times per day				0.581***	0.123	1.787	0.317	0.126	1.373
Technology available in the household				0.108***	0.012	1.114	0.048	0.013	1.049
Number of technologies used to connect to the internet outside the home (reference "0")									
Number of technologies used to connect to the internet outside the home - 1				0.304	0.146	1.355	0.247	0.15	1.28
Number of technologies used to connect to the internet outside the home - 2				0.638***	0.152	1.894	0.327	0.158	1.387
Number of technologies used to connect to the internet outside the home - 3				0.915***	0.161	2.497	0.481**	0.167	1.618
Number of technologies used to connect to the internet outside the home - 4				1.348***	0.192	3.848	0.714***	0.2	2.043
Digital skills							0.274***	0.011	1.315
Constant							-3.14***	0.367	0.043

continued on next page

Table 3. Continued

	STEP 1			STEP 2			STEP 3		
	B	**S.D.**	**Exp(B)**	**B**	**S.D.**	**Exp(B)**	**B**	**S.D.**	**Exp(B)**
R^2 Cox and Snell			15.8%			18.8%			25.2%
R^2 Nagelkerke			21.4%			25.4%			34.0%
Correct classification percentage "0"			49.2%			52.7%			63.7%
Correct classification percentage "1"			82.7%			82.7%			81.9%
Correct classification percentage total			69.2%			70.6%			74.5%

Regarding "technology available in the household" and the "Number of technologies used to connect to the internet outside the home", both variables are shown to have a positive relationship with the dependent variable. Therefore, as the technological resources present in the home increased, and as the number of different technologies used to go online from outside the home increased, the probability of downloading forms online also increased. At the same time, it is worth noting that, in contrast to the previous model, the "use of the internet several times per day" had a significant positive relationship with the dependent variable.

Finally, the "digital skills" indicator, introduced in the third step, was also shown to have a significant positive effect on the probability that an internet user would have downloaded forms online in the 12 months prior to the survey. In fact, the higher the level of digital skills, the greater the likelihood that this internet use would be adopted.

In the second regression model, the accuracy of the predictions increased as the independent variables were introduced in three steps. The overall percentage of correct classification went from 66.6% (63.3% true positive) to 72.4% (73.4% true positive). In addition, increases in Cox and Snell's R^2 (from 16% to 25.2%) and of Nagelkerke's R^2 (from 21.4% to 33.6%) have been observed.

The Third Model

In the third and last model implemented, "age" turned out to have a significant positive relationship with the dependent variable "submitting completed forms" (Table 5). In other words, the older the web user, the greater the probability of adopting this use of the internet. It must be noted, however, that the direction of this relationship shifted in the very last step when "digital skills" were introduced and the relationship went from negative to positive. It is possible that, once resources and digital skills are controlled for, age gains importance in generating the need to interact with public administration. In other words, the use of online forms is more likely to occur in older people, for whom there is a more frequent need to carry out different types of bureaucratic procedures. On the other hand, "sex" has shown a significant negative relationship with the sending of completed forms. Therefore, men would be more likely to adopt this use of the internet. Finally, it is worth noting how both "level of studies" and "household income" maintain a positive relationship with this dependent variable. In the first case, every category of the variable besides "primary", "first stage of secondary" and "post-secondary non-higher education", increased the probability of using the internet to send completed forms with respect to the reference category. In terms of income, all the categories of the variable had a significant positive impact on the dependent variable compared to the category "less than 900 euros".

As for the second step of the model, "technology available in the household" and "internet use several times per day" had a significant positive relationship with the use of the internet to send completed forms. However, the "number of technologies used to connect to the internet outside the home" only facilitates the adoption of this internet use in the case of using all four technologies

Table 4. Second model regression coefficients. Source: own elaboration based on INE data

	STEP 1			STEP 2			STEP 3		
	B	**S.D.**	**Exp(B)**	**B**	**S.D.**	**Exp(B)**	**B**	**S.D.**	**Exp(B)**
Age	-0.02***	0.002	0.98	-0.016***	0.002	0.984	0.004	0.002	1.004
Sex - Female	0.16	0.047	1.177	0.131*	0.048	1.14	-0.033	0.051	0.967
Level of studies (reference "no formal education")									
Level of studies - Primary	0.65	0.412	1.918	0.565	0.414	1.759	0.47	0.424	1.6
Level of studies – First stage secondary	1.371***	0.396	3.94	1.203**	0.398	3.331	1.077*	0.408	2.936
Level of studies – Second stage secondary	2.139***	0.395	8.492	1.857***	0.398	6.405	1.44***	0.408	4.222
Level of studies - Post-secondary non-higher education	2.018***	0.49	7.526	1.746***	0.494	5.729	1.288	0.509	3.626
Level of studies - Superior level vocational training	2.438***	0.398	11.446	2.124***	0.4	8.361	1.575***	0.411	4.832
Level of studies – University Degree	2.832***	0.398	16.976	2.488***	0.401	12.042	1.871***	0.411	6.498
Level of studies - MA or University Degree lasting 4-6 years	3.081***	0.398	21.774	2.684***	0.4	14.644	1.949***	0.411	7.022
Level of studies – PhD	3.522***	0.452	33.845	3.092***	0.457	22.018	2.234***	0.469	9.336
Household income (reference less than 900 euros per month)									
Household income - 900 to 1599 euros per month	0.1	0.076	1.101	0.002	0.078	1.002	-0.029	0.082	0.971
Household income - 1600 to 2499 euros per month	0.4***	0.079	1.492	0.218*	0.082	1.244	0.087	0.086	1.091
Household income - 2500 to 2999 euros per month	0.584***	0.098	1.793	0.34***	0.102	1.405	0.139	0.106	1.149
Household income - 3000 or more euros per month	0.61***	0.093	1.841	0.264*	0.097	1.303	0.095	0.102	1.099
Internet use several times per day				0.798***	0.147	2.221	0.514***	0.151	1.671
Technology available in the household				0.103***	0.012	1.109	0.048***	0.013	1.049
Number of technologies used to connect to the internet outside the home (reference "0")									
Number of technologies used to connect to the internet outside the home - 1				0.451*	0.171	1.57	0.383	0.177	1.467
Number of technologies used to connect to the internet outside the home - 2				0.801***	0.175	2.228	0.504**	0.181	1.655
Number of technologies used to connect to the internet outside the home - 3				0.987***	0.18	2.683	0.569**	0.187	1.767
Number of technologies used to connect to the internet outside the home - 4				1.447***	0.199	4.252	0.854***	0.206	2.348
Digital skills							0.262***	0.01	1.299
Constant							-4.363***	0.479	0.013

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Table 4. Continued

	STEP 1			STEP 2			STEP 3		
	B	**S.D.**	**Exp(B)**	**B**	**S.D.**	**Exp(B)**	**B**	**S.D.**	**Exp(B)**
R^2 Cox and Snell			16.0%			19.1%			25.2%
R^2 Nagelkerke			21.4%			25.6%			33.6%
Correct classification percentage "0"			69.4%			71.0%			73.4%
Correct classification percentage "1"			63.3%			65.6%			71.2%
Correct classification percentage total			66.6%			68.5%			72.4%

included in the survey. Lastly, consistent with what was shown in the two previous models, the results indicated the positive impact of "digital skills" on the dependent variable.

Yet again, the model shows an increase in the accuracy of the estimation as the variables are introduced in the different steps. The overall correct classification percentage goes from 66.8% (50.8% true negative) to 72% (62.5% true negative). The Cox and Snell R^2 and the Nagelkerke R^2 go from 13% and 17.4% to 21.4% and 28.7% respectively.

CONCLUSION

This paper has analysed the phenomenon of digital inequality in the field of e-government. Specifically, the aim was to monitor the potential presence of a second and third level divide in Spain in relation to three uses of the internet: "obtaining information from public authorities' web sites", "downloading official forms" and "submitting completed forms". The results have shown how, in the three logistic regression models implemented, web users with higher levels of study are more likely to adopt these uses of the internet. The quantity of technological resources present in the home also has a positive relationship with the three dependent variables. In addition, the use of the internet several times per day, and the number of technologies used to connect to the internet outside the home, increase the probability of "downloading official forms" and "submitting completed forms". Furthermore, household income is positively related to submitting completed forms online, as is the case with age and being male. Finally, digital skills had a significant positive relationship with the three dependent variables. In the three models implemented, moreover, the introduction of this variable mitigated the impact of internet users' material resources, particularly households' monthly incomes.

These results appear to indicate that we are indeed witnessing a second and third level digital divide phenomenon in Spain in relation to internet use for interaction with the administration. All of this points to the need for a series of reflections on the relationship between digital inequality and participatory usage of the internet. Firstly, we might consider that web users' educational and material resources influence their chances of participating in political usage of the internet, and their chances of taking advantage of the benefits provided by e-government. This has relevant consequences in terms of equality, since it could mean that only those segments of the population that are characterized by a greater concentration of resources might enjoy more effective and more immediate interactions with government agencies and public administration. Secondly, we might consider that the extent of the internet's penetration into citizens' lives, and their skill in the use of this tool, become fundamental requirements for a democratic participation via the same medium. In terms of Norris' democratic divide concept (2001), the capacity to use the internet could be understood to be a key element in this kind of divide. In other words, citizens with a greater capacity to use the internet will have a

Table 5. Third model regression coefficients. Source: own elaboration from INE data.

	STEP 1			STEP 2			STEP 3		
	B	**S.D.**	**Exp(B)**	**B**	**S.D.**	**Exp(B)**	**B**	**S.D.**	**Exp(B)**
Age	-0.015***	0.002	0.985	-0.012***	0.002	0.988	0.007***	0.002	1.007
Sex - Female	0.01	0.046	1.007	-0.022	0.047	0.978	-0.173***	0.05	0.841
Level of studies (reference "no formal education")									
Level of studies - Primary	0.31	0.266	1.36	0.236	0.269	1.266	0.15	0.274	1.162
Level of studies – First stage secondary	0.832***	0.253	2.298	0.697*	0.256	2.008	0.595	0.261	1.814
Level of studies – Second stage secondary	1.467***	0.253	4.335	1.223***	0.256	3.397	0.848***	0.262	2.334
Level of studies - Post-secondary non-higher education	1.214***	0.38	3.367	0.967	0.384	2.63	0.537	0.396	1.71
Level of studies - Superior level vocational training	1.729***	0.258	5.633	1.452***	0.261	4.271	0.944***	0.267	2.569
Level of studies – University Degree	2.08***	0.259	8.004	1.774***	0.262	5.895	1.188***	0.268	3.282
Level of studies - MA or University Degree lasting 4-6 years	2.183***	0.258	8.876	1.822***	0.261	6.182	1.111***	0.268	3.038
Level of studies – PhD	2.429***	0.341	11.345	2.033***	0.347	7.637	1.199***	0.355	3.317
Household income (reference less than 900 euros per month)									
Household income - 900 to 1599 euros per month	0.29***	0.071	1.336	0.211**	0.073	1.235	0.208*	0.076	1.231
Household income - 1600 to 2499 euros per month	0.656***	0.076	1.927	0.496***	0.078	1.642	0.405***	0.082	1.499
Household income - 2500 to 2999 euros per month	0.815***	0.098	2.259	0.596***	0.101	1.815	0.435***	0.105	1.545
Household income - 3000 or more euros per month	0.793***	0.092	2.21	0.481***	0.097	1.617	0.344***	0.101	1.411
Internet use several times per day				0.797***	0.126	2.219	0.567***	0.128	1.763
Technology available in the household				0.095***	0.012	1.099	0.04***	0.013	1.041
Number of technologies used to connect to the internet outside the home (reference "0")									
Number of technologies used to connect to the internet outside the home - 1				0.18	0.143	1.198	0.119	0.147	1.126
Number of technologies used to connect to the internet outside the home - 2				0.487***	0.149	1.627	0.196	0.154	1.216

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Table 5. Continued

	STEP 1			STEP 2			STEP 3		
	B	**S.D.**	**Exp(B)**	**B**	**S.D.**	**Exp(B)**	**B**	**S.D.**	**Exp(B)**
Number of technologies used to connect to the internet outside the home - 3				0.691***	0.157	1.996	0.286	0.162	1.331
Number of technologies used to connect to the internet outside the home - 4				1.071***	0.182	2.918	0.493*	0.189	1.638
Digital skills							0.246***	0.01	1.279
Constant							-3.116***	0.339	0.044
R^2 Cox and Snell			13.0%			15.8%			21.4%
R^2 Nagelkerke			17.4%			21.1%			28.7%
Correct classification percentage "0"			50.8%			54.1%			62.5%
Correct classification percentage "1"			79.0%			79.6%			79.2%
Correct classification percentage total			66.8%			68.6%			72.0%

greater chance of benefitting from the democratic possibilities, and the advantages, that it offers. On the other hand, citizens with fewer capabilities will be prevented from opting into said benefits. Finally, a third conclusion can be drawn from this research in terms of the democratic divide. As the existing literature on the topic suggests (van Dijk, 2020), digital skills appear with greater frequency among more advantaged people. Thus, people with greater economic resources and a higher level of education are more capable of navigating the web, and therefore have better chances of making political us of the internet.

These thoughts lead to a theoretical conclusion of vital importance. If the political use of the internet generates advantages for its users, digital skill may be becoming a chain of transmission from social inequalities to the democratic divide. In fact, a tremendous democratic problem would occur if only people with a high level of both offline and online resources were capable of taking part in online forms of political action. The very foundations of a democratic system, based in concepts such as isonomy and isegory, i.e., that all citizens are equal by law and have the same opportunity of participation, would be seriously damaged by such an occurrence (Robles, 2008). In fact, by excluding a part of the population from online interaction with the public administration, the third level digital divide would create differences between citizens, clearly demonstrating the existence of a "first class" and a "second class" citizenship.

While the internet has been viewed with optimism for many years due to its innovative and democratizing potential, many authors have warned how, in practice, this tool only serves to help strengthen the position of those who already have a prominent position in the offline world (Margolis and Resnik, 2000). In fact, the lack of sufficient levels of digital skills across the whole strata of society, has turned this tool into a vector of inequality, since the most advanced uses and the benefits derived from them, seem to yield positive results only in those segments of the population with greater material and digital resources. If it is true that inequality in the distribution of material resources is an extremely complicated issue to deal with in the short term, digital literacy should be a priority for all educational systems. Digital skills, like literacy skills for 20th century societies, should be considered a universal educational objective. In other words, they should be taught in schools as core subjects, since the proper development of people's public and social life in the 21st century, depends on them. The internet is here to stay, and it is taking over many of the spaces that were previously

reserved for face-to-face activities. Without adequate training in the use of this tool, digital citizens of different categories and worth will be generated, since not everyone will be able to take advantage of the opportunities that this technology has to offer. It is of fundamental importance, therefore, that the legislatorial and the educational community start dealing with this issue and make the fight against digital illiteracy one of their primary objectives.

LIMITATIONS

The *digital skills* variable only includes indicators relating to skill in the use of hardware and software (instrumental skills). An important addition would have been made were it possible to ascertain the impact of the other dimensions of the construct, such as information and strategic skills (van Dijk, 2006), as well as formal and communication skills (van Deursen et al., 2012; van Deursen, Helsper and Enion, 2016) since, at least on a theoretical level, they should also facilitate e-government-related behaviours.

The impact of digital skills on the ability to achieve tangible benefits from e-government-related internet uses is another important issue yet to be addressed. The survey used did not include indicators to measure such benefits.

Therefore, further analysis using more data in future, would certainly be advisable.

REFERENCES

Attewell, P. (2001). The first and second digital divides. *Sociology of Education*, *74*(3), 252–259. doi:10.2307/2673277

Bhandari, A. (2019). Gender inequality in mobile technology access: The role of economic and social development. *Information Communication and Society*, *22*(5), 678–694. doi:10.1080/1369118X.2018.1563206

Büchi, M., Just, N., & Latzer, M. (2015). Modeling the second-level digital divide: A five-country study of social differences in Internet use. *New Media & Society*, *18*(11), 2703–2722. doi:10.1177/1461444815604154

Büchi, M., & Vogler, F. (2017). Testing a Digital Inequality Model for Online Political Participation. *Socius: Sociological Research for a Dynamic World*, *3*. doi:10.1177/2378023117733903

Buhtz, K., Reinartz, A., König, A., Graf-Vlachy, L., & Mammen, J. (2016). *Second-order digital inequality: A clickstream analysis of e-commerce use*. *New Media & Society*. doi:10.1177/1461444820933252

Calderón Gómez, D. (2019). Technological capital and digital divide among young people: An intersectional approach. *Journal of Youth Studies*, *22*(7), 941–958. doi:10.1080/13676261.2018.1559283

Choi, N. G., & DiNitto, D. M. (2013). The Digital Divide Among Low-Income Homebound Older Adults: Internet Use Patterns, eHealth Literacy, and Attitudes Toward Computer/Internet Use. *Journal of Medical Internet Research*, *15*(5), e93. doi:10.2196/jmir.2645 PMID:23639979

Choi, Y.-T., & Park, S. (2013). Understanding gender inequality in central e-government: A Korean case study. *Government Information Quarterly*, *30*(3), 300–309. doi:10.1016/j.giq.2013.01.003

Davis, F. D. (1989). *Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. Academic Press.*

De Marco, S., Robles, J. M., Antino, M., & Fernandez, E. G. (2016). Influence of abilities for searching commercial information online on e-shopping: When inequality affects business. *Journal of Globalization. Competitiveness & Governability*, *10*(3), 136–152.

Dečman, M. (2018). The Analysis of E-Government Services Adoption and Use in Slovenian Information Society between 2014 and 2017. *Central European Public Administration Review*, *16*(2), 193–215. doi:10.17573/cepar.2018.2.10

DiMaggio, P., Hargittai, E., Celeste, C., & Shafer, S. (2004). From unequal access to differentiated use: A literature review and agenda for research on digital inequality. In K. M. Neckerman (Ed.), *Social Inequality*. Russell Sage Fundation.

DiMaggio, P., Hargittai, E., Neuman, R. W., & Robinson, J. P. (2001). Social implications of the Internet. *Annual Review of Sociology*, *27*(1), 307–336. doi:10.1146/annurev.soc.27.1.307

Dodel, M., & Mesch, G. (2018). Inequality in digital skills and the adoption of online safety behaviors. *Information Communication and Society*, *21*(5), 712–728. doi:10.1080/1369118X.2018.1428652

Drabowicz, T. (2014). Gender and digital usage inequality among adolescents: A comparative study of 39 countries. *Computers & Education*, *74*, 98–111. doi:10.1016/j.compedu.2014.01.016

Ebbers, W. E., Jansen, M. G. M., & van Deursen, A. J. A. M. (2016). Impact of the digital divide on e-government: Expanding from channel choice to channel usage. *Government Information Quarterly*, *33*(4), 685–692. doi:10.1016/j.giq.2016.08.007

Francis, J., Kadylak, T., Makki, T. W., Rikard, R. V., & Cotten, S. R. (2018). Catalyst to Connection: When Technical Difficulties Lead to Social Support for Older Adults. *The American Behavioral Scientist*, *62*(9), 1167–1185. doi:10.1177/0002764218773829

Gil-Garcia, J. R., Dawes, S. S., & Pardo, T. A. (2018). Digital government and public management research: Finding the crossroads. *Public Management Review*, *20*(5), 633–646. doi:10.1080/14719037.2017.1327181

Gil-García, J. R., & Luna-Reyes, L. F. (2006). Integrating conceptual approaches to e-government. In M. Khosrowpour (Ed.), *Encyclopedia of e-commerce, e-government, and mobile commerce* (pp. 636–643). IGI Global. doi:10.4018/978-1-59140-799-7.ch102

Gilbert, D., Balestrini, P., & Littleboy, D. (2004). Barriers and benefits in the adoption of e-government. *International Journal of Public Sector Management*, *17*(4), 286–301. doi:10.1108/09513550410539794

Hargittai, E., & Hinnant, A. (2008). Digital Inequality: Differences in Young Adults' Use of the Internet. *Communication Research*, *35*(5), 602–621. doi:10.1177/0093650208321782

Helbig, N., Gil-García, R. J., & Ferro, E. (2009). Understanding the complexity of electronic government: Implications from the digital divide literature. *Government Information Quarterly*, *26*(1), 89–97. doi:10.1016/j.giq.2008.05.004

Helsper, E. J. (2016). Inequalities in digital literacy: definitions, measurements, explanations and policy implications. In Pesquisa sobre o uso das tecnologias de informação e comunicação nos domícilios brasileiros: TIC domiclios 2015 (pp. 175–185). São Paulo, Brasil: Comitê Gestor da Internet no Brasil.

Helsper, E. J., & van Deursen, A. J. A. M. (2015). The Third-Level Digital Divide: Who Benefits Most from Being Online? Communication and Information Technologies Annual.

Ho, S. H., & Ko, Y. Y. (2008). Effects of self-service technology on customer value and customer readiness: The case of Internet banking. *Internet Research*, *18*(4), 427–446. doi:10.1108/10662240810897826

Kumar, V., Mukerji, B., Butt, I., & Persaud, A. (2007). Factors for successful e-government adoption: A conceptual framework. *Electronic*. *Journal of E-Government*, *5*(1).

Kurfalı, M., Arifoğlu, A., Tokdemir, G., & Paçin, Y. (2017). Adoption of e-government services in Turkey. *Computers in Human Behavior*, *66*, 168–178. doi:10.1016/j.chb.2016.09.041

Lee, H., Park, N., & Hwang, Y. (2015). A new dimension of the digital divide: Exploring the relationship between broadband connection, smartphone use and communication competence. *Telematics and Informatics*, *32*(1), 45–56. doi:10.1016/j.tele.2014.02.001

Lee, J. B., & Porumbescu, G. A. (2019). Engendering inclusive e-government use through citizen IT training programs. *Government Information Quarterly*, *36*(1), 69–76. doi:10.1016/j.giq.2018.11.007

Lin, F., Fofanah, S. S., & Liang, D. (2011). Assessing citizen adoption of e-Government initiatives in Gambia: A validation of the technology acceptance model in information systems success. *Government Information Quarterly*, *28*(2), 271–279. doi:10.1016/j.giq.2010.09.004

Lissitsa, S. (2015). Digital use as a mechanism to accrue economic capital: A Bourdieusian perspective. *Innovation (Abingdon)*, *28*(4), 464–482. doi:10.1080/13511610.2015.1081557

Lutz, C. (2019). Digital inequalities in the age of artificial intelligence and big data. *Human Behavior and Emerging Technologies*, *1*(2), 141–148. doi:10.1002/hbe2.140

Margolis, M., & Resnick, D. (2000). *Politics as usual: the cyberspace "revolution"*. Sage Publications.

Min, S. J. (2010). From the Digital Divide to the Democratic Divide: Internet Skills, Political Interest, and the Second-Level Digital Divide in Political Internet Use. *Journal of Information Technology & Politics*, *7*(1), 22–35. doi:10.1080/19331680903109402

Mossberger, K. (2009). Toward digital citizenship. Addressing inequality in the information age. In A. Chadwick & P. N. Howard (Eds.), *Handbook of Internet politics* (pp. 173–185). Routledge.

Naser, A., & Concha, G. (2011). El gobierno electrónico en la gestión pública (9211217679). Academic Press.

Norris, P., & Curtice, J. (2006). If you build a political web site, will they come? *International Journal of Electronic Government Research*, *2*(2), 1–21. doi:10.4018/jegr.2006040101

Norris, P. (2001). Digital divide: Civic engagement, information poverty, and the Internet worldwide. Cambridge University Press.

OECD. (2009). *Rethinking e-Government Services*. OECD.

Olson, K. E., O'Brien, M. A., Rogers, W. A., & Charness, N. (2011). Diffusion of Technology: Frequency of use for Younger and Older Adults. *Ageing International*, *36*(1), 123–145. doi:10.1007/s12126-010-9077-9 PMID:22685360

Robles, J. M. (2008). *Ciudadanía digital: una introducción a un nuevo concepto de ciudadano*. Editorial UOC.

Robles, J. M., Molina, Ó. M., & De Marco, S. (2010). La e-administración como modelo de democracia digital débil. *RES. Revista Española de Sociología*, (14), 67-84.

Robles, J. M., Torres-Albero, C., & de Marco, S. (2011). Spanish E-government and the third digital divide: A sociological view. *Journal of US-China Public Administration*, *8*(4), 401–412.

Rosenberg, D., Mano, R., & Mesch, G. S. (2019). Determinants of intention to use social media for health purposes among Jewish women in Israel: A cross-sectional study. *Journal of Hospital Administration*, *8*(5), 14.

Rufín, R., Medina, C., & Sánchez Figueroa, J. C. (2012). Moderating Factors in Adopting Local e-Government in Spain. *Local Government Studies*, *38*(3), 367–385. doi:10.1080/03003930.2011.636035

Scheerder, A., van Deursen, A., & van Dijk, J. (2017). Determinants of Internet skills, uses and outcomes. A systematic review of the second- and third-level digital divide. *Telematics and Informatics*, *34*(8), 1607–1624.

Scheerder, A. J., van Deursen, A. J. A. M., & van Dijk, J. A. G. M. (2019). Negative outcomes of Internet use: A qualitative analysis in the homes of families with different educational backgrounds. *The Information Society*, *35*(5), 286–298. doi:10.1080/01972243.2019.1649774

Scholl, H. J., & Klischewski, R. (2007). E-Government Integration and Interoperability: Framing the Research Agenda. *International Journal of Public Administration*, *30*(8-9), 889–920. doi:10.1080/01900690701402668

Schradie, J. (2011). The digital production gap: The digital divide and Web 2.0 collide. [doi:https://doi.org/10.1016/j.poetic.2011.02.003]. *Poetics*, *39*(2), 145–168.

Silcock, R. (2001). What is E-government. *Parliamentary Affairs*, *54*(1), 88–101. doi:10.1093/pa/54.1.88

van Deursen, A., & van Dijk, J. (2011). Internet skills and the digital divide. *New Media & Society*, *13*(6), 893–911. doi:10.1177/1461444810386774

Van Deursen, A. J., Helsper, E., Eynon, R., & Van Dijk, J. A. (2017). The compoundness and sequentiality of digital inequality. *International Journal of Communication*, *11*, 452–473.

Van Deursen, A. J., & van Dijk, J. A. (2014). *Digital skills: Unlocking the information society*. Palgrave Macmillan.

van Deursen, A. J., & van Dijk, J. A. (2019). The first-level digital divide shifts from inequalities in physical access to inequalities in material access. *New Media & Society*, *21*(2), 354–375. doi:10.1177/1461444818797082

van Deursen, A. J. A. M., Helsper, E. J., & Eynon, R. (2016). Development and validation of the Internet Skills Scale (ISS). *Information Communication and Society*, *19*(6), 804–823. doi:10.1080/1369118X.2015.1078834

van Deursen, A. J. A. M., & van Dijk, J. A. G. M. (2009). Improving digital skills for the use of online public information and services. *Government Information Quarterly*, *26*(2), 333–340.

van Deursen, A. J. A. M., & van Dijk, J. A. G. M. (2010). Measuring Internet Skills. *International Journal of Human-Computer Interaction*, *26*(10), 891–916. doi:10.1080/10447318.2010.496338

van Deursen, A. J. A. M., & van Dijk, J. A. G. M. (2014). Modeling Traditional Literacy, Internet Skills and Internet Usage: An Empirical Study. *Interacting with Computers*. Advance online publication. doi:10.1093/iwc/iwu027

van Deursen, A. J. A. M., van Dijk, J. A. G. M., & Peters, O. (2011). Rethinking Internet skills: The contribution of gender, age, education, Internet experience, and hours online to medium- and content-related Internet skills. *Poetics*, *39*(2), 125–144.

van Deursen, A. J. A. M., van Dijk, J. A. G. M., & Peters, O. (2012). Proposing a Survey Instrument for Measuring Operational, Formal, Information, and Strategic Internet Skills. *International Journal of Human-Computer Interaction*, *28*(12), 827–837. doi:10.1080/10447318.2012.670086

van Deursen Alexander, J. A. M., & Helsper Ellen, J. (2015). The Third-Level Digital Divide: Who Benefits Most from Being Online? *Communication and Information Technologies Annual*, *10*, 29–52.

van Dijk, J. (2006). Digital divide research, achievements and shortcomings. *Poetics*, *34*(4-5), 221–235.

van Dijk, J. (2020). *The digital divide*. Wiley.

van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2020). Determinants of 21st-Century Skills and 21st-Century Digital Skills for Workers: A Systematic Literature Review. *SAGE Open*, *10*(1). doi:10.1177/2158244019900176

Yera, A., Arbelaitz, O., Jauregui, O., & Muguerza, J. (2020). Characterization of e-Government adoption in Europe. *PLoS One*, *15*(4), e0231585. doi:10.1371/journal.pone.0231585

Yildiz, M. (2007). E-government research: Reviewing the literature, limitations, and ways forward. *Government Information Quarterly*, *24*(3), 646–665.

Zhu, S., & Chen, J. (2013). The digital divide in individual e-commerce utilization in China:results from a national survey. *Information Development*, *29*(1), 69–80. doi:10.1177/0266666912450168