Title

Extending the third level of digital divide by applying a capability approach: Who is unable to reach basic needs through the internet?

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Abstract

The present study extends the third level of digital divide by studying internet capabilities, which refer to the ability to reach basic needs through the internet, like being able to find a job or to apply for financial allowances. Differences between those who can and those who cannot reach basic needs through the internet can result in (digital) inequality. This study examines how demographic characteristics (gender, age, and educational level) and technological characteristics (internet access, skills, and use frequency) are differently associated with internet capabilities. While demographic determinants are traditionally used to identify people that are subjected to digital inequality, technological determinants might give an indication of which technological assets people need to benefit from the internet. Results of a cross-sectional survey (n = 750, 57.7% women, M_{age} = 50.14) administered between January and May 2021 demonstrate that a significant amount of our sample (15.9%) is unable to reach basic needs through the internet in terms of (1) arranging daily practicalities, (2) finding a job, (3) applying for financial allowances and (4) finding vital information. We found that people with a lower educational degree, lower ICT problem solving skills, lower information literacy skills and people who use the internet less frequent have significantly fewer abilities to reach basic needs through the internet. Therefore, we advise policy makers to implement ICT courses in vocational and adult education, to invest in internet skills improving programs, and to support and stimulate citizens in experiences with internet use.

Keywords: *Digital divide, Digital inequality, Internet benefits, Internet capabilities, Survey study, Determinants*

Introduction and Background

Being able to reach basic needs through the internet, for example, finding a job or applying for financial allowances, has been increasingly considered as a normality in digitizing welfare societies (Allmann & Blank, 2021). Indeed, more and more governments, companies and organizations are digitizing their services and administrations and expect citizens to be able to use them (Schou & Pors, 2019). However, some people experience difficulties in using these digital services and administrations, which may result in a social disadvantage, also referred to as digital inequality (Anrijs et al., 2020). For example, if a government decides that a financial allowance for unemployment can only be requested through an online form, not being able to do so may result into not receiving this allowance, which may in turn lead to problems with paying bills or mortgages.

To date, most research focusses on socio-demographic or socio-economic variables that are related to internet access and skills (for an overview see Scheerder et al., 2017). Identified socio-demographic or socio-economic determinants of higher internet access, skills, uses and benefits are, among others, lower age, male gender, higher educational level, ethnic majorities, urban living areas, and higher income level (Courtois & Verdegem, 2016; Forenbacher et al., 2019; Helsper, 2012; Laeeq Khan et al., 2020; van Deursen et al., 2017; van Deursen & van Dijk, 2010). Although studies investigating socio-demographic and socio-economic determinants provide insights of which people may be at risk of digital inequality and therefore should be targeted by e-inclusion initiatives, these determinants cannot be influenced by policy decisions, e.g., you cannot change someone’s age or gender. Therefore, this study seeks to identify technological determinants of digital inequality in addition to socio-demographic determinants, as technological determinants can be addressed in policy decisions and e-inclusion initiatives. For example, if it turns out that home internet connection is an important determinant of gaining benefits from internet use, governments can invest in good quality and affordable home internet connections for their citizens.

Three levels of digital divide

Since the wide adoption of Information and Communication Technologies (ICTs) by the general population in the early years of 2000, researchers started investigating the distribution and use of ICTs among varying populations and subgroups, and whether differences and inequalities could be found based on socio-demographic and socio-economic variables (DiMaggio et al., 2004; Hargittai, 2003; Mossberger et al., 2003; Stern et al., 2009). At first, the focus of digital divide research was on ICT access. The distinction was made between those people who had access to a personal computer and internet, and those who did not, often referred to as the haves and the have-nots (DiMaggio et al., 2004; Stern et al., 2009), and denoted as the first level of digital divide. At that time it was assumed, - more often by governments than by researchers -, that once people would gain access to ICTs or the internet, the digital divide would be fixed and therefore digital inequality would not be a problem anymore (Büchi, 2021).

However, soon it became clear that although disparities in access were diminishing as more and more Western people were connected to the internet, inequalities emerged in people's internet skills, use purposes and frequencies (DiMaggio et al., 2004). For example, significant differences were found in safety-related digital skills (Dodel & Mesch, 2018), general ICT skills (Aesaert et al., 2017), operational computer skills, online information searching skills, and online social skills (Livingstone & Helsper, 2010; Van Deursen et al., 2011) based on socio-demographic or socio-economic variables such as age, gender, educational level, and socio-economic status. Also with regard to internet use it has been found that capital enhancing activities, such as commercial transactions, information searching or news consumption, are more often performed by men, younger people, higher educated people, and people with higher incomes (Van Deursen et al., 2015). Other studies found similar results with regard to internet use in that individuals or families with lower educational attainment or lower household income less frequently use the internet for information searching on parenting, childcare or family communication (Wang et al., 2014). These unequal distributions in internet skills and uses based on socio-demographic and socio-economic variables were denoted as the second level of digital divide.

Recently, several scholars have argued that digital divide research should more focus on the benefits people derive from using the internet or the capacity to turn internet use into positive outcomes (Heponiemi et al., 2020; van Deursen & Helsper, 2015; Van Dijk, 2020). This third level of digital divide has been defined and operationalized by Van Deursen and Helsper (2015) as internet outcomes or *personal achieved benefits* along multiple life fields following Bourdieu's division of forms of capital, i.e., economic, social, and cultural capital. For instance, economic internet outcomes concern "having found a job online" or "having saved money by buying products online". Social internet outcomes are defined as "having better relationships with friends and family because of using the internet" or "having become member of a hobby or leisure club that you would not have found offline". Cultural internet outcomes are about "having gained insights into different sexual orientations" or "having formed opinions about complex social issues you would not have understand otherwise". For an overview of all operationalizations of internet outcomes, we refer to a recent study by van Deursen & van Dijk (2021). Applying this operationalization, researchers have empirically established that through the internet people have reached benefits such as making new friends, having saved money, having made better health decisions, and having engaged more often with politicians online (Calderón Gómez, 2020; van Deursen et al., 2017; van Deursen & Helsper, 2015; van Deursen & van Dijk, 2021). Recently, other researchers have operationalized the third level of digital divide as *general perceived benefits* in terms of perceived health benefits (e.g., "online services help citizens self-manage their health/well-being"), perceived economic benefits (e.g. "online services provide useful reminders such as the time of reception, laboratory tests, renewing prescriptions") and perceived collaboration benefits (e.g., "online services support the collaboration and information flow between the patient/client and carer") (Heponiemi et al., 2020).

Extending the third level of digital divide by applying a capability approach

The present study extends the third level of digital divide by investigating internet capabilities or a person's *ability* to reach basic needs through the internet. The concept of internet capabilities is based on "social exclusion" research which study people who are at a social disadvantage because they are unable to reach basic needs related to personal finances, housing and health (Benini, 2018; Cantillon et al., 2018). As more and more public and private organizations offer their services and administrations solely or cheaper through the internet and expect people to use these digital services and administrations instead of offline alternatives (Anrijs et al., 2020; Schou & Pors, 2019), people who are unable to use these online services and administrations may be at a social disadvantage. Therefore, in this study, we will explore people's abilities to reach basic needs related to finances, housing, and health through the internet.

The theoretical framework of our study is based on the capability approach (Hick, 2012). The capability approach is applied in studies on well-being, health and poverty and focuses on what people are able to do and be, as opposed to what they have or are (Alkire, 2005; Hick, 2012). To date, most studies on the third level of digital divide conceptualize benefits as *personal achieved benefits,* for instance "I found a job through the internet" (van Deursen & Helsper, 2015), or *general perceived benefits* (Heponiemi et al., 2020), for example "electronic services help people to find a job". In this study we conceptualize the third level of digital divide as internet capabilities or *personal reachable benefits*, namely: "I am *able* to search for a job through the internet". This approach is useful because person A may be able to search for a job through the internet but not have done so, because this is only a basic need in case this person has no job or wants to switch from job. In studies which operationalize the benefits as *achieved benefits*, this person A would seem less benefiting from the internet than a person B who indicated to have found a job through the internet, while actually both person A and B are employed. In studies who operationalize benefits as *reachable benefits*, person A who can find a job through the internet but is currently not in need to do so and person B who has found a job through the internet will be assessed as equally benefiting from the internet. Applying a capability approach to measure digital divide means that we want to investigate whether people are *able* to use the internet for instance to apply for a reimbursement or to make an appointment with a doctor rather than whether they *already have* applied for a reimbursement or have made an appointment with a doctor online. In this way, governments and policy makers can estimate which citizens are (likely to be) excluded as the result of digital-first or digital-only services.

Aims of this study

In this study we first want to explore how many people are unable to reach basic needs through the internet. We focus on four subdimensions of internet capabilities, namely (1) arranging daily practicalities (e.g., making an appointment or reservation online) , (2) finding a job (e.g., searching for job vacancies online), (3) applying for financial allowances(e.g., claiming an unemployment benefit from the government online), and (4) finding vital information (e.g., searching information on health insurances).

Thereafter, we want to investigate how demographic and technological user characteristics are associated with people's internet capabilities. With regard to demographic characteristics, previous research found that age, gender, and educational level are significantly associated with internet access on the one hand and digital skills on the other hand (Choi et al., 2021; Ragnedda et al., 2019; Van Deursen et al., 2011; Van Deursen & van Dijk, 2015). Most often, it has been found that younger persons, males, and people with higher educational levels have better internet access (Ragnedda et al., 2019; Van Deursen & van Dijk, 2015). Further, age has been found to be negatively associated with ICT skills, meaning that older people score lower on skills, as for example, selecting a webpage, downloading a document or entering a search string in a search engine (Van Deursen et al., 2011). Higher levels of education were also associated with higher proficiency levels in ICT skills, such as to opening a web browser, finding relevant websites or relevant information on a website, and protecting your computer from malware (Choi et al., 2021; Dodel & Mesch, 2018; Ragnedda et al., 2019; Van Deursen et al., 2011). A systematic literature review of 126 studies (Scheerder et al., 2017) also provide evidence that age, gender, and educational level are significant determinants of internet skills, use purposes and frequency, and of economic, social and cultural internet outcomes, such as having traded goods, having made new friends, or having engaged in political discussions online. Given the existing literature, we hypothesize that:

H1: Younger respondents, male respondents and higher-educated respondents will score higher on internet capabilities than older respondents, female respondents, and lower-educated respondents.

INSERT FIGURE 1 ABOUT HERE

In a study conducted by Van Dijk (2005), it has been demonstrated that ICTs result in beneficial outcomes for an individual if the individual has material access, has the necessary skills, and actually uses the technology. In addition, a recent study of Heponiemi et al (2021) has demonstrated that internet access and skills to use e-services are determinants of the third level of digital divide in terms of perceived benefits from online health and social care services. This study found that respondents with a home computer and internet connection and respondents with sufficient technical skills to use e-services were more likely to perceive benefits from the internet, such as that electronic services help people to self-manage their health or that electronic services save time or money (Heponiemi et al., 2021). Based on the above, we posit that:

H2: Respondents who have higher quality of internet access will score higher on internet capabilities

H3: Respondents who are more proficient in internet skills will score higher on internet capabilities.

H4: Respondents who use the internet more frequently will score higher internet capabilities.

Method

Data Collection

This survey study is part of an ongoing research project that aims to map "determinants and consequences of lacking ICT access and skills" and was designed to study and understand digital inequality in Flanders (i.e., the Dutch speaking part of Belgium). This project received ethical approval from the ethical board of the faculty of Social Sciences from [name of university blinded for purpose of review]. The present study is based on survey responses that were collected between January 2021 and May 2021. Eligibility criteria were that respondents were (a) 18 years or older, and (b) were not students. The survey was proofread and adapted by a professional organization for simple and plain language and could be completed in Dutch, French, English and Turkish. In order to assure a heterogeneous sample in which vulnerable and harder-to-reach populations are included, respondents were recruited using a threefold strategy. Including vulnerable and harder-to-reach populations is an ongoing challenge for digital divide research as a large number of studies relies on online data collection only, while a combination of offline and online data collection seems necessary to fully understand determinants and consequences of digital exclusion (Litt, 2013).

In a first phase, respondents were recruited via a) socio-economic organizations which support vulnerable people, such as low-income people, single parents, elderly or migrants; b) centres for adult basic education where adults without a degree of secondary education can learn a craft or improve their alphabetical, numerical and digital literacy, and c) e-inclusion organizations which aim to educate or support people in digital literacy and internet use. In total, eleven socio-economic organizations, three centres for adult basic education, and five e-inclusion organizations were willing to participate in the survey study and agreed to actively recruit respondents.

In phase two of the recruitment strategy, two students were involved in the data collection as part of their master thesis. Both students recruited respondents in their own network. One student recruited participants in a rural area with a majority of higher-educated people, while the other student recruited participants in an urban area with a majority of lower-educated people.

Finally, in phase three, we used a promoted Facebook add. More specifically, we targeted the following three groups: men between 18 and 64 years old, people with a lower educational degree or a blue-colour worker function (e.g., factory worker), and people with a migration background. Facebook users that were part of at least one of these predefined groups could see the add in their feed.

In total, 868 respondents were reached through our three-phase sampling strategy. After deleting respondents who did not give informed consent to use their data (*n* = 21), a dataset of 847 responses was obtained. In phase one and two surveys could be completed either via paper-and-pencil or on a computer of the recruiting organization, in phase three only computer survey completion was possible. Paper-and-pencil questionnaires were distributed together with a pre-addressed and pre-stamped envelope that had to be sent back to the last author of this study. Computer questionnaires were collected using Qualtrics. For the analysis of this paper partial responses on the study variables were excluded using listwise deletion, 750 responses could then be used for further analyses.

Measures

Internet Capabilities

Internet capabilities were measured with items adapted from the Digital Difficulties Scale (Anrijs et al., 2021), that measures who is (un)able to use the internet to reach basic needs. For subcategories of internet benefits are defined within this scale: (1) arranging daily practicalities such as buying a ticket for public transport (4 items), (2) finding a job such as searching vacancies (3 items), (3) applying for financial allowances such as claiming a social benefit online (2 items), and (4) finding vital information such as finding information about the reimbursement of health costs (3 items). An adapted sample item is: “Are you able to use the internet to search job vacancies?”. The following preamble was presented to respondents: “Are you able to do the things described below without the help of others? If you don't do certain things (anymore), try to answer the question as best you can by imagining that you should do it anyway.” Responses could be made along a four-point scale with 1 = definitely not, 2 = rather not, 3 = rather yes, 4 = definitely yes. Exploratory factor analysis (EFA) with Varimax rotation on all 12 items revealed one latent construct, explaining 73.13% of variance (item loadings ranging from .74 to .89), and the internal consistency was excellent (Cronbach’s alpha = .97). All items are presented in Table 1.

*** INSERT TABLE 1 ABOUT HERE ***

Demographic Variables

Gender could be answered with man, woman or other. Given the low frequency of the latter ($n = 2$), these respondents were omitted in the regression analyses. Respondents' age was determined by asking for respondents' birth year. Education was measured categorical with 1 = no degree, degree in primary education, or a degree in lower secondary education (= first three years completed), 2 = degree in secondary education (= six or seven years completed), 3 = degree in higher education short type (= bachelor or equivalent completed, 4 = degree in higher education long type (= master or equivalent completed). Two dummy variables were created for the regression analyses: the dummy primary or no educational degree with 1 = no degree, degree in primary or lower secondary education, and the dummy secondary educational degree with 1 = degree in secondary education.

Internet Access

Two items were used to measure respondents' internet access. The first one is the sum of all the devices through which users can access internet at home, i.e., personal computer, laptop, desktop, smartphone. As second indicator we asked respondents to assess the quality of their internet connection at home: "How good is the internet connection in your home? We mean a wired internet connection via cable or a wireless connection via Wi-Fi". A five-point response scale was used with 0 = I do not have an internet connection at home, 1 = bad, 2 = rather bad, 3 = rather good, and 4 = good.

Internet Skills

Respondents were asked to rate their perceived competence on three types of internet skills that seem useful for reaching basic needs through the internet: information searching skills, information literacy skills, and ICT problem solving skills. All internet skills items were inversed asked, measuring a lack of competence in order for respondents to not feel ashamed by indicating low internet skills. All internet skill items were scored by respondents along a five-point Likert scale ranging from 1 = disagree to 5 = agree and then reversed for analyses. *Information searching skills* were measured with three adapted items from a subscale of the Web User Self-Efficacy Scale (WUSE) from Eachus and Cassidy (2006). An example is: “Searching for information with Google, Yahoo or any other search engine is difficult for me”. EFA with Varimax rotation revealed one latent construct which explained 83.74% of variance of the original items (item loadings ranging from .89 to .94) and had excellent internal consistency (Cronbach’s alpha = .94). *Information literacy skills* was inventoried using three adapted items from Ishikawa et al. (2008) who measured online health literacy. An example of an adapted item is: “When I look up information on websites, I often come across words that I don't understand”. EFA with Varimax rotation resulted in one latent construct explaining 82.38% of variance (item loadings ranging from .88 to .95). The internal consistency was excellent (Cronbach’s alpha = .93). *ICT problem solving skills* were measured with three items from a subscale of the Digital Difficulties Scale (Anrijs et al., 2021). A sample item is: “When using a smartphone or computer, usually, I am not able to solve questions or problems myself.” EFA analyses with Varimax rotation revealed that the ICT problem solving skills construct accounted for 75.24% of variance (item loadings ranging from .82 to .93) and had an excellent reliability, with Cronbach’s alpha = .90.

Internet Use Frequency

Consistent with a study of Dodel and Mesch (2018) frequency of internet use was measured as follows: ”The following question is about you using the internet for practical matters. These are matters linked to, for example, finances, housing, health or other basic needs of you or your household members. In the past six months, how often did you use the internet yourself?”. Responses could be made on five-point scale with 1 = (almost) never, 2 = a few times, but less than monthly, 3 = monthly, 4 = weekly, 5 = daily.

Results

Both descriptive and regression analyses were performed using IBM SPSS statistics (version 26). Assumptions for regression analyses of non-zero variance of predictors, multicollinearity, homoscedasticity, linearity, normally distributed errors, and independence of the outcome values were assessed and met. Statistical significance was set at $p < .01$.

Descriptive Analysis

In Table 1 the descriptive statistics for separate internet capabilities items are presented. The most difficult need to reach is applying for a premium from the government (e.g., for parental leave or housing refurbishment), with 24.3% of our sample who is unable to do so (M = 3.18, SD = 1.09), while making bank transfers through the internet is the easiest need to reach with 8.9% of our sample who is unable to do so (M = 3.69, SD = 0.81). Descriptive statistics of socio-demographic variables, internet access, skills and use frequency are demonstrated in Table 2.

INSERT TABLE 2 ABOUT HERE

Correlation between Variables

Table 3 presents the Pearson correlation matrix of the continue variables. As hypothesized internet capabilities highly associated with all study variables. The strongest association was found between internet capabilities and ICT problem solving skills (r = .74, p < .001), followed by information literacy skills (r = .72, p < .001).

INSERT TABLES 3 AND 4 ABOUT HERE

Regression Analysis with Demographic and Technological Characteristics as Determinants of Internet Capabilities

An important research objective of this study was to identify demographic and technological determinants of internet capabilities. In order to do so, an ordinary least square multiple stepwise regression analysis was conducted. The analysis was performed in four steps, results are presented in Table 4. First, the inclusion of demographic variables gender, age, and educational degree in model 1 yielded significance. The strongest beta coefficients were identified for primary or no educational degree (β = -.502, $p < .001$), followed by secondary educational degree (β = -.216, $p < .001$), with higher educational degree as reference group. Model 1 predicted 30% of variance in internet capabilities, with men, younger people, and people with a degree in higher education reporting significant more to be able to reach basic needs through the internet compared to women, older people, and people without a degree in higher education.

Model 2 introduced two additional variables measuring internet access. Both variables significantly add variance in explaining internet capabilities with a change in R^2 of .145 compared to the baseline model (model 1). This means that in total 44.5% of variance in internet capabilities was determined by demographic variables and internet access. Based on model 2, it can be concluded that more devices at home that can connect to internet (β = .271, $p < .001$) and better quality of internet connection at home (β = .236, $p < .001$), the more able respondents are to reach basic needs through the internet.

In model 3 the three internet skills variables were added, resulting in a significant change in R^2 (added R^2 = .231), with 67.6% total explained variance. Internet searching skills (β = .184, $p < .001$), information literacy skills (β = .158, $p < .001$), and ICT problem solving skills (β = .344, $p < .001$) are all statistically relevant in this model at the .001-level. Model 3 demonstrates that the easier respondents find it to use search engines, the more they understand online information, and the better they are in solving ICT problems, the more internet capabilities they have.

Finally, frequency of internet use was added to the model, resulting in a significant change in R^2 of .043. The final model explained 71.9% of variance in internet capabilities and, as hypothesized, higher frequency of internet use is significantly associated with people's ability to reach basic needs through the internet (β = .260, p < .001).

Considering the final model, internet access, skills and use frequency can be identified as significant technological determinants of internet capabilities. With regard to demographic variables, only educational level turned out to significantly determine internet capabilities, while age and gender did not. The four most important variables that determine internet capabilities are ICT problem solving skills (β = .307, p < .001), frequency of internet use (β = .260, p < .001), information literacy skills (β = .167, p < .001), and primary or no educational degree compared to higher educational degree as reference group (β = -.138, p < .001).

Discussion

In this article, we extended the third level of digital divide by applying a capability approach and investigating which demographic and technological variables determine people's internet capabilities or their ability to reach basic needs through the internet. Previous research has mainly focused on the first level of digital divide, i.e., internet access, and the second level of digital divide, i.e. internet skills and uses (For a review, see Scheerder et al., 2017) or on the third level of digital divide from a capital-based approach (Heponiemi et al., 2020; Ragnedda et al., 2019; van Deursen & Helsper, 2015). Studying the third level of digital divide from a capability-based approach allow us to define who is at risk of social exclusion.

Based on a literature review, gender, age, and educational level were included as demographic determinants, while internet access, skills and use frequency were assessed as technological determinants. Our study revealed that mainly the technological determinants explain a significant part of variance in internet capabilities. These findings are important for policy makers, as in contrast to demographic variables, technological variables can be influenced by policy decisions. This section further elaborates on the main findings, limitations, and suggestions for policy and future research.

Our study demonstrated that one out of six people is unable to reach basic needs related to finances, housing and health through the internet (15.9%). With regard to the separate items of internet capabilities, applying for a premium from the government online was the outcome of which the highest number of respondents indicated to be unable to do so (25.1%), while making bank transfers online was the outcome of which the lowest number of respondents indicated to be unable to do so (9.3%).

When considering determinants of internet capabilities, the results of our study demonstrate that both demographic and technological variables are significant determinants. However, important to note is that the present study only found strong significant associations between gender and internet capabilities, and age and internet capabilities in the first model, when solely the demographic variables were included. Once the technological variables were included in the successive models, the associations decreased, disappeared or reversed, this could suggest that effects of gender and age on internet capabilities are partly explained by differences in internet access, skills and use. A similar conclusion was made by Heponiemi and colleagues (2020) in their study on the perceived benefits of using online health and social care services. Education was found to be a significant determinant, both before and after the inclusion of technological variables. Previously, education has been found to be an important determinant of internet access (Tsetsi & Rains, 2017; Van Deursen et al., 2019), of basic and advanced internet skills (Choi et al., 2021; Dodel & Mesch, 2018; Ragnedda et al., 2019; A. J. Van Deursen et al., 2011), and of internet use frequencies and purposes (Laeeq Khan et al., 2020; Reisdorf & Groselj, 2017). The significant associations between education and the three digital divide levels in this and other studies (Heponiemi et al., 2021; Van Deursen et al., 2015), suggests the importance of education as a capital-enhancing resource in a digitizing society and that those with higher educational degrees can take more advantage from internet use which then reinforce their already stronger position in society.

With regard to the technological determinants, especially ICT problem solving skills turned out to be a powerful predictor of internet capabilities, more powerful than information searching skills and information literacy skills. This finding suggest that more important than specific information-related skills, such as knowing how to search for information on the web and disposing over the vocabulary to read and understand online information, people should feel competent in solving ICT problems. ICT problem solving can be defined as searching a solution for an ICT situation in which someone does not immediately know what to do to achieve a goal (OECD, 2015). Especially as ICTs (both devices and applications) are characterized by constant changes due to updates or innovations, coping with unforeseen problems or situations, such as a device-related problem (e.g., problem with connecting to a Wi-Fi network) or application-related problem (e.g., problem with finding an online submission form on a new website) seems an inevitable part of using ICTs. A second important technological determinant of internet capabilities in this study is internet use frequency, meaning that the more frequent people use the internet for practical purposes, the more able they perceive themselves to reach basic needs through the internet. This finding ties into the idea that previous successful experiences are an important predictor of people's expectancy to successfully perform a certain behavior in the future (Bandura, 1977). For example, someone who has made an online appointment with a doctor in the past, will expect him- or herself to be able to do so in the future.

Despite the contributions of this research, our study is not without limitations. As a first limitation, we want to note that our sample is a convenience sample and is therefore not representative for people living in Flanders. Although we accomplished to gather a heterogeneous sample including vulnerable and harder-to-reach people, the results of this study cannot be generalized for these vulnerable population groups neither for all citizens living in Flanders. In order to generalize results, future research and/or governments should invest in representative survey studies. Second, we would like to point out that we investigated people’s self-rated internet skills and internet capabilities from a perspective of self-efficacy. Self-efficacy is a person’s judgments of one’s capacity to execute actions (Zimmerman, 2000). As argued by Aesaert et al. (2017) and Allmann and Blank (2021) an important disadvantage of measuring ICT skills in terms of self-efficacy and therefore measuring it indirect is that people’s self-reports might not accurately correspond with their actual performance levels. For instance, it has been demonstrated that students with lower level of actual ICT competence severely seem to overestimate themselves (Aesaert et al., 2017), while another study among a sample of Polish people aged 18-69 found that those with the highest average ICT skills were most likely to overreport their skills (Palczyńska & Rynko, 2021). Also, male, younger and higher-educated people tend to overreport their ICT skills (Palczyńska & Rynko, 2021). More research on the discrepancy between self-rated and actual ICT competences is needed to better understand and interpret people’s self-reports of digital skills. As a last limitation, we would like to point out that some respondents completed the survey at home, while others completed it in presence of their ICT course lecture or a social assistant. Although clear instructions were provided both for respondents and those people assisting respondents, varying ways of survey completion may have an influence on respondents’ answers, such as social desirable answers.

To end, some avenues for policy and future research can be suggested. First, as educational level turned out to be an important determinant of internet capabilities, and previous studies found the same for the first and second level of digital divide, special attention should be given to lower-educated people. A suggestion could be to implement ICT courses that focus on the use of digital services and administrations, such as governmental websites and online banking, in vocational and adult education programs. In addition, we advise that policy actions on digital divide should target people based on their technological characteristics (e.g., low internet skills or use experience) rather than based on their socio-demographic characteristics (e.g., gender or age), as our results demonstrate that technological characteristics can better explain who is at risk of digital inequality than socio-demographic characteristics. Consequently, policy actions that target people based on their technological characteristics rather than socio-demographic characteristics may be more effective in reaching the target population. Third, researchers should make explicit whether they investigate reached benefits (e.g., through the internet I found what political party to vote for), perceived benefits (e.g., the internet helps people to find what political party to vote for) or reachable benefits (e.g., I am able to search online which political party to vote for, if I would want or need it). Transparency in which way of operationalization is used will enable researchers to compare their research findings with previous ones and to make conclusions on the third level of digital divide. Fourth, future research could investigate the role of cognitional attitudes, such as computer anxiety, technology discomfort, or internet utility as determinants of the third level of digital divide. Cognitional attitudes might also explain people's ability to derive benefits from internet use as positive attitudes to use technologies are a crucial step toward initial internet adoption (van Dijk, 2005). For instance, internet utility attitudes and use motivation have been found to determine internet use frequency (Courtois & Verdegem, 2016; Reisdorf & Groselj, 2017).

In conclusion, this study among a heterogeneous sample of Flemish citizens identified educational degree, ICT problem solving skills, information searching skills and internet use frequency as important determinants of internet capabilities over other demographic and technological variables such as gender, age, and information searching skills. Based on these findings, policy makers and organizations should increase citizens' ability to reach basic needs through the internet by implementing ICT courses in vocational and adult education, by reinforcing citizens internet skills, and by stimulating and supporting regularly experiences with digital services and administrations.

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Figures and Tables

Figure 1

Conceptual Model of the Study

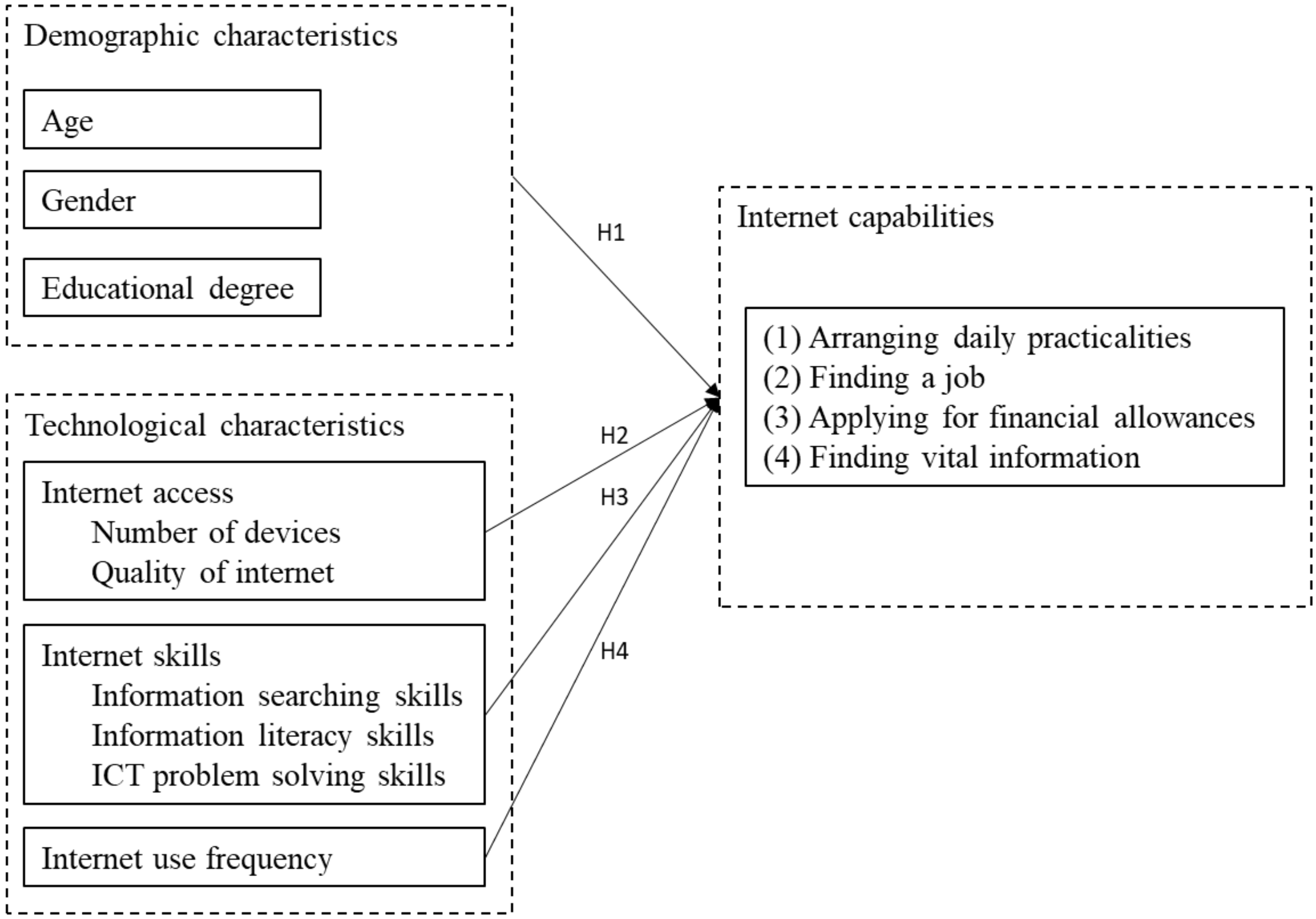

Table 1

Descriptive Statistics of Internet Capabilities (1 = definitely not, 2 = rather not, 3 = rather yes, 4 = definitely yes) (n = 750)

Can you use the internet…	Mean [Standard deviation]	Respondents who answered rather yes or definitely yes (%)
To arrange daily practicalities		
To make bank transfers	3.69 [0.81]	91.1%
To buy goods online	3.53 [0.97]	85.1%
To buy a ticket for public transport	3.43 [1.01]	83.1%
To make a reservation or appointment	3.59 [0.90]	87.7%
To find a job		
To search job vacancies	3.45 [0.99]	84.9%
To apply for a job	3.40 [1.02]	83.3%
To register as a jobseeker with the government	3.32 [1.07]	80.4%
To apply for financial allowances		
To claim a benefit from the government	3.19 [1.09]	77.1%
To apply for a premium from the government	3.18 [1.09]	75.7%
To find vital information		
To find information about services or the assistance of social organizations	3.50 [0.87]	88.3%
To find information about health insurance, fire insurance or family insurance	3.34 [0.96]	82.4%
To find information about the electricity, gas or water cost and connection at home	3.37 [0.95]	82.8%
Internet capabilities (total mean score)	3.41 [0.85]	84.1%

Table 2

Descriptive Statistics of Demographics, Internet Access, Skills and Use Frequency Variables (n = 750)

	Range	n (%)	Mean [Standard deviation]
Gender	1-2		
Male		317 (42.3%)	
Female		433 (57.7%)	
Age	18-91		50.14 [14.40]
Educational degree	1-3		
No degree, degree in primary education, or a degree in lower secondary education		95 (12.7%)	
Degree in secondary education		197 (26.3%)	
Degree in higher education (short or long type)		458 (61.1%)	
Internet access			
Number of devices that can connect to internet at home	0-12		4.31 [2.32]
Quality of internet connection at home	0-4		3.35 [0.97]
Internet skills			
Information searching skills	1-5		4.28 [1.12]
Information literacy skills	1-5		4.06 [1.16]
ICT problem solving skills	1-5		3.87 [1.24]
Internet use frequency	1-5		4.43 [1.14]

Table 3

Pearson Correlations between Continuous Study Variables (n = 750)

		1	2	3	4	5	6	7
1	Number of devices at home that can connect to internet	1.00						
2	Quality of internet connection at home	.29***	1.00					
3	Information searching skills	.40***	.36***	1.00				
4	Information literacy skills	.42***	.36***	.76***	1.00			
5	ICT problem solving skills	.45***	.37***	.70***	.78***	1.00		
6	Internet use frequency	.39***	.36***	.51***	.46***	.49***	1.00	
7	Internet capabilities	.48***	.40***	.69***	.72***	.74***	.64***	1.00

Note. ** $p < .01$; *** $p < .001$.

Table 4

Stepwise Regression with Demographics, Internet Access, Skills, and Use Frequency as Determinants of Internet Capabilities (n = 750)

	Model 1		Model 2		Model 3		Model 4	
	B (S.E.)	*β*	*B (S.E.)*	*β*	*B (S.E.)*	*β*	*B (S.E.)*	*β*
Constant	4.285 (.106)		2.907 (.138)		1.218 (.129)		0.737 (.128)	
Demographics								
Gender (male = reference)	-0.154 (.054)	-.089**	-0.071 (.048)	-.041	0.073 (.038)	.042	0.077 (.036)	.045
Age	-0.010 (.002)	-.171***	-0.008 (.002)	-.128***	-0.003 (.001)	-.049	-0.002 (.001)	-.026
Educational degree (higher education = reference)								
Primary or no education	-1.286 (.081)	-.502***	-0.949 (.076)	-.370***	-0.422 (.063)	-.165***	-0.353 (.059)	-.138***
Secondary education	-0.419 (.061)	-.216***	-0.304 (.055)	-.157***	-0.201 (.043)	-.104***	-0.144 (.040)	-.074***
Internet access								
Number of devices at home that can connect to internet			0.100 (.011)	.271***	0.038 (.009)	.103***	0.025 (.008)	.069**
Quality of internet connection at home			0.208 (.026)	.236***	0.077 (.020)	.087***	0.040 (.019)	.045
Internet skills								
Information searching skills					0.140 (.026)	.184***	0.086 (.025)	.114**
Information literacy skills					0.115 (.028)	.158***	0.122 (.026)	.167***
ICT problem solving skills					0.237 (.025)	.344***	0.212 (.024)	.307***
Internet use frequency							0.195 (.018)	.260***

	Model 1		Model 2		Model 3		Model 4	
	B (S.E.)	β	*B (S.E.)*	β	*B (S.E.)*	β	*B (S.E.)*	β
Model fit								
R^2 / Adjusted R^2	.300 / .296		.445 / .440		.676 / .672		.719 / .715	
ΔR^2	.300***		.145***		.231***		.043***	

Note. S.E. = Standard Errors. $^{**}p < .01$; $^{***}p < .001$.