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Inequalities in digital literacy: definitions, measurements, explanations and policy implications

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INEQUALITIES IN DIGITAL LITERACY: DEFINITIONS, MEASUREMENTS, EXPLANATIONS AND POLICY IMPLICATIONS

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INTRODUCTION

Digital divide research and policy have moved beyond looking at who does and does not have access to Information and Communication Technologies (ICT), and, therefore, the explanations for digital inequalities and the possible interventions to address it have become more nuanced and complex. The current emphasis is on digital skills or, more comprehensively, digital literacy and explanations for its uneven distribution. Most digital inequalities research and policies focus on individual characteristics as drivers of differing digital capabilities and levels of engagement with ICT. This paper will first discuss the implications of defining digital skills and literacy in different ways. It will then propose that the most useful definition of digital literacy is one that incorporates the idea that the focus should be on the tangible outcomes of Internet use. With the From Digital Skills to Tangible Outcomes – DiSTO project[2] as a starting point, a number of related measures are suggested to guide research and help evaluate policy and initiatives aiming to tackle digital inequalities. The paper concludes with the suggestion that this approach also requires reconceptualization of explanations of digital engagement to incorporate social context factors such as household and community dynamics. This holistic approach allows better understanding of what aids or hinders an individual's ability to benefit from engaging with ICT and enables better design and evaluation of policy.

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[2] Available at: <http://www.lse.ac.uk/media@lse/research/From-digital-skills-to-tangible-outcomes.aspx>. Accessed on: Jun 30, 2016.

DIGITAL LITERACY DEFINITIONS

To understand the diversity of engagement with ICT and potential explanations for why certain people are more digitally literate than others, it is important to start with a clear definition of digital literacy. The definition of literacy has implications for policy, education, and potential solutions to digital exclusion. Digital literacy, in the broadest sense, can be described as the ability to use ICT in ways that help achieve tangible, high-quality outcomes in everyday life (HELSPER, 2012; HELSPER; VAN DEURSEN; EYNON, 2015). According to this definition, digital literacy includes: the ability to access needed tools and software; the skills needed to access and engage with content; availability of content appropriate to the needs of users; and opportunities to translate these activities into beneficial outcomes in everyday life.

SKILLS

Most research and policy take a skills approach to digital literacy, dealing largely with definitions, measurements and interventions focusing on technical, Internet-related skills, called "button knowledge" (BUNZ; CURRY; VOON, 2007; POTOSKY, 2007; HARGITTAI; HSIEH, 2012). However, recent theorization and measurement shows more nuanced and elaborate understanding of skills, stressing that basic technical skills and content navigation and comprehension should be considered (BRANDTWEINER; DONAT; KERSCHBAUM, 2010; GUI; ARGENTIN, 2011; VAN DIJK; VAN DEURSEN, 2014). There is a valuable distinction between information skills and operational and technical skills. However, in view of increases in social media use and user-generated content, communication, social and content creation skills should also be considered (CALVANI et al, 2012; FERRARI, 2012; HAYTHORNTHWAITE, 2007; LITT, 2013; VAN DEURSEN; COURTOIS; VAN DIJK, 2014).

USES AND OUTCOMES

A more recent definition of digital literacy is "an individuals' capacity to translate their Internet access and use into favourable offline outcomes" (p. 30), adding uses and outcomes to the literacy factors that need to be conceptualized (VAN DEURSEN; HELSPER, 2015). Until recently, these conceptualizations have mostly been based on the Uses and Gratifications (U&G) approach, which classifies outcomes based on the gratifications individual users might derive, or hope to derive, from various uses of ICT. At the most basic level, these studies make a distinction between two types of gratifications: instrumental (e.g., financial, informative, health-related) and leisure or recreational (e.g., entertainment, hobbies, informal communication). Outcomes are derived and attitudinal rather than behavioural, measured as what people do online or hope to achieve by using ICT, rather than the actual results of that use (PAPACHARISSI; RUBIN, 2000). Another approach is based on the theory of reasoned action (TAM) (DAVIS; BAGOZZI; WARSHAW, 1989), which focuses on intentions to use ICT and subsequent behaviours associated with outcomes. Neither of these

approaches links needs or intentions to specific, tangible benefits in everyday life (VAN DEURSEN; HELSPER, 2015). There are studies that focus on more general outcomes such as well-being or happiness (CAPLAN, 2007; KAVETSOS; KOUTROUMPIS, 2010), but it is hard to connect these outcomes to a wider range of uses of ICT, specific forms of digital engagement and levels of literacy.

How literacy is defined influences the focus of policy and initiatives that tackle inequalities. When access was the main concern (the first-level digital divide), improved infrastructure was seen as the solution. It turned out that this was not sufficient to get people to use ICT. With new conceptualizations that included skills and use (the second-level digital divide), the emphasis was on providing formal training and accessibility of content for all. With the incorporation of outcomes (the third-level digital divide), it is slowly becoming clear that even formal training and accessibility might not be sufficient for people to obtain the benefits they want and need from ICT. The next section looks at potential explanations for this phenomenon.

EXPLANATIONS FOR DIGITAL LITERACY

Regarding access to tools and software, the most important factors that determine uptake seem to be socioeconomic, that is, related to income and wealth as well as the availability of infrastructure in certain areas (DIMAGGIO; HARGITTAI; RUSSELL NEUMAN; ROBINSON, 2001; VAN DIJK, 2012). However, for other aspects of literacy, the picture is more complicated and depends largely on how skills and engagement are defined and measured.

Most of the research on inequalities in digital literacy focuses on skills, overwhelmingly conceptualized as technical and information-seeking skills. Since the incorporation of communication and content creation skills within digital literacy research is relatively recent, there is not much data that allows testing of the hypothesis that social inequalities are linked to skill inequalities. Existing work shows that education and traditional literacy are consistently strong predictors of digital skills (VAN DIJK; VAN DEURSEN, 2014). Other factors that come up are age, gender and socioeconomic status. The relationship between age and digital skills could be more complicated but also more interesting than first expected, especially when considering a broader spectrum of skills. In a survey by Van Deursen, Van Dijk and Peter (2011) of Dutch Internet users, younger individuals had higher levels of medium-related (technical) skills, but older people tended to have the advantage when it came to content-related (critical information-searching) skills. Barbovschi and Marinescu (2013) have criticized the general assumptions behind using age as a decontextualized and homogenous variable. They argue that a lot of the research and policy are based on the persistence of two myths about young people (as compared to adults) that hinder better understanding of how people use the Internet (see also O'NEIL; STAKSRUD; MCLAUGHLIN, 2013). The first is the myth of the digital native, which positions young people as innately capable and comfortable users of ICT. The second is the myth of young people as vulnerable innocents, which positions them as victims of risky content and interactions in ICT. In reality, the diversity among young people in how (well) they use the Internet and whether they are capable users is often related to their family context and psychological characteristics (LIVINGSTONE; BOBER; HELSPER, 2005; PAUS-HASEBRINK; SINNER; PROCHAZKA, 2014).

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The literature on adult digital engagement reveals similar issues, and the conclusion is clear: Not all adults are equally equipped to get the most out of ICT (HARGITTAI; HSIEH, 2010; HELSPER; EYNON, 2010; WITTE; MANNON, 2009). Helsper, Van Deursen, Eynon and Van Dijk (2016) showed that when a wider variety of skills is considered, gender differences influence some but not all types of skills. Helsper (2010) also showed that gender differences in use become important at different stages of life.

Approaches based on U&G and TAM generally are generally limited to individualistic explanations of ICT use, with personality or interests as the dominating explanatory factors for belonging to different user types. Dutton and Blank (2015) did relate sociodemographic characteristics to different cultures and levels of use. However, their study was descriptive rather than theoretical, making it difficult to hypothesize about differences other than the ones measured (age, gender, income, life stage, and education).

As indicated before, research on outcomes tends to be very narrow or based on intangible, attitudinal outcomes (HELSPER et al, 2015). Therefore, it is even harder to theorize or hypothesize systematically about which groups are most disadvantaged when it comes to outcomes.

RETHINKING MEASUREMENTS (AND EXPLANATIONS) OF DIGITAL LITERACY

Considering the current weakness of digital literacy research, a more comprehensive, systematic, theoretically informed approach is needed to take research and evidence-based policymaking to the next level. The project "From Digital Skills to Tangible Outcomes" (DiSTO)[3] set out to do just that. Using Helsper's (2012) corresponding fields model as a starting point, the project utilized a three-step approach to develop theoretically grounded survey instruments to collect evidence and evaluate how different digital skills allow individuals to translate varying types of Internet use into a broad spectrum of tangible outcomes (VAN DEURSEN; HELSPER; EYNON, 2015; HELSPER; VAN DEURSEN; EYNON, 2014). The first step consisted of cognitive interviews carried out in both the UK and the Netherlands to test a survey instrument. Based on the cognitive interview results, some of the proposed skills, uses and outcomes items were amended to improve clarity and validity. This was followed by a pilot survey that allowed validity and reliability testing of the constructs and the corresponding items. Finally, the survey was used with a representative sample of the Dutch population in order to understand the nature of systematic inequalities in digital literacy.

This created the first-ever evidence base regarding the complexity of comprehensive digital literacy and its links to a broad spectrum of social inequalities, defined as pertaining to the economic, social, cultural and personal domains of resources in individuals' lives. DiSTO took a theoretical approach based on traditional notions of inequality to designing measures of tangible outcomes of Internet use, measures that could be used in general population

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[3]   This project has now been taken up internationally through separate projects in Latin America and the US and informs a revision of the World Internet Project surveys.

research and for comprehensive evaluation of the success of digital inclusion initiatives. This led to a classification of uses and outcomes in four domains: economic, cultural, social and individual well-being (HELSPER; VAN DEURSEN; EYNON, 2015). Economic outcomes are related to wealth and employment, such as monetary assets or property. Social outcomes are related to improved formal and informal relationships, networks and social support, including political and civic participation. Cultural outcomes are related to increased feelings of belonging to, and heightened identification with, certain sociocultural groups. Individual well-being outcomes are related to the physical and psychological aspects of well-being, as well as self-actualization (hobbies and leisure activities).

Two important aspects of the DiSTO project will be discussed here: 1) How to measure and evaluate distribution of digital skills and achievement of tangible outcomes in Internet use; and 2) The evidence for the existence of a third-level digital divide (socioeconomic and sociocultural inequalities in achieving high-quality outcomes of engagement with ICT).

IMPROVING MEASUREMENT

SKILLS

Most of the research on digital skills, including large-scale studies designed for the governing bodies for programs such as the OECD Programme for International Student Assessment (PISA) and the Eurobarometer studies, only measure general confidence, different types of Internet use, and use of various applications rather than actual skills. DiSTO avoided contextual items related to specific platforms or activities. This led to a set of 20 items organized in four categories of transferrable skills: operational, information navigation, social communication, and content creation skills, with good reliability and variance levels in the Dutch Internet user population (see Chart 1).

CHART 1
SKILL LEVELS IN DIFFERENT SKILL CATEGORIES

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Operational skills (α = .84)	Information navigation Skills (α = .88)
Social Communication Skills (α = .87)	Creative Skills (α = .89)

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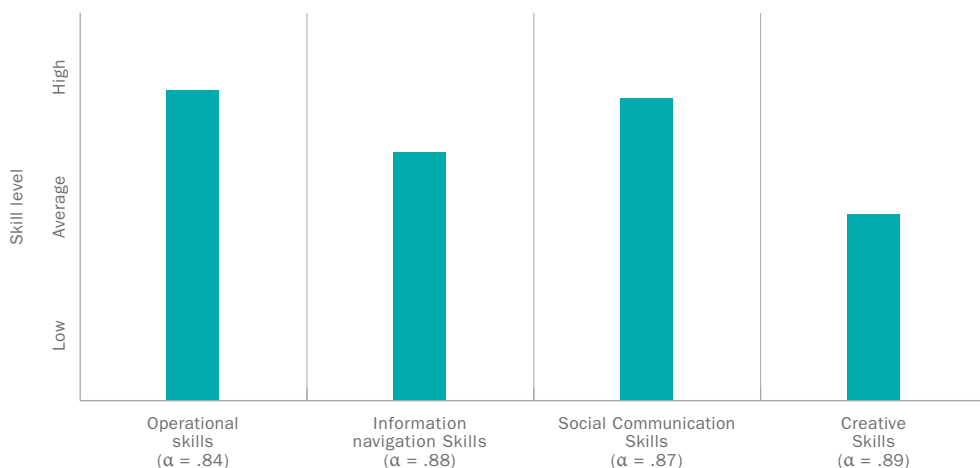
Base: Dutch Internet Users. *N* = 1,101

These skill categories were designed to be robust over time (independent of which particular application or platform is trending) and were shown to be needed to successfully carry out all types of online activities. Another category of skills emerged that might not be transferrable, containing items regarding mobile skills; as mobile platforms become more mainstream, these items are likely to be absorbed into the other transferable skills categories. All items were phrased in such a way as to ask about a person's ability to do something if they were ever in a situation where it was needed. The responses ranged from "Not at all true of me" to "Very true of me"; also included was the option "I do not understand what this means."

OUTCOMES

Previous studies have typically used measures of intangible outcomes that are not easily detectable by external observers, not testable as real outcomes in people's everyday lives, and more related to attitudes about rather than explicit achievement and quality of outcomes. Besides creating a theoretically informed classification of outcomes, DiSTO aimed to develop measures of the level of outcomes in a way that was meaningful and applicable in general population research and across the four outcome domains (economic, social, cultural and individual well-being). Helsper, Van Deursen and Eynon (2015) showed, after careful pilot research, that an answer scale composed of two aspects, quantity (achievement of) and quality (satisfaction with) of different outcomes, was the most appropriate way of measuring tangible benefits of Internet use. These showed good reliability and variance for the Dutch Internet user population. Chart 2 shows the data on achievement levels.

CHART 2
**ACHIEVEMENT LEVELS OF DIFFERENT OUTCOME CATEGORIES**
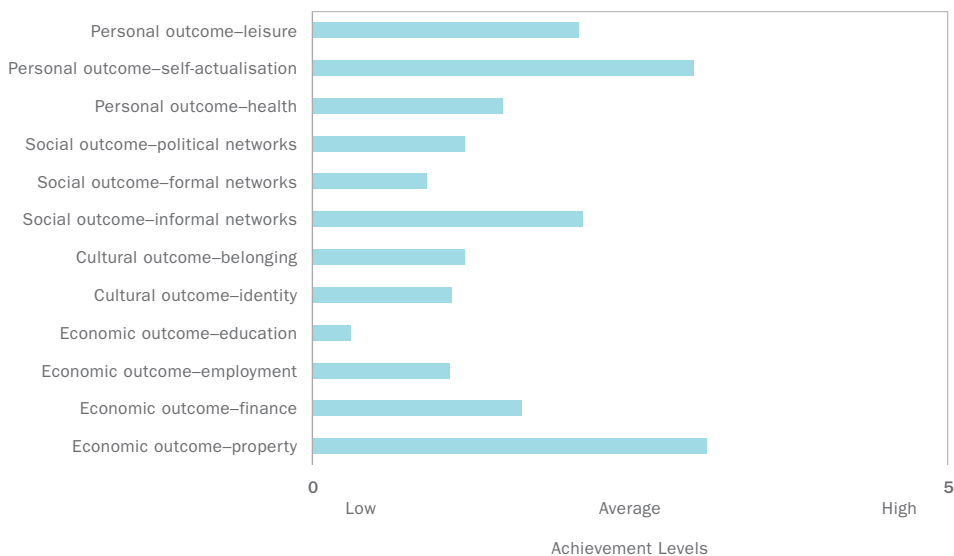
Base: Dutch Internet Users. *N*= 1,101

The inclusion of this range of outcome aspects allows researchers and evaluators to understand the unintended benefits of engagement with ICT and whether outcomes related to specific online activities are achieved. An intervention aiming to help people engage with learning might have the secondary outcome of improving health or increasing self-actualisation.

THE THIRD-LEVEL DIGITAL DIVIDE

Regarding inequalities in achievement of and satisfaction with tangible outcomes of ICT use, DiSTO concluded that: a) Engagement with a specific online activity does not necessarily lead to tangible offline outcomes; b) Those who are able to achieve an outcome in one area are not necessarily able to do so in another area; and c) Digital skills are a key mediating factor in translating engagement with online activities into tangible outcomes (VAN DEURSEN et al, 2016). The ability to translate use of ICT into tangible beneficial outcomes depends on all four digital skills: Operational and information navigation skills are preconditions for social and creative skills, without which individuals are not able to translate economic, cultural, social and individual online activities into related outcomes in everyday life (see Figure 1).

FIGURE 1
MODEL OF THE RELATIONSHIP BETWEEN SKILLS, USES AND OUTCOMES
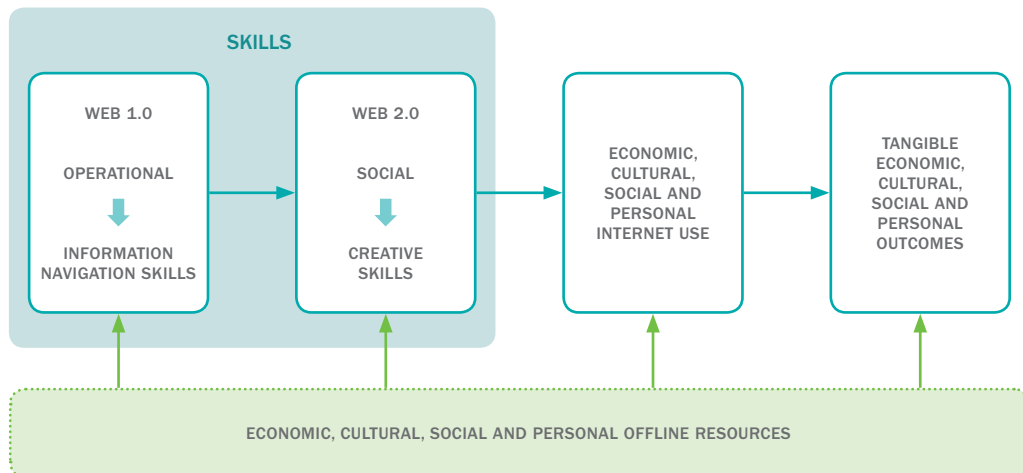
Source: Van Deursen et al (2016).

In what has been called the third-level digital divide, traditional inequalities reappear even in countries where there are minor inequalities in relation to the first-level (access) and second-level (skills and use) divides. When it comes to achieving beneficial outcomes, gender, education and other inequalities re-emerge (VAN DEURSEN et al, 2016). In particular, it seems that differences in creative and social skills explain inequalities. While differences between some sociodemographic groups can be explained by differences in these skills, this is not the full explanation. Age and household educational background are independently related to the types of uses and outcomes that a person achieves. Qualitative research is vital to understanding how achievement of and satisfaction with outcomes are constructed and to exploring the cognitive, quantitative aspects of outcomes as well as the affective, qualitative aspects of how digital engagement translates into real benefits in everyday life.

More population-based research is needed to understand differences in outcomes in different sociocultural contexts. It has been suggested that network effects might explain some of these differences. That is, norms, attitudes and behaviours in family, friend, and community networks could influence motivations to engage with ICT as well as perceptions of ICT benefits (DIMAGGIO; GARIP, 2012; HELSPER, 2016; THIRD et al, in press). The work of Helsper and Eynon (2010) on family dynamics showed that, while children influenced the acquisition of access and, to a certain extent, skills, family dynamics were not strongly related to uses of ICT, which were linked more to the sociocultural characteristics of parents. Future research should look at how peers and communities influence the norms related to the perceived usefulness, purpose and appropriateness of use of ICT (HELSPER, 2016).

CONCLUSIONS

IMPLICATIONS FOR RESEARCH, POLICY, AND INITIATIVES

This paper has argued that digital inequality research, policy and interventions need to be designed and evaluated around a broad definition of digital literacy, which should include access, skills, uses and benefits of ICT use. It is important to explicitly incorporate the full range of skills needed to achieve those outcomes, from technical and critical information literacy to social communication skills and different levels of content creation skills. Policy and interventions that address only technical, information-navigation and advanced creative skills (coding) will not lead to a digitally ready citizenry. Social communication skills must also be addressed in order to allow full citizen participation in societies where ICT is embedded in all aspects of public and private life.

But most importantly, in order to reduce digital inequalities, research, policy and initiatives need to start from an understanding of the outcomes that people are trying to achieve through their engagement with ICT. In other words, inequalities in digital literacy matter because of their impact on people's everyday economic, social, cultural and personal well-being. The broad definition of digital literacy presented in this paper forces those trying to tackle digital inequalities to start with an understanding of what technologies are for, how this might be different for different (groups of) individuals, and how it might be constructed and framed differently for different communities. Taking social, not digital, exclusion as a starting point,

Helsper (2014) suggested the following key steps for designing and improving digital equality initiatives: 1) Identify the main challenges sociodemographic and sociocultural groups face in terms of outcomes related to economic, social, civic, cultural and personal well-being; 2) Identify to what extent the digital exclusion of these groups in terms of access, skills, motivation and available content inhibits reaching desired outcomes; 3) Identify the best organisations, locations and platforms to reach and help these target groups; and 4) Evaluate these initiatives by measuring whether the groups *improved* their economic, social, civic, cultural and personal well-being as a result of their increased digital engagement. The measures for skills, uses and outcomes proposed here should be useful in this process. The next step in both research and policy will be to move away from the individual as the main site for the development of digital literacy. Access, skills motivation and content provision should be understood in the context of everyday life: Neighbourhoods, schools, clubs, families, and friends all shape how we perceive and interact with ICT. Therefore, future initiatives that tackle digital inequalities should incorporate the effect of these networks into their understanding of digital engagement.

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