DIGITALLY LITERATE: FRAMEWORK FOR THE DEVELOPMENT OF DIGITAL LITERACY

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ABSTRACT

The development of information and communication technology is placing the need for the acquisition of digital skills at the same level of the acquisition of conventional reading and calculus competences. The importance of being digitally literate increases as society becomes progressively more digital. This paper explores the concept of digital literacy and it intends to develop a framework for the development and dissemination of digital literacy as well as to propose a survey that will throughout time provide an assessment of individuals' digital skills. It begins by examining the various definitions of digital literacies and proceeds then to a discussion of what is being done to promote them and what can be done to improve their dissemination. The framework this paper proposes is composed of three core elements: access to technology, education and culture. The survey it recommends is an European Union-wide instrument of digital literacy measurement.

1. INTRODUCTION

Literacy is usually associated with the capacity to read and to write and the ability to speak and to listen. Despite the fact that these skills do represent the conventional foundation of literacy, the diversity of communication means has led to a more encompassing notion of literacy. The concept of literacy is progressively seen as the capacity "to share meaning through symbol systems to fully participate in society." (Hobbs, 2011).

There are over 250 million regular internet users in Europe, but while this number represents a positive scenario of internet usage, it does not depict the actual capacity of users to take advantage of that technology. Also, a good portion of these users are still not having access to more innovative resources, like Web 2.0 or mobile technology, and their perks (Newrly & Veugelers, 2009). Although there are some projects at an European level, which provide information on ICT aspects inside the Member States, regional and comparable information remains scarce (Vicente & López, 2011).

The evolution of the Information Society has determined that communication and information in a digital format are essential for economic and social development (Aleixo, Nunes, & Isaias, 2012). There is a growing focus on new literacies in the digital world that is transversal to a multiplicity of environments, social, educational, professional, economical that is happening as a result of globalization and the ever wider range of communication technology (Mills, 2010). As with other basic skills, digital competences need to be defined unequivocally by national governments in order to create a standard of basic and required skills that need to be developed by and inserted into the structure of compulsory education (Ananiadou & Claro, 2009).

2. DEFINING DIGITAL LITERACY

The original definition of the concept of digital literacy did not subsume an itemized list of what skills were necessary to achieve such literacy (Bawden, 2008). In his book, *Digital Literacy*, Gilster and Glister (1997) describes it in very general terms: "the ability to understand and use information in multiple formats from a wide variety of sources when it is presented via computers" (Gilster & Glister, 1997). Despite the fact that this definition was not welcomed by all authors, because it is so broad, it has remained timeless and

applicable to many competences, exactly because of its amplitude that does not limit the definition to a specific set of skills (Bawden, 2008).

"Digital literacy refers to the assortment of cognitive-thinking strategies that consumers of digital information utilize. Digital literacy is usually regarded as a measure of the ability of users to perform tasks in digital environments." (Jones & Flannigan, 2006). Digital literacy is a complex term that encompasses a multiplicity of skills, mind sets and technology. In terms of digital skills, there are numerous definitions and divisions of the required competences. van Deursen and van Dijk (2008) divided them into four essential groups: operational, which relates to the ability to operate digital media; formal, which comprises the competences to deal with digital media structures; information, the skills to find information; and strategic, "the skills to employ the information contained in digital media towards personal (and professional) development." (van Deursen & van Dijk, 2008). Alkali and Amichai-Hamburger (2004) highlight five main categories of digital skills: Photo-visual, reproduction, branching, information and socio-emotional. "photo-visual skills ("reading" instructions from graphical displays), reproduction skills (utilizing digital reproduction to create new, meaningful materials from preexisting ones), branching skills (constructing knowledge from non-linear, hypertextual navigation), information skills (evaluating the quality and validity of information), and socio-emotional skills (understanding the "rules" that prevail in cyberspace and applying this understanding in online cyberspace communication)" (Alkali & Amichai-Hamburger, 2004).

The assessment of people's real digital skills is challenging and cannot be limited to numbers of access. It is important to determine just how literate are the people using the internet, for example (Hargittai, 2005). Usage does not equal capacity of use. Some people do use the internet but are not capable of finding what they are looking for or, often, they are not in a position to understand what is online in terms of content and how to access it and use it for their benefit.

Digital literacy is a social practice and as such it goes beyond the technical aspects of being capable of operating certain media tools. The technical skills required to blog, for example, are less important in the context of social practices, than the content and the user's unique way of creating and sharing that content (Lankshear & Knobel, 2008). The definition of what constitutes digital literacy remains as diverse as the people who define them. The emphasis of what is the core of the digitally literate people is placed in different competences.

3. FRAMEWORK FOR THE DEVELOPMENT OF DIGITAL LITERACIES

The importance of being digitally literate is felt both in the business and social arena. Individuals failing to acquire this new type of literacy feel this limitation in the professional and social spheres of their lives (Newrly & Veugelers, 2009).

The development of digital literacy demands efforts that are technical, cultural and institutional. There is a cleavage between those who are late adopters and the Millenials. This difference becomes ever more evident in a fast paced media industry that constantly creates new devices and applications, leaving behind those with a more reduced digital proficiency (Jones & Flannigan, 2006). Digital illiteracy represents an essential element of the digital divide. Hargittai (2003) compares the acquisition of digital skills to the basics of traditional literacy: "Children are not simply given a book in the first grade and expected to read (...) instead we invest in teaching students how to read gradually" (Hargittai, 2003): 837). The author highlights the importance of focusing on developing policies and structures that promote training. Physical resources alone will not suffice to improve digital literacy and reduce the digital divide (Hargittai, 2003). It is becoming progressively clear that the lack of digital literacy is a crippling constraint (Jones & Flannigan, 2006). The digital literacy of a countries' professionally active population is vital for the development of their economy, as people with digital competences contribute to an increase in productivity, they can more easily embrace innovation and they have the capacity to create more employment. Digitally literate societies are more competitive (Newrly & Veugelers, 2009).

The framework for the development and promotion of Digital Literacy, proposed in this study consists of three core groups: access to technology, education and culture.

3.1 Access to Technology

The development of digital literacy is hindered by the existing digital divide. The disparity of access to technology is clear worldwide. There are many countries that have generally poor access to technology and others that despite having a reputation for being technologically advanced, still exhibit patterns of low access. In these countries the cleavage between those with a high level of access and those with a reduced degree of access is peculiarly clear among different social and economical classes and gender. A higher socio-economic profile is associated with an easier access to technology and with a higher quality of access. In terms of the inequality between genders, some studies show that girls have lower degrees of access to technology and have less interest and time spent on technologies than boys (Buckingham, 2007).

Some people are excluded of the digital era for economical reasons, for absence of interest and lack of perceived utility of technology. An important step towards the demystification of digital media and the comprehension of their importance is the planning and implementation of training programs suitable for the needs of adults. These programs should avoid being time consuming, they should account for a much needed flexibility and have a strong personal support. These programs can be planned to be hosted in libraries, colleges and other places where there is public access to technology (Hobbs, 2010).

The emergence of new technology was at the origin of the need to create new skills. Nonetheless, the access to technology and its particular features are only the starting point of digital literacy. It is paramount to have a wide availability of technological tools, but the acquisition of digital competences goes beyond this availability and it is dependent of other elements, digital and otherwise. Online and offline circumstances contribute to the development of digital ability (de Haan & Sonck, 2012).

3.2 Education

There seems to be a gap in the professional preparation of tutors and lecturers. It is imperative to create the conditions for teachers to feel competent and confident with digital skills to ensure their successful deployment into curricula. Also, the educational institutions themselves need to define structures for the effective planning of technology integration. The lack of structured technical learning goals impedes the development of digital literacy both in students and teachers. In some cases, what drives the digital progress inside academia is the effort of specific individuals who are digitally motivated and invest their own time to create strategies for digital integration (Jones & Flannigan, 2006).

The education system must adapt its curricula to include the innovative forms of communication among students (Doering, Beach, & O'Brien, 2007). Hague and Payton (2010) believe that it is fundamental to incorporate digital literacy skills in schools curricula, in order to promote a better use of technology since the early stages of education. Children and young people are making use of technology and it is paramount that they know as much as they can about them and how to use them to communicate and understand information. The incorporation of digital skills into curricula is leading to a reform of the educational system, where Information and Communication Technologies (ICTs) are being regarded as being as important as language and mathematics' abilities. Education systems must take responsibility for their students' literacy in the digital world. The professionally active population is required to possess a variety of abilities and skills that is compatible with the reality and demands of knowledge societies and economies. The business world counts on these skills to subsist and the place to start learning them is at school (Ananiadou & Claro, 2009).

3.3 Culture

The stance and attitude that users have towards technology and its use, greatly determines their capacity to master the skills needed to fully take advantage of its benefits. The mindset of the user is an element that needs to be developed and acknowledged as an important factor in the application and learning of digital skills (Ala-Mutka, 2011).

The cultural aspect is very important for the proliferation of digital competences. There are users with advanced skills that assume that other people have their degree of literacy and competence which leads to a fallacious illustration of digital literacy. On the other hand, there are those who are not aware of the importance and potential of acquiring these skills (Hobbs, 2010). Some people do not realize how excluded they are without them. Considering that "digital literacy is the ability to succeed in encounters with the

electronic infrastructures and tools that make possible the world of the twenty-first century." (Martin, 2005), involves a notion that there is a relationship with technology. This relationship with technology, as it becomes a tool for many of the society's routine practices, affects the successful adoption of technology. Users differ demographically in terms of age and sex, they present a variety of levels of technology skillfulness and also culturally. Many technology's are first cross-culturally assessed in order to maximize their acceptance by multiple cultural settings. (Oshlyansky, Cairns, & Thimbleby, 2007). Cultural awareness is, hence, fundamental for the development of digital literacies. Culture is one of the reasons why the EU exhibits patterns of different levels of digital skills and access between the Member states and also inside the countries themselves. Although other factors must be considered to explain the Divide, such as the urban-rural dichotomy, culture plays an important part (Vicente & López, 2011).

Additionally, with the successful proliferation of social and interactive online platforms for communicating and sharing, has shaped new online behaviors. Users require a specific set of skills to proficiently engage with these environments. New tools bring the need for new rules of engagement and a different stance toward the internet and the other users. These settings imply different methods of interaction and a mindset that is structured to share and deal with, not only formal content, but also private information and its emotional state. An important aspect of digital culture is the understand the nature of these specific contexts and to interact with them and other users in a safe manner (Eshet, 2012).

4. ASSESSING DIGITAL LITERACY: A EU SURVEY

In light of the importance and complexity of measuring literacy skills, this study proposes the draft of two European Union (EU) wide surveys to assess the levels of digital literacy in the member countries. The target population is composed by university students, both undergraduate and graduate and the employees of the top contributors to each country's national Gross Domestic Product (GDP). In terms of the university students, the courses that will be assessed are in computer science and social sciences courses. It is important to identify the differences between courses that are specifically directed at technical computer skills and courses that have no particular focus in this matter – although all students should be digitally literate, it would be interesting to see what is being done in non-IT related courses. All 28 member countries will be involved in this survey. The EU is an interesting unit of analysis, due to its heterogeneity. The discrepancies that exist regionally between countries, can also be observed internally in some Member states (Vicente & López, 2011).

The surveys will be divided into 3 sections. The first section inquiries the respondents in terms of demographic data and computer usage information. Demographic data such as age, gender and nationality will be collected followed by some questions regarding the participants' computer usage habits. With these questions this study aims to generally explore how often computers are used and for what purpose. This first section is common to both populations, hence it will be part of both surveys.

The second section is a self-assessment questionnaire that covers computer operation, internet, social media aspects (Facebook – upload photo), professional aspects (send an email with a document attachment) and it is based on the list of digital literacies competences that this paper has already defined has being core. This self-assessment will determine how the participants evaluate their own skills. The administration of self-assessment questionnaires is a customary practice to collect data on digital literacy levels. Some surveys are designed based on self-report of digital competencies, because they are seen as a method of providing a more accurate depiction of Digital skills levels (Chinien & Boutin, 2011).

The third and final section concerns a digital competences quiz, comprised of questions about specific tasks that require digital skills. The participants will be asked to choose what the correct option is for each of the questions relating to their own peculiar setting. Thus, both the self-assessment test and the digital skills quiz will be adapted to each of the populations. The students will have education related questions and tasks to perform and the professionals will be enquired with relation to work based digital practices. This section is very important because it supplements self-report based questions. Hargittai (2005) draws attention to the fact that self-reports on digital skills are insufficient to determine people's real competences. Their assessment alone is unable to provide an accurate depiction of the reality. It is the author's argument that the measurement of digital competences levels is more accurate and complete when it combines self-assessment

and a demonstration of individuals' skills by administrating some questions that can actually assess their knowledge in this area.

In order to assure a certain consistency in terms of the measurement of digital literacy, this study aims to apply these surveys throughout an initial period of five years. These surveys will be administered every year in the same time period to help to get prospective data through the years and check the evolution in terms of Digital Literacies.

5. CONCLUSION

This paper presented a framework to assist the development of digital literacy, covering three ample elements: access to technology, education and culture. These three core aspects of the foment of digital competences represent the need to provide people with access to a wide variety of technology to increase their familiarity with it; the necessity to invest in the implementation of digital skills inside the curricula at all levels of education; and the inevitability of changing the mindset of those who are still digitally phobic or dysfunctional. The technology, the training to deal with the technology and the knowledge of the specificity of the digital culture are key factors in the increase and propagation of digital literacy.

As with alphabetization, it is essential to understand the extent to which people are digitally literate. The assessment of digital competences allows for a better understanding of how the policies and guidelines implemented by the appropriate authorities are being followed. Also, it permits for an evaluation of the efficacy of such policies and guidelines. The survey that this paper proposes focuses on the EU. It intends to depict the level of digital literacy of the 28 Member countries by concentrating on their university students, both undergraduate and graduate and the employees of greatest contributors to their GDP. The five year period initially established to conduct this study, will allow the survey to be distributed annually, among these target populations. The final mapping of EU's digital competences will be the result of a comparison between the annual conclusions of each country' survey, allowing the registration of the evolution of national digital competences and also, the illustration of how the EU is growing as a community in terms of its digital literacy.

REFERENCES

Ala-Mutka, K. (2011). Mapping digital competence: towards a conceptual understanding. *Institute for Prospective Technological Studies. Available at: ftp://ftp. jrc. es/pub/EURdoc/JRC67075_TN. pdf (Accessed 15/01/2013)*.

Aleixo, C., Nunes, M., & Isaias, P. (2012). Usability and Digital Inclusion: Standards and Guidelines. *International Journal of Public Administration, 35*(3), 221-239.

Alkali, Y. E., & Amichai-Hamburger, Y. (2004). Experiments in digital literacy. *CyberPsychology & Behavior, 7*(4), 421-429.

Ananiadou, K., & Claro, M. (2009). 21st century skills and competences for new millennium learners in OECD countries: OECD Publishing.

Bawden, D. (2008). Origins and concepts of digital literacy. *Digital literacies: concepts, policies and practices*, 17-32.

Buckingham, D. (2007). Digital Media Literacies: rethinking media education in the age of the Internet. *Research in Comparative and International Education, 2*(1), 43-55.

Chinien, C., & Boutin, F. (2011). *Defining essential digital skills in the Canadian workplace: Final report*: Human Resources and Skills Development Canada.

de Haan, J., & Sonck, N. (2012). Digital Skills in Perspective: A Critical Reflection on Research and Policy. *Medijske studije, 3*(6), 125-137.

Doering, A., Beach, R., & O'Brien, D. (2007). Infusing multimodal tools and digital literacies into an English education program. *English Education, 40*(1), 41-60.

Eshet, Y. (2012). Thinking in the Digital Era: A Revised Model for Digital Literacy. *Issues in Informing Science and Information Technology, 9*.

Gilster, P., & Glister, P. (1997). *Digital literacy*: Wiley Computer Pub.

Hague, C., & Payton, S. (2010). *Digital literacy across the curriculum*. Bristol, United Kingdom.: Futurelab.

Hargittai, E. (2003). The digital divide and what to do about it. *New economy handbook*, 821-839.

Hargittai, E. (2005). Survey measures of web-oriented digital literacy. *Social Science Computer Review, 23*(3), 371-379.

Hobbs, R. (2010). Digital and media literacy: A plan of action. *A White Paper on the Digital and Media Literacy Recommendations of the Knight Commission on the Information Needs of Communities in a Democracy. http://www. knightcomm. org/digitaland-media-literacy-a-plan-of-action*.

Hobbs, R. (2011). Empowering learners with digital and media literacy. *Knowledge Quest, 39*(5), 12-17.

Jones, B., & Flannigan, S. (2006). Connecting the digital dots: Literacy of the 21st century. *Educause Quarterly, 29*(2), 8-10.

Kaminski, K., Switzer, J., & Gloeckner, G. (2009). Workforce readiness: a study of university students' fluency with information technology. *Computers & Education, 53*(2), 228-233.

Lankshear, C. J., & Knobel, M. (2008). Introduction: digital literacies: concepts, policies and practices.

Martin, A. (2005). DigEuLit–A European framework for digital literacy: A progress report. *Journal of eLiteracy, 2*(2), 130-136.

Mills, K. A. (2010). A review of the "digital turn" in the new literacy studies. *Review of Educational Research, 80*(2), 246-271.

Newrly, P., & Veugelers, M. (2009). How to strengthen digital literacy: practical example of a European initiative'SPreaD'. *eLearning Papers*(Number 12).

Oshlyansky, L., Cairns, P., & Thimbleby, H. (2007). *Validating the Unified Theory of Acceptance and Use of Technology (UTAUT) tool cross-culturally*. Paper presented at the Proceedings of the 21st British HCI Group Annual Conference on People and Computers: HCI... but not as we know it-Volume 2.

van Deursen, A., & van Dijk, J. (2008). *Measuring digital skills*. Paper presented at the Conference of the International Communication Association.

Vicente, M. R., & López, A. J. (2011). Assessing the regional digital divide across the European Union-27. *Telecommunications Policy, 35*(3), 220-237.