


# Software Literacy as a Vital Digital Literacy in a Software–Saturated World

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## INTRODUCTION

Software mediates almost every aspect of everyday life. Nearly all of our professional and personal activities are embedded and shaped within systems and interactions that involve software at some level; from the seductive ecosystems on devices such as smartphones or tablets, to the tools underlying everyday practices such as word processing and networked communication, through to the more functionally limited interfaces increasingly embedded into our homes and work spaces. None of these tools are ‘neutral’. They embody social and cultural assumptions about their use and all have particular values embedded in their interfaces and affordances. These reflect conceptual frameworks in which particular ways of acting or thinking are more possible and imaginable than others. Despite their ubiquity within contemporary society, software has only recently emerged as a field of study in its own right. As championed by the proponents of Software Studies this is a vital but neglected area of cultural production intersecting with and potentially shaping all other spheres of social, cultural, economic and political activity (Fuller, 2008; Johnson, 1997; Manovich, 2013). This article proposes the notion of ‘software literacy’ to highlight a neglected aspect of digital literacies, and a key means of conceptualizing the skills and understandings needed for people to be critical and creative users of software in today’s software-saturated culture. This contribution argues for the relevancy of software literacy as deeply intertwined with people’s engagement with software and how it influences the way people come to understand, represent, generate and critique knowledge.

The discussion below begins by overviewing the background and need for a focus on software studies before proceeding to define, introduce and elaborate on a framework for software literacy. An outline of the framework is then grounded in and exemplified through a case study located within a university teaching and learning context with implications for further thinking and research in the field.

## BACKGROUND

The proliferation of digital and networked technologies is an expanding and accelerating feature of modern societies and can be predicted to continue to rise and impact on almost every sphere of human living. This trend is reiterated in UNESCO’s latest policy document calling for all countries to mobilize the potential of digital including mobile technologies “to strengthen education systems, knowledge dissemination, information access, quality and effective learning, and more effective service provision” if

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they are to achieve the aspirational goal of inclusive and equitable quality education and lifelong learning by 2030 (UNESCO, 2015, p.37). Embedded within any digital device, software operates at multiple levels in contemporary life; as applications and platforms which we engage to facilitate and augment a host of social, economic and political practices, and less obviously as part of the taken for granted infrastructure of globalized cultural and economic exchange. We argue that software remains a conceptually neglected component of digital literacies, an often taken for granted aspect of the digital world which needs to be recognized as a distinctive part of contemporary literacies with its own dynamics and qualities which enable and constrain other literacies. Many practices within contemporary life, including those aggregated under the umbrella of digital, media and information practices are now ‘coded’ in the sense that they only exist and are constituted through programming code (Kitchin & Dodge, 2011).

However debates over terms such as information and communications technology (ICT) literacy, information literacy, digital literacy, media and information literacy, digital information literacy, and media and literacies studies tend not to acknowledge software as an actant in the world (Kitchin & Dodge, 2011) nor the emergence of software as a distinctive component of digital, media and information practices (Khoo, Hight, Cowie & Torrens, 2017). Our framework, software literacy, is intended to contribute to existing bodies of work on digital literacy (see for example, Ala-Mutka, 2011; Alexander, et al., 2017; Beetham & Sharpe, 2010; Hegarty et al., 2010; JISC 2014; Sefton-Green, Nixon, & Erstad, 2009; UNESCO, 2013). No studies to date that we know of raise the role of student understanding (including those who are new to using software) of how software and its affordances influence knowledge representation, generation and critique. Many studies have been conducted on information literacy and on ways of mastering software (Underwood, 2009), but the role of software itself tend to be taken for granted and is only now emerging as a field of study (Fuller, 2008; Lynch, 2015; Manovich, 2013).

Most people develop some level of proficiency with everyday software and hardware informally through their daily use and incremental engagement over time (Bulfin & Koutsogiannis, 2012; Hague & Logan, 2009). In educational research, informal learning practices have been shown to increase students’ sense of agency and consequently to have the potential to make learning a richer and more fulfilling experience (Furlong & Davies, 2012). Commenting on the trend of digital penetration, numerous authors have further argued that ubiquitous access to digital technologies has shaped a new internet-centred generation of ‘digital natives’ (Oblinger, 2003) with the corresponding assumption that access to digital tools has, on its own, facilitated the development of new learning skill sets (Tapscott, 2009). Terms such as the ‘digital generation’, ‘millennials’, ‘Net Generation’ (Tapscott, 1999), ‘digital natives’ (Prensky, 2001), ‘Google generation’, ‘Generation Y’ and so forth have derived from a host of assumption about the distinctive skill set of generations immersed within digital technologies. Such labels aim to characterize an emerging class of learners accustomed to engaging with software and other digital technologies such that they can effortlessly adopt such technologies, operate at ‘twitch speed’, are able to multitask, imagine, and visualize while communicating in multiple modalities and consequently possess higher technical skills compared to previous generations (Prensky, 2001). The term ‘digital natives’ itself assumes a generational change in digital literacies fed particularly by informal learning, opinions which are closely informed by emancipatory rhetoric surrounding the digital. As it has become used more colloquially, ‘digital natives’ suggests an inevitable increase of technical proficiency which is acquired through immersion within the digital world. Young learners are assumed to use trial and error, and an ability to network easily with peers to transfer knowledge, in the pursuit of skills which can translate to any new digital device. Implicit within this model of informal learning is the assumption that a user who develops a proficiency in one software application will be able to easily apply these skills to other forms of software.

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