

# Software Literacy

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## INTRODUCTION

Software mediates almost every aspect of everyday life. Nearly all of human 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 iPhones or iPads through to functional interfaces of automatic teller machines (ATMs), to the tools underlying everyday practices such as word processing and email, through to the sophisticated professional editors for multimedia design. None of these tools are ‘neutral’. They derive from social and cultural assumptions about their use and all have particular values embedded in their interfaces and hierarchy of affordances. These embody conceptual frameworks in which particular ways of acting or thinking are more possible and imaginable than others. Despite their ubiquity within contemporary society, software itself is only now emerging 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 cultural, economic and political activity (Fuller, 2008; Livingstone et al. 2014; Manovich, 2008). This article proposes the notion of ‘software literacy’ as one way to understand the skills and understandings needed for people to be critical and creative users of software (as application, platform and infrastructure) 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. Most people develop some level of proficiency with everyday software packages informally through their daily use and incremental engagement over time (Bulfin & Koutsogiannis, 2012; Hague & Logan, 2009). 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

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‘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 characterise an emerging class of learners accustomed to engaging with software and technologies such that they can effortlessly adopt new 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. Consequently in part the term articulates anxieties amongst educational institutions and practitioners that they are falling behind the literacies students will bring with them to learning contexts.

Educators thus are often encouraged to operate under the assumptions that students already possess the necessary computing skills and conceptual frameworks to learn with and through generic software packages, and tend to neglect the role which the affordances of software themselves play in shaping how students ‘perform’ the software (Adams, 2006). Recent research indicates that such assumptions about students’ digital proficiencies are unfounded and that digital inequalities and marginalization persist around students’ access to, and use of, information and knowledge (Bennett, Maton, & Kervin, 2008; Jones & Czerniewicz, 2010; Kennedy et al., 2008). There is evidence students may not be aware of how to apply software embedded technologies effectively to enhance their learning (Khoo, Johnson, & Zahra, 2012; Valtonen, et al., 2011). In other words, digital inequality may not be defined specifically to the issue of *physical* access to digital tools (software and hardware) but may be intimately shaped by each learner’s ability to learn and apply (software-based) tools in ways

which similarly constrain learning and access to knowledge. A student cohort where everyone has access to digital technologies does not necessarily mean that they have all naturally acquired the literacies to usefully apply and critically engage with those technologies. Inequalities also arise due to differences in the social and cultural support for digital use; the expectation of teaching and learning institutions should perhaps be that individuals may be more or less able to exploit and critique the affordances of software and hardware (Selwyn & Facer, 2007).

For example, common affordances such as copy, cut, and paste are assumed to be naturalized and embedded across different software applications and able to be picked up with ease by this current millennial generation for work and leisure pursuits. However these affordances are also poorly understood as tools contextualized within larger hierarchies of affordances and interfaces that shape both their use and more broadly people’s engagement with knowledge, culture and society in the 21st century (Livingstone, Wijnen, Papaioannou, Costa, & Grandio, 2014).

There is a need to parse the distinctions between distinct media, information and specifically digital-centered literacies relevant to current digital and networked technologies and to examine the nature of student understanding and decision making around which tools might best serve their learning purposes. Labels such as ‘digital natives’ tend to conflate a basic skill in operating new technologies with broader forms of understanding and the ability to critique aspects of technology-based cultures. It is important to challenge these stereotypes and assumed competencies in order to examine the range of skills and other literacies that today’s students bring (and do not bring) to their tertiary learning. Students may not be aware of the full implications of the affordances and constraints offered through particular software; students may be as likely to be ‘captured’ by specific applications as ‘empowered’ by them. The design of software necessarily enables some practices even as it constrains and marginalises

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