

1-1-2014

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McMahon, M. T. (2014). Ensuring the development of Digital Literacy in higher education curricula. Proceedings of Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education. (pp. 524-528). Dunedin, New Zealand. ASCILITE. Available [here](#)

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# Ensuring the development of Digital Literacy in higher education curricula

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Digital Literacy is widely considered to be an essential attribute for both academic and professional success. In an increasingly regulated and standards-based higher education environment, however, there is a lack of clear guidance as to what constitutes the nature of appropriate level of Digital Literacy that graduates need to demonstrate. This paper argues for the application of a Digital Literacy Taxonomy to articulate the dimensions inherent in it, which can then be applied to student activities and curricula. This process can be used to assist academics in identifying the literacy requirements of their courses, their own opportunities for professional development and the creation of appropriate pedagogies to teach them.

Keywords: digital literacy, higher education, curriculum, learning outcomes

## Introduction

The Australian University context has been characterized in recent years by two complementary priorities. One has involved addressing the needs of an increasingly diverse and non-traditional cohort of students entering university. At the same time, universities have been subject in an increasingly regulated environment through the development of threshold standards for graduates.

The focus on literacy in higher education is in many ways a reflection of the nationalized curriculum and emphasis on literacy assessment that has come to dominate the Australian secondary education system. The National Assessment Program – Literacy and Numeracy (NAPLAN) (Australian Curriculum Assessment and Reporting Authority, 2013) has constituted one formal response to criticisms about the lack of reading and writing in high schools (Leung, 2006). In the higher education sector, the approach by TEQSA was to adopt literacies such as English Language Proficiency and numeracy into its Terms of Reference. While the regulation of higher education has recently proven to be a problematic political space (Australian Government Department of Education, 2014), the current focus of higher education is still very much on the definition of university quality according to external standards (Thompson-Whiteside, 2012).

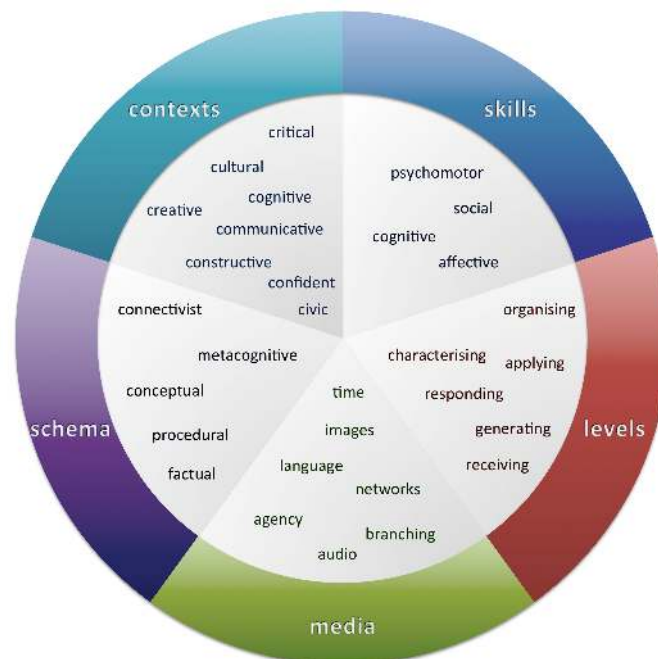
The most salient of these has been the integration of the Australian Qualifications Framework across all levels of higher education (Australian Qualifications Framework Council, 2013). This has set the expectations for learning outcomes for undergraduate and postgraduate awards and resulted in many universities developing course or program level outcomes as well as specifications for evidence needed to demonstrate these.

This formalization of standards, particularly in relation to literacy, has no doubt had a positive influence on the higher education sector but it does raise some important concerns about the graduate attributes that universities set and how we can ensure these are embedded at a curriculum level. This is particularly true for Digital Literacy. Students' ability able to use technology in appropriate ways is integral to most courses' expectations for their graduates. However, the foregrounding of traditional literacies in the form of English language proficiency and numeracy has entrenched these 'traditional' literacies at the expense of a broader information, social and cognitive attributes afforded and required by contemporary digital technologies (Hicks & Hawley Turner, 2013).

The notion of Digital Literacy can include conceptions such as critical information consumption, managed media attention or 'infotention', ethical collaborative research, networked coproduction of knowledge, and digital citizenship (Rheingold, 2012). It is tempting to assume that these skills are innate to contemporary learners and much has been made of the needs and learning styles of 'digital natives' (e.g. Oblinger, 2003; Prensky, 2006). More recent studies have shown, however, that such students tend only to value those technologies that impact immediately on their personal lives rather than contribute to their efficacy as learners (e.g. Kennedy, Judd, Churchward, Gray, & Krause, 2008; Ladbrook & Probert, 2011). There is a clear consensus that Digital Literacy is essential for future success (Chase & Laufenberg, 2011). Nevertheless, students still lack basic skills such as Internet searching, despite a heavy reliance on them (Marupova & Vega Garcia, 2007).

## An integrated taxonomy for Digital Literacy

A previous article has provided a taxonomy for the promotion of Digital Literacy (McMahon, 2014). This has been designed to reflect the complexity of Digital Literacy in terms of the multiple perspectives and ideologies that underpin them. Digital Literacy covers many sets of skills from psychomotor to social. It also incorporates the cognitive and social schema that provide the structural basis for organizing digital knowledge and skills, and contextual elements that determine the application of the literacies (e.g. Belshaw, 2012). The taxonomy proposes an outcomes-based approach that is highly influenced by the cognitive levels articulated through Bloom's Taxonomy (1956), expanded into fields such as psychomotor (Harrow, 1972) and affective (Krathwohl, Bloom, & Masia, 1964) domains and factual, conceptual, procedural and metacognitive knowledge types (Krathwohl, 2002). While many models of learning focus purely on individual psychology, the affordances of Internet communications and social media allow for a more expansive view, embracing the connectivist epistemologies that acknowledge the potential of knowledge to exist between people and within the network structures themselves (Figure 1).



**Figure 1: Integrative Digital Literacy Taxonomy**

The five components above provide a mechanism for characterising the many elements that constitute digital literacies in the following ways:

- **Skills** can comprise various types such as the physical use of devices (psychomotor), the ability to process contemporary forms of information such as non-linear content (cognitive), the notions of personal identity and self efficacy (affective) and the ability to use such technologies for social uses such as community building.
- Learners may demonstrate literacy at different **levels**, including lower order outcomes such as being recipients of information, organizing content and performing functional tasks or higher order ones such as analysing digital media (responding), using digital technologies to generate new content or evaluating (characterising) the experiences afforded by them.
- The **media** themselves may be traditional in nature (text, audio and images) but contemporary digital media also allow for time-based content such as animations, branching information architectures common to websites or the more diffuse network structures such as chains of comments, tweets and so on. Agency provides a deeper level of interaction than navigation adding contingency through digital forms such as computer games.
- **Schema** include those knowledge structures proposed by the revised Bloom's Taxonomy (Krathwohl, 2002) but acknowledges the connectivist tenet that knowledge is not always internal but can sit between individuals and as networks (Siemens, 2005).

- Using digital technologies as creative or communicative tools or to critically engage in media demonstrate some of the **contexts** to which Digital Literacy is applied. This component also includes adherence to social norms (cultural), reworking or mashing up existing content (constructive), using such technologies ethically and purposefully (civic), and demonstrating confidence through fluency and adaptability with technology use.

## Characterising student activity through the Digital Literacy taxonomy

The first step in applying the taxonomy is to use it to understand the various literacies that students need to engage in within any given discipline. Table 1 demonstrates some of the ways in which the taxonomy can be mapped to typical academic tasks.

**Table 1: Applying the Taxonomy to Academic Tasks**

Activity	Skills	Levels	Media	Schema	Contexts
Using a keyboard	Psychomotor	Applying	Language	Factual	Constructive/ Confident
Writing an critique of digital culture	Cognitive	Responding	Language	Conceptual	Critical / Communicative
Reflectively blogging about your creative process as you complete a project	Cognitive / Affective	Characterising	Language / Images	Metacognitive	Communicative
Designing a Business Card	Cognitive	Generating	Language / Images	Conceptual	Creative
Searching the Web	Cognitive	Organising	Branching	Factual	Cognitive
Collaborating on an assignment using a Wiki	Social / Cognitive	Generating	Language / Images / Branching	Connectivist	Constructive
Replying to a discussion board	Social	Responding	Language	Conceptual / Connectivist	Communicative
Learning nursing skills through a role playing game	Cognitive / Affective	Characterising	Agency	Procedural / Metacognitive	Cultural / Cognitive

The examples above are only to demonstrate how an academic task can be analysed in terms of the nature of the digital literacy elements that constitute it. In some cases, elements may be mutually exclusive but would not always be the case. Media is typically easily defined, for example, but there may be multiple media involved, such as in a multimedia environment where a student may be developing an e-portfolio of creative work. Similarly, complex activities may subsume smaller elements so that an aspect of a nursing role playing game may be learning a procedure to insert a catheter but also include social elements in terms of patient interaction and professional behaviour. Similarly, a photographic ‘mashup’ of other images may contain creative and constructive elements, but also civic ones regarding the ethical considerations of recontextualising the original images, the nature of reality or possibly even how individuals may be represented or portrayed through that process. Complex activities may be disaggregated into smaller ones, such that in the example of an online portfolio, the affective skills involved in the formation and portrayal of a digital identity can be separated from the social elements of commenting and community-building using networked media. This could be a valuable means to delineate the multiple literacies that often underpin complex activity, though care would need to be taken to ensure that an unnecessarily high level of granularity did not diminish the utility of the taxonomy.

## Towards a curriculum and pedagogy for Digital Literacy

Different disciplines would have different expectations and demands on learners’ Digital Literacy. The taxonomy proposed here is contextually neutral in the sense that it can apply to any activity. For example, confidence in the use of digital tools can come from being able to easily manipulate data in a spreadsheet or use the keyboard shortcuts in a graphics application.

The nature of the discipline ultimately defines what constitutes the appropriate application of Digital Literacy. This paper proposes that the Digital Literacy Taxonomy articulated here can provide a useful step in firstly defining those activities as they relate to a discipline, and then ensuring that the breadth of digital skills are addressed in contextually relevant ways. Over the next several months, the author will be engaged in a curriculum renewal project at his university and the taxonomy will be applied during this process. This will include the development of a program level outcome to set a standard for the application of digital technologies

within an undergraduate Design degree, using the taxonomy at the level of majors and units to ensure that the outcome is met through demonstrable and assessable activities.

A further and perhaps even more compelling argument for the Taxonomy is that it is also a necessary step for the development of academics' own digital skills and generation of appropriate pedagogies to teach them. Applying the Taxonomy during the design of a course ensures that consideration is given to the ways in which industries and disciplines have evolved and in which teachers and learners need to adapt to ensure currency.

The greatest problem with Digital Literacy is that it is a notionally important concept in higher education but still one that is addressed in piecemeal or underdeveloped ways. For universities to fully embrace the concept, there needs to be an acknowledgement that there are expectations of graduates to be digitally ready but this may constitute different attributes within different disciplines. Similarly, while there are many ways to teach Digital Literacy, the nature of the activity will inevitably define the extent to which students need to engage in modes of learning that may be highly structured, reflective, involve problem-solving or teamwork and so on. Defining the elements of what constitutes Digital Literacy and engaging in an activity where those are mapped in discipline specific ways allows academics to embrace the concept, identify opportunities for development in their courses and themselves and then create curriculum that prepares graduates to enter the needs of a 21<sup>st</sup> century workforce.

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**Please cite as:** McMahon, M. (2014). Ensuring the development of Digital Literacy in higher education curricula. In B. Hegarty, J. McDonald, & S.-K. Loke (Eds.), *Rhetoric and Reality: Critical perspectives on educational technology. Proceedings ascilite Dunedin 2014* (pp. 524-528).

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