What is good practice in the development, assessment and evaluation of digital literacy for graduate employability?

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No. 2 2015, What is good practice in the development, assessment and evaluation of digital literacy for graduate employability?, Pauline Hagel
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Abstract

This report seeks to identify the features of good practice in the development, assessment and evaluation of digital literacy for graduate employability.

The report forms Stage 2 of a two-stage literature review. The results of the first stage of the review are reported in: Towards an understanding of 'Digital Literacy(ies)'. The current report draws on some of the same literature to that of the Stage 1 report and covers the same time period – up to the end of 2012. In addition, the current report covers literature that provides discussion and accounts of good practice in digital literacy – particularly practice that is embedded in course curricula.

The literature provides numerous examples of standalone digital literacy practices. While such practices may be effective for some purposes, they may be less effective than course-integrated practices in contributing to graduate employability. However, there are few accounts of course-integrated practices in the literature and fewer still that provide a compelling case for their positive contribution to graduate outcomes. Accordingly, the report identifies eight criteria of good practice in digital literacy for the assurance of graduate learning outcomes. It then identifies types of broad teaching and learning practices that appear to best encompass these criteria and which provide meaningful contexts in which to develop the digital literacy competencies of students.

Keywords: digital literacy, higher education, graduate outcomes, best practice, assessment and evaluation, inquiry-based learning

Introduction

This report forms Stage 2 of a two-part literature review of digital literacy. Stage 1 of this investigation was concerned with conceptualising and defining digital literacy. The purpose of the Stage 2 report is to establish what constitutes good practice within the higher education sector in the development, assessment and evaluation of digital literacy. The information about good practice will be used to inform the practice of the Deakin University Library in contributing to renewed and enhanced course curriculum aimed at ensuring digital literacy as a learning outcome of Deakin graduates.

The context for the review is the Deakin Learning Futures AGENDA 2020 through which course teams are engaged in a four-stage process of course enhancement. The enhancement process involves scoping, redesigning, resourcing and evaluating. In redesigning their courses, teams are required to redesign assessment and unit learning objectives so that these are aligned to course learning outcomes. In the evaluation stage, course teams will be required to evaluate the effectiveness of the course enhancements they have made.

Course learning outcomes derive from the Deakin Graduate Learning Outcomes (GLO). GLOs are designed to improve graduate employability. One of the Deakin GLOs is digital literacy which is defined at Deakin University as: ‘using technologies to find, use and disseminate information’ (Deakin University 2012a).

Along with the other GLOs, course teams are required to integrate digital literacy in their programs and units; assess and evidence students’ achievement of digital literacy; and evaluate the effectiveness of their course enhancements for the assurance of digital literacy. The course enhancement process also requires design for Cloud or located learning environments (Deakin University 2012c). Cloud learning and associated Web 2.0 technologies offer enhanced ways for students to learn online including through the generation of their own
content and through collaboration with others (Deakin University 2012a). Therefore, course teams need to also consider how digital literacy is most effectively developed, assessed and evaluated using various online and cloud-enabled technologies.

Faculty Liaison librarians are expected to play a role in assisting course teams to develop, assess, evidence and evaluate digital literacy. Consequently, this report is aimed at providing support for the liaison librarians in this work by establishing what constitutes good practice in integrated, discipline-specific, digital literacy practice. The report is primarily concerned with the alignment between learning activities, learning objectives, assessment of learning outcomes and the evaluation of digital literacy practices.

First the report describes the method of the review. The second section outlines and justifies eight criteria for establishing good practice in digital literacy. The third section of the report identifies types of broad practices that may comply with the criteria for good practice and which provide meaningful contexts in which to develop digital literacy competencies of students and assure learning outcomes.

**Method**

The method of review drew firstly on some of the papers and reports used in Stage 1 of the report. The Stage 1 review encompassed a search of several main databases, peer reviewed journals and sites of various government, education and professional bodies up to December 2012. The first stage of the review also uncovered some prior reviews of digital literacy practices including those of Beetham, McGill and Littlejohn (2009), Gray, Thompson, Sheard, Clerehan and Hamilton (2010), Kenton and Blummer (2010). This report draws on all these sources in identifying features of good practice for digital literacy.

Initially the review focused on identifying examples of good practice in digital literacy published in the literature. However, finding comprehensive accounts of discipline-based, digital literacy assessment and evaluation practices proved problematic. An initial scan of literature to identify examples of digital literacy practice indicated that: (1) very varied practices are described as those of ‘digital literacy’; (2) many accounts of digital literacy practice in the literature focus on innovations in technologies rather than learning or literacy practices; (3) many good examples of practice are non-assessed and delivered through central services such as libraries rather than integrated within disciplines; (4) practices are often reported as snapshots that provide insufficient details on which to judge their quality; and (5) few practices are comprehensively evaluated and methods for evaluation are still underdeveloped, not just for digital literacy practices but for learning more generally (e.g., Tanner, 2011).

In their review, Beetham, McGill and Littlejohn (2009) noted that there were likely to be extensive incidences of digital literacy practices that are implicit in discipline practice and are underreported because they are so implicit and deeply ingrained with curricula. In an attempt to uncover some of these practices, further searches of the literature were conducted in discipline-specific teaching and learning journals (e.g., BMC Medical Education), journals that focus on information and communication technologies (ICT) use in higher education (e.g. Australasian Journal of Education Technology) and the conference site of the ASCILITE. The search terms used included combinations of ‘digital literacy’, ‘information literacy’, ‘assessment’, ‘evaluation’, ‘graduate outcomes’, and ‘graduate employability’.

The results of an initial search of these discipline journals on teaching and learning indicated that the term ‘digital literacy’ is not yet in common usage. Rather, information literacy remained the dominate concept. For example, a search of Accounting Education for the five years to 2012 resulted in the identification of only two papers that used the term ‘digital literacy’ in contrast to 72 that used the term ‘information literacy’ and 24 for ‘media literacy’. This pattern of results was similar for other journals, for example, Advances in Health Science Education returned four papers for ‘digital literacy’, and 20 each for ‘information’ and ‘media’ literacy.

Again, most of the discipline-specific practices identified through these searches were not explicitly about digital literacy but in some cases did encompass aspects of digital literacy practice. For example, evidence-based learning
used widely in the health sciences require students to find and use information (e.g., Ilic and Forbes 2010) as a critical part of being able to make clinical assessments.

Further, while they may not focus on digital literacy, more accounts in the literature are beginning to provide information about the evaluation of practices and the evidencing of student learning. Various national and international bodies are leading this push for evaluation including the Office for Learning and Teaching (OLT, formerly ALTC), JISC in the United Kingdom and the National Institute for Learning Outcomes Assessment (NILOA) in the US. This report draws on reviews from these bodies including those that have reviewed practices in digital literacy (e.g. Beetham et al 2009), assuring graduate outcomes (Oliver 2011a) and the assessment and evaluation of social media use for learning (Gray et al 2010).

What is good practice in digital literacy development, assessment and evaluation?

The literature relevant to the purpose of this report is diverse, extensive and fragmented. As a means of drawing together the disparate literature, this section proposes eight criteria of good practice in the development, assessment and evaluation of discipline-specific integrated digital literacy. The discussion provides an outline of each criterion but is not exhaustive. Further, as the report is concerned primarily with the alignment between learning activities and the assessment and evaluation of learning outcomes, there is some overlap between criteria.

1. Does the practice address digital literacy?

This report adopts a broad conception of digital literacy (or literacies) and encompasses practices focused on different digital literacy competencies (i.e. finding, using and disseminating information). Further, as noted in the Stage 1 report, Towards an understanding of ‘Digital Literacy(lies), digital literacy may encompass elements of information, ICT, media and visual literacy practices. Consequently, there may be varied practices that ‘count’ as examples of digital literacy practices. These may place different degrees of emphasis on information, technology or media depending on the background and/or interests of the educator/developer. However, digital literacy practices are not about skills in using technologies in isolation from information: it is about using technologies in finding, using and disseminating information. Further, practices that constitute digital literacy are not restricted to information that is only textual. Digital literacy may include finding and digitally encoding a speech into a podcast or disseminating ideas through images and symbols (see Knobel and Lankshear 2008).

In making sense of the myriad of possible practices encompassed under the term of digital literacy, Martin and Grudziecki (2006) distinguished between three levels of digital development: digital competence, digital usage and digital transformation.

Level 1, digital competence, is the base level and encompasses skills, concepts, approaches and attitudes (Martin and Grudziecki 2006). As noted in the Stage 1 review, Towards an understanding of ‘Digital Literacy(lies), Bawden 2008, suggested that the attitudes or perspectives included in digital literacy are those of independence and the ethical use of information. Digital literacy concepts include those of the provenance of information and its authenticity. Consequently, digital practices at Level 1 may encompass developing students’ skills in checking the authenticity of information. Digital literacy assessment practices may include checking whether students use information ethically and know how to appropriately attribute the sources they use.

Level 2, ‘digital usage’ encompasses the professional and discipline application of digital competence. Martin and Grudziecki (2006; 258) view this as the ‘central and crucial level’. It is one where people use their digital competences (for example in searching, finding and organising information) to develop a solution or product that addresses the task or problem they have encountered in their life or work situation.

Finally, Level 3, digital transformation, is when the ‘digital usages which have been developed enable innovation and creativity, and stimulate significant change within the professional or knowledge domain’ (Martin and Grudziecki, 2006; 259).
Good practices in developing digital literacy as a graduate attribute could conceivably encompass all three of these levels of digital literacy. However, for the assurance of the achievement of minimum performance standards for graduates, it is arguable that practice should be focused on Level 2, digital usage of Martin and Grudziecki’s (2006) framework.

In summary, the content of digital literacy practices may include tasks around finding, using and disseminating information in textual and other forms. Additionally, it may include also practices for developing knowledge and attitudes in students that support their use of information. Importantly, if students are to gain, demonstrate and evidence their digital literacy, then practices must provide them with opportunities to use their digital competences in ‘authentic contexts within the discipline, domain or profession’ (Martin and Crudziecki 2006; 260).

2. Is the practice consistent with principles of good learning, teaching and assessment?

The intention for this criterion is to focus on assessment rather than principles of good learning and teaching. (For an overview of what constitutes excellent student learning, see Deakin University 2012b, Cloud and Located Learning.) However, learning and assessment are closely linked: whatever is assessed is also what is learned. Therefore, learning critically depends on having assessment tasks that enhance learning (see Ramsden 1992).

There are various uses of the term ‘assessment’ in the literature with some using it interchangeably with that of ‘evaluation’. In this report, these two terms are distinguished and ‘Evaluation’ is discussed as part of Criterion 7. The ‘assessment’ of digital literacy is used here to refer to processes of judging a student’s progress and achievement of digital literacy within a course of study or unit. Some important principles for good assessment include the following:

- There should be a constructive alignment between the learning objectives of each unit of study and the forms of assessment (Biggs 2003). Further, there should be alignment between the objectives of each assessment task and the task design.
- Feedback should focus on what students need to do to improve their learning (Boud 2009; Chickering and Gamson 1987).
- Assessment tasks need to be designed to enable students to ‘demonstrate, improve and evidence their achievement’ (Deakin University 2012c).
- Assessment tasks need to be authentic to the discipline (see also the discussion under criterion 3).

The recent guide by Boud (2009), Seven Propositions for Assessment Reform, support and extend the above advice about effective assessment. The seven propositions made by Boud (2009) are:

1. Assessment is used to engage students in learning that is productive.
2. Feedback is used to actively improve student learning.
4. Students are inducted into the assessment practices and cultures of higher education.
5. Assessment for learning is placed at the centre of subject and program design.
6. Assessment for learning is a focus for staff and institutional development.
7. Assessment provides inclusive and trustworthy representation of student achievement.

The literature provides other guides that cover different facets of assessment including those for online tasks (e.g. JISC 2007) and those for assessment using social media (Gray et al 2011). For example, Gray et al. (2010) note that Web 2.0 activities offer two key affordances – related to their collaborative and public nature – and that these
require, specific consideration in assessment design. The authors produced draft guidelines and conventions for
designing and conducting assessment that include checklists of the affordances of social media, assessment
processes and policy to assist academics in the design of appropriate assessment tasks using social media (Gray et
al 2010).

Digital technologies also have the potential for creative, transformative and emancipative experiences. However,
these potentialities may be difficult to achieve without explicit design to ensure their achievement. In their
ethnographic study of what students do in a digital word, Lea and Jones (2011) observed that students’ digital
engagements were dominated by the rules and regulations of assessment procedures and practices. Therefore, if
universities and academics want students to demonstrate creativity and experience transformative experiences,
then assessment practices need to be explicitly designed to make possible these outcomes.

The literature reviewed for this report also suggests that good practice in assessment (and teaching) should not
assume that all students are digital natives (see the discussion under Criterion 6). Consequently, if an assessment
mandates the use of particular technologies, then consideration must be given to students’ access to the required
technology and training in the use of the technology. That is, in assessing digital literacy it is important that
assessment tasks are designed to assess students’ learning in their current unit of study rather than their access,
prior knowledge or previously acquired skill in using the technology.

In summary, good practice in digital literacy assessment requires an alignment between learning objectives and
assessment tasks, feedback that facilitates learning, and tasks that are authentic for the discipline. However,
there are additional considerations necessary with digital literacy given the centrality of digital technologies in
practice. The affordances of each technology need to be considered in design; student knowledge of technologies
should not be assumed; and assessment must be of learning that has occurred as a result of the practice rather
than prior knowledge of content or technology.

3. Is the practice integrated with discipline learning?

The review of the literature revealed many examples of digital literacy practices but few of these were of
integrated practice. This finding is supported by a review of literacy practices in the UK, Beetham et al (2009; 6)
that identified three categories of practices:

- institution wide program (usually portfolio-based) with generic processes of review and reflection but
  with specific skills practiced and assessed in subject modules;
- skills modules or module components, delivery alongside ‘subject’ teaching, typically by central
  services staff: may include tailored (subject-specific) tasks or examples; and
- literacy provision fully-integrated into modules and/or programmes of study, including learning
  outcomes and assessment: typically in professional/vocational program that are already competence-
  based.

Similar categories of findings have been identified by Bruce (2004) and Price et al (2011).

Beetham et al (2009) acknowledged that there were likely to be excellent digital literacy practices within
disciplines that may not be explicitly identified as digital literacy, but may be deeply ingrained into the teaching
and practice of the discipline. One example they suggested was critical assessment in media studies. While
difficult to ‘surface’ and identify, these are precisely the types of practices that are likely to best demonstrate
effective digital literacy practice. However, the majority of reported practices fit in the first two of Beetham et al.
(2009) categories. There are relatively few reports of integrated, discipline-specific, digital literacy practice that
would demonstrate Level 2 development in Martin and Grudziecki’s (2006) framework.

As noted in a previous section, Martin and Grudziecki’s (2006) concept of digital usage involves students in:
‘applying their digital literacy competencies to develop a solution or product that address an authentic task or
problem’. Thus, information or digital literacy involves complex set of skills and knowledge practices (Goodfellow
2011; Johnson and Webber 2003). These are skills best developed in the discipline (Lankshear and Knobel 2008).
Why is the integration of digital literacy with discipline practice so important? Grafstein (2002; 202) gives the most direct and compelling reason for its importance: 'because being information literate crucially involves being literate about something' (italics in the original). That 'something', according to Grafstein (2002) is the particular knowledge of the discipline, its discourses and epistemological structures; its research paradigms and procedures; the scope of the research questions it asks; and, its rules of evidence. Similarly, Lankshear and Knobel (2008;11-12) argue that we need to have students more actively participating ‘in scholarly ways of doing and being; (e.g. doing historical research like an historian, doing background research like a fiction writer, being a physicist or mathematician like professional physicists and mathematicians)’.

Further, Grafstein (2002) argues that there is an advantage for students in developing their information literacy within knowledge environments in which they are familiar. They can use their prior knowledge and familiarity with the discipline to build new literacy knowledge and practice their skills. Skills of synthesis are easier for students who are exposed already to the structure of knowledge in their disciplines. Skills in critical thinking and evaluation can be best developed when students know about the research concerns of their disciplines.

Arguably then, integrated practice could be considered central to a definition of Level 2 ‘digital usage’ (Martin and Grudziecki 2006). In summary, such integrated practice involves students in:

- finding, assessing, using, thinking, and reasoning about aspects of subject matter within their disciplines (Grafstein 2002)
- learning their skills in context and applying their learning to real situations or authentic tasks (Hunt and Birk 2004; Martin and Grudziecki 2006). (Elsewhere this type of learning may be described as ‘situated learning’, for example, Herrington and Oliver 2000.)
- having opportunities for metacognition as the learner reflects, thinks and writes about his/her own information literacy practices (Bruce 2004, 14).

There are existing, good pedagogical practices that involve students in active and scholarly ways of doing and being within their own disciplines and which allow for digital literacy to be learned in an integrated manner. These practices include evidence-based practice (EBP) in medicine, nursing and other health fields (e.g. Price and Kirkwood 2010); ‘problem-based’ learning in various disciplines including health sciences, social work and education, and ‘case-based’ learning in many business and management studies. These could be all classed as variations of inquiry-based learning.

There are diverse practices that come under the banner of inquiry-based learning but all involve practices driven by a question that needs answering or a problem to solve (Aditomo, Goodyear, Bliuc and Ellis 2011). The questions may be scholarly research questions or problems and questions of professional practice.

For example, evidence-based practice involves students in ‘making’ clinical decisions informed by the most relevant, valid and robust evidence (Ilic 2009). The process of inquiry involves several key steps (1) asking a question that needs to be answered; (2) systematically searching for and accessing evidence from appropriate sources; (3) critically appraising the evidence; and (4) integrating the appropriate information into the clinical setting (Ilic and Forbes 2010; 1).

In problem-based learning, students are given a real world problem to address. Students then engage in a process of refining the problem, identifying what they need to further understand the nature of the problem and address it, and working out how to find information or assistance that enables them to address any knowledge-gap they may have. Case-based teaching focuses on the analysis of case narratives that may have self-contained information or require students to do further research (Aditomo et al 2011).

Aditomo et al (2011) recently conducted a survey of inquiry-based practices used throughout Australian universities as reported by discipline teachers. In total they identified nine different forms of inquiry-based practices from a broad range of disciplines. The review did not collect data specifically about the objectives,
assessment and evaluation of these practices. However, from the information provided, it is clear that the majority do require digital literacy practices and offer, therefore, authentic discipline contexts for digital literacy.

Drawing on various sources reviewed for this report, integrated discipline practice for digital literacy should reflect and be consistent with:

- the different epistemological structures in the disciplines
- how knowledge is organised within each discipline
- the research and professional concerns in the discipline
- the scope of the research questions that can be asked
- the rules for research and the evidence that can be recognised
- the sources researchers and practitioners need to consult
- the kinds of criteria that can be used to evaluate claims critically
- the information needs and skills of professionals in the discipline

While there are other discipline based pedagogical practices that may also be consistent with the above concerns, these have a good fit to many practices that are described as inquiry-based learning practices.

4. Does the practice involve authentic assessment in support of graduate employability in the discipline?

There is a considerable connection between this criterion and the previous one: practice that is integrated within the discipline. If the practice is integrated within the discipline then it should also have the attributes of authenticity. This fourth criterion does, however, draw particular attention to practice that is authentic for enhancing graduate employability.

Graduate employability may be conceived as: ‘the skills, understandings and personal attributes that make an individual more likely to secure employment and be successful in their chosen occupations to the benefit of themselves, the workforce, the community and the economy’ (Yorke 2006, cited in Oliver 2010a;10).

The skills, understandings and personal attributes that comprise digital literacy were outlined in the companion report Towards an understanding of Digital Literacy(ies). These elements were identified by Bawden (2008) and are reproduced below using both the language that Deakin has adopted for defining digital literacy skills and the language used above to describe graduate employability:

- **Skills**: finding, using and disseminating
- **Understanding**: the nature of information - forms, sources/origins, understanding of the ‘publication chains’, authorship, provenance
- **Personal attributes**: independent learning; ethical use of information; ethical behaviour in digital communication

In addition to practices that are designed with these particular skills, understandings and personal attributes in mind, there may be particular digital technologies that can be used to enhance graduate employability within particular fields. For example, Gray et al (2010) argue that the uses of Web 2.0 authoring have proliferated in various areas of prospective employment including civic, business, professional and research settings. Consequently, digital literacy practices that incorporate use of the technologies may be particularly authentic to needs of students in areas such as journalism, media studies, public relations, marketing and teaching.
Similarly, evidence-based practice (EBP) is authentic to the practice of graduates in the health sciences including medicine and nursing. Thus assessments that involve students in using EBP and applying their learning of EBP in real or simulated situations conform to notions of authentic assessment for employability within these disciplines.

5. **Does the practice use the affordances of the digital technology?**

Affordance is used in this report in the sense of Norman (1988) to refer to the design aspect of the digital technology which suggests how it should or could be used. For example, the affordances of cloud technology include its ability to support the instant updating of work-in-progress for effective collaboration, sharing, and accessibility (Ching and Hsu 2011). Social networking sites such as Facebook, with its mini feed, wall posts and prod features, afford users various opportunities for the way that they present themselves and their identities, and for interacting with others to generate, communicate and negotiate meaning (Knobel and Lankshear 2008b).

Further, making use of the affordances may be important in motivating students to learn. Ching and Hsu (2011) use the language of ‘values’ rather than affordances and suggest that Web 2.0 values collaboration, interaction, participation. They argue that students may be unmotivated without a match between what the technology offers (i.e. its values) and what they, the students, are asked to do with the technology.

It is important that advantage is made of the affordances of technologies. However, in too many practices the selection of digital technologies for learning is ill-conceived. As Price and Kirkwood (2010; 779) concluded from their review of technology enhanced learning: ‘more often than not technology was used to address an under-defined issue’. Further, often the technology is chosen with little consideration of learning objectives.

Gray et al (2010) provide guidelines for academics in universities to ensure that there is an appropriate fit between the affordances that Web 2.0 activities entail and what assessment is trying to achieve. These guidelines are valuable for designing and evaluating assessment tasks, ensuring students are treated equitably in assessment, and that students are ‘safe’ in using these technologies for learning.

In summary, the affordances of technology may differ. Practices in developing and assessing digital literacy skills and knowledge should be designed to use technologies appropriately. However, use of the technology should be subordinate to the pedagogical practice: the focus of digital literacy practices should be on what students are asked to do with the tool rather than what the tool can do (e.g., Burden and Atkinson 2008). Selection of digital technologies should also consider the needs and situation of the diverse users.

6. **Does the practice cater for a diverse student body?**

A consideration of the needs of diverse student cohorts should be a routine part of digital literacy practice. However, this criterion is separately identified to focus on issues of equity for and the participation of underrepresented groups in higher education.

The literature review revealed two particular issues for practices related to digital literacy. First are the assumptions made about the digital technology skills and preferences of students (i.e., the ‘digital native’ debate). The second issue is about access issues to technology (i.e., the ‘digital divide’ discourse).

While the use of digital technologies among the young may be widespread – that is, there may be many students who use digital devices and social networking sites in their personal lives – it cannot be assumed that these same students are equally familiar with all technologies, can transfer their skills from social use to educational use easily, or are sufficiently expert in the digital technologies they encounter for assessment purposes (Crawford and McKenzie 2011; Tsai, Liang, Hou, Tsai 2012).

A number of studies suggest that the digital prowess of students is overstated and far from uniform (e.g. Margaryan, Littlejohn and Vojt 2011; Ng 2012; Tsai, Liang, Hou, Tsai 2012; Kennedy, Judd, Churchward, Gray and Krause 2008; Brown and Czerniewicz 2010). Additionally, the assumptions often made about students’ preferences for using digital technologies for learning may also be misguided. Just because students use digital
technologies in their personal life, does not mean they will find the use of these same technologies motivating or authentic for their formal learning. On the contrary, there is evidence that some students do not want ‘their’ technologies to be appropriated for assessment tasks. Margaryan et al (2011; 438) reported that students were reluctant to use personal mobile devices for learning for both cost reasons and because they did not want to be ‘constantly connected’. Similarly, Lea and Jones, (2011; 390) concluded from their study that students resisted such ‘intrusion’ and were ‘less than enthusiastic about these possibilities’.

The above literature casts doubt on the assumptions made about students as digital natives. Further, as Brown and Czerniewicz (2010) suggest this concept can be non-inclusive, may promote simplistic thinking around the digital and non-digital and is often based on spurious categorisation around age.

Others suggest that an unthinking use of digital technologies serves to strengthen existing inequities in students’ experiences and outcomes (e.g., Littlejohn Beetham and McGill 2012). For example, Crawford and McKenzie (2011), in reporting about an outreach program in Perth, WA, found that the location of students’ residences and the types of school they attended had an impact on their self-assessed online participation, the reliability and speed of their internet connections and their confidence and ease with computers and the internet. That is, there were material and affective differences and outcomes for students based on their SES status (as measured by geographic location). These findings are further supported Crawford and McKenzie (2010) who cited 2009 ABS data that showed home computer access and internet access rates varied significantly between households in the highest and lowest income quintiles.

Factors such as poorer access and less comfort with using computers mean students from low SES backgrounds may be disadvantaged (Anderson, 2005, cited in Crawford and McKenzie 2010) in situations where the use of online or digital technologies are mandated. This is despite the commonly mentioned potential for online learning environments to improve access to those students who, by virtue of their remote locations or work and family responsibilities, may otherwise lack such access to higher education (e.g. Elliot 2010). Further, mere access to computers is insufficient with evidence that existing social or educational capital plays a role in the uptake of new digital opportunities (Littlejohn, Beetham and McGill 2012; 548).

However, disadvantage is unlikely to be uniformly experienced across all digital literacy practices. For example, Buzzetto-More (2006) suggest that practices such as e-portfolios may be well suited for use by disadvantaged students because these practices enable students numerous opportunities to confirm that they have achieved the required learning outcomes. This example again suggests that educators need to be aware of the affordances of the digital technologies as well as being aware of student diversity.

Gray et al. (2010; 16) include questions in their checklist of policies for the use of Web 2.0 technologies that also address some issues of diversity. The two items are: ‘this assignment provides for equitable assessment for students with a disability’ and ‘students are guaranteed access to IT services or equipment to complete this assignment’. These questions are useful for consciousness-raising when designing digital literacy practices. However, the sources of disadvantage are numerous, and disadvantage may have complex influences on students’ experience of digital literacy practices.

In summary, good practice in digital literacy involves testing the usual assumptions made about the knowledge, experience and preferences of so called ‘digital natives’ and ensuring that already disadvantages groups are not further impeded by choices made in curriculum design about the uses to which digital technologies are put.

7. **Is the practice consistent with effective evaluation procedures for the assurance of graduate outcomes?**

‘Evaluation’ is used, here, to refer to the process of reviewing the design, implementation1 and results of including digital literacy in a course or unit to ensure learning outcomes include graduate employability. Universities need processes of evaluation to demonstrate accountability, to provide guidance about where improvements can be made (Swing and Coogan 2010) and to evidence student outcomes. However, as noted by

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1 The definition of evaluation used here is adapted from the OECD DAC Glossary [http://www.oecd.org/dac/evaluationofdevelopmentprogrammes/](http://www.oecd.org/dac/evaluationofdevelopmentprogrammes)
Oliver (2011), practice in measuring the achievement of graduate outcomes however, has lagged against that of the assessment of knowledge.

Assuring graduate outcomes is problematic. In a recent review, Oliver (2011; 2) outlined a quality approach to assure graduate outcomes through the collection and use of evidence. The approach involved the following steps:

- Determine the outcomes graduates need, and at what standard
- Know where and how the outcomes are developed and assessed
- Evaluate the standards at which the outcomes are achieved, and
- Drawing on evidence of achievement, implement strategies to improve graduate outcomes as part of the quality process (Oliver, 2011; 2).

Evaluation of learning outcomes can draw on different types of data including student perceptions and opinion, results of tests of content knowledge or skill acquisition, and tests of performance within discipline contexts or graduate outcomes. Ideally data from different sources is triangulated to ensure more robust findings (see Nygaard and Belluigi 2011).

For evidencing graduate outcomes, there are also some well-established instruments that purport to collect evidence of some graduate outcomes. For example, some items on the CEQ and Collegiate Learning Assessment (CLA) survey instruments seek to measure the achievement of graduate attributes such as written and oral communication and problem solving (Oliver 2011a).

In another approach to the assurance of graduate outcomes, a 2008 project by Oliver and colleagues (Building course team capacity to enhance graduate employability) developed a graduate employability indicator (GEI) survey for use with graduates, employers and course teams (see Oliver 2011a). The survey draws on items from National Survey of Student Engagement in the US and the Graduate Pathways Surveys in Australia which ask about graduate attributes and generic capabilities. The GEI survey seeks to capture students’ perceptions of the importance of 14 capabilities to their early professional success and their views about the extent to which they feel the degree they studied contributed to the development of those capabilities. Employers and course teams are also asked to rate the importance of these same 14 capabilities. Finally, employers are also asked to rate the extent to which they feel graduates exhibit these capabilities. The aim of the GEI is to use the results as part of curriculum review and for benchmarking between universities (Oliver 2011a). However, while surveys may play a useful role in evaluation, many employ only self-reporting of student achievement or skills or of employer’s perceptions of the skills of graduates. As such, they do not provide ‘evidence’ for the purposes of assurance of learning.

In response to the limitations of survey approaches, Oliver (2011) noted a shift in focus away from measurement to judgement of achievement. Potential ways of judging the achievement of graduate outcomes are through self- and peer assessment by students, formal assessment tasks, and portfolio approaches. Self-assessment can be particularly powerful for learning as it allows students to assess their own achievement. Eportfolios, in particular, can be used for various purposes including summative assessment, self-reflection and learning, personal and professional development planning, and the presentation and evidencing of learner achievements and learning. (See the JISC 2008 review: Effective practice with ePortfolios.)

However, within ‘practice’ disciplines in particular, concerns remain about how to reliably assess student learning outcomes. For example, in a recent editorial for the Journal of Nursing Education, it was observed that the field ‘lacks common metrics or standardized approaches for the evaluation of learning outcomes that are relevant for a practice discipline and that assess not only students’ knowledge gains but also their ability to use it during the provision of patient care’ (Tanner 2011; 492).

Gathering ‘contextualised evidence of student learning is difficult (Nygaard and Belluigi 2011), and what constitutes evidence of learning, graduate outcomes and the impact of learning and teaching practices is
For comprehensive assessment of learning practices, Price and Kirkwood (2010) suggest that we need to consider both the type of evidence collected and its potential impact. They distinguish between three types of evidence: accounts of the innovation (including descriptions of what happened, observations, satisfaction data); lessons learned from use or innovation (may include formal and informal data collection); and changes in practice (how evidence has been used to change practice).

While much has been written about the need for evaluation of student learning outcomes, developing measures, collecting evidence and performing evaluation remain challenging. Further, the higher education sector needs to invest more resources in developing the capacity and expertise of institutions to perform evaluation (Tanner 2011; Price and Kirkwood 2010) including evaluations which enable librarians to more effectively collaborate with academic teams.

8. **Is the practice sustainable?**

Whether a practice is sustainable should be part of its general evaluation (see Criterion 7). However, sustainability is identified here as a separate criterion because of its potential to be overlooked, or dealt with only cursorily, in accounts about practice in the literature.

A practice may be considered sustainable if it persists or endures over time (see, Stephens, Hernandez, Roman, Graham, and Scholz 2008). A sustainable practice for integrated, discipline-specific, digital literacy would be one that can be repeated and/or used within different contexts and which would remain relevant over time.

In the literature reviewed for this report there were many studies that give accounts of digital literacy practice. In some cases the practices were developed as innovations or ‘pilots’, involved very small numbers of students (e.g. Ching and Hsu 2011), and/or depended crucially on the particular skills and interests of individual academics or library staff. There are few accounts of digital literacy practices that have been offered on multiple occasions or for units with the large student enrolments that are typical of the Deakin University context.

Some good practices are unsustainable because of limitations in infrastructure. A good example of this has been e-portfolios where, until recently, problems in ensuring portability and open access to a student’s portfolio have limited penetration of this practice in universities.

Both the teaching and assessment and the evaluation processes must be sustainable. Assessment of digital literacy practices can be very time-consuming. This is particularly true for practices involving portfolio reviews (Swing and Coogan 2010.) Indirect costs in the form of teacher’s time are substantial but are very difficult to measure (Swing and Coogan 2010). The literature also indicates that, students too, incur substantial time costs with some online learning tasks (e.g. Terrell et al 2011).

Other factors that influence sustainability are the costs involved in integrating and/or mainstreaming practice including the training of staff. A further factor in sustaining practice can be maintaining the attention of managers and academics as other objectives intervene or because of the constant appeal of the ‘new’ in education circles.

However, good digital literacy practice need not produce costs. There may be effective practices already in place that fit the definitions of digital literacy. This is particularly true for some of the integrated discipline practices discussed under point 3. In such cases, a faculty or university may still need to perform ongoing evaluation to decide what practices are most effective and which should be retained (Swing and Coogan 2010).

Finally, evaluation itself is costly in money and time. There has been little work done on cost effectiveness of evaluation within universities (Wellman 2010; 5). However, Wellman (2010; 17) argues that ‘adding cost analysis to ongoing assessments of student success will sharpen the focus and improve the usefulness of assessments [and evaluation]’.
In summary, while continued innovation and experimentation may be important for examining the possibilities of new practices and technologies, good practice in digital literacy development, assessment and evaluation should be repeatable in subsequent teaching periods, apply to more than one context and be cost efficient in both time and money for both universities and their students.

Conclusion

This report attempts to establish what constitutes good practice in digital literacy development, assessment and evaluation. It outlines eight, interrelated criteria of good digital literacy practice as follows:

1. Does the practice address digital literacy?
2. Is the practice consistent with principles of good learning, teaching and assessment?
3. Is the practice integrated with discipline learning?
4. Does the practice involve authentic assessment in support of graduate employability in the discipline?
5. Does the practice use the affordances of the digital technology?
6. Does the practice cater for a diverse student body?
7. Is the practice consistent with effective evaluation procedures for the assurance of graduate outcomes?
8. Is the practice sustainable?

Digital literacy involves complex sets of skills and knowledge practices that are best developed as deeply integrated practice within the discipline. Practices aimed at developing digital literacy should involve an alignment between the learning objectives of the task, assessment tasks and forms of evaluation. Higher education needs to develop more robust means of evaluating outcomes including those for the assurance of graduate outcomes in digital literacy.

Among the many pedagogical practices used within disciplines, inquiry-based learning practices offer relevant and authentic contexts for the development of digital literacy skills. These are well-regarded and widely-used practices across disciplines. The processes of inquiry used in these practices require students to employ technologies to find, use and disseminate information. Germane to these practices are concerns about the nature of knowledge and knowledge structures, the research and professional concerns in the discipline, rules for research and evidence within the disciplines and the information needs of researchers and professionals.

In summary, the concerns and types of knowledge at the heart of inquiry-based learning practices are also consistent with those of digital literacy. However, specific design decisions will impact on how well such practices other criteria identified for this report, namely, whether the particular inquiry-based practice uses the affordances of digital technologies, can be effectively evaluated for the assurance of graduate outcomes, is sustainable and caters for student diversity.
References


Tanner, C A 2011, ‘The Critical State of Measurement in Nursing Education Research (Editorial)’, *Journal of Nursing Education*, vol. 50, no. 9, pp. 491-492.


