Developing Digital Literacies:
Briefing Paper in support of JISC Grant Funding 4/11

Contents

1. Scope and definitions

This briefing paper accompanies the JISC funding call 4/11 for projects to develop digital literacies in a strategic manner in UK FE and HE institutions.

Its purposes are:

- to provide more detail of the background against which JISC has decided to issue this cross-committee funding call;

- to describe work that has already been funded by JISC and its partner agencies in the area of digital literacy.

1.1 Defining digital literacy

We propose defining digital literacy in as neutral a way as possible, following the lead of the European Union and the JISC-funded LLiDA[1] project.

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digital literacy defines those capabilities which fit an individual for living, learning and working in a digital society

Defining a particular set of capabilities as a 'literacy' means that:

- they are a pre-requisite or foundation for other capabilities;

- they are critical to an individual's life chances;

- they are essential to the making and sharing of culturally significant meanings;

- as a result, there is or should be a society-wide entitlement to these capabilities at some level.

Digital literacy can therefore be seen as a responsibility of the whole education system and indeed of wider society, which is how digital inclusion has been interpreted by successive UK governments. However, the JISC is funded to support the adoption of digital technologies in UK Further and Higher Education specifically, so for the purposes of this funding call we are concerned with capabilities that are required and/or developed in those contexts. These include:

- ICT/computer literacy: the ability to adopt and use digital devices, applications and services in pursuit of goals, especially scholarly and educational goals

- information literacy: the ability to find, interpret, evaluate, manipulate, share and record information, especially scholarly and educational information, for example dealing with issues of authority, reliability, provenance, citation and relevance in digitised scholarly resources.

- media literacy, including for example visual literacy, multimedia literacy: the ability to critically read and creatively produce academic and professional communications in a range of media

- communication and collaboration: the ability to participate in digital networks of knowledge, scholarship, research and learning, and in working groups supported by digital forms of communication

- digital scholarship: the ability to participate in emerging academic, professional and research practices that depend on digital systems, for example use of digital content (including digitised collections of primary and secondary material as well as open content) in teaching, learning and research, use of virtual learning and research environments, use of emergent technologies in research contexts, open publication and the awareness of issues around content discovery, authority, reliability, provenance, licence restrictions, adaption/repurposing and assessment of sources.

- learning skills: the ability to study and learn effectively in technology-rich environments, formal and informal, including: use of digital tools to support critical thinking, academic writing, note taking, reference management, time and task management; being assessed and attending to feedback in digital/digitised formats; independent study using digital resources and learning materials

- life-planning: the ability to make informed decisions and achieve long-term goals, supported by digital tools and media, including for example reflection, personal and professional development planning, CV building, identity and reputation management, showcasing achievements

All of these capabilities are expressed in specific learning, teaching and research activities,

which take their meaning from the subject areas in which they are practised. For the purposes of this programme, 'digital literacy' is not a loose collection of separate skills, but rather their *integration* in specific educational contexts. In further and higher education at least, digital literacy is not a 'one size fits all' skill set, though there may be elements of common entitlement: rather it is a nuanced and varied set of capabilities, tuned to the requirements of different roles and the practices of different subject areas.

Responsibility for these capabilities is often located with specific professionals in the educational organisation, for example with learning support, the library, careers and e-learning teams. But the evidence is that digital literacies are developed and progressed most effectively when technologies are integrated into authentic activities that fulfil educational or scholarly goals[2]. There are examples of this integration being carried out effectively by specialist professionals, and also by mainstream academic, research and administrative staff[3]. A strategic approach is likely to combine elements of both, and to rely on new partnerships across professional roles.

Digital literacy gives individuals and organisations the capacity to respond positively to change, including change in the digital tools and services available. Flexibility, agile adoption of new practices, and the capacity to choose critically among available technologies are all central to a lifelong digital capability. The idea of digital literacy therefore goes beyond being skilled in *current* software applications, important though that foundation may be in supporting access to learning and work.

It is nearly 15 years now since the term 'digital literacy' entered use[4], Since it was first coined by Paul Glister, use of the term has implied a *critical* approach to digital information and media: in his words, digital literacy is about mastering 'ideas, not keystrokes'. Since this work was first published, the widespread use of web 2.0 technologies and accompanying social practices have shifted the focus away from a consume-create, or a research-publish model, and towards a model of knowledge in constant circulation (produce-circulate-enrich-reproduce). This means that any definition of digital literacy needs to include participation in social networks as a central element of knowledge production and reproduction, and of being critical in the digital age.

Academic practices and values such as reviewing, commenting, referencing, arguing, presenting information and making data openly available for scrutiny are all newly relevant in an age of democratic access to knowledge. ICT is now integral to the development of early literacy and numeracy (see for example the National Literacy Trust study on Young People's Writing[5]), suggesting that far from being one among a multitude of capabilities, digital literacy is at the heart of what it means to learn, study and know. Indeed, David Buckingham has argued, based on many years' research into children and young people's digital practices, that '*we need a much broader reconceptualization of what we mean by literacy in a world that is increasingly dominated by electronic media*[6].

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2   These and other findings from the literature are laid out in the 'Messages and implications' section of the LLiDA final report: http://caledonianacademy.net/spaces/LLiDA/index.php?n=Main.MessagesAndImplications

3   See for example the best practice examples collated by the LLiDA project: http://caledonianacademy.net/spaces/LLiDA/index.php?n=Main.BestPracticeExamples

4   Glister, P. (1997) *Digital Literacy*, New York: John Wiley

5   Clark, C. and Dugdale, G. (2008) *Young People's Writing: Attitudes, behaviour and the role of technology*. National Literacy Trust. Available online at: http://www.literacytrust.org.uk/research/nlt_research/261_young_peoples_writing_attitudes_behaviour_and_the_role_of_technology

6   Buckingham, D. 'Defining Digital Literacy: what do young people need to know about digital media?' in Lankshear, C. & Knobel, M. (2008) *Digital Literacies: Concepts, Policies and Practices:* this quote available online at http://dougbelshaw.com/wiki/#[[Defining%20Digital%20Literacy]] (with thanks to Doug Belshaw)

1.2 Whose digital literacies?

Any publicly funded intervention in educational practice needs to be clear whose capabilities it is concerned to develop, and what impact that focus is likely to have on the organisation and sector as a whole. There are arguments for supporting (or helping institutions to support) digital literacy development among all of the following groups.

Group	Rationale for a focus on this group
Learners (specific groups of learners)	Focus directly on developing graduate attributes for a digital age
	Prevalence of learner-owned technologies (devices, skills, personal and social practices) supports a direct approach to learners as independent, self-motivated users of technology
	Learners may straddle several institutions and/or may be accessing institutional resources without being formally enrolled
	Evidence that learner satisfaction and engagement depends to an increasing extent on their experiences of learning with/through digital technologies[7]
	Both risks and opportunities in engaging students directly in funded activities – would mean building new partnerships
Teaching staff	Focus on supporting students' digital literacy through enhancing expertise and confidence of teaching staff.
	Good evidence that learners' experience and confidence with technology is critically dependent on teaching staff
	Interventions in CPD, ITT and professional practice (e.g. via e-learning champions) can have a long-term impact on professional practice and consequently on the learning experience of future students
	Existing partners and professional bodies have a track record of working successfully with teaching staff around an ICT agenda.
Researchers	Focus on improving capacity for managing research data
	Strong funding pressures: research has to become smarter and more technology-enabled
	Economic case for supporting research and innovation during recovery; relevance of research/innovation skills to the knowledge economy
	Argument from scholarship: skills gained by staff working in research contexts will be cascaded to others e.g. via teaching
	Good claims to support innovation in this area via JISC's Research 3.0 campaign[8] ('driving the knowledge economy')
Other staff	Focus on strategic uses of technology throughout into core processes of institution to create efficiencies and enhance delivery to stakeholders
	The 'learning organisation' case: need for an approach to capability which does not discriminate strata of staff (or students) but supports more permeable arrangements e.g. multi-role teams; technology champions in a variety of roles
	Arguably there is are strong cases for investing in digital capability among: senior managers, student service providers, estates and technical staff, and staff

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7 http://www.jisc.ac.uk/whatwedo/campaigns/studentexperiences.aspx

8 http://www.jisc.ac.uk/whatwedo/campaigns/res3.aspx

	responsibility for quality processes.
Users of content and services	Focus on meeting user needs, usability, and return on investment
	Providers of content and services have a general interest in the digital capability of end-users, regardless of their role
	Need for content and services which are aligned with skills of end-users and/or
	Need for content and services to be enhanced in ways which make them usable regardless of the skills of end-users
	Expertise in meeting user needs and links with powerful partners in content provision

Projects will need to provide a clear rationale for the stakeholder group(s) on which they plan to focus their interventions, based on the benefits to the organisation as a whole, the uptake and impact of any new/revised provision, the ease of embedding new expertise and practices, and the opportunities of cascading them from the target group(s) to others.

2. Background

The JISC 3-year strategy (2010-2012)[9] describes how digital technologies are changing the education and research environment. *'A good ICT infrastructure is essential',* it argues, *'but the real challenge for institutions is to exploit ICT more effectively ... and for students, researchers and teachers to thrive and excel in a digitally-enabled world. In particular this means more high quality technology-enhanced learning [and] improved skills of teachers and learners in using technology in appropriate and effective ways.'*

With the core value of '*putting digital technologies at the heart of UK education'*, it seems inescapable that the JISC should become concerned with the development of digital literacy. Objective 3 of the strategic plan indeed includes a digital literacies strand as follows:

Investigating learning literacy in the digital world *(status – a good body of knowledge, with some gaps)*	Improved delivery and integration of digital learning skills to learners and teachers *(status – current priority)*	Effective use of a mixture of institutionally provided and user-owned technologies by institutions, learners and teachers *(status – longer-term objective)*

This section situates the JISC's commitment to digital literacy against two background contexts: a funding and policy context; and a research and development context.

2.1 Funding and policy context

Digital inclusion
Martha Lane Fox launched the new government's 'Networked Nation' manifesto in July 2010[10], with an aim of getting every working person in the UK online by 2015. Research in support of the manifesto found that more than 90 per cent of all new jobs require basic

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http://www.jisc.ac.uk/aboutus/strategy.aspx

10 Warman, M. (2010) 'Everyone of working age' online by 2015, says Martha Lane Fox'; *Daily Telegraph*, 12.07/2010: http://www.telegraph.co.uk/technology/internet/7884842/Everyone-of-working-age-online-by-2015-says-Martha-Lane-Fox.html

internet skills. The specific role of further and higher education in supporting digital inclusion has yet to be clearly articulated, but it can be inferred that a much higher than 90% proportion of graduate jobs require internet skills, and that graduates will play a leading role in cascading digital practices to other members of society. At the launch, Sir Iain Duncan Smith, secretary of state for work and pensions, said: *'Digital literacy is a great enabler of social mobility. It is a way for those who have had bad experiences of institutions to re-engage in learning, and it can break down feelings of social isolation. It is a powerful weapon in the fight against poverty.'* e-inclusion also features prominently in the Digital Agenda for Europe[11] adopted by the European Commission in May 2010. Under Pillar 6 (Enhancing digital literacy, skills and inclusion), the Commission proposes a series of measures to promote take-up and functional use of digital technologies. Strategic frameworks for digital inclusion also exist for Wales[12] and Scotland[13].

Accessibility and widening participation
There is a growing body of evidence that the use of ICT can enable students to overcome physical and situational barriers to accessing educational opportunity[14]. A focus on digital inclusion can therefore support other social justice agendas.

Employability and the digital economy
The digital (technology and content) sector directly employs 2.5 million people in the UK[15], most of them graduates, is are identified as a priority sector for growth in the Government's strategy document *Building Britain's Future – New Industry, New Jobs.* Digital and creative industries were recently described by Jeremy Hunt, the Secretary of State for Culture, Olympics, Media and Sport, as the '*biggest single economic opportunity the UK has at the moment*': an important feature is that these are growth industries in regions of the country worst hit by public sector cuts, e.g. the North East of England[16]. In addition, the vast majority of graduate jobs require use of ICT as an integral aspect of professionalism and performance. Digital literacy is therefore a crucial graduate attribute and an ever-more significant element of employability.

Higher skills
The Leitch Review of Skills, Prosperity for All in the Global Economy: World Class Skills (2006)[17] identified concerns over the ability of UK to compete in globalised markets without a significant improvement in intermediate and high level skills, equating to, for example, more than 40% of adults being qualified to Level 4 and above (equivalent to degree-level qualifications) by 2020. Since Leitch reported, the Melville enquiry, the Google Generation report and Sir Ron Cooke's submission to the HE Framework (Higher Ambitions) consultation have all identified digital literacy as an essential high level skill, and one that is in global demand. In Scotland, the HE Quality Enhancement themes '21st C Graduate attributes' and 'Curriculum for Excellence & Lifelong learning' are part of an increased emphasis on the development of higher skills, including research and ICT skills, over and above subject knowledge.

Student satisfaction
2010 saw student satisfaction ratings, as measured by the NSS, remaining steady at around 82%. However, with funding cuts in prospect, alongside a steep rise in the student contribution to the costs of learning, it is possible that this could represent a high point. The present UK Government is keen to see universities meet student expectations and has

11 http://ec.europa.eu/information_society/digital-agenda/index_en.htm
12 http://wales.gov.uk/consultations/housingcommunity/digitinclusion/?lang=en
13 http://www.scotland.gov.uk/Publications/2001/09/10080/File-1
14 Seale, J., Draffan, E.A. and Wald, M. (2008) Exploring disabled learners' experiences of e-learning: LexDis Final Project Report: http://www.lexdis.org/project/media/LEXDIS_ProjectReport_Dec08final.doc
15 http://www.e-skills.com/Research-and-policy/Insights-2010/2671
16 e.g. the Thinking Digital conference http://www.thinkingdigital.co.uk/
17 http://www.dius.gov.uk/worldclassskills.pdf

indicated that student satisfaction will be taken as a critical measure of how higher education is performing. The JISC's work on student expectations found that prospective students had uncertain ideas about what role ICT would play in their university studies, but the general picture is of rising expectations that technology will be used appropriately and well. In particular, the Committee of Inquiry into the Changing Student Experience[18] found that students have high expectations of staff confidence and capability with technology, and the Learners' Experiences of e-Learning programme[19] found that learners' experiences of technology-supported learning were largely determined by staff e-learning skills.

UK HE in a global education market

Higher Education remains a major contributor to the UK economy: £59 billion in 2009, or more than the pharmaceutical and advertising industries combined, and accounting for 3% of the workforce[20] A leading international brand – and still second in the global league of universities[21] - UK universities attract a higher proportion of international students than any other nation except Australia and New Zealand, generating over £6bn direct income each year (not including indirect income which is estimated to be 9% of all foreign visitor income). The UK also sells more brainpower per capita than anywhere else in the world – a quarter of all UK exports are knowledge-related services – and publishes 12% of cited papers worldwide[22]. However, thanks to the widespread availability of open content, and the rapidly expanding HE systems of newly powerful economies such as India, China, and Brazil, UK HE is having to find new ways to attract students.

Surviving and thriving with constrained resources

The recently-completed JISC programme Transforming Curriculum Delivery through Technology[23] identified a number of areas in which ICT can support organisational efficiencies. These include: rationalising administrative systems, especially around management of course related information; making assessment and feedback processes more efficient; more productive content development and use; working effectively with larger classes; saving staff and learner time. However, all of these potential efficiencies depended on changes in practice and expertise as well as in the supporting systems. In other words, digital expertise can contribute to efficient learning and teaching practices.

Digital expertise is also central to many strategies for exploiting new student markets. For example, remote learning (work-based, on placement etc) and online/blended/distance learning require teachers and students to be skilled in the use of ICT. Syndicated arrangements with partner colleges make others demands such as the development and use of open content. Again, staff and student digital capabilities are a prerequisite for responding to new challenges and opportunities.

Open information, data and content

Research data, government data and social data are increasingly available for public access and use. At the same time, a wider than ever range of data is being collected from private individuals through their participation in digital services. Arguably, all citizens need educating in the uses of data and in the ways data crosses the public/private boundary, but graduates will be at the forefront of defining new practices for an era of open data. Keeping safe online,

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18 ISC (2009) *Higher Education in a Web 2.0 World*:
http://www.jisc.ac.uk/publications/generalpublications/2009/heweb2.aspx

19 https://mw.brookes.ac.uk/display/JISCle2/Home

20 University of Strathclyde (2009), reported in *Economic Voice* http://www.economicvoice.com/33billion-contribution-to-the-economy-from-higher-education/.

21 Morgan, J. (2010) 'Reality check: the UK clings on to second place in global league': *Times Higher Education Supplement* 16.09.2010:
http://www.timeshighereducation.co.uk/story.asp?sectioncode=26&storycode=413527&c=1

22 All 2007 figures or earlier, cited in UK HE International Unit (2007) *Global Opportunities for Higher Education*:
http://www.international.ac.uk/resources/Global%20Opportunities%20for%20UK%20Higher%20Education.pdf

23 http://www.jisc.ac.uk/curriculumdelivery – see the Synthesis Report at the top of this page

behaving ethically, and managing one's digital identity are aspects of this agenda, along with the many positive contributions which data literacy can make to public life such as citizen journalism, healthcare advocacy, and community research projects.

Open educational content, as a specialist form of open information, plays a particular role in building the capacity of educational institutions and of individual learners. While players such as the BBC and British Library are helping to get people using online content in general, educational organisations have a key role to play in supporting the use of open data and open content in scholarly and learning settings.

Exploiting digital content

Not all digital content that is useful for learning and research is open. Some of the most valuable resources and collections require a log-in, though because this is usually managed via an Athens account, the difference between this and open content may not be clear to users registered with a UK HE or FE institution. Much of the content that has been digitised by JISC and JISC Collections[24] falls into this category. Indeed, the UK has led the world in digitising its culturally valued resources, whether these are held by museums, galleries and archives, libraries (including the British Library), Universities and colleges, newspapers and periodicals, or organisations like the BBC and the British Film Council. Digital literacy on the part of academics, researchers, students and academic librarians is essential if the national investment in digital content is to bear fruit. This should include awareness of different categories of content, and some knowledge of authentication and access issues.

Organisational capacity building and workforce development

In a report commissioned by the JISC and quoted in the HEFCE *Higher Education Workforce Framework 2010*[25] Professor Janet Beer argued that: '*ICT processes are one route to improved business processes and staff productivity in both the core teaching, research and KT [knowledge transfer] business, and in the wide range of administrative functions which support that core business. Adapting the human and business processes to new ICT systems ... will lead to the reconsideration of the current models for reward and recognition.*' This adaptation will also require extensive investment in staff digital capability to prepare organisations for the future.

2.2 Research and development context

Digital literacy is a growth area for educational research. At the Association for Learning Technologies annual conference in September 2010, for example, the #digilit tag was the most widely used by a factor of 5-6. A call for pilot institutions to test materials developed from the LLiDA project received nearly 60 responses. Analysis of these members showed that they were in a variety of organisational roles, and were responding to a variety of organisational agendas. What they had in common was a new responsibility for 'digital literacy' development within their organisation.

Specific studies that have been funded by the JISC and partners are documented in the following section: this section briefly summarises some areas of research and development which might be drawn upon for evidence to support a strategic approach to digital literacies development.

Learning 2.0

Several prominent theorists have argued that familiarity with web 2.0 technologies opens up a completely new space for and style of learning, focusing on: collaborative knowledge building; shared assets; breakdown of distinction between knowledge and communication[26].

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24 http://www.jisc-content.ac.uk/

25 http://www.hefce.ac.uk/pubs/hefce/2010/10_05a/

26 See e.g. Bacigalupo, M. et al. (2008) *Learning 2.0: The Impact of Web2.0 Innovation on Education and Training in Europe: Report on a validation and policy options workshop organised by IPTS, Seville*, 29-30 October 2008: available at

Some, like Jenkins (2006) have gone so far as to argue that the participative practices of web 2.0 can stand in for more formal study skills, and that higher education should adapt its expectations accordingly. Against this case, there is evidence that pro-active, creative web 2.0 users are still in the minority of learners and that learners' ICT skills are less advanced than educators and learners think[27]. Characterisation of young people as 'digital natives' hides many contradictions in their experiences, and learners' engagement with digital media is complex and differentiated[28].Active knowledge building and sharing, e.g. writing wikis, tagging, reviewing, recommending, repurposing, remain minority activities to which most learners are introduced by educators[29]. There is still a need, then, for institutions to help learners to bridge the gap between their informal knowledge practices and the demands of study.

Ubiquity, accessibility and ease of use are, however, features of technology that are changing the expectations that learners have of their university and college experience. Many learners bring digital capabilities to their studies that can also be valuable to their teachers and peers. Some institutions are making more formal use of these skills by employing learners or encouraging them to set up enterprises that sell digital services back to course teams. A traditional model of development whereby 'expert' teaching staff instruct 'novice' learners may not be appropriate when it comes to digital capability, and the more democratic, participative approaches to learning implied by 'learning 2.0' deserve further exploration in a digital literacies context.

Learner experience/learner expectations
There is a current of opinion that learners are being let down by formal education when it fails to use digital technologies in the ways and to the extent that they use such technologies in their personal/social lives. However, the evidence about this is mixed[30]. Learners expect and benefit from access to their own personal technologies in learning contexts, and from the capacity to personalise the technologies they access through their programmes of study. Mobile access to course information and learning content is increasingly significant to learners juggling to fit study into complex lives. Learners who have positive experiences of technologies being used by educators will have heightened expectations of technology use across their programmes of study. However, some learners positively choose not to engage with technology-enhanced learning, for example because they have had positive experiences of face-to-face learning and are not persuaded of the case for change[31]. In general, learners expect technology use in formal educational settings to be different from its use in other settings and are highly dependent on their experience in that context – led by tutors and course requirements – to determine their expectations.

Research skills
A study by the Research Information Network in 2009[32] found that training for researchers on information seeking and management was uncoordinated and generally not based on any systematic assessment of needs. While researchers are embracing new technologies and services to discover, locate, gain access to and create information resources, research information skills training has generally not kept pace. This chimes with the British Library

http://insight.eun.org/ww/en/pub/insight/school_innovation/best_practice/learning_2_0.htm;
Downes, S. (2005). E-learning 2.0, *eLearn Magazine*, 17 October: available at:
http://www.elearnmag.org/subpage.cfm?section=articles&article=29-1
27 Nicholas et al. 2008, JISC 2008-09
28 Bennet et al 2008, Hargittai 2009
29 Selwyn, N. (2009): see also 'The digital native - myth and reality' paper presented to CILIP London seminar series, March 2009
30 Luckin et al. 2009
31 Hardy et al. 2009
32   RIN (2009) *Mind the skills gap: information handing training for researchers:* http://www.rin.ac.uk/our-work/researcher-development-and-skills/mind-skills-gap-information-handling-training-researchers

(2008) and JISC (2009) findings (see below) relating to undergraduate students, which highlighted their lack of research skills and over-confidence in their own capacities to handle research data and to find research outcomes relevant to their studies. Innovation in all areas of the academy and economy now depends on the management of complex data: all students should be prepared to meet those demands.

General literacy

In 2008. the National Literacy Trust study on Young People's Writing conducted a survey[33] of 3001 UK school pupils aged 8 to 16. It concluded that among this extensive sample of young people:

- Technology-based formats were most frequently written: 82% of young people wrote text messages at least once a month, with just 52% sending hand-written notes to other people.

- 56% of young people said they had a profile on a social networking site, such as Bebo or Facebook; 24% said that they had their own blog. Bloggers were much more likely than non-bloggers to enjoy writing in general (57% vs. 40%), to be more prolific writers, to be more positive about computer use, and to view writers more favourably.

- Most young people said they used computers regularly and believed that computers are beneficial to their writing, agreeing that a computer makes it easier for them to correct mistakes (89%) and allows them to present ideas clearly (76%). Overall, nearly 60% of young people also believe that computers allow them to be more creative, concentrate more and encourage them to write more often.

Among students there is evidence of a shift of attention from print to screen, and (less robustly) towards graphical and hypermedia (linked, multi-layered) forms of representation. Editing and referencing software, spell checkers, speech-to-text, plagiarism detection, the ubiquitous cut-and-paste capability, are all changing the nature of student writing. Lankshear and Knobel[34] have argued that new kinds of literacy are being required and called forth by these practices. Gunther Kress[35] (interviewed for this study) asserts that knowledge is now constitutively multi-modal, or available in multiple formats and genres.

Learning transitions and boundaries

Further Education Colleges are particular concerned with how the development of digital literacies can help learners manage the transition from school to college and then to workplace and/or higher education. While institutional IT systems differ across sector boundaries – and there is evidence that this can create problems for learners – learners' own technologies and technology-based practices offer a new kind of continuity. The potential for digital practices to provide aggregation and continuity, for example through learning pathways, portfolios and blogs, is particularly relevant as increasing numbers of learners study across different institutions, access formal and informal opportunities at the same time, or choose not to enrol formally at all. There is presently a dearth of research evidence as to how learners engage across these boundaries and the role that digital technologies can play.

Open content

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33 Clark, C. and Dugdale, G. (2008) *Young People's Writing: Attitudes, behaviour and the role of technology.* National Literacy Trust. Available online at: http://www.literacytrust.org.uk/research/nlt_research/261_young_peoples_writing_attitudes_behaviour_and_the_role_of_technology

34 Lankshear, C. and Knobel, M. (2007) Researching New Literacies: Web 2.0 practices and insider perspectives, *E-Learning*, 4(3): 224-240: available at http://dx.doi.org/10.2304/elea.2007.4.3.224

35 e.g. in Kress, G. and Van Leeuwen, T. (2001), *Multimodal Discourse: The Modes and Media of Contemporary Communication*, Oxford University Press

The UK OER programme[36] and the global open content revolution depend for their impact on learners finding and using open content effectively. JISC's Executive Secretary, Malcolm Read, has commented that '*Open Educational Resources are one of the building blocks of digital Britain in the twenty-first century.*' There would seem to be a natural link between open content and digital literacy. At present, however, most of the evidence about OER use relates to university staff and to students enrolled on formal programmes of study, and the link with digital literacy has not been well researched. This picture will be enriched by a JISC-funded impact study[37] and literature review[38], both due to report in late summer 2011.

Emerging environments for learning and research

Horizon scanning reports from Beyond Current Horizons[39] and NMC[40] suggest that immersive, adaptive, semantically-enhanced, location-aware and other 'intelligent' environments for learning are likely to become the norm in coming years. The TLRP/TEL programme[41] is actively examining how students learn in such environments. While some are designed for sensory realism and ease of use, others require more radical adaptation to current forms of learning and inquiry. There is no doubt that students and researchers of the future will need to be adaptable to thrive in different technology-supported contexts.

3. Review of previous work in this area

There follows a brief review of work funded by the JISC and HE Academy (and to a lesser extent other partners), classified according to the roles identified in section 1.

3.1 Supporting digital literacy of learners

Supporting Learners in a Digital Age (2010)
https://wiki.brookes.ac.uk/display/slida/Home

The Supporting Learners in a Digital Age project is investigating how UK further and higher education institutions are supporting the development of effective learners in a digital age through the implementation of relevant institution-wide strategies and policies. Ten institutional case studies are in final preparation. These look at: digital literacy as part of a widening participation or employability agendas; the use of e-portfolios to develop learners across the institution; learners supporting the development of digital literacies in other learners (such as through a student mentoring scheme; learner-led digital enterprise; changes in learning environments to better support digital learning experiences.

Literacies Supporting Learning and Enhancing Employability in a Diverse Undergraduate Population (2010-2012)
http://www.heacademy.ac.uk/projects/detail/ntfs/ntfsproject_UCLAN10

This two-year HE Academy-funded inter-disciplinary project explores how a framework of 'learning literacies' can support learning and enhance employability in a diverse undergraduate population. It will investigate the development, inter-relationships between and application to employability of mathematical literacy (use of mathematics), communication literacy (using reading, writing and speech), digital and information literacies (accessing and using information) and emotional literacy (understanding our own and others' emotions).

Anytime Learning Literacies Environment (2010-2011)
http://www.jisc.ac.uk/whatwedo/programmes/elearning/ltig/alle.aspx

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36 http://www.jisc.ac.uk/oer
37 Examination of the Impact of OER use on Teaching and Learning: JISC ITT:
  http://www.jisc.ac.uk/fundingopportunities/funding_calls/2010/08/oer2bi.aspx
38 http://www.heacademy.ac.uk/funding/detail/2011/OER_LearnerVoice_2011
39 http://www.beyondcurrenthorizons.org.uk/
40 http://wp.nmc.org/horizon2010/
41 http://www.tlrp.org/proj/index.html

Building on the work of the LLiDA project (below) this project is building a 'learning journey', made up of reusable learning objects, to support learners in the range of capabilities defined in the LLiDA digital literacy development framework. It will go on to evaluate the impact on learners' capabilities and attitudes to technology.

Learning Literacies for a Digital Age (2009)
http://caledonianacademy.net/spaces/LLiDA/index.php?n=Main.HomePage

Described more fully in 3.4, this study conducted a wide-ranging review of the research evidence surrounding learners' changing needs for digital capability and relevant graduate attributes. It concluded that learners need integrated, progressive and personalised support for developing digital literacy, both generically and relevant to their chosen subject of study. It identified evidence that all graduates require digital capabilities and attitudes to thrive in the worlds of work, citizenship and culture and to support lifelong learning.

University of Wolverhampton Embedding Graduate Attributes project (2009)
http://www.heacademy.ac.uk/resources/detail/ourwork/changeacademy/CaseStudy_Wolverhampton

This project focused on three key graduate attributes: digital literacy, enterprise, and global citizenship. Among its findings were that 'graduate attributes' are a valuable way into discussions about the value and purpose of university education. Evidencing graduate attributes is a significant challenge, but students remain very enthusiastic for the concept.

Students' Use of Research Content in Teaching and Learning (2009)
http://www.jisc.ac.uk/media/documents/aboutus/workinggroups/studentsuseresearchcontent.pdf

An important JISC-funded study for contextualising digital literacy development. It found that:

- There is a growing diversity in the kinds of content identified as research but journal articles and books still dominate

- Students are very reliant on library catalogues, databases and staff advice

- Research content is seen primarily as a source for assignments, though some students do use research more generally to broaden their understanding and explore arguments; students are not generally sophisticated in their understanding of scholarly practice around research, peer review and publishing

- The vast majority of students use either a home computer or a university computer to access research

- Most students will go to their library catalogue first, then Google; Google Books and Google Scholar are also heavily used

- Students are bewildered by the number of responses they receive from Google and will rarely look beyond the first couple of pages of search terms

- An increasing number of students are using the limited preview facility in Google Books to either read books not in their library or to save themselves the trouble of actually going to the library

- Some students will use a discipline-specific database to access research. These students have had a better experience of accessing research and some use these databases almost exclusively. However, this means they are dependent on the holdings of the database

- Students at all universities expressed dissatisfaction with their library holdings and level of service

- There is limited evidence of students using social networking and other Web 2.0

<u>technologies to identify and access research</u>

Dealing with plagiarism in the digital age (2009)
http://www.heacademy.ac.uk/assets/EvidenceNet/Syntheses/Leicester.pdf

A HE Academy-funded project which discusses use of electronic plagiarism detection systems with students to improve academic writing.

Digital storytelling synthesis (2009)
http://www.heacademy.ac.uk/assets/EvidenceNet/Syntheses/Digital_Storytelling_Synthesis_19th_November_2009.docx

A HE Academy-funded project which covers the use of the traditionally-defined digital storytelling in higher education and how its interpretation and use is being expanded in respect of more accessible technologies such as Web2.0.

Creating future-proof graduates (2009)
 http://search3.openobjects.com/kb5/hea/evidencenet/resource.page?record=a5XhXPsFlzM

A HE Academy-funded suite of simulated critical incident case studies co-authored in collaboration with employers and other partners which can be integrated into any student learning experience.

Transforming Curriculum Delivery through Technology (2008-2010)
http://www.jisc.ac.uk/curriculumdelivery

Described more fully in 3.4, this programme included some projects which focused specifically on learners' changing needs with respect to digital capability, and on how to engage learners in rethinking the curriculum. Many examples of effective use of ICT to support learning outcomes, and design of authentic tasks involving digital skills.

Learning from Digital Natives (2008)
http://search3.openobjects.com/kb5/hea/evidencenet/resource.page?record=6OmDYUP2qmo

Students are increasingly making use of a variety of e-tools (such as mobile phones, email, MSN, digital cameras, games consoles and social networking sites) to support their informal learning within formalised educational settings, and that they use the tools that they have available if none are provided for them. Whilst the students' information searching literacy seemed adequate, the ability of these students to harness the power of social networking tools and informal processes for their learning was low.

Student Expectations of e-Learning (2007, 2008)
http://www.jisc.ac.uk/news/stories/2007/09/expectations.aspx*;*
http://www.jisc.ac.uk/news/stories/2008/06/greatexpectations.aspx

In 2007 JISC commissioned Ipsos MORI to undertake research among prospective university students, which was followed up a year later once they had begun their studies. This research set out to understand attitudes to and expectations of ICT use at university, and whether those expectations were broadly being met. It revealed that while 'google generation' learners were adept ICT users in their personal and social lives, they found it difficult to imagine using technology to support their learning except in ways they had already experienced in school. The follow-up study found that the cohort's expectations were broadly met, and in some ways exceeded, by the use of ICT for study that they encountered at university. However, 25% felt they had little encouragement to use web 2.0 for study, and support for the use of ICT for learning was rated significantly lower than general ICT support.

'Google generation' report or Information Behaviour of the Researcher of the Future (2008)
http://www.publishing.ucl.ac.uk/behaviour.html

Widely cited and influential study which questions the common assumption that the 'Google

Generation' – young people born or brought up in the Internet age – is the most adept at using the web. The report by the CIBER research team at University College London claims that, although young people demonstrate an ease and familiarity with computers, they rely on the most basic search tools and do not possess the critical and analytical skills to asses the information that they find on the web. Research-behaviour traits that are commonly associated with younger users – impatience in search and navigation, and zero tolerance for any delay in satisfying their information needs – are now the norm for all age-groups, from younger pupils and undergraduates through to professors. The conclusions of this study are that young people are dangerously lacking information skills and that well-funded information literacy programmes are needed if the UK is to remain as a leading knowledge economy. HEFCE included this study in the update to its e-learning strategy (2008), noting that '*Higher education, therefore, continues to have a unique role in providing learners with the higher-order skills of evaluation, critical analysis and reflection, synthesis, problem-solving, creativity and thinking across discipline boundaries.'*

Learner Experiences of e-Learning (2005 – 2009)
https://mw.brookes.ac.uk/display/JISCle2/About

The Learner Experiences of e-Learning theme of the JISC e-Learning programme funded a total of ten projects from 2005 to 2009 and had the sustained involvement of over 200 learners and nearly 3,500 survey respondents to explore learners' perceptions of and participation in technology-enhanced learning in a digital age. The projects produced rich, detailed data that sheds light on what learners expect from the use of technology in further and higher education and the choices they make about using technology to support their study. Like other studies, the programme highlighted a gap between learners' personal and social practices with technology, and their capacity to use technology confidently for learning. In particular, they found shortfalls in learners':

- research skills and information literacies;

- confidence to use new devices and applications, or to use familiar technologies in new ways;

- understanding of academic communication, e.g. issues of audience, stance, authority, citation, in any media.

'Many applications such as immersive environments, wikis, e-portfolios, data analysis tools, referencing tools – and their associated practices – are almost always introduced to learners by their tutors.'

Big Blue (2001-2003)
http://www.jisc.ac.uk/whatwedo/programmes/programme_jos/project_big_blue.aspx

This early example of a JISC project on Information Skills developed a blueprint for IS training based on observed good practice in UK HE and FE. The two Big Blue toolkits have continued to be used. The project also produced case studies, literature reviews and interpretations of Key Skills requirements.

3.2 Supporting digital literacy of teaching staff

Institutional and curriculum development: pilot materials (2010)
http://caledonianacademy.net/spaces/LLiDA/index.php?n=Main.DigitalLiteraciesPilotMaterials *and http://cloudworks.ac.uk/cloud/view/4293*

The e-Learning programme is supporting almost 100 representatives from further and higher education to help develop and then pilot a set of materials for institutional and curriculum development in the area of supporting digital learners. Over 100 sets of materials have been distributed in print format and similar numbers downloaded online. Analysis of participants shows that they are predominantly from an e-learning background but include many other roles directly involved in the support of learners, including libraries, careers, widening

participation and learning development.

Transforming Higher Education Through Technology Enhanced Learning (2009)
http://www.heacademy.ac.uk/resources/detail/ourwork/learningandtech/transforming_he_thro ugh_technology_enhanced_learning

Although this book has its genesis in the e-learning Benchmarking and Pathfinder Programme (2005-2008) it includes several chapters relevant to digital literacies, including in particular Westerman and Barry's report on the DEBUT project. The aim of DEBUT was to evaluate whether a contextualised approach to staff development, grounded in the concepts of literacy, could be successful in raising confidence in using and exploiting digital tools. Over two iterations of the course, a significant increase in staff digital literacy was observed: this was measured according to a scale derived from Martin's work referenced in Section 1. Other evaluation findings were that in developing their digital literacy skills, staff very much valued a contextualised and personalised approach with face-to-face contact and follow up. Staff with low to medium digital literacy at the outset experienced more significant benefits.

JISC Advance (ongoing)
http://www.jiscadvance.ac.uk/about-us/services

A number of JISC services, now grouped under the Advance umbrella, offer support to teaching staff in aspects of digital literacy, for example:

JISC Digital Media: supporting creation and use of digital media
JISC TechDis: supporting use of assistive technologies and capacity to meet diverse student needs JISC Netskills: a wide variety of courses addressing staff digital capability
JISC Infonet: produces infokits on e-portfolio use and curriculum design, which impact directly on the development of digital literacy
Web2Rights: support for IPR issues, arguably an important aspect of digital literacy

JISC Advance will be tracking usage of these services and undertaking work to enhance the user experience. These findings and ongoing activities will be critical to any interventions the JISC makes around the issue of digital literacy. Similarly, any innovations activities funded by the JISC must inform future offerings by JISC Advance. The regard in which these services are held – as confirmed by interviews for this study – makes them central to any case for the JISC taking a leading advocacy role for digital literacy.

JISC e-learning publications/communications (ongoing)
e.g. http://www.jisc.ac.uk/practice

Many publications originated by the e-learning team have had a demonstrable impact on staff awareness of learning technology issues and are widely used in staff development. Online materials and face to face workshops by the e-learning team have also been very favourably evaluated in terms of their impact on teaching staff see
http://www.jisc.ac.uk/whatwedo/programmes/elearning/elearningcommsevaluation.aspx .

3.3 Supporting digital literacy of researchers

Citing, linking, integrating and publishing research data (CLIP) (2010-2011)
http://www.jisc.ac.uk/whatwedo/programmes/mrd/clip.aspx

As well as seeking to demonstrate ways in which research data management in UK Universities can be improved, the JISC Managing Research Data programme is seeking to demonstrate the potential for transforming research and scholarly communications. Individual projects (funded from August 2010) are showing how the data that underpins research can be made more usable and valuable by linking it, not just to publications, creators, but also to related concepts and data. Projects are being asked to demonstrate how their outcomes benefit research, requiring evidence of enhanced research user capability, as well as an enhanced technical environment for research.

Researchers of Tomorrow (2010-12)
http://www.jisc.ac.uk/news/stories/2010/07/generationY.aspx

The first year of this longitudinal study gathered evidence from doctoral students in the UK, including: a cohort of 60 'Generation Y' or 'Google generation' doctoral students from 36 universities, responses to a national survey returned by over 2,000 Generation Y scholars and responses to the same survey returned by 3,000 older doctoral students. They found Generation Y and older students agreeing on:

- desire for a seamless, accessible research information network: *however 'most Generation Y students do not have a clear understanding of what open access means and this negatively impacts their use of open access resources'*

- exasperation over restricted access to research resources due to the limitations of institutional licenses: '*students regularly speak favourably about sector-wide shared services and resource sharing'.*

However, Generation Y scholars are more likely to turn to their supervisors for resource recommendations than older doctoral students. A third of Generation Y students say they have never used library staff for support in finding material and most have not used inter-library loan services, relying instead on their own institutional library.

Training Materials in Research Data Management (2010-2011)
http://www.jisc.ac.uk/whatwedo/programmes/mrd/rdmtrain.aspx
Five projects have been funded to create a body of discipline-focussed postgraduate training units which can be reused by other institutions and curriculum development teams. The projects are undertaken by the relevant academic departments in partnership with centres of expertise in research data management, ensuring that while generic issues in research data are addressed, the emphasis is on developing discipline-specific expertise. The projects are supported by JISC's Digital Curation Centre, the Research Information Network, and by Vitae and Sconul as key stakeholders in the development of research skills.

Research Data Management Infrastructure Projects (2009-2011)
http://www.jisc.ac.uk/whatwedo/programmes/mrd/rdmi.aspx

These projects are identifying requirements to manage data created by researchers and piloting research data management infrastructures at institutional, departmental or research group level, to address these requirements and demonstrate benefits to the sector. Several projects are also producing training materials to address data management skills (Sudamih, Incremental, IDMB) and exploring the role of institutional support from research offices (Incremental, MaDAM).

Lives and technologies of early career researchers (2009)
http://www.jisc.ac.uk/publications/reports/2009/earlycareerresearchersstudy.aspx

This study looked at the ICT experience and use of early career researchers and found that they engage in a multitude of tasks in which ICT plays a role - seeking new information, gathering data, analysis, reflection and discussion, publishing and administrative roles. Physically proximate relationships are currently dominant in the lives of many ECRs; particularly strong relationships are characterised by the use of multiple redundant communication channels or technologies. The study concluded that the development of early career researchers would be enhanced by a more distributed network of contacts, which due to funding constraints on travel could best be supported by online scholarly networking.

Despite an interest in new technologies, 72% of early career researchers reported that they did not even use Web 2.0 or social media to share their research. Constraints which limit ICT take-up amongst ECRs include cultural norms (e.g. secrecy in research practice), social practices (still very dominated by face to face contact), confidence, skills, and institutional issues e.g. infrastructure and support. New tools and practices spread generally via networks: serendipitous discovery and word of mouth are also very common.

Many of the projects outlined in section 3.5 address researchers as primary users of digital content and services.

3.4 Organisational development

Supporting Learners in a Digital Age (2010)
https://wiki.brookes.ac.uk/display/slida/Home

Ten institutional case studies, as described above.

Institutional and curriculum development: pilot materials (2010)
http://caledonianacademy.net/spaces/LLiDA/index.php?n=Main.DigitalLiteraciesPilotMaterials *and http://cloudworks.ac.uk/cloud/view/4293*

The e-Learning programme is supporting almost 100 representatives from further and higher education to help develop and then pilot a set of materials for institutional and curriculum development in the area of supporting digital learners. Over 100 sets of materials have been distributed in print format and similar numbers downloaded online. Analysis of participants shows that their roles are changing to include digital literacy support in response to a range of organisational pressures, including: changing modes of learning and teaching; identified learner needs; modernisation of institutional mission and offer; graduate attributes agenda; use of e-portfolios and personal development profiles; move towards competence curriculum.

Learning Literacies for a Digital Age (2009)
http://caledonianacademy.net/spaces/LLiDA/index.php?n=Main.HomePage

Learning Literacies for a Digital Age, (LLiDA) was a research study aiming to find out what literacies learners require for the digital age and what UK higher and further institutions are doing to support them. The project:

Reviewed the evidence of change in the nature of work, knowledge, social life and citizenship, communications media and other technologies, in the context of learning

Investigated through auditing and best practice exemplars a range of current responses to these changes from the further and higher education sectors

Made recommendations for institutions to consider as they examine their own provision and support in this area, as follows:

- Tutors need to be proactive in helping learners to develop learning and digital literacies
- Learning and digital literacies need to be embedded into the curriculum and moved out of silos
- Learners need to be engaged in their own development, and their existing digital practices need to be recognised
- Academic staff need to be engaged in rethinking their scholarly and professional practice in the light of digital developments, rather than required to attain generic ICT skills
- Information literacy needs to be broadened to include – or be supplemented with – communication and media literacies
- Employability needs to be more carefully and critically defined as the demands of the digital economy impact on professions and disciplines

The study further recommended that funders and institutions should distinguish between:

- a generic entitlement to digital literacy (the inclusion agenda), in which FE and HE

must play a role alongside other education sectors, and

- the specific responsibility of post-compulsory education (the enhancement agenda), to fit learners for graduate roles in which different digital capabilities will be demanded, and to develop researchers, innovators and knowledge/information professionals

Higher Education in a web 2.0 World (2009)
http://www.jisc.ac.uk/publications/generalpublications/2009/heweb2.aspx

This Committee of Inquiry reviewed a wide range of existing studies and concluded that:

- Use of Web 2.0 technologies is high and pervasive across all age groups from 11 to 15 upwards

- The processes of engaging with Web 2.0 technologies develop a skill set that matches both to views on 21st-century learning skills and to those on 21st-century employability skills – communication, collaboration, creativity, leadership and technology proficiency

- Information literacies, including searching, retrieving, critically evaluating information from a range of appropriate sources and also attributing it – represent a significant and growing deficit area

Staff roles, skills and responsibilities (2010)
http://www.jisc.ac.uk/whatwedo/programmes/staffroles.aspx

This work package focuses on the impact of new ways of working that arise from adopting ICT and technology supported practices, and follows on from previous JISC work looking at both learners' experiences, the methods of ensuring data quality utilising data grading techniques and also the impact of ICT on staff in a leadership role. Within this package, the Work-with-IT project and Embedding Work-with-IT projects (http://www.work-with-it.org.uk/) are working with HE sector and professional associations to develop and support staff and embed innovative technology-enhanced working practices, thus enabling the UK to maintain its position as a global leader in education. This work includes enabling new approaches to staff development that take into account the new skills, competencies and relationships required.

Building capacity programme (2010-2011)
http://www.jisc.ac.uk/whatwedo/programmes/bcap.aspx

This programme is working to enhance the uptake and use of JISC outputs in the Higher Education Sector. The programme is working with senior change agents in HEIs (Pro Vice-Chancellors or equivalent) to create senior management led change in a number of key strategic concerns that are facing that institution. The evidence from this programme will help to reveal what are the barriers to uptake of JISC project and service artefacts, and what institutional processes (including development of staff skills and literacies) can ease deployment of JISC outputs. http://www.jisc.ac.uk/whatwedo/programmes/bcap.aspx

Developing an institutional model for embedding academic and transferable skills (2009)

This HE Academy Change Academy project was funded at the University of Greenwich to embed academic and transferable skills across the University, identifying the most effective relationship between academic curricula and skills development in a context of increasing student diversity, distributed provision, and necessarily divergent academic and professional cultures.

Transforming Curriculum Delivery through Technology (2008-2010)
http://www.jisc.ac.uk/curriculumdelivery

Institutions are no longer expected to simply prepare graduates for a specific professional

role, but to equip them with lifelong learning and development skills, and to continuously support the learning and professional development of working people. This programme has investigated a wide range of flexible and creative models, both for including 'literacies of the digital' in learning outcomes of programmes, and for providing learning experiences in ways that support the development of autonomous digital learners.

Institutional Approaches to Curriculum Design (2008-2012)
http://www.jisc.ac.uk/whatwedo/programmes/elearning/curriculumdesign.aspx

Twelve projects are exploring whole-institution approaches whereby joined-up ICT and information systems support a more effective, flexible and fit-for-purpose process of curriculum design. Learning, teaching, research and core administrative processes are all addressed: for example the PALET project at the University of Cardiff[42] is making use of the University's 'Modern IT Working Environment' to streamline the processes involved in bringing curriculum ideas from inception through to enrolment and delivery.

In addition to these most relevant projects, a wide range of other JISC-funded projects are helping institutions to build capacity across emerging areas of digital practice, including: open content, open access publishing, repositories, technology-enhanced assessment, administration, and design of learning spaces. As these practices become more mainstream, and more critical to organisational survival, digital expertise needs to be proactively developed and integrated into everyday working practice. JISC-funded outcomes also depend for their take up on digitally-literate users, across all roles in the educational system. Digital literacy is therefore a priority for organisational and sector development.

In September 2010, Scotland's input to the JISC e-learning consultation defined a high-level strategy as: '*How can ICT support the development of essential skills from school to further and higher education, with particular reference to Curriculum for Excellence and Graduates for the 21st century?'* This document goes on to recommend developing staff skills in: '*curriculum design (for 'capability' outcomes); (their own) digital literacy, especially Web2.0 and communication tools to support collaboration across sectors'.* Further input to this process is awaited from the other UK nations.

3.5 Supporting users of digital content and services

The digital information seeker: Findings from selected OCLC, RIN and JISC user behaviour projects (2010)
http://www.jisc.ac.uk/publications/reports/2010/digitalinformationseekers.aspx

This commissioned report analysed and synthesised 12 user behaviour studies conducted in the US and the UK between 2005 and 2009, and was designed to support information professionals in planning how best to support information users. Common findings included:

- Regardless of age or experience, academic discipline, or context of the information need, speed and convenience are important to users.

- Users are beginning to desire enhanced functionality and content to help them evaluate resources

- They seem generally confident in their own ability to use information discovery tools.

- However, it seems that information literacy has not necessarily improved.

- Users value human resources in their information seeking

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42 http://www.jisc.ac.uk/whatwedo/programmes/elearning/curriculumdesign/palet.aspx

JISC user behaviour observational study: User behaviour in resource discovery (2010)
http://www.jisc.ac.uk/publications/programmerelated/2010/ubirdfinalreport.aspx

This study investigated the information-seeking behaviour of students and researchers working in the Business and Economics disciplines using subscribed and freely available Internet resource discovery systems in three UK HE institutions: Cranfield University, London School of Economics and Middlesex University. The institutions were chosen as exemplars of the Russell Group, the 94 Group, and the Million+ groups of universities in the UK. The final report touches on the overlap between digital, information and ICT literacies, which are described as 'entwined'. Navigating information, for example, may be made easier by enhancements to information systems.

Findings included:

- poor usability, high complexity, and lack of integration of many electronic resource discovery systems, have raised the entry threshold of information technology literacy;

- information literacy skills are generally lacking;

- as a result, students tend to rely on Google or Google Scholar which have lower thresholds of information technology literacy, and (importantly) always return a list of 'hits';

- use of resource discovery systems storage features was low, with a preference for storing 'tabs' in the short-term and transfering data manually to e.g. word. Users need accessible means of creating repositories of information that can be accessed easily and transferred across different platforms.

Information Environment programme (2009-2011)
http://www.jisc.ac.uk/whatwedo/themes/informationenvironment.aspx

This programme seeks to develop an e-infrastructure for learning, teaching and research which supports better use of digital information resources. Though not an explicit strand of this programme, 'data literacy' is relevant to all of it, i.e. a capacity on the part of individuals to interact successfully with a wide range of data systems and services, and to be aware of how different kinds of data are collated and used (e.g. personal, system, geospatial data).

While some of the JISC Advance services are potentially relevant to users of content and services, the Digital Curation Centre also provides specific guidance and training in digital curation, including the DCC Digital Curation Lifecycle[43] (a key tool in understanding and conceptualising the tasks and skills involved) and various training courses[44] and outreach activities such as roadshows. '*Closing the Digital Curation Gap*'[45] is an initiative to spread good practice in data curation from industry experts to the practitioners who often undertake curation work without specialist professional training.

3.6 Work funded by other agencies

ESRC has funded research seminars in the 2008/09 round on: Learning in the Digital University; Educational Futures; and young people's digital literacies in virtual online spaces: http://lidu.open.ac.uk/home.cfm; http://edfutures.futurelab.org.uk/

TLRP-TEL has produced a theme paper on digital literacy and continues to summarise

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43   http://www.dcc.ac.uk/resources/curation-lifecycle-model

44   http://www.dcc.ac.uk/training

45   http://www.dcc.ac.uk/projects/closing-digital-curation-gap

outcomes from its funded projects that have a bearing on digital literacy:
http://www.tlrp.org/tel/digital_literacy/

As noted, **SCONUL** has taken a national and indeed international lead on the issue of information literacy. Several resources are available including a position paper, learning outcomes map, and the original 'seven pillars of information literacy', which are in the process of being updated to reflect ICT developments in the last decade[46]. JISC signed a Memorandum of Understanding with SCONUL in 2009 which proposed collaboration on, among other issues, 'the changing scholarly communications process' and 'supporting the user experience'.

Vitae has produced a Researcher development framework (RDF) for postgraduate researchers and research staff in higher education institutions[47]. It was designed following extensive consultation in 2009 as a tool for planning, promoting and supporting the career development of researchers. With statements of capability in four areas – knowledge and intellectual abilities, personal effectiveness, research governance and organisation, and engagement, influence and impact, the RDF includes a number of capabilities aligned with digital literacy. Like SCONUL's '7 pillars of information literacy', the RDF acknowledges that while some generic capabilities exist, the development of competence depends on extensive practice in authentic, discipline-specific contexts.

The **Research Information Network** has funded a study into researchers' use of web 2.0 tools[48], which summarises the factors that support and constrain adoption. The study also explores interdisciplinary differences and how web 2.0 tools are changing researchers' behaviour in areas such as discovery, data sharing, publication and communication.

JISC is working with **SEDA** and the **Leadership Foundation** on the Embed-IT project to examine changing staff roles and skills.

Many **professional bodies** in further and higher education support aspects of digital literacy, and/or recognise digital literacy as an aspect of professionalism among a particular group of staff. This often takes the form of a competence or professional development framework. For example, SCONUL's '7 pillars of information literacy' model[49], the European Charter for Media Literacy[50] and the European Computer Driving Licence[51] all address aspects of digital literacy in ways that may be relevant to UK HE and FE. Vitae's Researcher Development Framework[52] described above, the CMALT scheme[53], SEDA's Embedding Learning Technologies award[54] and the UK Professional Standards Framework for Learning and Teaching[55] all define the capabilities of specific groups of UK HE/FE staff. A more comprehensive review of digital literacy frameworks was conducted by the LLiDA project in

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46   http://www.sconul.ac.uk/topics_issues/info_literacy/

47 http://www.vitae.ac.uk/policy-practice/234301/Researcher-Development-Framework.html

48   Research Information Network (2010) *If you build it, will they come? How researchers perceive and use web 2.0:* http://www.rin.ac.uk/our-work/communicating-and-disseminating-research/use-and-relevance-web-20-researchers

49   http://www.sconul.ac.uk/groups/information_literacy/sp/model.html

50   http://www.euromedialiteracy.eu/index.php

51   http://www.ecdl.org/

52   http://www.vitae.ac.uk/policy-practice/234301/Researcher-Development-Framework.html

53   http://www.alt.ac.uk/get-involved/certified-membership

54   http://www.seda.ac.uk/pdf.html?p=3_1_10_1_4

55   http://www.heacademy.ac.uk/ourwork/universitiesandcolleges/accreditation/ukpsf

2009[56].

4. Stakeholder map

This stakeholder analysis is based on an analysis of participants in the JISC Digital Literacies Pilot project (n=63) and feedback from JISC staff consulted for a Digital Literacies review (October 2010). It is not intended to stand in for projects' own analysis of key stakeholders in their proposed interventions in digital literacy development and support.

Senior managers e.g. Dean of Students, PVC Student Learning Experience, Vice Principals	The Leadership Foundation Universities UK The Learning and Skills Improvement Service Association of Colleges *JISC Organisational Support Committee* *JISC Infonet*
Teaching staff	Higher Education Academy Staff and Educational Development Association Teaching unions (UCU, ATL) *JISC Learning and Teaching Committee*
Providers of ITT and CPD to teaching staff	Higher Education Academy Staff and Educational Development Association Institute for Learning The Learning and Skills Improvement Service Qualified Teaching Learning and Skills *JISC Learning and Teaching Committee* *JISC Netskills*
Support/services staff (general)	Heads of Student Services *JISC Organisational Support Committee*
Learning technology/e-learning/ILT staff	Association for Learning Technology (ALT) *JISC Learning and Teaching Committee*
Learning support/development staff (includes academic writing/literacy staff)	Association of Learning Development in HE The Learning and Skills Improvement Service
Librarians/LR staff (includes information literacy specialists located in the library)	Society of College, National and University Libraries Chartered Institute of Library and Information Professionals *JISC Support of Research Committee*
Community education/outreach/widening participation staff	National Institute of Adult and Continuing Education
IT/IS managers	Universities and Colleges Information Systems Association *JISC RSC Technical Forums* *JISC Infrastructure and Resources Committee*
Careers/employability staff	Association of Graduate Careers Advisory Services
Administrative staff	Association of University Administrators

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56 http://caledonianacademy.net/spaces/LLiDA/index.php?n=Main.RelevantFrameworks

	JISC Organisational Support Committee
Estates staff	Association of University Directors of Estates *JISC Organisational Support Committee*
Research staff including post-graduate research students	Research Funding Councils vitae Society of College, National and University Libraries Research Information Network *JISC Support of Research Committee*
Students	National Union of Students *JISC Learning and Teaching Committee*
Employers and professional bodies	Sector skills councils Department for Business, Innovation and Skills
Community organisations/regional bodies	National Institute of Adult and Continuing Education *JISC RSCs*
Content providers including OER	British Library BBC Digital Curation Centre *JISC Collections* *UK OER programme*

Analysis of the digital literacies participants found the following to be additional drivers for developing digital literacies institutionally:

- Developing new ways of teaching/learning especially blended/online

- Supporting part-time, work-based and remote students (e.g. studying on placement or abroad)

- Supporting learners' professional development and capturing the CPD market

- Developing online materials and support processes for staff and/or students

- Supporting new partnerships within and beyond the institution

- Engaging and supporting learners online

- Widening participation

- Developing independent learners

- Enhancing the learning experience/meeting learners' expectations

- Addressing graduate attributes

- Enhancing student induction

- Meeting learner entitlement to basic ICT skills

- Supporting international learners/ESL/ refugees

- Supporting learners with special needs

- Supporting subject-specialist capabilities: creative digital skills (visual design context); critical thinking and analysis (academic writing context)

5. Recommendations arising from key stakeholder interviews

This section summarises a series of one-to-one consultations with key stakeholders about priorities for a JISC-funded programme to develop digital literacies strategically. These recommendations should not be regarded as offering a complete picture, and nor can they stand in for local consultations in the institutions that are successful in the bidding process.

5.1 General recommendations for a JISC-funded programme on digital literacy

There are a large number of stakeholders operating in this area (see section 4). Funded projects should demonstrate that they are working with other agencies as relevant, while leading and taking ownership of their own institution's response to the issue. The Developing Digital Literacies programme should provide a focus for work across the sector, applying existing evidence and frameworks, undertaking strategic development, and evidencing the benefits of investing in digital capability.

The digital inclusion agenda is moving into the mainstream of European policy, with many new initiatives in this area. This programme will help to shape the response of the UK HE and FE sectors and to demonstrate what value is added to individuals' life chances and opportunities, over and above a basic entitlement to internet access.

Organisations should be preparing for a number of different future scenarios, for example around open data, open content and open scholarship, and building the capacity to adapt.

JISC has a long-established role in developing a research and information environment which is the envy of the world. In order to capitalise on this, the Developing Digital Literacies programme should enhance capability in exploiting research data and information services. This would maximise return on the public investment already made, and support the researchers, innovators, and knowledge/information professionals of tomorrow. The focus should be on behavioural, cultural and capability issues rather than on the information environment or content/services *per se*.

There is a growing demand for support from staff in institutions who are being given new roles and responsibilities around 'digital literacy'.

While the evidence is against a huge generation gap in terms of digital practice, there is certainly a contextual gap between personal and social practices with technology, and the expectations of formal education courses and institutions. The Developing Digital Literacies programme should aim to narrow this gap in both directions, bringing together work being done to enhance the capabilities of teaching staff, and work being done to understand and describe 'native' skills of learners as information users, leading perhaps to new forms of recording, recognising and showcasing their capabilities.

Some of the trends discussed in this background paper carry risks for the institution, at least as traditionally conceived, e.g. copyright and IPR, open educational content, open accreditation frameworks, changed learning and teaching relationships, informal learning. The Developing Digital Literacies programme should show how capacity building and personal/professional development can ameliorate risk, as well as enabling the institution to seize opportunities.

Many of the partner organisations listed in section 4, have developed frameworks to describe the digital capabilities of the relevant staff and student groups. The Developing Digital Literacies programme offers an opportunity for these to be better articulated, for commonalities and differences to be revealed, and for case studies in implementation to be collated. This is just one example of how responsibilities for digital literacy are diffused across organisations, and of how the programme could support greater coherence in the sector's response.

Good practice guidelines, case studies and exemplars are always popular project

deliverables. The programme should bring together the best of these and avoid producing large numbers of very similar outputs.

The remaining recommendations are presented in relation to the different stakeholder groups identified in section 1, though not because separate strands of work are proposed. Interdependence between these strands is taken as understood, so that improved organisational capability will involve improvements to the digital literacy of staff (including teaching, research and administration), which will enhance the digital literacy of learners and lead to enhanced outcomes. Projects funded under the Developing Digital Literacies programme will need to support joined-up working across roles, subject areas, service areas, and professional bodies.

5.2 Recommendations on enhancing the digital literacy of teaching staff

There was a strong emphasis on supporting the literacies of teaching staff, with the most common rationale being that teaching practice is critical to the development of learners' own attitudes and capabilities.

There was also a strong emphasis on 'reflection' and 'conversation', i.e. a sense that staff in all roles need to become more reflective about changing practices and about the meaning of digital communication, and require opportunities to discuss this with colleagues in an environment where scholarship rather than terms of service are to the fore.

Subject area was seen as critical to the kinds of digital capability required by students and so by their teaching staff. Projects were encouraged to work with subject/professional bodies and Subject Centres where possible to pilot deeply embedded approaches. Different subject specialisms were also seen as having different expertise to contribute to the overall digital literacy agenda.

Professional development frameworks are a valuable tool for embedding new expertise and practice. It was recommended that projects consider piloting, embedding, refining etc existing frameworks in partnership with the relevant professional organisations.

There were strong recommendations that any intervention should support both staff working in course teams and those working in parallel with the curriculum to support learners individually, e.g. in the library, e-learning, careers and learning development areas. The digital inclusion agenda in particular is served by learning professional staff who are themselves digitally literate.

5.3 Recommendations on enhancing the digital literacy of learners

A key recommendation from participants with expertise in the learning experience was that learners should be encouraged to produce and consume a wide range of digital media artefacts, both formally and informally. A critical question for the Developing Digital Literacies programme should be: in what media are learners expressing their ideas effectively, and how can academic programmes support this better?

Another repeated theme was assessment. How are we recognising, valuing, recording, responding to and assessing what learners produce in digital media? There is a need for examples of digital literacy being made manifest in programmes of study, and recognised in assessment criteria.

There is a need to remain aware of the personal and ethical dimensions of digital literacy. This has several aspects: digital inclusion (both using digital means to provide learning opportunities to those who might otherwise be excluded, and recognising that ICT itself presents a barrier to some learners); safe behaviour online; the impact of living and working in environments where public/private is being redefined; and managing a public digital identity and reputation.

Outputs of funded projects might include reusable learning objects, open content materials, new and revised development frameworks, and other tangible artefacts. These should be collated and made openly available under suitable licences. However, content development should not be a direct aim of funding.

Different groups of learners have different requirements and challenges in relation to digital literacy. Groups identified as meriting particular attention were: international students; work-based learners; mature students.

5.4 Recommendations on enhancing the digital literacy of researchers

As with learning capabilities, some research capabilities are generic (search, filtering) while others are subject and context specific, ranging from use of software for analysis (SPSS, ArcGIS etc) to the various 'informatics'. The availability of digital data and analytics is even creating new research specialisms within existing subject specialisms. Therefore interventions in this area need to be sensitive both to the generic competence frameworks that have emerged (SCONUL, vitae) and to how research communities evolve and value their own practices.

JISC clearly has a role in building capacity for handling research data. A funded programme could help to bridge the gap between librarians/information specialists, other support/training services and research-oriented departments.

There is an opportunity here to link research and teaching/learning more closely through the development of research capability across the learning career, and through repurposing of open research data and outcomes as learning/teaching materials. There are links here between the proposed digital literacy programme and the UK Open Educational Resources programme.

5.5 Recommendations on enhancing organisational capability

Projects will need to demonstrate how different approaches have had an impact on organisational capability and also, in a period of financial constraint, what the costs have been. The programme should then develop robust business and benefits cases for institutions engaging in a digital literacy programme, and should also seek evidence that enhancing digital capability leads to enhanced take-up of and benefit from the JISC offer.

The JISC has valuable ongoing partnerships in this area, and projects should be willing to collaborate where opportunities are identified.

The programme as a whole should be in a position to describe how digital capabilities are reshaping the workforce, including through the development of new and hybrid roles.

Institutions will need to consider how they provide both a generic entitlement to digital capability (for example through induction and pre-induction, central services) and a specific offer around the development of graduate capabilities in different professional and subject area contexts.

Subject librarians represent a critical bridge between subject curricula and the information agenda. It may be that subject learning technologists could play a similar role with respect to digital literacies, with the support of JISC and ALT.

5.6 Recommendations on enhancing digital content and services

There is a tension between a focus on enhancing the usability of content and services, and a focus on enhancing the capability of users. Contributors in the area of content services emphasised that through metadata, tagging, linked data, user tracking and other means, users can reasonably expect their experience of digital content and services to improve even if their skills remain unchanged. This suggests that the focus for users might move towards understanding the purpose, meaning and value of digital services, and how to best use them

to meet personal or collective goals.

One suggestion was the development of a toolkit for those responsible for digitising and managing content and collections, which would raise awareness of digital literacy considerations and allow them to be incorporated into user interfaces, in much the same way that IPR considerations are currently incorporated.

JISC's digital content and services teams have world-class expertise in enhancing usability and the changing behaviour of users. This should be harnessed by projects to help bridge the gap between existing take-up, which is often still confined to specialists, and the capacity to benefit, which is potentially universal.