Building digital capability
Framing digital capabilities for UK HE and FE staff: Resources and references

Helen Beetham, July 2015

This list does not include the actual frameworks, specifications, standards etc reviewed for the Jisc digital capabilities programme.

These are secondary resources - articles, reports, research outcomes and professional reviews - which are sometimes linked to specific frameworks. They were used to help plan the frameworks review, construct the new Jisc digital capabilities framework and to write the accompanying reports.

Further down you will find a list of web sites, blog posts and professional resources which provide useful additional information and materials, not necessarily evidence-based and not always drawn on directly for this project.

Articles, reports, books and book chapters with indicative quotes


In view of recognizing the lack of a sound theoretical orientation to guide teacher preparation in technology integration, researchers initiated during the last five years systematic research efforts for the purpose of developing theory and models upon which to ground research in the area of teacher cognition about technology integration... These researchers advocate the need to develop a new body of knowledge that constitutes an extension of Shulman's (1986, 1987) pedagogical content knowledge (PCK) into the domain of teaching with technology.

[...] ICT–TPCK is what makes a teacher competent to design technology-enhanced learning, and can be described as the ways knowledge about tools and their affordances, pedagogy, content, learners, and context are synthesized into an understanding of how particular topics that are difficult to be understood by learners or difficult to be presented by teachers can be transformed and taught more effectively with technology in ways that signify its added value.

[...] Research on instructional design and teacher education clearly indicates that teachers’ instructional thinking and decision-making is guided by a unique body of knowledge that is deeply situated in classroom
practices. Particularly, in Moallem’s (1998) study, teachers’ situated knowledge was considered as a highly contextual and practical complex body of knowledge that teachers acquire through years of experience.


It is clear that professional development in ODeL [open and distance e-learning] is a complex process that requires continuous engagement in design work, critical reflection, and membership in a community of practice. Thus, training in course design should be part of a holistic and integrated faculty development programme in ODeL which would include not only workshops but also opportunities to undertake experiments, to learn alone or with a partner or with a small group, and to share experiences and critical reflections as well as ‘products’ of innovation, using a whole range of tools and resources (toolkits) and with appropriate and effective administrative and research support.


And, in the UK at least, the academics are now outnumbered by other staff in universities (Salisbury and Gornall 2011)... As universities become more complex, undertaking many outward-oriented functions (marketing, outreach, knowledge transfer, spinout, income generation as such), ‘third space’ professionals emerge (Whitchurch 2006), injecting creative dynamism in driving the university, now become ‘the entrepreneurial university’ (Clark 1998). Whereas academics are devoted to their disciplines, these new professionals can devote themselves to the fortunes of their universities.

[...]

‘Fast-time’ crowds out ‘slow-time’... and long-term horizons are overtaken by short, urgent and even of-the-moment horizons... All these phenomena of speeded-up comprehension and understanding are, of course, made more stark by the onward march of interactive digital technologies, in the slide towards new forms of the university, now attracting such epithets as ‘the borderless university’ (Cunningham et al. 1998), the ‘edgeless university’ (Bradwell 2009) and the ‘virtual university’ (Cornford 2000; Ryan et al. 2000; Carswell 1998). The rhythms, and the time-space complexes of the university are changing utterly (Mason 1998, 1999). In the process, the humanities – which rather march to old-fashioned beats of slow-time, of time across centuries and even millennia – face difficulties in securing their survival.

[...]

For today’s academic, this is a multimodal world (Kress and van Leuwen 2001), where the modes of communication themselves are several and where individuals can choose from a palette of voices. Yes, academics know a lot; they are paid to do so; and they are ever more adept at communicating in different ways with multiple audiences...
Institutions have to prepare themselves, and not just their learners, for an uncertain future. Among the paradigm-breaking scenarios considered in this study, an increase in contract-based and self-employment giving rise to a loss of confidence in formal qualifications is perhaps the one that should give institutions most cause for concern. Institutions must position themselves to respond quickly and flexibly to the need for new kinds of capability, and to recognise and represent graduate capabilities in new ways.

How do we recognise the changing contexts (new opportunities and challenges), bring them into the institution in ways that are accessible to learners, change our teaching and support practices, and help learners transform their practices to become more effective learners, workers and citizens?

We see [digital capabilities as] situated knowledge practices and as such extending beyond technical competence, such as the ability to form letters in writing, or use a keyboard. Knowledge practices are meaningful and generative of meaning: they depend on the learner’s previous experiences (Goodyear and Ellis, 2008), on dispositions such as confidence, self-efficacy and motivation (Candy, 1991), and on qualities of the environment where that practice takes place, including of course the available digital technologies (Engestrom, 1999). We already inhabit technical, social, economic, cultural and educational contexts in which digital forms of knowledge predominate. It make sense to ask how literacy practice and provision should adapt to fit graduates for living and working in such contexts.

Tomorrow’s workforce will be increasingly individualistic, older, mobile, international, ethnically varied and far more demanding of their employers (CMI, 2008a). There is doubt as to whether the education system can produce the right number of people at the right skills level in the future. […]

Over 20% of UK nationals with a degree live in other OECD countries while immigration tends to be unskilled or low skilled workers. By 2010, fewer than 20% of the full-time workforce will be white, able bodied men under the age of 45 –the historical core of the workforce. […]

If the UK does want to be world-leading in higher level skills then it has to recognise that most of these will be gained on a part-time basis as the context for education changes (King, 2008). The current government target stated in the Leitch report of 40% level 4 by 2020 can only be achieved if part-time student numbers increase (Leitch, 2006). This is partly due to funding considerations and partly due to the potential size of the full-time undergraduate marketplace (traditionally 18-20 year olds) shrinking. […]
Between a tenth and a fifth of the UK population is still functionally illiterate in terms of reading a newspaper, filling out a form, or reading a timetable (Mayor and Binde, 2001).


When we consulted leading captains of industry they were much more concerned with what type of professional does the economy need in the future, rather than specific digital skills. They said for UK PLC to remain competitive we need

» professionals who can invent new digital technologies,
» professionals who can integrate those inventions into technology platforms,
» professionals who can build software applications that address business needs,
» professionals capable of protecting our information, our digital infrastructure and our intellectual property


The emergence of new digital platforms will add 2.5 per cent to European employment numbers by 2025, with some countries like Spain potentially seeing twice that growth, according to McKinsey — though the higher numbers are partly the result of making work previously done in the informal “grey economy” visible by pulling it on to online marketplaces.


From Forward by Francis Maude MP:

Today, the web has 2.4 billion users worldwide. To put this incredible speed of adoption in some context, radio took 38 years to reach 50 million users, television took 13 years, web took 4 years and Facebook took just 10 months. In 2013, 89% of young people now use a smartphone or tablet to go online, up from 43% in 2010.

Among other things, the Strategy commits the UK Government to:

» establish a cross-government digital capability and skills programme for people to learn how to use the government’s digital services;
» identify the digital capability civil servants need to do their jobs and provide services to users, map out what skills they have at present, then provide training where needed to fill any gaps;
» agree a common definition of digital skills and capabilities.

Resources could well be diverted from ‘front line’ teaching and research into marketing and ‘customer care’. In future, academic leadership may be valued less highly than the ‘business planning’ skills needed to manage the new fees and funding environment ... Collegially determined (and largely self-policing norms), rooted in trust, could be replaced by performance measures and management targets ... Two points deserve to be emphasized in this respect. The first is that the drift towards such behaviours is already well established. Policy insiders and institutional managers are perhaps less aware of it – partly because they derive advantages from it and partly because they have become routinized by its effects through daily exposure – than [various external] critics. The second point is that such corporate behaviours can flourish in the absence of true markets, just as collegial and mutualist behaviours can flourish in commercial environments. The reform of English higher education may not be successful in producing the market university, but it is certainly likely to provide a powerful stimulus to the development of the managerial university.


Over 90% of companies lack digital skills; 87% of companies feel digital transformation is a competitive opportunities, but only 46% are investing in developing digital skills. Moreover, only 4% of companies align their training efforts with their digital strategy.


We reject technological models of teacher training like those developed in the ‘70s through CBTE programs. The premise of considering faculty as adult students is indisputable, and, as a consequence, it is essential to recognize their autonomy as well as their learning and transformation capacity (Darling-Hammond & Sykes, 1999; Feiman-Nemser, 2008). As Borko and Putnam (1996) pointed out, new learning is built on previous knowledge and experience. Hence the importance of identifying and making the teaching staff aware of their basic knowledge. ... For this reason, training cannot be conceived as a static process directed by experts who establish rigid learning sequences. Its purpose is not, and must not be, solely to develop technical routines and skills, but to promote teacher empowerment, facilitating thus professional development (Minott, 2011).


**Digital competence is:**

- multidimensional, because it implies the integration of cognitive, relational and social abilities and skills;
- complex, because it cannot be completely measured by single tests: it requires more time and different contexts before becoming evident;
- interconnected: it is not independent from other key competences like reading, numeracy, problem solving, inferential skills etc.;
- sensitive to the socio-cultural context, because its meaning could change over time, according to the context and to the different educational settings.
The UK has witnessed one of the highest rates of higher education expansion across Europe over recent decades, but has not seen an increase in high-skill jobs matching that expansion... Our analysis shows that while there are examples of occupations where jobs have been upgraded as graduates have moved into them in increasing numbers, many other occupations have simply experienced either job competition, where those with degrees simply replace non-graduates in less demanding jobs, or enter jobs where the demand for graduate skills is non-existent or falling. [...] It is increasingly less clear-cut that technological improvements necessarily create a greater demand for skills. While the two may have been interlinked in some historical periods, there is now evidence that many graduate-level jobs are subject to a 'digital Taylorism' (Brown, Lauder and Ashton, 2011) as better technology removes the need for skilled decision-making, creative thinking or discretion and makes some ‘knowledge work’ more routine. More recent predictions about the impact of new technologies on work do not restrict falling demand to lower-skilled jobs, but also suggest technology may reduce the demand for some high-level skilled work, such as technicians, financial analysts, accountants and auditors, paralegals, and cartographers (Frey and Osborne 2013).


The disappearance of routine skilled jobs, the scarcity of high–skilled workers and the substitution of low–skilled workers for more expensive machines causes the labour market to bifurcate. Mean and median wages gradually diverge, as low–skill wages are held down while high–skill wages continue to rise. The employment profile across skill sets starts to resemble an hourglass – bulges in high–skill and low–skill jobs, with a narrowing waist where medium–skill jobs are disappearing.

 [...] We are already seeing work becoming more uncertain. No–one now expects to leave school, go into a job and stay there until they retire, as was commonplace in the post–war generation. Most people expect to change jobs frequently during their working life, and increasingly people don’t just change their jobs, they change their careers, studying and retraining at various stages in their life as their interests, needs and opportunities change. Education, formerly regarded as a young person’s game (with maybe a second flush among the newly retired), is becoming a lifelong process. The nature of employment is changing, too. Traditional full–time jobs are declining,
and there is substantial growth in part–time, temporary and self–employed work. Many people now rely on a portfolio of part–time, temporary and casual jobs to provide them with a sufficient income. The distinction between work and leisure is becoming increasingly blurred as people make money from hobbies and do socially beneficial work for nothing.


What drives our project is a desire to understand how changes in technology will affect those ill served by the economy—in particular, low-income workers, people of color, immigrants, women, youth, and the formerly incarcerated. After learning about the ways technology is re-configuring work, I'm convinced these changes are rapidly outpacing our ability to adapt and respond... I'm concerned that we, as a progressive movement, will focus too much energy on maintaining New Deal-era worker protections that may apply to a shrinking share of the workforce. That we will provide important immediate relief to workers (in the form of higher wages, paid sick leave, etc.) but leave those same workers vulnerable as the structure and availability of work fundamentally changes.


The research participants featured in this narrative inquiry study are engaged in digital, networked and open scholarly activities. According to their perceptions, their digital scholarship practices, and the values, ideologies and activities associated with it, make their approaches to scholarly work a distinct practice. They see it as setting them apart from other scholars who might be using the Web to assist with their research but who do not necessarily advocate the main principles of digital scholarship practices such as networked learning or the openness of academic work.

Costa identifies four 'dispositions' among the digital scholars she interviewed:

They are highly reflective on the purpose of their profession; they are committed to openness; they value their extended online networks and online communities; they want to make a difference.


Over 90% of respondents across all the creative industries surveyed agreed that: 'there will be an increase in the demand for individuals with combined creative and digital skills'


Teaching Creativity

» Creative subjects should be on an equal level as the sciences.
» Creative skills can be applied to sciences – creativity is beyond the boundaries of the teaching of creative subjects.
» Creativity has a socialisation agenda, helps learning and boosts engagement with the world; makes us curious.
» Where does creativity meet digital skills?

Based on ONS figures for 2011, around 1.5 million workers in the UK, representing around five per cent of the active workforce, are employed in job categories that are likely to involve elements of the role of the data scientist...

*The data scientist is a best thought of as a “hybrid of data hacker, analyst, communicator, and trusted adviser.” Keys skills required for the role of data scientist include: The ability to write computer code; A foundation in maths, statistics and probability; Skill in communicating the ‘story’ the data tells to a non-technical audience; Ability to display complex information visually.*

*The construction, real estate, financial and insurance, public sector and arts, entertainment and recreation sectors are some of the largest users and re-users of open data.*

Deloitte (2014) *One Third of Jobs in the UK at Risk from Automation.* Available online.

» 35% of existing UK jobs at high risk of replacement in next twenty years, 30% in London
» 40% of UK jobs are low or no risk, 51% in London
» Lower-paid jobs over five times more likely to be replaced than higher-paid, almost eight times as likely in London
» 73% of businesses in London plan to increase headcount overall, with advances in technology requiring new skills and a major shift in job types

*Technology, automation and robotics will cause a significant shift in the UK labour market in the next twenty years, with one-third (35%) of existing jobs at risk of being replaced… Advances in technology will likely see jobs requiring repetitive processing, clerical and support services, replaced with roles requiring digital, management and creative skills. These trends are already well under way.*


Many of the respondents who informed this report pointed to the need for a shared language when it comes to aspects relating to building digital capacity… A shared set of assumptions and definitions is required. [T]he report clearly shows senior management’s widespread recognition that current initiatives while innovative, are generally ‘fragmented, piecemeal and often unsustainable’. Respondents underline how crucial Continuing Professional Development (CPD) for academic staff is when it comes to building digital capacity.


*The deployment of information and communication technologies (ICTs) and their uptake by society affect radically the human condition, insofar as it modifies our relationships to ourselves, to others and to the world.*

*The ever-increasing pervasiveness of ICTs shakes established reference frameworks through the following transformations:*
the blurring of the distinction between reality and virtuality;
the blurring of the distinctions between human, machine and nature;
the reversal from information scarcity to information abundance; and
the shift from the primacy of entities to the primacy of interactions.


We need to embed trust, ethics and security into digital services. To achieve this we urgently need an investigation into “data and society” that openly and honestly recognises the challenges of handling and analysing personal data; that assesses the true benefits and limitations of big data and open data; and that defines a set of principles/rights and builds a new legislative framework to enshrine those rights in law.

We recommend funding a programme to provide basic digital skills to those who lack it, while providing assistance to those who can or will never use digital... Where a service is digitised [ ], we must insist that everyone should be able to benefit from this.

[We recommend] increasing digital capabilities across the public sector by embedding it into all organisations.


The use of the Internet is Britain has risen substantially over the last two years, reaching 78% of the population 14 years and over.

There has been progress on narrowing digital divides with a rise in Internet access for lower income groups, people with no formal educational qualifications, retired people, and individuals with disabilities.

The beliefs and attitudes of Internet users are diverse, reflecting five broad cultures, the largest of which, the "cyber-moderates", have more tempered views about the value and risks of Internet use than most other groups of users. [In descending order of internet use they are: e-mersives 12%, techno-pragmatists 17%, cyber-savvy 19%, cyber-moderates 37%, adigital 14% - NB this latter group find the internet 'out of their control', 'not for them' or 'frustrating' but they are not non-users]

The rise of next generation users, who use multiple devices, one or more of which are mobile, has grown to represent 67% of users.

Patterns of use have not changed dramatically, but the diffusion of social networking has stabilised at a plateau of 61% of Internet users.

Use of digital government services has continued to progress, particularly around transactional services, such as renewal of automobile licences.

Use of the Internet and social media tends to complement rather than substitute for traditional forms of communication, but is nevertheless tied to social changes, such as in meeting new people.

The perceived benefits of Internet use accrue far more to the next generation users, creating a second digital divide beyond mere access to the Internet.
A majority of users believe that the government should not regulate the Internet more than it does, but there is an increase in the proportion of the public that wants the government to do more to protect children online.

Digital choice remains a key factor leading many non-users to remain offline, underscoring the value of support of non-users to experience the Internet.


The way economists understand firms is largely based on an insight of the late Ronald Coase. Firms make sense when the cost of organising things internally through hierarchies is less than the cost of buying things from the market; they are a way of dealing with the high transaction costs faced when you need to do something moderately complicated. Now that most people carry computers in their pockets which can keep them connected with each other, know where they are, understand their social network and so on, the transaction costs involved in finding people to do things can be pushed a long way down.

This has a range of knock-on consequences, all of which are becoming key features of the on-demand economy. One is further division of labour. Thomas Malone, of the MIT Sloan School of Management, argues that computer technology is producing an age of hyper-specialisation, as the process that Adam Smith observed in a pin factory in the 1760s is applied to more sophisticated jobs. Another is the ability to tap underused capacity.

This applies not just to people’s time, but also to their assets: to drive for Lyft or Uber, you do need a car. The on-demand economy is in many ways a continuation of what has been called the “sharing economy” exemplified by Airbnb, a company which turns apartments into guesthouses and their owners into hoteliers. For people with few assets, though, on-demand labour markets matter more.

[...]

The idea that having a good job means being an employee of a particular company is a legacy of a period that stretched from about 1880 to 1980. ... These companies introduced a new stability into work, a structure which differentiated jobs from one another more clearly than before, thus providing defined roles and new paths of career progress. Many of the jobs were unionised, and the unions fought to improve their members’ benefits. Governments eventually built stable employment along these lines into the heart of welfare legislation. ... But the model started to get into trouble in the 1970s, thanks first to deteriorating industrial relations and then to globalisation and computerisation... Computerisation and improved communications then sped the process up, making it easier for companies to export jobs abroad, to reshape them so that they could be done by less skilled contract workers, or to eliminate them entirely.

This has all resulted in a more rootless and flexible labour force. ... A recent study by the Freelancers Union, a pressure group for freelance workers, suggests that one in three members of the American workforce (and a higher proportion of younger people) do some freelance work.


Between 2013 and 2020 a very large increase in roles for big data specialists is expected, reflecting the growing UK digital economy and the increasing amounts of data that will be created from internet-connected devices (the ‘Internet of Things’). [This report estimates 56k jobs in big data by 2020, compared with 21k in 2013].
A unique skill set is required to make the most of the opportunities offered by Big Data analytics.

**Hard skills:** subject matter expertise; data and technical skills; maths and stats knowledge.

**Soft skills:** problem solving; storytelling; collaboration; curiosity; communication; creativity.


The Importance of Cognitive Skills: This panel discussed these issues over the course of a year and has reached consensus that as technology approaches ubiquity, an increasing importance must now be placed on educating and training citizenry in the ICT skills necessary to function effectively in a global economy increasingly dependent on ICT. The panel’s overarching belief is that the digital divide should no longer be defined only in terms of limited access to hardware, software, and networks, but rather, one that is also driven by limited literacy levels and a lack of the cognitive skills needed to make effective use of these technologies. Technology skills alone, without corresponding cognitive skills and general literacy, will not decrease the gaps defined by a digital divide.

European Schoolnet (2013) *Survey of Schools: ICT in Education: Final Study Report: Benchmarking access, use and attitudes to technology in Europe’s schools*. European Commission

DG Communications Networks, Content & Technology. Available online.

*The Survey findings provide evidence that teachers are confident in using ICT, positive about ICT’s impact on students’ learning, and organise more frequent ICT based activities than previously. They do it most when they are in schools with easy access to pervasive equipment, but also do it more often even when they are in schools with low equipment provision than teachers lacking confidence and not positive about ICT but in schools with high equipment provision and easy access.*

*... Interestingly, around 70% of students at all grades are taught by teachers who have engaged in personal learning about ICT in their own time. ... The more teachers are confident in using ICT, the more they participate in professional development and spend time on such training, and the more they report frequent ICT-based activities during lessons across all grades.*


*[About the two outputs of the DIGCOMP project and their potential use cases] The self-assessment grid could be used as a tool for each citizen to describe their own level of digital competence to third parties and to understand how to improve their own digital competence... The self-assessment grid can also be used as a communication tool, as it presents the model in a concise and easy-to-grasp way.*

*[...]*

*The framework could be used by curricula and initiative developers who want to develop the digital competence of a specific target group, and could be inspired by or gain ideas from this model... The framework could also be used as a reference tool to compare existing frameworks and initiatives, in order to map which areas and which levels are taken into account by a currently existing framework (or certification scheme, or syllabi).*
ICTs are not mere tools but rather environmental forces that are increasingly affecting:

1. our self-conception (who we are);
2. our mutual interactions (how we socialise);
3. our conception of reality (our metaphysics); and
4. our interactions with reality (our agency).

In each case, ICTs have a huge ethical, legal, and political significance, yet one with which we have begun to come to terms only recently.


Communication technologies offer us the flexibility to balance our work with other aspects of our lives in a way to better suit us at the cost of reducing our separation from work and associated negative effects on wellbeing. However, people are their own agents and carry out boundary work to maintain their preferred balance between work and non-work. In this paper we reveal and explore one tactic people use to do boundary work with technology – making use of multiple devices to either separate (or integrate) their work and non-work.


Firstly DOT EVERYONE has to help educate all of us, from all walks of life, about the internet. The internet is the organising principle of our age, touching all our lives, every day. As the late activist Aaron Swartz put it, "It’s not OK not to understand the internet anymore".

Secondly, DOT EVERYONE must put women at the heart of the technology sector. Currently there are fewer women in the digital sector than there are in Parliament.

Finally, we should aim for a much more ambitious global role in unpicking the complex moral and ethical issues that the internet presents. For example, what are the implications of an internet embedded in your home appliances? Do children need online rights? What is an acceptable use of drones?


While computerisation has been historically confined to routine tasks involving explicit rule-based activities, algorithms for big data are now rapidly entering domains reliant upon pattern recognition and can readily substitute for labour in a wide range of non-routine cognitive tasks. In addition, advanced robots are gaining enhanced senses and dexterity, allowing them to perform a broader scope of manual tasks. This is likely to change the nature of work across industries and occupations. [...] According to our estimates around 47 percent of total US employment is in the high risk category. [...] Our model predicts that most workers in transportation and logistics occupations, together with the bulk of office and administrative support workers, and labour in production occupations, are at risk. These findings are consistent with recent technological developments
documented in the literature. More surprisingly, we find that a substantial share of employment in service occupations, where most US job growth has occurred over the past decades, are highly susceptible to computerisation. [...] Finally, we provide evidence that wages and educational attainment exhibit a strong negative relationship with the probability of computerisation. Our findings thus imply that as technology races a head, low-skill workers will reallocate to tasks that are non-susceptible to computerisation – i.e. tasks requiring creative and social intelligence.


Recommendation 4: Workforce Capacity

One of the strongest themes that emerged from FELTAG’s commissioned research, its online conversation and its surveys with teachers and managers was the need for significant investment in the knowledge, skills and understanding of the learning technology’s potential among policy-makers, governors, principals, senior and middle management, teachers and support staff. Benchmarks should be established for initial teacher education/training and teachers’ continuing professional development so that their ability to understand and optimise the use of learning technology can be enhanced and refreshed regularly. This should include the use of assistive technology. Additionally, continuous professional development for teachers needs to be considered when purchasing any capital expenditure for learning technology.

Finding from staff survey:

While there is a trend towards more teachers innovating with digital technology, this is on their individual initiative and support comes only from peers within their organisation:

» teaching practitioners increasingly use their personal digital technology experience and apply this to the circumstances of their learners
» teaching practitioners are more curious than fearful of digital technology and are using a wide range of products and digital technology in their practices
» there is a growing degree of collaboration between teaching practitioners with their colleagues and learners - but this is mainly confined to collaboration inside their organisations
» teaching practitioners increasingly regard themselves as independent professionals who explore their own use of digital technology, with few indicating that they expect guidance or direction from others.


The McKinsey Global Institute, the research arm of the management consultancy, estimates that what it calls "online talent platforms", job sites such as Monster.com and platforms such as Uber, could add 2 per cent to global gross domestic product by 2025, increasing employment by 72m full-time equivalents. [...] The UK has added 1.4m “micro-firms”, those with between zero and nine employees, since 2000. [But] the dream can be just that; the average income from self-employment fell 22 per cent in the UK between 2009 and 2014, even as self-employment contributed 732,000 of the 1.1m rise in total employment. The rewards of new forms of employment contract accrue to a minority, while others lose out.
But teachers have been at the cutting edge of the uses of technologies at work, using multiple software and new devices ahead of the general working population, indeed often called upon to put on the courses and training to upskill the workforce in these areas. Academics have also been in the forefront of professional and employee flexibility, productivity and adaptation as well as research and development, knowledge creation, experimentation and innovation, passing on, circulating and sharing with students, colleagues and other partners. They have embraced ICT and open methods in their courses as part of a new craft, working in new teams and collaborations, in models of reprofessionalized, contemporary work. Institutions thus need to include and recognize these, and also to encompass a notion of the ‘whole job’ in accounts of workload, or else to allow staff the autonomy to (self) organize and manage their time, judging what is to come first, second, third, and what last.


The focus on employability rather than social inclusion in accounts of digital capability risks ossifying existing exclusionary practices in the online and offline worlds (Beetham, McGill, and Littlejohn 2009; Belshaw 2011; Newfield 2010). It reflects an entrepreneurial turn in the management of the curriculum, where the econometric focus on producing commodity skills that can be exchanged, is a form of alienation of both the learner and the teacher from a wider range of social, classroom practices. [...] Teaching staff welcome critical guidance on how to integrate relevant practices in their classrooms, in order to support a diverse range of learners (Hague and Williamson 2009; Johnson 2008), and this is best achieved in partnership. [Also we argue that] a focus on pedagogically grounded, self-evaluation of digital literacy underpins a reassertion of teacher professionalism.


The DLHE data show that the largest increases in terms of the numbers of graduates in employment in the UK were the professional and managerial types of work categories. The number of graduates in employment as science professionals and engineering and building professionals increased the most compared to 2011/12 graduates, followed by marketing, PR and sales professionals and arts, design and media professionals. The proportion of graduates working as retail, catering, waiting and bar staff decreased to 13% compared to 13.7% in 2011/12. Overall there were 124,700 graduates working in the UK in professional or managerial jobs in 2012/13, accounting for 66.3% of all graduates in a known occupation in the UK, compared to 64.9% in 2011/12.


The growing complexities of information landscapes demand new approaches to learning that are learner-centred and self-regulated... Changing modes and methods of expression mean that the learner has to take responsibility to decide which tools to use and what contributions and connections to make on an on-going basis... Within new information landscapes, learners are continually challenged to manage their own learning. The speed of change, as well as the growth of contextual information needs, means that learners are required to regulate the direction and scope of their learning throughout their lives (Buchem, Attwell, and Torres 2011, p. 11). This includes reflecting on strategies and practices that are effective as well as being able to identify gaps and needs for learning.


14. Advancing technologies and technology-based services will change public experiences and expectations for accessing and sharing knowledge, requiring HEIs to rethink the ways in which they add value. A good information and communications technology (ICT) infrastructure is essential but the real challenge is for institutions to exploit ICT more effectively than their competitors (both national and international). In particular this means more online learning, better management systems, improved tools for collaborative research, more online content and more effective tools to find and use this content.

15. Technology also has the capacity to revolutionise the managerial and administrative functions of an HEI, enabling it to operate enhanced process efficiency or highly effective information and data systems (for example for student data or grant applications). The exploitation of ICT to realise cost savings and improve value for money needs leadership and culture change...

16. There are three primary ways in which the implementation and future development of ICT will impact on the HE workforce:

the continuing need for updated skills and ICT capacity, both for academic staff (who will have pedagogic and scholarly expectations to meet around ICT use and development) and professional/support staff who will require competency in core ICT systems;

the way in which ICT will inform and shape future workforce planning, either because ICT will drive business process automation/efficiency which will facilitate shared services or workforce efficiency, or because ICT planning and forecasting tools will enable more accurate workforce planning in the future;

cultural change and leadership, required to lead HEIs into new ways of working in an ICT-enabled institution.


In today's knowledge economy, the role of higher education is being redefined... Disruptive forces may be stemming from technology, particularly in publishing, including:

» unbundling (taking content from various sources, mixing it and creating new ways to produce it) which in turn is affected by the digital divide, models of authorship and costs of production
Demand pull (move from producer push to demand pull) as students take a minimalist approach to browsing

Ubiquitous access (all information is becoming accessible freely by one form or another, anytime, anywhere) and open access materials are becoming the new norm, challenging the university as an institution that provides access to knowledge

The rise of the pure property view of ideas (IP rights) impacting on the relationships between students and professors with regard to the generation of new ideas

Opportunities include:

Exploring new models of scholarly communication (moving from print to digital repository software)

Using copyright in the service of sharing (e.g. through the creativecommons.org mechanism) which allows licences with reservations

Embracing mass digitisation (ubiquitous access) to free up scarce resources

Leveraging cost curves (managing to abundance rather than scarcity) to take full advantage of low marginal costs

Participating in the open source movement to break down monopolistic practices and prevent the sector becoming over commercialised (Hilton, 2006)


Digital technology will also challenge traditional methods of delivering education, meaning schools and teachers will have to adapt. New models of learning—such as increased online learning and employer-designed short courses—need to keep pace with evolving technology and digital change. Changing demands from firms, consumers, students and communities mean that apprenticeships, vocational qualifications and degrees need to deliver more general—and also specific—digital capabilities. Adults need more opportunities to learn throughout their lives to adjust to a world changing in ways as yet unknown. Education needs a greater emphasis on providing every citizen with adaptable digital skills. The incoming Government, devolved administrations and grant-giving bodies should agree an agenda of change for further and higher education that addresses the magnitude of the challenge; and re-examine investment in science and research.


Six drivers: extreme longevity; rise of smart machines and systems; computational world; new media ecology; superstructured organisations; globally connected world.

Ten skills for the future workplace: sense making, social intelligence, novel and adaptive thinking, cross-cultural competency, computational thinking, new media literacy, transdisciplinary, design mindset, cognitive load management, virtual collaboration.


The new skills [required in a participatory media culture] include:
» **Play**: The capacity to experiment with the surroundings as a form of problem solving.

» **Performance**: The ability to adopt alternative identities for the purpose of improvisation and discovery.

» **Simulation**: The ability to interpret and construct dynamic models of real-world processes.

» **Appropriation**: The ability to meaningfully sample and remix media content.

» **Multitasking**: The ability to scan the environment and shift focus onto salient details.

» **Distributed cognition**: The ability to interact meaningfully with tools that expand mental capacities.

» **Collective intelligence**: The ability to pool knowledge and compare notes with others toward a common goal.

» **Judgment**: The ability to evaluate the reliability and credibility of different information sources.

» **Transmedia navigation**: The ability to follow the flow of stories and information across multiple modalities.

» **Networking**: The ability to search for, synthesize, and disseminate information.

» **Negotiation**: The ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms.

---

*Jump, L. (2010)* *The Experiences of University Lecturers When Enhancing Their Teaching Through the Use Of Digital Technology: A Systematic Review.* Available online.

This review [...] showed that lecturers use technology to increase the satisfaction of their students, improve their learning or to mediate changes in their learning behaviour[...]. The skills and professionalism of the lecturer are key determinants of student satisfaction when technology is used to enhance their learning.


*Increasingly, changes we notice in the use of technology may also be observed at work within the walls of the academy – physical walls or virtual. They are breaking down traditional barriers separating academic research from teaching, work-based learning and informal learning. Academic research requires keeping up with technological advancements and social media dissemination channels, even if technology is not the research focus. However in this paper, we are particularly concerned with those who are responsible for curriculum design and teaching delivery. The paper... argues that faculty engagement should go beyond technology adoption in their teaching to adoption in their own professional learning. [...]*

*All the approaches [to professional learning reviewed in this paper] embrace peer learning from experience: collectively reflecting on a work-related (teaching or learning) experience, or going through experiential learning together in a community or group. Considering faculty development for the future, Brooks (2010) observes that as technological advancements rapidly evolve, and as expectations to use technologies increase, faculty members need timely assistance when faced with technology-related problems. Short-term problem-solving is needed as well as support in long-term development.*


First, workplaces are being transformed such that production and practice are increasingly knowledge-driven (Hardt and Negri 2008, p. 290). Not only are workplaces making extensive use of networked technology, they are beginning to model themselves on such technologies, becoming distributed, dynamic, and highly mediated environments (Fiedler and Pata 2009). Second, work problems are becoming more complex such that people have to constantly build new knowledge to solve these problems, requiring updating of expertise and continuous learning (Fiedler and Pata 2009; Littlejohn et al 2011). Third, people are regularly and repeatedly transitioning into new roles and careers, necessitating lifelong learning (Kirpal et al 2007). Fourth, expertise is becoming more distributed, creating a need to learn across sites (Ludvigsen et al 2011). Finally, learning itself is increasingly mediated by technology and is being redefined by technology. One significance of these trends is that the requirement to learn is now a lifelong imperative and increasingly also a life-wide one, with learning opportunities integrated into work and leisure. Coupled with these emerging demands of the workplace, full political and social participation in society requires digital skills (EC 2010). Digital literacy is, therefore, becoming central to what higher and vocational (further) education can offer.

The debate around digital literacy offers opportunity to redefine and reassert the ‘academy’s’ special relationship to knowledge in society. Universities have lost their unique claim on valued knowledge. They even face alternative models of scholarship and critical thinking as the internet throws up its own public intellectuals – celebrity bloggers, champions of the digital commons, open educators, critics and geeks. What claims can universities make as sites of public knowledge and intellectual value? Supporting the development of critical literacies for the digital age may be one benefit universities are still uniquely placed to deliver.


The digital practices associated with networked collaboration and co-creation are central to academic work (see the chapters by Jones, Fransman, and Goodfellow in this volume). Indeed, the invention of the Internet was to allow academics to collaborate, communicate and integrate data to solve increasingly complex problems. Many areas of academic practice are, therefore, deeply inscribed with technology. [...] 

‘Employability’ is often the stated rationale for embedding competences into the curriculum, and is assumed to define learners’ ultimate goals and aspirations. However, we found ‘employability’ to be very poorly articulated. Clearer focus could support subject teachers in identifying how graduate professions and employment pathways are changing with the impact of digital technologies, and in modelling how academic practices such as criticality, peer review and innovation are becoming central to knowledge practice in many employment contexts. Similarly, the employability agenda could refocus literacy provision around authentic tasks in complex
social situations. Clearly there is also a need to discuss in a broad sense what graduates can bring to their communities and workplaces. We would argue that notions of digital citizenship and participation, as well as digital scholarship and professionalism, have their place here.

[...] As members of research and professional communities, academics understand that ways of reaching and expressing judgement are aspects of personal identity, and that managing one's identity as a knowledgeable person is different in a digital age... [L]iteracies continually evolve in response to changes in the technical, epistemological and cultural order.

[...] The baseline activities of projects in the [Jisc Developing Digital Literacies] programme also revealed fears around using digital technologies for both staff and students, ranging from dehumanisation, distraction, erosion of personal and professional boundaries, time management, information management and superficiality of exchanges. There appears to be a need for staff and students to negotiate some fairly complex choices around which technologies they use and how far they incorporate them into their teaching and learning.


New for 2015 is an indicator to show the link between digital maturity and organisational success. The key overall finding is that the most digitally mature organisations are one-third more likely to have seen an increase in their turnover in the last two years than the least digitally mature.

The real progress is found amongst SMEs, where those without basic digital skills reduced from 25% to 23%. To put it another way, this means that 77% now have basic digital skills. In contrast, charities lacking those skills have actually increased from 55% to 58% since 2014.

1.85m organisations have a very low level of digital understanding and capability - many make no use of the internet at all and do not have any web or social media presence. Nearly 2.35m organisations have a medium level of digital maturity - they may have a basic social media presence, use simple e-commerce tools or carry out some but not all banking transactions online.

Almost 1.2m organisations in the UK have a high degree of digital maturity, meaning they invest significantly in digital infrastructure, training and use of advanced digital security techniques.

Makers Academy (2014) Written evidence to the House of Lords Select Committee on Digital Skills. Available online.

We change our course every six weeks to fit the needs of the market. Unlike universities, we are not accredited, which enables us to move at a superior speed to respond to the market. In the three/four years it takes to complete a degree, the tech industry on your day of matriculation will bear little resemblance to the industry on the day of your graduation. Given the time it takes for higher education institutions to agree, create and begin to teach more up-to-date content, it will never be possible for students to learn the sorts of languages, techniques and best-practises that are current in the market.

At the time of publication of this report (February 2014), 78% of the UK adult population have Basic Online Skills, leaving 11 million people still left without the basics needed to use the web in the 21st century. There are many benefits to getting the nation online. For example NHS could save close to £108 million if just 1% of their face to face visits were converted to visits to NHS Choices and the Government saves around £194 per person when they do transactions over the internet rather than in person. The average household could save up to £560 a year just by shopping and paying bills online. Using the internet also helps people learn, find a job and stay in touch with loved ones. Overall the UK’s GDP would also benefit substantially.


Recommendations curriculum change (with implications for the practice and capabilities of curriculum staff) include:

Curricula need to become more „open support new and diverse ways of supporting learning and as learners access and create their own content

In a more open curriculum, feedback becomes critical - that dialogue between learners' own activities/productions and developmental feedback on them from peers, tutors and possibly employers.

Digital media (for curriculum representation and communication) support better ongoing dialogues e.g. with employers, between different players in the curriculum design and delivery process, with learners and potential learners allowing continuous improvement to be well-informed.

Curriculum staff need to recognise that curriculum delivery models and, sometimes, curriculum design must change in order to allow for a greater integration of technology.

Curriculum managers need to lead and drive the change. This will involve challenging existing practice, providing vision and direction, understanding the implications of the change and providing support. They must also be able to provide the necessary resource in staff time/remission and facilities.


There will be a shortage of talent necessary for organizations to take advantage of big data. By 2018, the United States alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the analysis of big data to make effective decisions.


For decades, technology has been transforming the nature of work and raising productivity, starting with the use of robots and other smart machines to automate routine production work, such as on an assembly line. A second wave of work redesign over the past 15 years has affected jobs that involved information processing and routine transactions. Transaction jobs that could be standardized and scripted—cashing checks and taking
deposits, answering a customer call, or processing a service request—were automated or, with the aid of
technology, they were shifted to workers in low-wage locations. Now a third wave of change is reaching jobs
that involve complex interactions and often require deep knowledge, independent judgment, and experience.
These are the jobs of the knowledge economy and include managers and salespeople, as well as professionals
such as doctors, lawyers, and teachers. For more than a decade, such interaction jobs—including both high-skill
and low-skill ones—have been the fastest-growing category of employment in advanced economies.[...]
Companies are now focusing on raising productivity in high-skill interaction jobs... One technique is to
"disaggregate" jobs by separating routine tasks that don't require high skills and automating them or
reassigning them to specialist workers... At the same time, employers are finding that they can change where
and when jobs are carried out—to meet their needs and those of employees. Using ubiquitous broadband
connections and other technology, many interaction jobs can be conducted “virtually,” whether from the road,
remote offices, or a worker’s home. This not only enables employees to choose work routines that suit their
lifestyle preferences (and gives employers access to employees they may not otherwise engage), but it also gives
employers unprecedented flexibility in how they use labor.

[...] Workers with the strong cognitive, communication, and problem-solving abilities that are required for the
most sophisticated types of work have experienced low unemployment and rising wages—the opposite of what
has been happening to workers at lower skill levels. The diverging fates of high- and low-skill workers are seen
across the OECD: the share of employed workers who lack an upper secondary degree has declined by one-third
since 1995. The result is growing polarization of opportunities in the labor market, with strong demand for both
the most skilled workers and for workers in non-tradable, low-skill jobs (e.g. food preparation), but shrinking
opportunities for those between these poles.

Academic Working Lives (op cit.)

As Gornall and Thomas (2001) and Beetham et al. (2001) noted more than a decade ago, something significant
is happening in the academic job market, and the surge in new job titles is indicative of a much broader
structural change. These changes manifest themselves in contradictory ways. On the one hand, academics may
be losing some of their traditional ‘gatekeeping’ (controlling student admissions) and pastoral roles. On the
other hand, they are increasingly required to produce more visible and impressive course material and learning
outcomes documentation, as well as spending more time assessing larger numbers of students.[...]

The so-called bureaucratization of universities should come as no surprise, given the rise of ‘management’ roles
throughout the wider economy and the expansion of organizations, their finances and community. As public and
private sector organization have grown over the last century, management occupations have been the fastest
growing occupations in advanced industrial societies...

Whitchurch (2008) takes the view that, far from becoming marginalized, new types of ‘third space’ professionals
are likely to continue to emerge. It is plausible to speculate that the ability of such groups to generate income
and prestige for their universities will make them more, not less, secure. Their ability to blend activities, work
across disciplines, departments and traditional divisions of labour, may make them more resilient in turbulent
times. We know less about the detailed expectations and requirements of such posts, though it is highly likely
that they enjoy far less autonomy than has been the case for traditional academics. Whilst lecturers have
relatively vague job descriptions around teaching, research and administration, many of these ‘third space’ posts will have very specific targets and thus will need to work to much tighter, target-driven job descriptions.


The current experience of most digital workplaces is one of fragmentation. The level of disconnection between applications and devices that form the workplace landscape for most employees seems to be growing at an alarming rate. Investigations into this problem reveal statistics such as workers changing windows to check email or other programmes nearly 37 times an hour, and that the top frustration for information workers is that it takes more than one application to complete a simple task.


In a CPD context] Digital literacy has an impact on users' performance and effort expectations.


University staff in the UK tend to report that demands are increasing, while support and a sense of having control at work have fallen. Many complain about the rushed pace of work, the lack of respect and esteem, having too much to do, inadequate support and lack of opportunity for promotion. The psychological stress among university employees appears to be much higher than in other professional groups and the general population.


Companies across the economy are moving towards a world of bigger, messier, faster data. Creating value from that data requires talent with a new mix of skills – including analysis, coding, business sense and creativity.

Four out of every five companies we interviewed say that they struggle to find talent with those skills.

Policymakers, educators and industry need to consider how to address these skills shortages by upgrading workforce skills, improving the supply of data talent from education, and changing perceptions of data work as dull and boring.

Managers need to find, team-up and organise their data talent.

- (2013) *Creative Economy Manifesto*. Available online: [Available online]

The UK’s creative economy is one of its great national strengths, historically deeply rooted and accounting for around one-tenth of the whole economy. It provides jobs for 2.5 million people – more than in financial services, advanced manufacturing or construction – and in recent years, this creative workforce has grown four times faster than the workforce as a whole.


Six themes:
The proliferation of open educational resources has emerged as a major topic of interest to national governments and universities, but requires effective policy to become mainstream in practice.

Likewise, measuring learning through data-driven practice and assessment, currently on the rise in universities in the developed world, will reach its maximum impact in higher education in about three to five years, but many leading institutions are moving considerably faster.

The redesign of learning spaces requires initiative to imagine how the physical set-up of classrooms can better accommodate progressive teaching, but also how to share those ideas broadly.

A long-term trend is the growth of collaboration between different higher education institutions. This trend reflects the notion that innovation can scale better when ideas are shared between institutions.

The increase of blended learning, highlighted as one of two developing short-term trends in the following pages, is bringing both technical and pedagogical enhancements to online and blended learning.

All over the world, universities and colleges have been gradually rethinking how their organizations and infrastructures can be more agile.


There is also a strong correlation between levels of education and internet use: 95% of those with a university education use the internet, compared to 54% of those with a basic or secondary school education (Dutton, W. H. And Blank, G. (2011) Next Generation Users: The Internet in Britain. Oxford: Oxford Internet Institute). A 2012 survey (The internet and informal learning: A report by UK online centres and ICM July 2012) showed that 72% of employers would be unlikely to interview a candidate that does not possess basic online skills.

Our economy will have 13.5 million job vacancies in the next decade, but only 7 million young people will enter the labour force during that period (CIPD (2012) Managing a Healthy Ageing Workforce: a National Business Imperative). There is a 6.5 million gap which will need to be filled by people working longer, people working more hours and people returning to the labour market. Additionally, the UK will need 750,000 more skilled digital workers by 2017 to compete in the global market (O2 (2013) The Future Digital Skills Needs of the UK Economy) while the digital sector alone will require 300,000 recruits with the high-end skills to invent and apply new technologies. Almost 20% of these vacancies are already difficult to fill due to skills shortages (UKCES (2013) Technology and Skills in the Digital Industries: Executive summary. Rotherham: UKCES). Some of these jobs could be filled by young people entering the workforce, but this is not enough to solve the digital skills gap. Only 9% (57,500) of pupils who entered GCSEs in the 2012/13 academic year took IT as a GCSE, and only 7% (41,800) achieved an A*-C grade in this subject (DfE (2014) Statistical First Release: GCSE and Equivalent Results in England in 2012/13 (Revised). London: DfE.)

Standard computing / ICT skills are not enough to fit the UK workforce for the future. The OECD Survey of Adult Skills (OECD (2013) OECD Skills Outlook 2013: First Results from the Survey of Adult Skills. OECD Publishing) states that: 'In addition to mastering occupation-specific skills, workers in the 21st century must also have a stock of information-processing skills and various "generic" skills, including interpersonal communication, self-management, and the ability to learn, to help them weather the uncertainties of a rapidly changing labour market.'

[A] distributed responsibility for the development of local plans [can be supported by] a common frame for discussions and interpretations. In [a schools] setting TPACK has turned out to be a useful model for understanding practice and management today, for defining competence needs among teachers and school managers and as a strategy tool for school development.

OECD Written Evidence to the House of Lords Select Committee on Digital Skills (2014). Available online.

English adults perform near the OECD average for problem solving in technology-rich environments, but adults in Northern Ireland score significantly below average

Performance of young adults in problem solving in technology-rich environments is considerably lower in England and Northern Ireland than in many other countries, raising concerns about the skills of the future workforce

Access to information and communication technologies is widespread in the United Kingdom, with above-average use in England but below-average use in Northern Ireland outside of work

In England and Northern Ireland, individual characteristics such as education and gender have a stronger relationship with proficiency in problem solving in technology-rich environments than in other countries

Higher performance in problem solving in technology-rich environments is associated with higher employment and wages, especially in England


Identifies ‘seven transformational themes’:

- Curriculum reforms and new pedagogies;
- Student-driven, flexible study modes
- Integration of learning with working practices
- Mobility and transferability between providers
- Uses of technology to transform learning experiences
- Uses of data analytics for personalised services
- Unbundling of educational service provision

Identifies ‘six factors explaining the slow pace of innovation among UK universities’:

- conservatism of university cultures
- inflexible organisational structures and processes
- fragmented and tentative nature of change initiatives
lack of incentives for innovation

confidence in the resilience of the sector

views that predicted disruptions will remain marginal to core business

Except with regard to curriculum modernisation, a substantial proportion (between 35% and 60%) acknowledged that the important innovations in each area are mostly happening outside the UK. In the areas of student mobility, unbundling of services and uses of student analytics, a significant number (over 30%) saw UK providers lagging behind the rest of the world.[...]

Contrary to the opinions of many commentators, HE leaders do not regard the existing models of provision as broken or unsustainable. With an eye also on the uncertain effects of abolishing student number controls, universities appear reluctant – for the moment at least – to abandon the ‘known knowns’ of current operations for the ‘unknown unknowns’ of radical innovations.

Constraints on innovation: ‘adaptability of operations’ rated the highest at 48%. ‘Capacity of staff’ next at 35%.


Employees can have difficulty mentally distancing themselves from work during off-job time due to increasing use of communication technologies (e.g., e-mail, cell phone, etc.). However, psychological detachment from work during nonwork time is important for employee recovery and health. This study examined several antecedents of psychological detachment: work-home segmentation preference, perceived segmentation norm, and the use of communication technology at home. Results indicate that segmentation preference and segmentation norm were positively associated with psychological detachment. Further, technology use at home partially mediated these relationships.


Work and living patterns are changing due to increased usage of information and communications technologies (ICT). Individuals now have more flexibility over where they live and work. These changing patterns, and how they impact on energy and transport infrastructure, need to be better understood to inform policy decisions.

[...]

Concerns about meeting long-term skills requirements have been persistent; underpinned, first, by difficulties in predicting and anticipating demand, and second, by challenges to meeting demand through UK-based education and training as well as absorption of skills available from other countries. In the first case, predicting and anticipating demand for skills is beset by inherent uncertainties: it is difficult to know what skills sets will be needed by society in future production or in the provision of future services, and how these skills sets might be changed (or even eliminated) by advances in technology... Alongside cultivating and maintaining high levels of scientific literacy at national level, individuals should also be supported in ‘learning to learn’ (i.e. learning
through applying knowledge and skills flexibly in a variety of roles, and treating learning as a life-long endeavour) and be empowered to make proactive careers decisions.

[...]

The delivery of education using the Internet promises to bring learning opportunities to more people than ever before, potentially drawing new audiences from across the world, whilst also enabling learners to have greater control over when and how they learn... This expansion in e-education, however, is not without challenges. On a practical level, sustainable business models for commercialising MOOCs, encompassing systems for verification of credentials, assessment and certification, have yet to be developed; [...] issues around quality assurance and ways of accessing reliably-verified information have yet to be resolved. [...] As yet, development of good practice is unsystematic. Little is known about the relative efficacy of widespread e-education, particularly as it relates to the social engagement of learners... The challenge of providing [the] necessary technological infrastructure poses questions for democratic access to information and learning.


Confidence is important as an indicator of professional involvement with technology-in-action because every teacher develops their potential to be more effective as part of the larger developing teaching body. [...] A developing teaching body is one that recognises the constant challenge of the new and with the imagination to apply the properties of technology to purposeful and effective teaching and learning.


Key issues in technology: MOOCs, Social Media, Telepresence, Modelling and simulation, Human-Computer Interaction, Neuroeducation, 'Edugenetics', Digital pedagogy

Key issues in IAG: E-assessment, Badges, Learning analytics, Next Generation Learning Management Systems.


While unemployment rates have declined, the proportion of people in non-standard employment has increased since 2005, according to the OECD. Non-standard jobs includes part-time and short-term workers and self-employed people. About two in five people in employment have such contracts in Spain, Italy and Germany. Across the OECD, an average of one in three jobs are non-standard. Temporary jobs account for more than 20 per cent of employment in Spain and an average of 11 per cent of jobs in the OECD. These kinds of jobs tend to be much more widespread among young people. More than half of those in work and aged between 15 to 24 years old in 2014 in Spain, France, Italy and Germany were in temporary employment.

A temporary job might be a first step in the workforce, but could prove to be a trap. According to the OECD less than 50 per cent of workers in European countries in temporary jobs had full time permanent contracts three years later. [...] About 22 per cent of households that rely on non-standard work are below the poverty line.

For practitioners it is a challenge to design for learning which supports students in developing or strengthening “digital literacy”, when it might not be clear what actually constitutes “digital literacy”. […] At one end of the spectrum, it seems that the level of macro-political definitions too rigidly infuses itself into the micro-level of actual classroom practice. This can potentially alienate teachers and result in inflexible, prescriptive curricular “literacy chunks” that overlook the complexity of these literacies. At the other end of the spectrum, we can also see how it can be difficult for teachers to embed digital technologies and translate broader concepts of digital literacy into meaningful classroom practices. We therefore argue that it might be fruitful to think of pedagogical approaches, such as [problem based learning] as meso-level pedagogies or strategies which can act as “boundary objects” between macro-level policy descriptions and micro-level classroom practice (this might also encompass other approaches, such as action learning, discovery learning or progressive inquiry).


Global skills shortage, particularly in high-end jobs is rife, with 50% of employers having difficulties filling positions in the last year (CIPD, 2013). As the gulf between high and low skilled positions continues to widen, the term talent becomes more than the ability to work in high demand/low supply positions. Talent underlines personal qualities which boost organisational performance, over and above skills, knowledge and previous experience. Linkages between graduate qualities (attributes) and organisational talent are well documented (Connor & Shaw, 2008), with many global organisations seeking graduate talent to supply talent pipelines to ensure strategic succession for continued success.


The day-to-day lives of learners and educators are saturated with digital technology use – both in terms of personal uses of devices and the more hidden uses of technological tools and systems by educational institutions. Digital technology continues to be an important educational priority for governments, politicians and policymakers – especially in terms of national efforts to engineer new and improved education systems with the capability to ‘out-educate and out-hustle the rest of the world’ (Obama, 2011).

[…] Most contemporary educational systems are now seen as being based around the creation and use of data that support the organization of relations through communication and information. […] Schools, for instance, are largely predicted upon data-driven processes of internal school management, teachers' performance management, target setting and pupil tracking. The intentions of this amplification of data work within the organization and management of education are deliberate – not least the intentional move towards what Jenny Ozga terms 'governing education through data' and the shift from centralized governance to individual self-regulation.

Lists ten 'new approaches to learning, teaching and assessment' to inform teaching practice and organisational management.

» Massive open social learning
» Learning design informed by analytics
» Flipped classroom
» Bring your own devices
» Learning to learn
» Dynamic assessment
» Event-based learning
» Learning through storytelling
» Threshold concepts
» Bricolage


For many individuals, the relatively low-risk micro-entrepreneurship allowed by peer-to-peer business may be the first step to broader entrepreneurship, perhaps an 'on ramp' of sorts to freelancing or starting an independent business, by generating supplemental income, extending expertise, and creating a broader professional network. The extent to which this will stimulate the creation of larger traditional businesses, and their ensuing economic impact, is an empirical question. However, there is very likely going to be a short-term rise in the number of freelance workers and sole proprietorships.

The peer-to-peer business facilitated by new platforms shifts labor from more narrowly specialized activities to a broader range of activities. Although many entrepreneurs work full-time to provide the services they supply, many do not. Moreover, many of this latter set are engaged in labor that does not reflect their primary skills. Thus, it is quite likely that the 'work' that is being created by peer-to-peer businesses is not being fully measured by government employment surveys. As peer-to-peer business starts to constitute an increasing fraction of the economy, it seems important that these be updated to reflect work that is not considered by the worker as traditional 'employment'.


A range of managerial approaches developed in [non-research-intensive universities'] responses to the changing landscape – notably greater centralisation of administrative services, more central oversight of teaching and learning activities, and increased reliance on metrics in decision-making – are not being applied to the same extent, and in the same ways, in [research-intensive universities].
We found a new emphasis on employability, with all the case study universities wishing to produce graduates who meet employers’ needs. We found this focus in [the ‘non research intensive’ universities studied] on immediate employer needs – the skills needed to do a specific job immediately on graduation – rather surprising, considering that a widespread view of higher education’s function in this regard is to prepare students for jobs that do not yet exist (Crossick 2010). There is also considerable evidence that many employers (to put it no higher) seek to recruit graduates with what might be regarded as the traditional graduate attributes of critical thinking, the ability to present coherent arguments, to master new material, and a range of “soft” skills, although relevant work experience gained through placements is also valued (Archer and Davison 2008)... we question whether the “landscape” changes which have driven this new emphasis on employability will prove to be in the best long-term interests of students, and indeed employers.


At one level, there has been an optimistic vision of the economy as being fluid and knowledge-intensive (Leadbetter, 2000), readily absorbing the skills and intellectual capital that graduates possess. ... Increasingly, individual graduates are no longer constrained by the old corporate structures that may have traditionally limited their occupational agility. Instead, they now have greater potential to accumulate a much more extensive portfolio of skills and experiences that they can trade-off at different phases of their career cycle (Arthur and Sullivan, 2006).

On the other hand, less optimistic perspectives tend to portray contemporary employment as being both more intensive and precarious (Sennett, 2006). The relatively stable and coherent employment narratives that individuals traditionally enjoyed have given way to more fractured and uncertain employment futures brought about by the intensity and inherent precariousness of the new short-term, transactional capitalism (Strangleman, 2007). Rather than being insulated from these new challenges, highly educated graduates are likely to be at the sharp end of the increasing intensification of work, and its associated pressures around continual career management. Consequently, they will have to embark upon increasingly uncertain employment futures, continually having to respond to the changing demands of internal and external labour markets. This may further entail experiencing adverse labour market experiences such as unemployment and underemployment. The challenge for graduate employees is to develop strategies that militate against such likelihoods. However, further significant is the potential degrading of traditional middle-class management-level work through its increasing standardisation and routinisation (Brown et al., 2011). As Brown et al. starkly illustrate, there is growing evidence that old-style scientific management principles are being adapted to the new digital era in the form of a ‘Digital Taylorism’. Moreover, in the context of flexible and competitive globalisation, the highly educated may find themselves forming part of an increasingly disenfranchised new middle class, continually at the mercy of agile, cost-driven flows in skilled labour, and in competition with contemporaries from newly emerging economies.

From the Executive Summary: Recommendation 1: UCISA should work with other agencies, such as Jisc, to adopt a standard definition of digital capabilities. We recommend institutions use this definition where they have none. This shared definition would make benchmarking easier and enable the sector to share resources and exemplars. Specific competencies and baseline measures could be developed from this, either sector wide or institution specific, to enable competency or fluency to be demonstrated in specific roles or disciplines.

[...]

The most important factors driving or enabling the development of student and staff digital capabilities were student expectations and requirements and the student experience survey. The development of innovative pedagogic practices was ranked as the third most important factor driving staff digital capability development, reinforcing the message that the digital capabilities of teaching staff positively influences students’ digital capabilities.

[...]

The most important internal strategies for driving development included the Teaching, Learning and Assessment strategy, the Library/Learning Resources strategy, and the Technology Enhanced Learning (TEL) and Information and Communication Technologies (ICT) strategies. The Estates and Staff Development strategies featured mid table, and the marketing strategy was least important overall. There was general recognition that the digital capabilities agenda impacts across the organisation.


The proportion of respondents from HE who agreed or strongly agreed that they find their job stressful has increased from 72% in the 2012 survey to 79% in 2014. There was a considerable increase in the proportion of members from HE that reported experiencing unacceptable levels of stress ‘always’ or ‘often’: 39% in 2012 and 48% in 2014. The biggest ‘wellbeing gaps’ related to work demands, change management, management support, relationships and role clarity. The wellbeing gaps for all stressor categories have widened since the previous survey was conducted in 2012 which, in turn, had worsened since the first survey in 2008.

The proportion of members from FE who agreed or strongly agreed that they find their job stressful has increased from 78% in the 2012 survey to 87% in 2014. There was a considerable increase in the proportion of members from FE that reported experiencing unacceptable levels of stress ‘always’ or ‘often’: i.e. 45% in 2012 and 62% in 2014. The biggest ‘wellbeing gaps’ related to change management, work demands, role clarity, management support and relationships. The wellbeing gaps for all stressor categories have widened since the previous survey was conducted in 2012, which in turn had worsened since the first survey in 2008.


If current trends run a steady path, in 2030 the UK workforce will be multi-generational, older, and more international, with women playing a stronger role. While the highly skilled will push for a better work-life balance, many others will experience increasing insecurity of employment and income. As businesses shrink their workforces to a minimum using flexibly employed external service providers to cover shortfalls, a much smaller group of employees will be able to enjoy long-term contracts.
Information technology will pervade work environments everywhere. Technologies and disciplines will converge, giving rise to important innovations. Jobs and organisations will become increasingly fluid as people move from project to project. Yet this proliferation of technology and our increased global interconnectedness will also make societies and business processes more vulnerable. Within this context, companies will be forced to make their business models more resilient.


As of August 2012, the digital economy accounted for 14.4% of all companies and 11% of jobs. It’s not just the technology sector that needs digital skills but all sectors. Consequently, as Chief Scientist at Metaswitch Networks Chris Mairs put it at our London regional meeting, increasingly “every company is a digital company and almost every job is a digital job.” The need for digital skills is only going to grow: the Science Council estimates that the ICT workforce alone will grow by 39% by 2030.

In order to assess how important digital skills are to the UK economy, Chris Mairs, the Chief Scientist at Metaswitch Network and the Chair of the UK Forum on Computing Education, used our framework in an assessment of the 361 standard occupation codes used by the government to categorize the occupations of the UK workforce. [...] This analysis suggests that well over half the workforce requires digital skills that extend beyond the basic skills of digital citizenship and that over 90% of jobs require at least those basic digital literacies.

Universities UK (2015) Making the Most of Data: Data Skills Training in English Universities. UUK. Available online.

The collection and analysis of quantitative data is becoming increasingly important across a range of sectors. As business and research interest in data expands, so too does the demand for workers able to analyse and interpret datasets. The potential to utilise data hinges on the supply of skilled individuals. However, research suggests that employers are struggling to find suitable candidates for data roles.


The prophecies about the impending irrelevance of universities were overblown, but we can recast these prophecies in terms of how scholars can change their own practice. Without addressing some of the issues set out in this book, scholars may find themselves excluded from discussions in the wider social network, their work hidden away in obscure repositories and their research ignorant of social issues. This would be the real tragedy of scholars, even if they continued to be successful in terms of employment and research funding.

[...]

If Boyer’s four main scholarly functions were research, application, integration and teaching, then I would propose that those of the digital scholar are engagement, experimentation, reflection and sharing. It is the adoption of these functions that will generate the resilient scholarship of the next generation.

Whitworth, A. (2009). Literacy and Counter Knowledge. In Information Obesity, Oxford: Chandos. Some resources from this chapter are available online.


New literacies, in contrast with traditional literacies, are more participatory. They are more collaborative in allowing for the open sharing and creation of information on sites like wikis and blogs. New literacies also offer the opportunity for the design of texts that are fluid and can be added to, remixed and constantly re-shaped. They can be shared easily through less hierarchical forms of distribution (Jenkins, 2006; Lankshear & Knobel, 2007). The ideas of the "read-write" web and Web 2.0, where easy publishing, blogging, posting of pictures and social networking exist, has created a shift of power that changes in possibilities of authorship and challenges notions of expertise. One way of thinking about the change in power is as a change in mindset between ideas of Web 1.0 and Web 2.0 (Knobel & Wilber, 2009) or between a "physical-industrial" and "cyberspatial-postindustrialist" model (Lankshear & Knobel 2007, p.11). In the first case technology is the location of information and texts are unchanging; the user interacts with the technology primarily to get information on an individual basis. In the second case, texts are changeable, and authorship is open, giving the user more power to write, remix, and publish. […]

What it means to read has also changed because readers must now make sense of multiple modes of communication: video, images and advertising. This challenges orthodox understanding of texts: what counts as a text; how text structures are created, understood, shaped and re-shaped (in the case of remixing); how genres are made and subverted; and how copyright is defined and understood (Lessig, 2008).


The project format is rooted in … project time. It tends to become in conflict with other temporalities involved in knowledge production. Project time entails a clearly defined timeframe with a certain beginning and end, which is unconnected to internal, contextual, nonlinear process time involving periods of standstill, deceleration and acceleration. Furthermore, project time includes 1) commodification of time by translating research time into money, 2) control of time by dividing time into beforehand determined phases in which accountability of the use of time is required, 3) compression of time by fostering speeding up of productivity, and 4) colonization of time by subordinating other temporalities into the project-based clock time regime. As a consequence, the project format contributes to the redefinition of academic values and ideals, glorifying such virtues as economic rationality, instrumental orientation, efficiency, accountability, short-terminism and speed.
Web sites, blog posts, professional resources

Digital capability development - for learners

The challenges of IT and digital skills training in the changing HE landscape | UCISA
Post-Secondary Resources about ICT Digital Literacy | ICTliteracy.info
Digital literacies toolkit | eLanguages.ac.uk
Developing Digital Literacies Infokit | Jisc
Digital Literacies and the AAAR model for personalising learning | Digitally Ready project
Digital literacy must become an essential part of the ICT curriculum | Teacher Network | Guardian Professional
Will 'Digital Literacy' Determine Your Future Career Success? | University of Derby
Learning journeys | Thames Valley University
Digital literacy across the curriculum | Futurelab

Digital capability development - for staff

Developing staff digital literacies | Jisc
Digital capabilities survey 2014 | UCISA
Mapping resources to competences | SCONUL
Assessment criteria for professional registration | CILIP
What is the Professional Knowledge and Skills Base? | CILIP
ARMA case study | AUA CPD Framework

Developing digital capability frameworks

Competency map and use cases | EIFEL
Research related to the iSkills (ICT literacy) Assessment Framework (US)
Final Report on the City of Leicester Digital Literacy project
DigComp project of the European Commission
LLiDA ‘framework of frameworks’ (2009)
Future requirements for living/working/learning

The Future of Work | ongoing series in Pacific Standard
Futures review | Beyond Current Horizons
Next Generation User Skills Report | Digital 20/20
Scenarios beyond 2020 Report | SCONUL
Digital leadership research | Horizon Scanning Report to the Society of Chief Librarians
Report of the Open and Online Digital Learning Group, Wales
Educational Futures | Educational Futures Research.org
Human + Machine futures in full colour | Institute for the Future
Technology Enhanced Learning in Research Led Institutions | TELRI Project

Changing nature of work in HE/FE

FELTAG | Learning Technology in Further Education
How can the FE and skills sector prepare for a digital future? | Niace
“The detail, the colour, the tone, the air, the life”: Academia in, against and beyond the University | David Kernohan
Four Trends Driving Higher Education Futures | Thinking Futures
The challenges of IT and digital skills training in the changing HE landscape | UCISA
Five Predictions for Academic Publishing in 2015 | Publishing Technology
Ten trends accelerating technology adoption in 2015 | Times Higher Education (report on NMC’s Horizon Report 2015)

Elements of digital capability:

ICT skills

Bring Your Own Device 4 Learning
OCR qualifications in functional skills: ICT
Self-assessment pathway | Open University library
Self-assessment test from the Cabinet Office - mainly aimed at civil servants
Test your digital skills for employability | Skillage EU

Information and media literacy
A New Curriculum for Information Literacy (ANCIL) | CILIP
7 pillars of information literacy: core model and associated resources | SCONUL
Media and Information Literacy curriculum | UNESCO
Digital and information literacy | Library Services | Open University
Hague Declaration on Knowledge Discovery in the Digital Age
What do people look for when they search online for learning resources?
Evaluating web sites and other key online literacies | Northampton University: Liberation
MIL as Composite Concept | United Nations Educational, Scientific and Cultural Organization
Proving the value of digital and information literacy in higher education | Project DELILA
The role of research supervisors in information literacy | Research Information Network
digit
A Manifesto for Media Education | Media Education and Digital Competence
Resources from Mediasmarts | Canada's centre for digital and media literacy

Data literacy
Data literacy and skills development vital to UK economic health | Jisc Nesta UUK
Resources on Research Data Management | Jisc
Scientific visualization across disciplines | MIT Open Courseware
Twenty Questions for Research Data Management | Data management planning project
Today's data, tomorrow's discoveries | National Science Foundation (US)
Big Data Analytics: assessment of demand for labour and skills | eSkills UK

Open practices
STELLAR European research network of excellence in technology enhanced learning | Open Research Online
The Open Scholar | Academic Evolution
The Digital Scholar: How Technology is Transforming Scholarly Practice | Martin Weller/Bloomsbury Open
Innovation and scholarship

Results from the Researcher Development Framework | Research Skills Toolkit
Getting every researcher digital | iSGTW
23 Things for Research | University of Oxford
Digital literacy for researchers | Jisc design studio
Tooling Up for Digital Humanities | Stanford University
MaKey MaKey: An Invention Kit for Everyone (Official Site)
Digital Transformations blog: exploring community-powered creativity
RDF resources — Vitae Website

Communication, collaboration and networking

Social media use in academic contexts | Jisc Design Studio
Using digital innovation to enhance university marketing and communications | Universities UK
Digital Evolution: Social Media's Growing Impact on Youth Political Engagement | Connected Learning
Digital writing: Digital teaching blog | hickstro.org

Employability

eSkills for Jobs 2015 | The European Commission
Developing digital literacies for employability | Jisc design studio
Technology for employability | Jisc
Job profiles | National Careers Service
Report on transferability of Information Literacies beyond academia | Research Information Network
Learning from Futuretrack: The Impact of Work Experiences on HE Student Outcomes
Digital Literacy can boost employability and enhance the student experience | Guardian
Learning in a digital age

Learning for a digital age | University Library of Leeds
Connectivism: A learning theory for a digital age | George Siemens
Recommended Resources: Digital Citizenship, New Media Literacies, Games and Learning | DMLcentral
The New Digital Learning Age | RSA
Digital Literacies in the Curriculum | Jisc Design Studio
Study of Undergraduate Students and Information Technology, 2014 | ECAR (US)
A Bill of Rights and Principles for Learning in a Digital Age | Hybrid Pedagogy

Digital identity and wellbeing

My Digital Footprint
National Well-being Measures, September 2014 | ONS
iRights: statement on the five rights of young people in a digital age
Coming of Digital Age Motion (2015) | NUS
Next Steps for Digital Inclusion | Niace
The Digital Revolution Remains Unevenly Distributed | University of Oxford/Reuters Digital News
Digital Natives as Self-Actualizing Citizens | Rebooting the System
France bans managers from contacting workers outside business hours [in line with other European employment legislation] | Neil McAlistair: The Register
Exploiting emerging technologies to enable quality of life | George Siemens
Social networking with our students: digital identity, privacy and authenticity | Catherine Cronin
Twitter’s Safety Centre
Symposium on Life Transitions supported by digital technology | Lancaster