Association of Colleges
Promoting. Representing. Supporting.

Association for Learning Technology

# A summary discussion of the use of learning technologies in further education: AoC/ALT position paper

September 2014

## Association of Colleges

### Introduction

The Association of Colleges (AoC) represents and promotes the interests of colleges. We are a not for profit organisation created by colleges for colleges.

We:

- Represent colleges nationally;
- Provide advice to members on critical areas;
- Support organisational needs of colleges and partners.

### About Colleges

FE and sixth form colleges are institutions that provide academic and vocational qualifications and skills to anyone.

Colleges provide a rich mix of academic and vocational education. They offer a wide variety of courses and opportunities for anyone, from young to old, to help them achieve their goals. These may include:

- A Levels
- Apprenticeships and Higher Apprenticeships
- Foundation degrees
- Vocational qualifications at all levels
- Community Learning
- Undergraduate and postgraduate level degrees.

Key Facts:

- Every year colleges educate and train three million people.
- 846,000 16 to 18-year-olds choose to study in colleges – almost twice as many as school sixth forms. This includes 185,000 young people taking A Levels
- 154,000 students study higher education in a college
- Colleges run 1,300 businesses open to the public, including hair and beauty salons, restaurants and nurseries
- Colleges are major employers with 139,000 full-time equivalent staff members

## Association for Learning Technology

The Association for Learning Technology (ALT) is the UK's leading membership organisation in the learning technology field and represents over 1300+ members, both individuals and organisations such as universities, colleges and schools.

Our purpose is to ensure that use of learning technology is effective and efficient, informed by research and practice, and grounded in an understanding of the underlying technologies, their capabilities and the situations into which they are placed.

We do this by improving practice, promoting research, and influencing policy.

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Dr Ian Chowcat has over twenty years experience in online learning. For many years he was an Associate Lecturer for the Open University, teaching courses, mainly online, at both undergraduate and post-graduate levels, as well as leading training and development for OU tutors in online teaching. He worked as an e-learning facilitator for Ufi/learndirect and the National College for School Leadership, and from 2005 to 2008 was Director of the South Yorkshire e-Learning Programme, then the largest regional e-learning programme in the EU. Since 2008 he has been Head of Learning Innovation for Sero Consulting Ltd working on many assignments for Becta, Jisc, and local and regional authorities, covering e-learning, digital inclusion and digital information projects, as well as project managing the establishment of Sheffield's University Technical College specialising in engineering and creative and digital media.

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Matt Dean has worked as a lecturer and teacher of History in Higher Education and has extensive experience in the project management of technology and education projects for the public and private sectors. He has worked for a technology start up, for a large software house supplying products to the financial sector and for a web publishing company. Prior to joining AoC, he was part of the London Borough of Tower Hamlets Building Schools for the Future team with responsibility for the IT work stream, having previously worked on large scale IT projects within the borough's Children's Services Directorate. As AoC Technology Policy Manager, his role is to help to develop and articulate the strategic policies developed by the AoC with regard to the role of technology as it applies to all aspects of college activity including: learning and teaching, data management and college business processes. More generally, he is interested in the impact of technology on pedagogical policy and practice.

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Professor John Slater acts as Development Advisor for the Association for Learning Technology. John's professional career involved specifying and procuring hardware and software systems across a wide range of environments including those relating to e-learning and learning technology; he also had several years of experience at PVC level. As an ex JISC and subcommittee member, and the initial joint head of the MAU and TAU, he has experience of monitoring and evaluation. He was responsible for the definition and delivery of national shared software procurement services. Working with HEFCE and HERO he was responsible for devising and piloting the National Student Survey and the provision of public information on teaching quality.

**Professor John Traxler**
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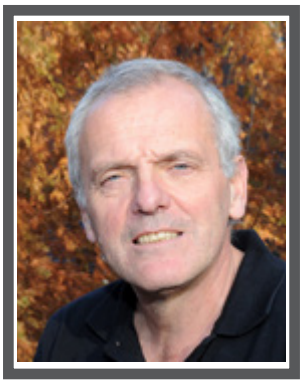

John Traxler is Professor of Mobile Learning, at the University of Wolverhampton. He is a Founding Director and current Vice-President of the International Association for Mobile Learning and Executive Committee Member of the USAID mEducation Alliance, as well as Associate Editor of the International Journal of Mobile and Blended Learning and of Interactive Learning Environments. He is on the Editorial Advisory Board of Progressio, South African Journal for Open and Distance Learning Practice, the Editorial Boards of Research in Learning Technology and IT in International Development. He is co-editor of the definitive book, Mobile Learning: A Handbook for Educators and Trainers, with Professor Agnes Kukulska-Hulme.

# Foreword

The context within which we think about how technology is used in education is important. New technologies emerge, evolve and become embedded (or not) with increasing speed and in qualitatively different ways than many of us are able to fully comprehend. The pace and scope of change raises questions about how colleges identify, prioritise and implement digital technologies in ways that will improve the experience of, and outcomes for, students. It is no longer desirable, or useful, to think of technologies as discrete tools which are somehow located 'outside' of the social, economic and political environments in which they develop. It is this argument that provides the central theme of the following AoC/ALT position paper.

All of the contributors to this paper recognise that, while specific technologies are important, the debate on how best to deploy technology is reliant upon an understanding of context. Of course, this has always been the case: technologies do not simply appear out of 'nowhere' and become adopted by people who separate the technology from the society in which they live. The relationship between technology and society is complex and understanding, and explicating, that relationship is beyond the scope of this paper. It is the aim of this paper, however, to describe how the debate over the use of technology in education might best be framed.

It is argued throughout this paper that while the long view of the relationship between technology and society is important, there are specificities about the ways in which digital technologies develop which are particular to those technologies and this informs the ways in which individuals, governments and colleges react to them. The speed of adoption, uneven proliferation and the ways in which digital technologies lend themselves to use not envisaged by the creators of those technologies are significant points to consider when thinking about how we use technology to teach. The development and use of digital technologies is often not coherent or linear.

The ability of educators to identify and make best use of a device or an application is dependent on its perceived usefulness, the expectations of teachers and students, on the political policy agenda and on the economy. Colleges, as with any large organisations, are confronted with the challenges of responding to the policy agenda, the requirements of the broader economy, financial constraints, the expertise of teachers and the ways in which students expect to learn. In turn, these considerations raise issues associated with project and change management, procurement and sustainability. This complexity, and the multiplicity of factors to take into account, poses very real challenges for college management teams and teachers.

The intention of this paper is to elaborate upon the challenges, and opportunities, raised by the debate on technology and education. It does so by bringing together current research and discussion in four areas: current use of learning technologies, debate over the efficacy

of online and blended learning, summary of academic discourse on digital technologies and pedagogical practice and government policy on technology in learning since 2010. The aim of the paper is to provide a useful synopsis of current research and debate in order to provide a coherent basis on which to understand the issues and move the debate forward.

# Introduction: purpose and scope

In 2010, the publication *Technology in Learning* (ALT, 2010) examined the UK evidence base for the intelligent use of learning technology. Four years on, much has happened to broaden the use of technology in learning, teaching and assessment across sectors – examining what works and what doesn't and the impact of innovation on learning outcomes remains relevant. Accordingly, this publication draws on evidence from all sectors and also recognises that the social context within which formal education occurs is perhaps more important than any specific institutional or sectoral context.

The 2010 publication was itself a response to a broad set of questions on Technology Enhanced Learning (TEL) posed to ALT by the Department of Business, Innovation and Skills (BIS). The questions probed established and emerging learning technologies in relation to their effectiveness and efficacy. In this publication there is a greater learner focus but a continued emphasis on cost effectiveness, though here too, the increasing impact of the wider social context makes this harder to define precisely. This position paper looks at evidence from research literature, and other sources, published from roughly August 2010 onwards and seeks to complement and update the earlier publication rather than replace it completely. It also analyses recent UK governmental policies and strategies. However, much of the earlier observations, sources and analysis remain true, accurate and relevant.
We should note that there have been other relevant general overview publications in the intervening time, which have been used in the compilation of the current publication, including:

- *Scaling up: Achieving a breakthrough in adult learning with technology* (Ufi Charitable Trust, 2012)
- *Paths forward to a digital future for Further Education and Skills* (FELTAG, 2013)
- *AoC Learning Technology Survey Report* 2012 (AoC, 2012)
- *Higher Education in a Web 2.0 World* (Jisc, 2009)
- *Collaborate to compete*, a Report to HEFCE by the Online Learning Task Force (OLTF) (HEFCE OLTF, 2011)
- UCISA TEL *surveys and case studies* (UCISA, 2014)
- *A literature review of the use of Web 2.0 tools in Higher Education* (HEA, Conole and Alevizou, 2010)
- *A Critical Review and Analysis of the Issue of "Skills, Technology and Learning"* (Jenson *et al*, 2011)
- *Horizon Report > 2014 Higher Education Edition* (and its annual predecessors), New Media Consortium (Johnson *et al*, 2014)

The current position paper is not a formal 'systematic' review in the sense defined by the EPPI-Centre and draws on secondary and 'grey' literature as well as peer-reviewed sources. Evidence from the UK and the US is included in this paper, particularly meta-analyses and reviews. In the UK, the emphasis on e-learning research has generally been weighted towards

evaluation in specific contexts rather than comparative studies and, because of the complexity of the situations in which e-learning interventions are made, claims for generic benefits can often be contentious at all levels, whether they concern policy or practice. It is important to state therefore that the methodology used in this paper supports its purpose as a position paper, i.e. the statement of expert analysis, rather than as primary research. This caveat is necessary because the evidence base used in the paper is subject to interpretation and discussion.

The timing of this paper is important. Not only has there been continued steady change in learning technology since the earlier publication but there has also been an increasingly obvious transformation in the relationships between education, digital technologies and the wider world.

Whilst many of the institutions of education, especially in Higher Education (HE) in much of Europe, seem to be in a state of relative retrenchment and apparent stagnation in educational technology, the world outside the institutions is undergoing profound changes in terms of the distribution, composition and application of personal, social and domestic digital technologies. These changes do not merely reproduce the demographics of earlier generations of digital technology; they are significantly different and much more pervasive and ubiquitous. The changes in the people and organisations involved (the actors) also affect government and agency responses. New actors involved include social network providers; MOOC and other course providers; OER resource providers; tablet, smartphone and other device manufacturers; as well as the traditional large players such as telephone network service providers, Apple, Microsoft and Google.

The changes are transforming the economy, not only the balance of assets, transactions, commodities, employment and organisations, but also the nature of work and the workplace. They are transforming creative, expressive and cultural activities and artifacts too, as well as forms of political expression.

All these factors constitute the wider environment within which learning technologies are deployed, and account for many of the initiatives, such as the digital literacy agenda, that are discussed in this paper.

# 1 Current use of learning technologies and trends in practice

## 1.1 Introduction

The most obvious change to note since the publication of the 2010 study is not so much in the uses of learning technology *per se* but in the uses of other, previously non-educational, technologies for learning. By this we mean that many of the observed trends of learning technology, and specifically trends within the institutions of education, have progressed in a slow but linear and rational fashion. The larger changes have been the continued appropriation of social and personal technologies for education by the institutions of education as well as the use of these technologies by the public to pursue informal, self-directed or opportunistic learning, perhaps with user-generated content. Examples include retail smartphone apps or communities in social network sites.

The focus here is not so much on the technology itself, be it innovative, emerging or established, but on the issues, pedagogy and curriculum around that technology, whether it be a dedicated learning technology or an appropriated commercial or personal technology.

## 1.2 Established learning technologies

We can make an informal distinction between observations about those learning technologies that are established and those that are currently emerging. The technologies that are established and stable include, for example:

- Virtual learning Environment (VLE)/Learning Management System (LMS)
- e-portfolio
- messaging
- plagiarism detection

None have developed, evolved or grown much since the earlier publication. Innovation and change has happened only at the margin. There have, however, been some changes in these institutional systems, often adding various web 2.0 functions, and some shifting amongst various models and brands, possibly migrating to cloud services, open source systems or shared services.

Currently, there seems to be considerable uncertainty within central IT support departments about responses to technology developments from outside educational institutions. Traditionally, pure technical developments have been sufficiently new to be co-opted into the institutions but this is impossible with, for example, mobile technology or social network technology as the student is already a major user with established patterns of use long before entering the institution. (See, for instance, (GSMA, 2012).

In previous generations, those technologies being exploited for their capacity to support institutional business processes, such as the institutional VLE giving access to institutional intellectual property (IP) and expertise and support, and plagiarism detection systems, guaranteeing the integrity of qualifications, and those technologies that are about discussion, collaborating and other aspects of learning and teaching, were synonymous with or at least part of a larger closed system. The current developments challenge these earlier assumptions.

Data here are available from UCISA who annually survey provision and activity across their members in the IT support departments of universities and colleges (UCISA, 2012a).

## 1.3 Emerging learning technologies

In this section we consider:

- Tablets, especially iPads
- e-book readers
- Programming, specifically Arduino and Raspberry Pi
- Flipped classroom
- Personal Learning Environments (PLEs)
- Massive Open Online Courses (MOOCs)
- Virtual schools
- Digital literacy
- Green ICT
- Learning analytics

This list is not exhaustive or comprehensive but represents a consensus amongst the researcher and practitioner community of the most important trends. They are not always specific discrete technologies: sometimes they are pedagogies and techniques appropriated, adopted and adapted for learning. It is challenging to document and evaluate each of these technologies in isolation, especially those mainly in the public and social domain rather than the institutional domain, because of their complex and fluid inter-relationships, the speed with which they are adopted and adapted, and difficulties in obtaining representative and authentic evidence.

The Horizon Report 2014 Higher Education Edition (Johnson *et al*, 2014), an annual US horizon scanning report with some UK input, corroborates many of these choices, canvassing 850 international experts and identifying:

- *Fast trends: driving changes in higher education over the next one to two years*
  - *Growing ubiquity of social media*
  - *Integration of online, hybrid, and collaborative learning*
- *Mid-range trends: Driving changes in higher education within three to five years*
  - *Rise of data-driven learning and assessment*
  - *Shift from students as consumers to students as creators*
- *Long-range trends: Driving changes in higher education in five or more years*
  - *Agile approaches to change*
  - *Evolution of online learning*

Alongside:

*Significant challenges impeding higher education technology adoption*

- *Solvable challenges: Those that we understand and know how to solve*
  - *Low digital fluency of faculty*

    - *Relative lack of rewards for teaching*
- *Difficult challenges: Those we understand but for which solutions are elusive*
    - *Competition from new models of education*
    - *Scaling teaching innovations*
- *Wicked challenges: Those that are complex to even define, much less address*
    - *Expanding access*
    - *Keeping education relevant*

Leading to:

*Important developments in educational technology for higher education*

- *Time-to-adoption horizon: one year or less*
    - *Flipped classroom*
    - *Learning analytics*
- *Time-to-adoption horizon: two to three years*
    - *3D printing*
    - *Games and gamification*
- *Time-to-adoption horizon: four to five years*
    - *Quantified self*
    - *Virtual assistants*

This 2014 prognosis is broadly similar to those of previous years but has to be seen in the context of US culture, institutions and resources. The authority of the publishers, the New Media Consortium, may make the prognosis somewhat self-fulfilling and some reviewers contest the choices and the underlying values. Some of the predictions, such as 3D printing, concern discrete technologies, whilst others are more complex compounds of social, pedagogic, economic and institutional forces; for example, the shift from students as consumers to students as creators. Others are somewhere in-between, making a difference to their likelihood and their manifestation in a UK context.

## 1.4 Tablets

In some respects any discussion of the current role of tablets in learning and teaching is actually a discussion about iPads. Recent journal output, pilot projects and conference activity underline both the current popularity of tablets and of iPads in particular as the tablet of choice (see, for example, UCISA, 2012b; Souleles & Pillar, 2014; mlearn, 2014).

These now embrace most of the curriculum used, such as in  interactive lectures, field trips and wet labs. The literature and presentations are usually reporting pilots, fixed-term projects and small-scale interventions and are often imaginative, innovative and worthwhile, exploiting an excellent technology for enriched pedagogy. This phase may pass (as have earlier ones for devices such as the PC). The champions of tablets must certainly address the usual challenges of embedding, mainstreaming and sustaining their innovation; champions of the iPad in particular must also argue convincingly about lock-in to the iTunes business model and the closed Apple technology eco-system. The iPad hovers uneasily at the boundaries of the bring-your-own-device debate; it is proprietary and expensive but popular and highly effective, possibly occupying subsidised niches in the curriculum but possibly unsuitable for institution-wide procurement and deployment.

One Australian university has, however, taken the decision to invest in iPads for all undergraduates, a decision costing about 25m AUD, the price of a substantial education building in the UK (University of Western Sydney, 2014). This was a bold decision as most of the available data on iPad use in institutions is provided by small-scale pilots. It is a leap of faith to move from localised, enthusiast-led projects to major deployment across an

institution as there is no obvious data available supporting scalability. However, it indicates strong confidence at a senior level in the direction that the learning and teaching require.

In the schools sector, a London Knowledge Lab report (Clark & Luckin, 2013 p.2) observes that, "In the three years since the iPad was first introduced, there has been a rapid uptake of iPads and other 'post-PC' tablet devices in schools both in the UK and globally." In this context it critically evaluates available activities, reports and observations and the level of technology and pedagogy is enthusiastic, viewing the possible developments as both necessary and exciting but nevertheless concerned about the need for imagination, resources and commitment.

## 1.5 eBook readers

Although a minor and discrete technology, e-books and e-book readers are increasingly a pervasive part of people's lives. Institutional libraries and course tutors are beginning to make the necessary adjustments in procuring and providing these resources, alongside the continued transition of journals to an online format, whilst some teachers and lecturers are experimenting with self-taught e-book authoring and publishing. The format is particularly attractive to institutions with a distance learning and online learning portfolio and there have been several exploratory projects (McKellar and Warburton, 2013; Kissinger, 2011) identifying both practicality and increased efficacy, especially with more interactive and rich-media formats. They represent another possible variant on the bring-your-own-device scenario.

## 1.6 Arduino, Raspberry Pi and programming

'Programme or be programmed' is the recent rhetoric arguing for the education system to shift the curriculum balance away from generalised use and consumption of IT applications to the design and construction of IT systems, specifically to computer programming (Grover and Pea, 2013). This is part of the wider STEM agenda and an attempt to preserve, rebuild or enhance the UK software capability (Siiman *et al*, 2014). The development of several highly affordable single-board computers, such as Raspberry Pi and Arduino, running standard operating systems and language compilers, often open source (Shrestha *et al*, 2011), and capable of interfacing easily with motors and sensors, suddenly makes this eminently practical and allows schools and colleges, at practically every level, to engage in authentic software tasks and projects. To those with longer memories, this might look like LOGO and DESMOND (the Open University's Digital Electronics System Made Of Nifty Devices) revisited, but the economics and designs are significantly more attractive across all sectors.

## 1.7 Flipped classroom

"Flipping the classroom" is a popular term and a pedagogical strategy that replaces the standard lecture-in-class format with opportunities for students to review, discuss, and investigate course content with the teacher or lecturer in class. The underlying premise is that students review lecture materials outside the classroom and then come to class prepared to participate in learning activities guided by the lecturer or teacher. Whatever the specific context, 'flipping the classroom' relies heavily on technology, both popular technology and learning technology (Hughes, 2013; Arshad & Imran, 2013; Hoffman 2014; Bishop & Verleger 2013). The flipped classroom concept attracted considerable professional attention around 2012. Now research continues and may continue to inform subsequent developments. It represents an easy and coherent concept around which to attempt to optimise the value of

personal contact between learners and teachers.

## 1.8 Personal learning environments

Personal Learning Environments might be viewed as a concept related to the use of technology for learning that focuses on the appropriation of tools and resources by the learner. The term PLE may have been consciously coined as an antidote to the VLE in order to emphasise the centrality of the learner. The PLE concept has proved fairly elastic, encompassing the individualistic and ad hoc use of whatever technology suits the learner's whim, preferences and affordance; and a more learner-centred suit of technologies (Buchem *et al*, 2011). In the current context, the PLE may be a useful concept for refocusing institutional attitudes and provision onto the learner.

## 1.9 MOOCs

MOOCs are now an established global educational phenomenon. A MOOC is a "course where the participants are distributed and course materials are dispersed across the web. This is possible only if the course is open, and works significantly better if the course is taken by a large cohort. The course is not a gathering, but rather a way of connecting distributed instructors and learners across a common topic or field of discourse" (Wikipedia, 2014) and is another example of 'open' scholarship. The Wikipedia entry outlines the history and size of previous MOOCs, some running into tens of thousands of students, their relationships to formal courses and formal institutions and their espoused pedagogy. The Wikipedia quote does however ignore the subsequent growth and diversity of MOOCs, and indeed the controversy around MOOCs including those with a specifically UK focus. The recent *Maturing of the MOOC* report from BIS gives a balanced official account and extensive bibliography (BIS, 2013).

The controversies usually focus on the sense that the early innovative and open pedagogy was over-written by more conservative, corporate and commercial considerations. The development of proprietary platforms, FutureLearn in the case of the UK, and the high drop-out rates give an increasing sense that MOOCs currently do not address well either the missions of smaller institutions or the needs of less sophisticated learners.

Diana Laurillard (THE, 2014a) critically examines some of the underlying mythology of MOOCs, saying, *"Free online courses that require no prior qualifications or fee are a wonderful idea but are not viable."* A recent press article (THE, 2014b) reinforces concerns about the tendency for MOOCs to scale up bad teaching. It reports work by Allison Littlejohn, director of the Caledonian Academy, saying *"Students taking massive open online courses (MOOCs) end up learning in a "passive" way and fail to use their new knowledge in their jobs".* More research will no doubt follow but it may have little impact in the short term on corporate and institutional ambitions and momentum.

## 1.10 Virtual schools

A little-known development, a consequence of the home-schooling movement, is the virtual school (Bacsich *et al*, 2013). Virtual schools and colleges are an increasingly important alternative for students and are becoming more and more prevalent all over the world. It would be worth exploring their contribution to the development of more diverse and resilient online learning.

## 1.11 Digital literacy

Digital literacy can be defined in terms "those capabilities which fit an individual for living, learning and working in a digital society" (Beetham, 2010:1). A more pragmatic definition outlines the constituent capabilities of digital literacy:

- "they are a pre-requisite or foundation for other capabilities;
- they are critical to an individual's life chances;
- they are essential to the making and sharing of culturally significant meanings;
- as a result, there is or should be a society-wide entitlement to these capabilities at some level."

(Beetham, 2010:1)

Digital literacy has emerged as a major theme and features in the Jisc programme (Jisc, 2013a) that started in 2011. Definitions and interpretations embrace part of the employability agenda, part of the inclusion agenda and the earlier IT skills agenda, as well as social, personal, political, cultural and more critical aspects. Pilots, tools, workshops and resources are gradually demonstrating how digital literacy can be operationalised and embedded in the curriculum, such as the continually improving and evolving JISC Design Studio (Jisc, 2014a).

Comparable work is happening in schools at a local level. The DigiLit Leicester project (Hall *et al*, 2014) demonstrates thata "shared development framework constitutes a new model for implementing digital literacy aimed at transforming the provision of secondary education across a city." Leicester may, however, be some way ahead of the field in this work.

## 1.12 Green ICT

There is a growing awareness of the ecological dimension to both popular and educational ICT. The recent Science Museum Dead Ringer exhibition, for instance, drew attention to the environmental impact of discarded mobile phones. This was a valuable educational resource although it illuminated only one aspect of the problem. Jisc have supported a portfolio of over 40 projects (Jisc, 2013b; Jisc, 2010) and have linked this portfolio to other parts of their remit, such as cloud computing (Berl et al, 2010, McDonald *et al*, 2010). It embraces FE and HE. Meanwhile there are also implications at a broader global and systemic level (Cramer, 2012). The debate over Green ICT is important because it informs the broader discussion of cost savings, return on investment and on meeting the changing expectations of students and staff.

## 1.13 Learning analytics

The amount of data being collected on the behaviour of learners and their contexts including assessment, timing and activity has grown considerably since 2010. The related alternative term "Educational Data Mining" joins the activity with conventional data mining – such as looking for patterns and behaviours to identify students most at risk of dropping out. It is viewed as part of the "big data" movement where "academic business intelligence" is gathered from institutional data, collected by a variety of systems including Virtual Learning Environments, Management Information Systems and Course Management Systems (CETIS, 2012/3).

# 2 Debate over efficacy of online and blended learning

## 2.1 The changing role of evidence, the changing nature of efficacy

The earlier publication looked more at cost effectiveness than at efficacy. One measure of cost effectiveness is that adopted within the private sector and in training situations. Thus, where cost is a driver for both learner and supplier, meaning both learner and supplier want to reduce costs, the hypothesis of supporting learning with technology is viewed as a "no brainer". Evidence that this is likely appeared in the report of the OLTF (HEFCE, 2011 p. 2) which concluded that "online learning – however blended with on- or off-campus interactions, whether delivered in the UK or overseas – provides real opportunity for UK institutions to develop responsive, engaging and interactive provision which, if offered at scale, can deliver quality and cost-effectiveness while meeting student demands for flexible learning." This hints at both efficiency and efficacy. It did, however, highlight the need for investment, collaboration, better intelligence and structural change as part of a complex mix in which efficacy is only one possible outcome, one that might be traded off against efficiency.

When considering any evidence of benefits, a distinction has to be made between learner performance, other kinds of enhancements to the learning experience, and benefits that are not directly felt by learners e.g. organisational efficiencies. They are not independent but there are clearly possibilities for trading off between them.

Evidence of benefits to learners, including enhanced efficacy, is widely available with respect to specific technologies in specific contexts and knowledge domains: few innovations have been introduced into the mainstream of learning and teaching without such evidence. In some cases the relevant work has been undertaken by the developers themselves and the evaluation of technology enhanced learning can often be flawed, challenging and problematic (Higgins, 2012).

Much research funding prefers small-scale fixed-term studies with subsidised technology and many studies are conducted in situations where novelty value, researcher attention, teacher enthusiasm and special funding may all have a role to play in the enhanced performance or in the experience of learners and so a significant placebo or Hawthorne effect can be present for which a correction is rarely made.

Furthermore, research typically doesn't address the problem of building an ecology of learning, and does not take the integration of the innovation or the management of change into account as a research issue. Once integrated into the mainstream the enhancements associated with specific technologies can often diminish or disappear. A further confounding factor is the enveloping social change, apparent in the increasingly widespread ownership, familiarity and experience of powerful technologies, that surrounds these ecologies of learning and makes clear causal relations unlikely.

Although new technologies still continue to receive research attention as things in themselves, perhaps still conceived and funded as 'innovations', there is a growing trend in our education systems to assume a technology-rich environment for learning, and to investigate the impact of particular pedagogical approaches or learning strategies within that context. As "new" networked and mobile technologies become ubiquitous aspects of learners' personal experiences, it becomes both less useful and less valid to ask questions about whether or not a given technology is effective or efficacious in the classroom. Research has consistently demonstrated that learners will use technology to support their learning regardless of the specific requirements of the task and tutor, and that the ways in which they use technology are becoming an aspect of personal learning style (Jisc, 2014b).

It is increasingly more useful and important to ask whether the education systems in question adequately mirror their host societies, societies where technology is ubiquitous and pervasive, taken for granted and not worth mentioning in the lives of learners before, after and outside their contact with education systems. Thus, while emergent technologies such as virtual immersive worlds continue to be studied in terms of their specific performance and experiential impacts, established technologies such as podcasts are difficult to study in these terms: learners may, or may not, choose to access podcasts to support their learning depending on a range of factors that have nothing to do with their immediate classroom experience. Podcasts are, in fact, a very good example of the change in the locus of educational activity, shifting content creation from colleges, agencies, publishers and universities to users learning from each other, mediated only by iTunes or some similar service.

The UCISA survey (UCISA, 2012 p. 3) observes:

> *"The 2012 TEL Survey revealed that dedicated TEL strategies were becoming less common across the sector, with current practice directed towards embedding TEL concerns within overarching Learning, Teaching and Assessment strategies. The case study findings reinforce this view. Of the institutions that we interviewed, some had never developed a separate TEL strategy and those that did are now debating whether this should remain separate."*

This may corroborate the notion that 'technology enhancement' is no longer a separate and separable element of learning and teaching. It may also deprive TEL of access to dedicated developmental funding. Instead, there is a distinct possibility that as the technologies in question become overwhelming lifestyle phenomena rather than specialist educational ones, strategies and policies for learning with technology will become obvious common sense, to managers, policy-makers and other stakeholders, needing no further researcher input, only procurement and deployment.

There is always the risk, in using the 'technology enhanced' vocabulary, of assuming that nothing fundamental is changed, it has only been 'enhanced', that technology is merely added on or added into the *status quo ante*. The case is clearly easy to overstate or to oversimplify but technology now increasingly facilitates individuals and groups in creating, choosing, sharing, changing and discussing ideas, information, images and opinions. This characterisation must at some level resonate with that of conceptions of learning but a very changed version of it, one not adequately or systemically recognised within many education systems.

At a much more technical level, this is accompanied by changes and transformation in genres as the postcard, the letter, the snapshot, the photo album and the essay compete with the selfie, the blog, the text and the Instagram as forms of expression, and language mutates accordingly.

In the UK, there was a period when significant government funding went into acquiring evidence of eLearning impacts. This has been through Jisc, the Research Councils, The Higher Education Academy (HEA), Becta, the funding bodies and others. For example, Jisc, on behalf of the FE and HE funding bodies, has supported an on-going programme of pilots and development projects, all of which have been evaluated and the results consistently archived, if not archived consistently. The TEL programme, funded by EPSRC and ESRC, contributed substantially as did Becta and LSDA/LSN funded work in the FE sector. The HE Academy Evidence Net project collated evidence on behalf of interested practitioners and scholars.

ALT continues to review the evidence from a practitioner point of view but more importantly provides a forum for the critical discussion of evidence. This continues to be a vital activity as the increasingly contextual nature of research findings necessitates critical discussion if issues of scale, sustainability and transfer are to be addressed with any safety or rigour. There is thus a very large body of knowledge that should constitute a UK evidence base. The increasing rapidity of technical change makes this a very perishable asset, in need of constant replenishment, and the rapidity with which technical change is commercialised and appropriated, makes this an increasingly complex challenge. Thus the role of evidence in discussions of efficacy is problematic but perhaps irrelevant if education systems are to mirror society. By this it is meant that emphasis on 'evidence-based research' to support the adoption, or not, of particular technologies may be becoming irrelevant because of the ways in those technologies are becoming embedded in wider society.

## 2.2 Efficacy and performance enhancement and the wider context

Performance enhancement is clearly one relatively 'hard' component of efficacy (and perhaps efficiency) while others may be more subtle, social and subjective. The 'softer' components will always be harder to measure or generalise. The EduServ-funded *Reveel Final Report: How compelling is the evidence for the effectiveness of e-Learning in the post-16 sector?* (du Boulay, 2008: 118-120) summarises an extensive review of research studies, and consultations with expert researchers, thus:

> *'Key factors in e-learning were identified as being learner confidence, prior knowledge (both operational and conceptual), the presence and involvement of the teacher, communication (the dialogues between teachers and learners) and the cultural issues relating to managing change. This range of categories in itself identifies the complexity of the field under review.'*

It concludes that: *'learning in technology-rich environments... occurs in multiple contexts both within and beyond the institution. ... Institutions however need to move away from the use of simple KPI outcome measures and begin to focus on quality improvement.'* This is an important observation since one of the key characteristics of popular personal technologies is their capacity to cross contexts (widely exploited in learning with mobile technologies). The more education systems exploit this capacity, the less appropriate are the simple KPI outcome measures.

Becta's *Understanding the Impact of Technology: Learner and School Level Factors* (Under wood

*et al*, 2010) built on almost 10 years of 'impact' studies at primary and secondary school level. A school-based study, the report is significant in two respects. First, it confirms the shift of emphasis over those ten years, away from researching the impact of specific technologies towards researching the impact of learners' overall engagement with ICT as an aspect of their learning experience. Second, it reiterates that use of ICT is becoming highly differentiated and personalised, with disparities between learners – even those in the same class and (apparently) experiencing the 'same' in-school ICT environment.

Findings included that: *learners' investment in their own learning is critical to academic success but this is enhanced by schools exhibiting maturity on arrange of measures including "e-maturity"; effective learners responded positively to personalised challenges presented by teachers [but in general] personalisation, if only perceived as learner autonomy, was a consistently negative predictor of performance... most pupils thrived when their learning took place in an educational environment that set a clear framework for their learning; more mature schools, providing a more personalised learning experience supported by embedded and used technology, achieved above average learning outcomes; embedding technology was swift when it matched pedagogies (e.g. interactive whiteboards), but slow if not (e.g. learning platforms).*

ALT and Jiscinfonet's Jisc-funded CAMEL Tangible Benefits of e-Learning Project found that where e-learning projects provided figures for student achievement, they were recording improvements of around 10% in pass rates as a result of e-learning implementations. A briefing paper written by ALT, JiscinfoNet, and the HEA gives access to a range of further findings arising from funding body activities.

Online learning has some clear advantages over face-to-face instruction when it comes to teaching and learning, according to a key meta-analysis released by the U.S. Department of Education in 2009 (U.S. Department of Education, 2009)

> *"The study found that students who took all or part of their instruction online performed better, on average, than those taking the same course through face-to-face instruction. Further, those who took "blended" courses — those that combine elements of online learning and face-to-face instruction — appeared to do best of all. The Education Department examined all kinds of instruction, and found that the number of valid analyses of elementary and secondary education was too small to have much confidence in the results. But the positive results appeared consistent (and statistically significant) for all types of higher education, undergraduate and graduate, across a range of disciplines."*
>
> (Jaschik, 2009)

This meta-analysis was based on 51 studies undertaken in the period 1996 – 2008 which met strict criteria for inclusion. It attributes most of the positive benefits to learners having more control over their learning process, and (perhaps related) taking more time to complete and reflect on tasks than in face-to-face situations.

These accounts do however raise several common issues relating to relevance. The lag before the publication of a meta-analysis after the initial individual pieces of research is significant given the rapidity of change in the domain and forces us to consider trade-offs of rigour and timeliness. Furthermore, even for research conducted within the UK, there must be concerns about context and transferability, about how we apply the findings from one context safely to another, as the contexts themselves become more fluid and permeable. The finding of the positive benefits to learners from having more control over their learning process and

increased time for learning is, however, exactly the effect of greater social and personal ownership of technologies – as long as education systems can align themselves to these changes. The practice of banning mobile phones in schools and the discussion of bring-your-own-device policies should perhaps be seen in this light.

So as already noted, evidence about learners' expectations and experiences of technology in their learning must be read against the background of extraordinary expansion in their general access to information and communication technologies. Young people are using new forms of communication which appear to include layers of meaning not accessible by 'traditional' language skills alone. In the UK, young people aged 12-15, the next generation of college students, have devices in their bedrooms, and children aged 8-11 have an average of four such devices while the 2009 ECAR survey of undergraduates in the US found 98% computer ownership including 79% owning a laptop that was less than a year old.

If nothing else, the wealth and diversity of social and domestic experience of technology drives up learners' expectation of the provision they will find within the education system, putting the older cycles of procurement and replacement under serious pressure. UCISA stated, in summarising their 2014 survey of concerns amongst their members, that *"It is not surprising, given the current economic climate, that financial issues dominate with ongoing funding and sustainable resourcing of IT the greatest concern and delivering services under severe financial constraint the second ranked issue. IT Strategy and planning and providing a quality, resilient service also ranked highly"* (USICA, 2011). Given this growing amount of funding that is required merely to stand still in providing devices for learners, it is perhaps unsurprising that may institutions are exploring a paradigm shift in favour of bring-your-own-device as a major component of institutional provision. Nevertheless, institutions are likely to provide equipment for some time – both for specialised use such as heavy duty design packages, and as a back-up for those who cannot bring their devices in for technological or other reasons.

Bring-your-own-device policies are also confusingly referred to as bring-your-own-services policies, a reference to the fact that learners will inevitably bring all the other functionality and expectations along with their hardware device itself, including social networking. (The CoSN report of 2012 - Making Progress (COSN, 2012) reviews these ideas from a college and school perspective.)

Use of social networking is approaching 100% among young undergraduates and expanding rapidly in the older cohorts. Eight out of 10 (80%) in the ECAR survey were *'very confident in their ability to search the internet effectively and efficiently'* – though as other studies show, we may need to take this confidence with some scepticism. Some anecdotal accounts show undergraduates making little or no connection between their technology uses at home, study and work and ongoing work led by Jisc is starting to reflect a diverse and complex picture of current practice (Jisc, 2014b).

Except in instances of deprivation, universities and colleges no longer enhance the learning experience simply by providing access to networked desktop computers (though anecdotally college and university students arrive with generally different expectations on this issue). This means that institutions are no longer the gate-keepers to technology or knowledge, and in the light of the ever-increasing fees burden on students (currently in England HE exceeding £9000 pa) and the ongoing competitive marketisation and globalisation, institutions must each be very clear about what it is offering and how technology can help it deliver. Furthermore, when the balance of provision shifts from institution to individual, perhaps led by the weight of resource constraints and bring-your-own-device policies, then the nature of equity and exclusion changes, especially as the technologies now by their nature blur the distinction between academic and recreational usage.

However, although *"young people demonstrate an ease and familiarity with computers, they rely on the most basic search tools and do not possess the critical and analytical skills to assess the information that they find on the web"* (Baker, 2013, p.109). Another study found that students were strongly influenced by their experience of learning with technology in school, where *"[there are] only a few embryonic signs of criticality, self-management and meta-cognitive reflection"* (Luckin, *et al*, 2009 p.87). Indeed, there is a growing body of research that is showing up some of the contradictions in the characterisation of young people as 'digital natives' and this characterisation is being challenged by 'digital visitors' and 'digital residents', as follows:

> *a visitor (one who logs on to the virtual environment, performs a specific task or acquires specific information, and then logs off)*
>
> *a resident (one who has an ongoing, developing presence online).*
>
> (Connaway et al, 2011:1)

Whilst new forms of media are clearly significant in shaping their practice, learners' engagement with digital media is complex and differentiated, and needs to be interpreted whilst taking account of the results of the OECD studies on reading competence which suggests problems with literacy performance more generally.

For example, in Finland, around 18% of 15-year-old students tend to be unable to read texts. This is in the sense of comprehension: finding information in a paragraph, interpreting the information and reflecting on or evaluating it (De Coster et al, 2011). The Jisc/HEA Committee of Inquiry into the Changing Learning Experience, in the Higher Education in a Web 2.0 World (Jisc, 2009 p.6), mentioned earlier found somewhat unsurprisingly that:

> *Present-day students are heavily influenced by school methods of delivery so that shifts in educational practice there can be expected to impact on expectations of approaches in higher education.*
>
> *Face-to-face contact with staff – the personal element in study – matters to students.*
>
> *Imagining technology used for social purposes in a study context presents conceptual difficulties to learners as well as a challenge to their notions of space.*
>
> *They need demonstration, persuasion and room to experiment in this context.*
>
> *Staff capability with ICT is a further potential problem area.*

The first point, the one about school experiences, is increasingly important – in Wolverhampton, students are graduating from the schools having been supported by the Learning2Go mobile learning programme, started in 2002, throughout their time at school. This will clearly have raised and shaped their expectations of further and higher education, as will a handful of other projects across the UK. However, this diversity or scarcity, rather than uniformity, of experiences is something that must be addressed, as must the rather differing profiles of 'traditional' post-school entrants and 'mature' entrants.

The later point, about notions of space, is also interesting and increasingly significant. Earlier and ongoing work, such as the Jisc publication Designing spaces for effective learning of 2006 (Jisc, 2006), looks at the impact and interactions of learning technology and educational

architecture, at roughly the same time as the Building Schools for the Future did something similar for schools, and the adequacy of the estate continues to be a challenge. This work continues with the report Learning, spaces and technology exploring the concept, published in 2011 (Poole et al, 2011).

The current report is, however, looking at the not wholly distinct issue of cyberspace – for example, personal space (messages), group space (social networking sites such as Facebook, LinkedIn) and publishing space (blogs and social media sites such as YouTube). To these needs we need to add formal space (VLEs such as Moodle), gamespace (in World of Warcraft for example), phonespace (Skype, IM, Twitter and text, Townsend 2000) and virtual immersive space (worlds such as SecondLife). These are increasingly important places, inhabited and signified by learners, potential learners and pretty much everyone else (Facebook's active population could exceed that of China by 2015; it has already passed India's (Petronzio, 2014.).

Education systems could perhaps reconceive their outreach missions in terms of these spaces; education systems have already seen the field-trip possibilities, though not always the full ethical implications (HEA-funded, SIG-explored 'informal ethics of popular digital technologies'). In fact, the related Jisc report says, "There is an area within the boundaries of the so-called group space that could be developed to support learning and teaching" (Jisc, 2009 p.6) and there is much learning and teaching activity already on social network sites at a grassroots level but also much uncertainty about the legal and regulatory issues.

The important corollary of the growth of online spaces, and the transient, diffuse and fragmented communities that inhabit them, is the concept of digital identity (multi-facetted as the literature shows, Birch, 2007; Lyon, 2003; Goode, 2010; Allison *et al*, 2005); online identity is an alternative term and digital footprint is a cognate term describing the trajectory, history or residue of an individual in cyberspace. This concept of digital identity, defined perhaps as those attributes, characteristics, expressions, values and experiences that would otherwise constitute an identity in the 'real' world, is not something that the formal, static, physical world of education systems is instinctively able to engage with, in its totallity.

The fact that real learners often do have multiple fluid digital identities hardly helps and there is a tendency to see the issue of digital identity in technical terms. Various topics currently infiltrating the curriculum, such as professional practice, e-safety and digital literacy, do, however, increasingly address some of the issues raised.

There are incidentally a wide variety of studies of social networking sites showing how they loosen, transform, dilute and consolidate social ties amongst individuals at various life changes, including a number that look at the move from school to college, and also consider the nature of social capital involved (see, for example, Ellison *et al*, 2007; Roblyer *et al*, 2010; Valenzuela *et al*, 2009; Sheldon, 2008).

The Higher Education in a Web 2.0 World report also makes some perhaps naïve observations about digital divides, saying:

> *The digital divide, the division between the digital 'haves' and 'have nots', has not been entirely overcome and persists in several dimensions: in access to, and engagement with, technology; the capability of the technology; and in individual competence.*

The digital divide is, in fact, multiple divides that each new technology complicates and reconfigures. They, not it, are a consequence of society not of technology and are not

merely an issue of 'have' or 'have not', but factors around access, ownership, confidence, support and agency. The complex nature and continued existence of digital divides represents a continued challenge for access and inclusion.

The findings above are supported by students responding to the 2007 Higher Education Policy Institute (HEPI) survey of undergraduate experiences. They rated smaller teaching groups over an increase in the number of teaching contact hours a week. However, they rated training for lecturers, identified as a 'challenge' in the *Horizon Report* mentioned earlier, even higher than smaller teaching groups. This suggests that it is the quality of the teacher, including their knowledge and understanding of the use of technology in learning that concerns students more than the character of the teaching occasion. In the context of other discussions, such as the idea of curating course content rather than creating it, and the policy of bring-your-own-device (and services) mentioned earlier, this suggests that a radical reconceptualisation of the teacher's role is needed in all sectors, one that relinquishes the privileged position of unconditional expertise, replacing it with one of collaboration and shared agency.

## 2.3 Evidence and efficacy from the perspective of the student, teacher and the institution

A review in the learner experience of 83 learner-centred studies from the e-learning literature was conducted for Jisc (2007). It found that only seven studies genuinely included evidence gathered from the students' perspective (as opposed to survey data). It concluded that 'there is in general a scarcity of studies of the learner experience' and that 'the overwhelming majority of e-learning research to date has focused on establishing the value of particular e-learning course designs, teaching methods or tutor interventions'. Since this review, an increasing number of learner-focused studies have been funded, and the UK ELESIG research network (founded by members of the Jisc programme with the support of the HEA) currently has 1700 members who are actively researching learners' experiences of e-learning in post-compulsory contexts.

The nature of this work, especially projects and researchers explicitly working across FE and HE sectors, gives it a new generality. The focus on learners and their experience has been broadened into a more active involvement in some more recent Jisc programmes, denoting a change in emphasis and perspective. This includes work with students acting as 'agents of change' and transforming traditional approaches by researching and co-developing innovative solutions in partnership with teaching staff. Student-led projects in a handful of institutions have focused on many aspects of learning and teaching, including technology, and placed the agency rather than just the opinions of learners at the centre.

These projects have, in part, appealed to the rhetoric of concerns about student feedback and the wider student experience in the context of the changing fees regime, but in fact also tap into a wider professional commitment to improvement.

The UK has built up a significant number of researchers who work in close collaboration with practitioners (often they are the same individuals). This means that the research workforce is focused on getting and interpreting results. This leads to workers who are realistic about what can be achieved and who, having achieved it, move on to another project. This close relationship between research and practice is a considerable strength for the UK but it also leads to a proliferation of small-scale, short-term projects.

# 3 Academic discourse on the impact of digital technologies on pedagogical practice

The UK is a major focus of research activity, both in terms of significant international centres, such as the London Knowledge Lab or the Open University Institute of Educational Technology, and of internationally recognised researchers, and is a major contributor to global thinking on online learning from Australia and New Zealand, through to India and South Africa to Canada and USA; domestic funding cuts also mean that, out of necessity, UK researchers and practitioners are strongly represented in EU research projects. The nature of funding and the nature of opportunity, as well as the impetus of curiosity, of technology change and of an evolving political agenda (for example globalisation, marketisation, and consumerisation) contribute to the shaping of the discourses about online learning. There is a growing body of innovative practitioners and these too contribute to academic discourse; they have an increasingly identifiable role, ethos and function.

This paper gives an outline of the general shape of the discourse, and of the reviews that capture its general direction, and gives references to specific, relevant projects. In addressing the impact of digital technologies on pedagogic practices we must recognise several factors at work.

1. Academic discourse filters out to pedagogic practice through various mediating agencies, practitioner conferences such as ALT-C, management priorities, comprehension and commitment, support agencies (now fewer and some such as Jisc and HEA in reduced configurations), technical support and services as represented nationally by UCISA, and understandings of research-informed policy; in fact, academic discourse seldom reaches a practitioner audience in a raw format.
2. Academic discourses will not be the only force impacting on pedagogic practice; there might be, for example, student pressure as articulated by NSS, vendor inducements, and vendor events such as BETT and the HE Expo, perceptions of risk, effort, incentive and workload (specifically in how standard contact-hours contracts skew professional judgment) and the evolving lecturer competence and role in relation to technology.
3. Academic discourse is itself the subject of some bias; academic careers thrive on success. Thus, they need to report success, as do funders. Failures may go unreported.
4. The steps from the research that provides the substance of academic discourse, to pedagogic practice at any scale are problematic; innovation and novelty do not necessarily teach much about dependable deployment, fixed-term, small-scale subsidised projects teach little about sustained sector-wide deployment and discrete research teaches little about embedding and institutionalising change.
5. There is a space between research outputs and pedagogic practice. There are various methods and formats to fill this space – the recent REF emphasis on observable 'impact', the various 'what the research says' publications, the Jisc 'synthesis' role supporting projects, the 'public understanding of science' activities in universities – but generally it is a problematic chasm. This paper and others like it exist in the contested territory between the specifics of research outputs and the needs of policy, attempting

to reconcile detail, rigour, history and context with generality, reliability and cost-effectiveness.

6. The composition of academic discourses about online learning is evolving as a result of changes within the learning technology community. In some senses as technology gets better the research focus can move to the pedagogy. It also evolves as a result of changes outside the learning technology community and outside education institutions.

Even within the formally defined bounds of e-learning, the research that informs academic discourse is difficult,

> *What makes researching e-learning so difficult is the ever-changing technology itself and the increasing access to IT resources in informal settings, changing the balance between formal and informal uses of e-learning. This rebalancing not only results in a wider diversification of IT uses by learners but also a greater variability in their IT literacies and unknown variables such as the level of control of the learning activities, and contributions from third parties online.*
>
> (Cox, 2013: 85)

It would in any case be simplistic to see this process as one in which academic discourse has an impact on pedagogic practice. Apart from the fact that most active academics research and teach, academics are constantly involved in the observation, assessment and evaluation of pedagogic practice, seeing the impact of digital technology.

Whilst these observations would all have been true several years ago, a new one is needed for a wider academic discourse growing out of the fact that the technologies of learning are no longer institutional or corporate phenomena. They are no longer specialist or dedicated; they are social and sociological. The academic discourses around learning technology require an increasingly broad and inter-disciplinary approach as well as agile and appropriate responses to technical and social change.

# 4 Government policy on technology in learning since 2010

The election of the Coalition Government in 2010 marked a decisive shift in policy towards learning technology. What has evolved since the election, following an initial distancing, has been a new relationship between government and the education technology community. At the same time, while many educators interested in learning technology continue to be interested in its potential for new pedagogical approaches, the debate at national level has tended to reinstate learning technology in the context of the need to raise educational attainment and as a contributor to building UK economic competiveness, following disappointing PISA scores.

The then Shadow Secretary of State, Michael Gove, set out his vision for education in November 2009 and highlighted the power of being able to access online learning resources from around the world. He also talked of radically shifting power from central and local government and from agencies, towards schools and parents. Once in power this meant a stepping back by central government from trying to lead the school and college systems on learning technology. This was clearly exemplified by the announcement of the closure of Becta within three weeks of the new government taking office. This meant the end of the national e-learning strategy, discontinuation of national monitoring of ICT maturity in the system, and the closure of a range of programmes aimed at stimulating the development of technology-enhanced learning and sharing knowledge. For a short while, a number of staff from Becta formed a transitional Technology Policy Unit within the Department for Education. Its head, Vanessa Pittard, formerly Director of Evidence and Evaluation for Becta and now the policy lead for STEM within DfE, summed up the change in 2012: "Whilst the department and ministers do not need to be convinced about the potential of technology to improve teaching and learning, the days of government control, intervention, ring-fenced funding and telling schools what they have to do is over." (Harrison, 2012)

Yet while this was true at the level of national policies for teaching and learning, it is not the case that all central government support for learning technology has ceased. While it withdrew from earlier attempts to play a leading role in fostering the role of learning technology in pedagogical innovation, leaving this for individual institutions to decide as part of the their overall learning and teaching strategy, it has continued to play a role in supporting technology infrastructure for schools and colleges. For example, the DfE has continued to support national procurement frameworks. Fresh advice to schools on buying ICT was published in March 2014 (Department for Education, 2014d). Included in this advice is a link to the NAACE self-review framework for ICT in schools (Naace, 2014), as an aid to planning ICT purchases. The Department continues to maintain the ICT Services Framework from which all schools and colleges can purchase both ICT equipment and services including learning platforms (virtual learning environments) (Department for Education, 2014a). The current framework has been extended to November 2014 but a follow-on framework is in hand. In addition, a complementary Information Management and Learning Services framework has been established and runs until 2016. A Memorandum of

Understanding with Microsoft, running until the end of 2015, has also been agreed by DfE. It offers discounts and enhanced licences to all UK schools on Microsoft products (Department for Education, 2014b). Issues relating specifically to technology use in schools have been subsumed into wider contexts of school practice. For example, concern with e-safety has largely been delegated to individual schools and integrated into Ofsted inspection frameworks, but the DfE website provides advice and case studies on bullying as a behaviour management issue, mentioning cyber-bullying as one facet of this issue (Department for Education, 2014e).

At the same time, and notwithstanding the overall tendency to move away from ring-fenced funding, when it comes to new schools such as free schools and University Technical Colleges, a separate capital budget for ICT is provided through the Department's Education Funding Agency (EFA), with support from dedicated ICT advisers employed by EFA to provide expert help on technology requirements that support school curriculum and administration needs and to provide guidance through the procurement process. ICT is seen as being as much a necessary part of capital investment in new schools as is establishing physical accommodation. In the case of UTCs and other developments such as Studio Schools which aim in particular to support skills needs in crucial STEM curriculum areas, additional capital funding is also provided for technical equipment which includes the ICT required not only for general teaching and learning but also the specialist ICT requirements of, for example, modern engineering equipment and manufacturing processes.

BIS, like DfE, has moved away from centralised interventions in how institutions approach teaching and learning. The 2011 Higher Education White Paper (BIS, 2011a) contained no references to it, yet the importance of FE college use of learning technology continued to feature in its policy statements. The November 2010 high-level strategy document *Skills for Sustainable Growth* (BIS, 2013) called for a college teaching workforce that made "full use of the potential of technology" within "flexible and innovative approaches to teaching and learning" (p.22) and this was echoed in the August 2011 plan for further education *New Challenges, New Chances* (BIS, 2011). The responsibility for implementing these plans falls on agencies discussed below. The 2011 plan also outlined a role for college adult learning provision in supporting the national digital inclusion efforts being championed by Martha Lane Fox, which has now evolved into the Go On UK digital skills alliance and the digitalskills.com website (currently in beta, to be fully launched September 2014).

In response to the changes in government policy since the 2010 election, the Labour Party has made a commitment to increasing the national network infrastructure and its speeds for which mandated targets are to be set. This would support many of the TEL activities described above. Labour has also argued for more local control of the ways in which technology is used in education (Labour Party, undated), but recognises that central government has a role in brokering collaboration along with the local bodies. This is necessary for introducing cost-effective TEL as local standards might conflict with subject-based standards and inhibit peer collaboration. Moreover, Labour has targets for the number of people in HE or in FE undertaking an apprenticeship, and the development of University Technical Colleges and New Studio Schools (Labour Party, 2010).

As with the developments in Coalition policy described above, the Labour Party has articulated the view that FE colleges have a crucial role in helping to ensure economic competitiveness and social mobility. In particular there are specific aims to improve the quality of education being delivered, especially in English and maths; moreover, there is a general commitment to greater integration between colleges and the world of work and business with an emphasis on staff development. All of this potentially points to more use of TEL, more student choice, more flexibility in delivery and a better prepared FE workforce.

As with any opposition party, Labour has the problem that it cannot control agencies, direct activity, and finance pilots and other activity and, in this sense, its policy is aspirational. There is an obvious recognition of the importance of technology as it is used in learning and teaching, allied to its potential to improve economic and social prosperity. More detail is likely to emerge in the manifestos in the run-up to the 2015 election.

Wide governmental support for digital inclusion campaigns and plans for shifting provision of government services to online-led delivery signalled continuing government interest in the importance of technology. The tenor of these statements focused on ensuring that citizens, and the workforce, had the digital skills demanded by the modern world and an awareness of the potential of technology to enhance learning opportunities. These aspects of the government's approach became more manifest in the speech by Michael Gove to the BETT educational technology show in January 2012 in which he highlighted how technology is transforming education, and that such change was both a response to the growth of the digital world and the seizing of new opportunities afforded by technology (Department for Education and The Rt Hon Michael Gove MP, 2012). While mentioning a range of examples, he again foreswore any central government role in leading change in favour of the autonomy of institutions, while announcing four initiatives that set the scene for current government policy:

- A focus on ensuring teachers are confident in using technology, echoing the BIS theme mentioned above.
- A new Nesta-led scheme to research and fund innovative technology projects in schools. Nesta by this time was ceasing to be a publicly funded agency, but this commission from government signalled an interest in stimulating educational innovation through business-led innovation in learning technology, on which more below.
- Central support to bring schools together to share expertise in the use of technology, initially through the Open University's Vital programme and networks of the new Teaching Schools.
- Major reforms to the ICT curriculum, with a more rigorous focus on computer science not only as a response to industry concerns about the suitability of the then existing ICT provision, but also to open up new and more advanced ways of learning with technology across the curriculum.

In a second speech at BETT in January 2014 (Department for Education and The Rt Hon Michael Gove MP, 2014) the Secretary of State, besides updating the audience on how the curriculum reforms were being implemented and teacher training supported, also mentioned:

- The redevelopment of the design and technology curriculum to encompass digital manufacturing skills including 3D printers, with pilot funding to help schools acquire 3D printers.
- Consultation on the use of MOOCs (Massive Open Online Courses) to support 16-19 learning, with a research contract on the topic of MOOCs and schools subsequently being advertised by the FE. This reflected the huge worldwide interest in the phenomenon, discussed above, of applying online distance learning to very large scale student populations, which had already been the subject of a BIS research study in 2013, *The Maturing of the MOOC*, focusing on the potential of MOOCs to disrupt higher education (BIS, 2013). That study had also included MOOCs in FE, which were found to be a matter for concern for colleges but marginal in existing practice in that sector (although US community colleges were demonstrating the potential), but not schools.

Between these two speeches to BETT, the then BIS Skills and Enterprise Minister, Matthew Hancock, had convened an expert group to make recommendations in the use of technology in learning, teaching and assessment in the further education and skills sector. The Further Education Learning Technology Action Group (FELTAG) published its report in October 2013 (FELTAG, 2013). Consultation on the recommendations is ongoing and a ministerial response was published in June 2014 (BIS, 2014). It is a major theme of the report, and the response, that the sector itself has to own the outcomes of the group's work and that government has a facilitating role where this applies. The report envisages implementation focusing on three key areas and leading to significant growth in the use of learning technology in the FE and skills sector:

- Funding frameworks
- Assessment, accreditation and inspection
- Professional development of teachers and management

The ministerial response to the report focused on the following areas for further work:

- Investment
- Regulation
- Funding
- Learners
- Capacity and capability of further education and skills providers
- Employers
- Online English, Maths and ESOL

In January 2014, also speaking at Bett (Hancock, 2014), Mr Hancock announced the setting up of an Education Technology Action Group (ETAG), to be chaired by Stephen Heppell, looking at the best use of learning technology across all phases of education – schools, colleges and universities. The group included Michael Gove and the then HE Minister David Willetts as well as a range of education experts (ETAG, 2014). The aim is to identify actions which can be taken to develop the use of technology in learning, including the removal of any barriers put in its way by government. It should of course be noted that, in light of the Ministerial reshuffle (July 2014) the membership and aims of the group may be subject to change.

The establishment of both FELTAG and ETAG marks a new phase in the evolution of government policy in respect of learning technology. It represents the view that, while institutions need to be autonomous in their learning and teaching policy, government has an ongoing role to play in creating the right conditions for that which educators want to happen (Gove, 2014). That is not to say we should anticipate the reinvention of a technology focussed agency, even if there were a change of government in 2015.

At the same time, these two action groups connect to two other government agenda points in education. One is a concern to raise attainment levels especially in the light of recent PISA results. Using learning technology is seen as one way of driving up standards. It is also a key component of an education that prepares students for life and work in a digital world. In this the UK chimes with EU activities such as the public/private partnership initiative the Grand Coalition for Digital Jobs (European Commission, 2014).

At the same time it links educational technology to broader government agenda around technological innovation, which extends more widely but is seen as embracing education. Hence the growing role for Nesta in initiatives around learning technology, as well as the BIS and Technology Strategy Board's £1m competition during 2014 to challenge business to design new innovations in learning technology products and services. The involvement of a

technology venture capital company in both groups is also noteworthy (indeed they were a co-chair of FELTAG). Moreover, the choice of Matthew Hancock rather than Michael Gove to announce the setting up of ETAG gave the opportunity to put learning technology in the context of convergence with technological innovation in other sectors and the export potential of new learning technology.

What is envisaged is a more complex set of interactions where the pedagogical and practical concerns of teaching professionals, and the aspirations of learners, come into closer contact with the concerns of government for global economic competiveness, business and job growth, and public finances. Exactly what organisational shape this might take in the longer term remains to be seen.

Scotland and Northern Ireland continue to follow approaches distinctive from that of England and Wales in continuing to support national online networks for schools: Glow in Scotland (Education Scotland, 2014) and c2k in Northern Ireland (DfE, 2013). Issues encountered in the move of Glow to a new delivery platform during 2013 appear to have been overcome, although they caused considerable public comment at the time. The Welsh system is closer to that found in England; however a recent OECD report reviewing Welsh education following disappointing PISA results (OECD, 2014) found, amongst much else, that more could be done to help teachers integrate learning technology into their practice.

## 4.1 Non-government agencies and community bodies and learning technology

In the immediate aftermath of the 2010 election there was a shake-up of quasi-autonomous government and non-government agencies in education as in other sectors. Some like Becta and Futurelab (which had relied on Becta funding) were closed. Others were absorbed back into government departments. An example is the National College for Teaching and Leadership (which now includes the former Teacher Training Agency) and the Education Funding Agency. Others lost their core public funding but were reconstituted as self-financing organisations.

As a result, the major national organisations active in learning technology include:

**(i) Higher education**
With the removal of a lot of central funding form agencies, membership bodies from within the community have taken on some representative, consultative and brokerage roles. Examples include the Association for Learning Technology which has, for instance, sat on FELTAG, and the NUS representing learners.

Jisc remains a major agency focusing on digital technologies, largely for HE although also with an FE and skills remit, the latter mainly being discharged through the network of 12 Regional Support Centres. Centrally Jisc has been reconstituted as a registered charity with funding mainly from the HE funding bodies across the UK, supplemented with membership fees from institutions. Jisc is organised around four areas of activity:

- Network and IT services, including the Janet network and Eduroam access service.
- Digital content, with a large amount of activity supporting digital library resources and digital collections. Activity includes supporting institutions in the development of open data, especially in the light of the requirement that all publicly funded research outputs and data be made openly available, and in the increasing use of learning analytics, such as identifying students at risk of academic failure.

- Advice services, including the TechDis service on technology for accessibility and support on e-safety, mobile learning and more;
- Research and development, increasingly being run through a low budget co-design approach with partners and institutions rather than being centrally driven.

The Jisc e-Learning Programme ended in 2012 and although most of the resources generated are still available, many are significantly out of date. On the other hand, Jisc continues to publish valuable resources in its more niche areas, including a guide to Open Education Resources published in 2013 (Jisc, 2013). However, often the output of Jisc projects are practical shared services and resources rather than documents; for example, a prototype service for sharing usage data between institutional libraries, the Knowledge Base+ shared service to help libraries manage their digital resources, and access to a range of open access learning resources.

The HEA, funded by the four UK HE funding councils, exists to improve the quality of teaching and learning in HE. It is a partner in a 2012-14 project led by the Leadership Foundation for Higher Education, which fosters leadership development in HE, called 'Changing the Learning Landscape' to help institutions embed learning technology. The other partners are Jisc, ALT, and the NUS and it is a first for this set of partners working together. The HEA part dealt more with supporting the actual teaching staff in delivery and online resources around online learning, and open education resources.

Given the ferment around MOOCs it should be noted that many UK universities are participating in MOOC developments. FutureLearn (2014) is the UK-based MOOC consortium led by the Open University but UK institutions are participating in other MOOC initiatives such as Coursera. No UK universities are participating yet (at least publically) in the European MOOC platform diversity although the OU is a partner in yet another European MOOC offering, OpenupEd. The European University Association published a useful if European-focused overview of MOOCs in January 2014 (Gaebel, 2014).

**(ii) Further education and skills**

In the FE sector the call by BIS to focus on the skills of college teaching is being picked up by the Education Training Foundation (ETF). Activity around learning technology includes a strategic consultation with the sector. The ETF also has a programme of provider-led projects in learning technology and has picked up a remit to provide a technology self-assessment tool for institutions. Teaching staff in FE can join the Institute for Learning and benefit from their online personal learning space (e-portfolio), REfLECT and CPD resources which include learning technology topics. The Association of Colleges provides briefings and events to support college use of digital technologies. The Crescent Purchasing Consortium, a membership organisation for FE colleges and academies, provides a procurement service that includes IT services.

Ofsted published a resource – confusingly called an e-portfolio – called *Virtual Learning Environments* in January 2013, updated in April 2014, which drew on a range of surveys and inspections of VLEs used in FE and sixth form colleges (Ofsted, 2014). This found many examples of good practice but advocated the need to move on from VLE use being a 'cottage industry' for a minority of interested staff or individual institutions rather than reflecting coherent and consistent take-up across the sector. This recommendation has a familiar ring.

The National Health Service, in conjunction with Health Education England, the HEA, and others including Jisc, announced in October 2013 a new Technology Enhanced Learning programme which aims to promote and share good practice in the use of technology in health and social care education. This follows the Department of Health's own guidance

document providing a framework for technology-enhanced learning in health education published in 2011 (Department of Health, 2011).

In the adult learning arena, NIACE, although smaller than it has been, continues to support the sector, for example in the provision of advice on e-safety (Campbell-Wright, 2013), and was a full member of FELTAG. A newer player is the Ufi Trust, a registered charity that uses the funds from the sale of learndirect to fund large-scale e-learning projects in adult learning. Its initial tranche of projects include a free open online course in blended learning for all those who teach or support vocational learning, the use of simulation software in skills training, and Citizen Maths, a free and open online maths course aimed at adult learners to acquire maths skills up to Level 2. These projects followed on from research commissioned by the trust that produced the report *Scaling Up* (Ufi Charitable trust 2012), advocating the use of Trust funds to provide a catalyst for a step-change in the scale and scope of the use of digital technology in vocational education. More recently, the City & Guilds Centre for Skills Development has published *Culture, Coaching And Collaboration: How To Unlock The Potential Of Digital Technology In Vocational Teaching And Learning* (February 2014) arguing for a culture of experimentation to be fostered in colleges that allows teaching staff to gradually incorporate digital technologies into their practice (Pullen & Varley-Winter, 2014).

**(iii) Schools**

Weaknesses in both the teaching of ICT and the wider contribution of ICT to the curriculum in secondary schools were highlighted by the Ofsted report on ICT in Schools published in 2011 (Ofsted, 2011). This report was one of the contributing factors leading to the reform of ICT qualifications, and Ofsted have a seat on both FELTAG and ETAG. The Ofsted report painted a much happier picture of ICT use in primary schools.

Although the demise of Becta was part of a pattern of withdrawing public funding from centralised initiatives on learning technology in school, and had a predictable disruptive effect on agencies that relied on such funding, several are still active. The Regional Broadband Consortia continue to provide connectivity and associated ICT services to many schools, with funding through membership and traded services. Naace, the national association for those promoting ICT in schools, took over sole ownership of the ICT self-review framework and ICT Mark award when Becta disappeared, and supports practitioners in developments such as the new computing curriculum and using technology to promote school improvement. Over 800 schools are now accredited with the ICT mark and Naace has created the third Millennium Learning Award for schools that take the next step in school improvement, demonstrating strong achievement in using ICT to deliver education “fit for the 21st century”. Naace state that over 70 schools now have the award.

MirandaNet has existed as an international non-profit organisation supporting ICT in education since 1992 and continues to promote teacher training in ICT, in particular through recent participation in the EU Hands-On ICT project running through to the end of 2015 which will develop new online training resources. Meanwhile BESA, the trade association for suppliers to schools, conducts an annual survey of opinions and trends in ICT in UK schools, the latest of which found that school investment in ICT will reach a record high in 2014 (BESA, 2014).

**(iv) Cross-phase**

The tendency to reposition learning technology in the context of skills and innovation has led to some agencies becoming more prominent. The Technology Strategy Board is sponsored and funded by BIS as an arms-length agency with the role of stimulating innovation to promote economic growth. It is running a £1.1m competition between May and July 2014 for the design of new technology-based products and services that will improve learning

outcomes, with the focus on designing products specifically for education rather than adopting existing technologies for education purposes. The potential for adoption at scale is a related criterion (TSB, 2014). A subsequent phase of further funding for product and service development is envisaged.

Meanwhile, continuing the theme of learning technology as a focus for commercial innovation, Nesta has been reconstituted as an independent charity with a stronger focus on education than previously. Its *Decoding Learning* report in 2012 (Nesta, 2012) sought to identify the areas where technology can have the most impact on school learning. This has been followed up by a programme of practical research projects around the themes of flipped learning, remote tutoring and making good classroom practice visible. In addition, Nesta is keen to support the involvement of young people in using technology to make things, through its Make Things Do Stuff platform and now the Digital Makers Fund helping good projects educating young people and adults in digital making to scale up. This fund has been developed in conjunction with the Nominet Trust which supports new ventures in applying digital technology to social challenges. Two Nominet reports from 2012 addressed how new technologies can help re-engage NEETs (Nominet, 2012), and a new Digital Enterprise Award iDEA scheme for 16-25 year olds is being launched with the Duke of York. Innovation in technology is also the focus of the Edtech Incubator accelerator programme for education technology launched by the Education Foundation think tank.

The importance of ramping up education in STEM subjects (science, technology, engineering and maths – sometimes expanded to include design and creative media skills) has been an increasing topic of national debate with major reports from the CBI (CBI, 2014) and the work of Lord Baker and the Edge Foundation (2014) in support of University Technical Colleges and many other initiatives. Computer science is itself a STEM subject, but more broadly STEM initiatives have wide-ranging implications for the application of technology in education as computer control, computer-aided design, digital manufacturing, marketing, presentation and virtual collaboration tools all form part of the STEM skill set. The more STEM becomes the focus of the curriculum at all levels of education the more the integration of technology into learning comes in its wake. Alongside this, congruent with Section 1 above, there is an increasing emphasis on project-based learning, linking learning in different contexts, mobile learning and 'bring your own device' networks, and many other themes. In many cases the themes are not new to practitioners in the area.

It may well be that the economic demands of STEM skills and the need to raise learning performance, highlighted by the disappointments of PISA, will do more to drive forward the development of technology in education than have many previous initiatives.

# Conclusion

The debate over the use of technology in education has developed considerably since the publication of the 2010 Technology in Learning report undertaken by ALT. Changes in technologies, and how they are used, a change of government and the continuing impact of the financial crisis have all played a role in these developments and this paper has sought to describe, map and critique those changes. It has, moreover, sought to frame the debate in ways which reflect the complexities of technological, policy and wider societal changes.

It has been argued here that what is required from policy-makers, college managers and teachers is a fundamental reassessment of the ways in which technology is used to inform and delivery the curriculum. Most importantly, the primary conclusion to be drawn from the preceding analysis is that technology cannot be viewed as somehow separate from, or ancillary to, the wider context within which education is discussed, planned and delivered. If this appears to be a somewhat obvious conclusion, then it ought to be considered what this way of thinking about technology in education implies.

To adopt the more nuanced way of thinking about technology is to recognize that the idea of 'future proofing' is itself largely redundant. Teachers and managers cannot now afford to expend time, energy and resources attempting to anticipate advances in technology and how they might be applied. This is not to say that all who work in education ought not to be conversant with current technologies and trends, but is rather to suggest that the ubiquity of digital technology, and the pace and scope of its development, render 'linear' ways of planning as inherently limiting. Given the issues around supplier timescales for development, project and change management and financial sustainability, attempting to plan for and use the next 'killer app' (itself now a quaint phrase) may be damaging rather an effective means of creating strategy.

In practice, this means that college management teams must view the use of technology as integral to all aspects of college activity. Management structures, financial planning and curriculum development have to incorporate the use of technology at every stage while recognizing that specific technologies are not panaceas. Technologies, whether devices, software or applications (or, increasingly, a mix of all three), do not solve every problem confronting the colleges; however, they may help solving some of them. Whatever we may feel about the use of technology in education it will be used, whether formally or informally, by an increasing number of teachers and students.

Policy-makers need to adopt a similar approach to those who work in education. The emphasis on 'pilot studies', focused more often than not on a specific technology, are expensive and often do not yield meaningful results. Case studies help inform the debate, but are not always replicable in a sector as diverse as the college 'sector'. Devolving the responsibility solely onto the provider for the decisions about which technologies to adopt does not solve the perceived 'problems' with education and does not reflect the ways in

which funding is allocated. A degree of centralized planning at organisation, local and central government level is required not least because of the expense and resource-intensive nature of technology projects. A move away from defining 'efficiency' as simple cost-cutting is also required. An 'efficient' educational system, or individual college, is one that deploys its resources in the most useful, relevant and appropriate ways to ensure that students receive the education they require and want. (The definition of what is 'required' and 'wanted' is, of course, the subject of much debate.)

Whether it be MOOC, BYOD or migrating services to the cloud, the decision about using a particular technology has to answer one fundamental question: will it enable the student to secure the maximum benefit from her or his education?

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## Useful links

**Association of Colleges** http://www.aoc.ac.uk

**Association for Learning Technology** http://www.alt.ac.uk

**Crescent Purchasing Consortium** http://www.thecpc.ac.uk

**digitalskills.com** http://www.digitalskills.com

**The Education Foundation** http://www.ednfoundation.org/

**Education Funding Agency**
https://www.gov.uk/government/organisations/education-funding-agency

**Education Technology Action Group** http://www.etag.support

**The Education and Training Foundation** http://www.et-foundation.co.uk/

**Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre)** http://goo.gl/1OXgs6

**Further Education Learning Technology Action Group** http://feltag.org.uk/

**Go ON UK (the UK's Digital Skills Alliance)** http://www.go-on.co.uk

**Hands-on ICT** http://handsonict.eu

**Leadership Foundation for Higher Education** http://www.lfhe.ac.uk

**Institute for Learning** https://www.ifl.ac.uk

**iversity** https://iversity.org

**Jisc** http://www.jisc.ac.uk

**Jisc infoNet** http://www.jiscinfonet.ac.uk/

**London Knowledge Lab** http://www.lkl.ac.uk/

**MirandaNet** http://www.mirandanet.ac.uk

**Naace** http://www.naace.co.uk

**The National Education Network** http://www.nen.gov.uk

**Nesta** http://www.nesta.org.uk/

**NHS 'Technology Enhanced Learning (TEL)'** http://goo.gl/te2DYS

**OpenupEd** http://www.openuped.eu

**Think Out Loud Club** http://thinkoutloudclub.com/

**Ufi Charitable Trust** http://www.ufi.co.uk/

**What research has to say for practice wiki** http://goo.gl/O7ojLe

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