



Bridging the gap between policy and practice: a framework for technological intervention

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Abstract

It appears as if e-learning is now embedded in most educational institutions; from the provision of an appropriate technological infrastructure to support teaching, research and administrative activities through to the innovative use of technologies for learning. National and international policies in the area reflect this and are filled with rhetoric about the potential technologies offer for education – personalisation, flexibility, adaptively, and engaging, authentic environments. However, closer inspection suggests that there is a gap between the promises inherent in the policy rhetoric and actual use in practice. This paper will focus on a retrospective e-learning timeline, mapping the shifting directions of policy perspectives and their subsequent impact on practice. It will extrapolate the timeline to consider the implications of technologies for education in the future. It will then present a framework for ensuring that e-learning interventions are effective, that emphasises the relationship between e-learning policy, research and practice. The paper argues that use of such a framework can help ensure that e-learning research informs and helps shape both policy and practice and vice versa - that activities in practice can in turn inform further policy directions and suggestions for areas which need further research investigation.

1 Introduction: scrutinising the e-learning history line

There is evidence to suggest that e-learning is beginning to mature as an area (Marshall & Mitchell, 2004; Jones & O’Shea, 2004; Conole & Oliver, 2007; Zhang & Nunamaker, 2003). Technologies are now an integral part of educational institutions’ infrastructures and core strategies and policies. The promise of e-learning infiltrate national and international policy perspectives; purporting that e-learning offers new exciting possibilities for learning – for personalisation, for student-centred learning, to support new forms of communication and dialogical learning and enriched multi-model forms of representation (DCSF, 2009; M. Brown *et al.*, 2007; Hodgson, 2002; Andrews & Haythornthwaite, 2007). Nonetheless the promise behind the rhetoric of e-learning has yet to be realised (Hedberg, 2006). Zemsky and Massy in their ‘Thwarted innovation’ report (Zemsky & Massy, 2004) argue that there are three naïve assumptions associated with e-learning: ‘If we built it they will come’, ‘The kids will take to e-learning like ducks to water’ and ‘E-learning will force a change in the way we teach’. One of their key conclusions was that ‘The hard fact is that e-learning took off before people really knew how to use it’. Many others have written about ‘what went wrong’ with e-learning (Davis *et al.*, 2007), the gap between the rhetoric and reality (Conole, 2007) and the ‘no significant difference’ (between e-learning and traditional teaching) argument (Ramage, 2001; Russell, 2001).

So what is the reality? The reasons for the lack of impact of technologies in education to date are complex and multifaceted. In truth successful implementation of e-learning is dependent on a range of inter-connected factors – which are as much to do with pedagogical and organisational issues as with purely technical ones. To explore these issues, this section will provide a brief summary of some of the key technological developments of the last few decades, focusing in particular on the relationship between technological developments, policy directions and actual impact on practice.

Conole, Smith and White provided a chronological reflection of the development of e-learning in a UK tertiary educational context spanning the period 1965-2000 (Conole, Smith *et al.*, 2007). They argue that whilst technologies change rapidly, the management of them change much more slowly. I would add that the impact on change in practice is also much slower. This lag between technological developments and impact on policy and practice is one of the factors hindering radical change. They divide technological change into four main phases:

- 1965-1979: Mainframe systems. In the sixties, use of computing in education was dominated by mainframe computers and mainly focused around use for high-end scientific research. Nonetheless the potential

for education was evident. In the seventies policy reports considering the use of technological for educational purposes began to emerge and subsequently associated funding initiatives and professional bodies. The focus in this phase was very much on the application of computers in a scientific context primarily for research purposes; mainframes operated by computer specialists dominated the discourse although there were hints of the potential wider application of computers across institutions.

- 1980-1989: Stand-alone systems. The emergence of the personal computer was the first major shift in terms of technologies having a broader impact on education. Initial application focused around the use of PCs in a business context, with the consequently emergence of basic office tools such as word processing applications and spreadsheets, but as educators began to use these tools to support their general administrative duties they also began to experiment with how they could be used in a teaching context. In the UK and in mainland Europe funding initiatives explicitly exploring the potential of new technologies for education emerged, including the TLTP programme in the UK (Gilbert, 1999; Stern & Impact, 1997) and the EU Framework Programmes for research and technological developments (Berleur & Galand, 2005; Muldur *et al.*, 2007). Significant funding was made available via these programmes that enabled educators to explore the different affordances of new technologies and to gather empirical evidence of their impact on practice. Many of the technological artefacts produced through these initiatives (interactive computer-based tutorials, laser disks, etc.) became obsolete with the emergence of the Internet, nonetheless this period of technological experimentation marked the emergence of e-learning as a new research field (Conole & M. Oliver, 2007). What is evident from initiatives in this phase is that they were characterised by two things: the exploration of the potential of technologies through the 'let a thousand flowers bloom' approach and the emergences of associated new professional roles (e-learning researchers, learning technologies, managers of learning systems) (Conole, White *et al.*, 2007).
- 1990-2000 Networked technologies: The emergence of networked technologies, and in particular the Internet, marked the next major phase of technological developments. Email became the main communication tool within institutions, replacing the paper-based memo; word processors replaced the traditional role of secretaries and institutions began to exploit the communicative affordances of the web for disseminating information both internally and externally. This indicated that technologies were moving from being peripheral innovations to affecting all

aspects of learning and teaching. Institutions were beginning to understand that technologies were a core aspect of their business and hence needed to be incorporated into institutional strategies and policies.

- Beyond 2000: Politicisation and systematisation. Conole *et al.* were optimistic that post-2000 there was evidence of more coherent policy perspectives at a national level in the UK, with an increasing emphasis on the importance of technologies to support learning. They argued that the various e-learning funding initiatives were not only providing opportunities to gather evidence on how technologies might be used in education, but also resulting in the growth of new professionals with specialised expertise in this area. They highlighted the growth of associated research centres specifically focusing on e-learning and the consequential increase in publications and conferences discussing the field. They argued that the web in particular was a significant trigger during this time, singling out Virtual Learning Environments (VLEs)/Learner Management Systems (LMS) which they argued acted as important catalysts for shifting the use of technologies beyond early adopters by providing easy to use, all in one environments for supporting web-based teaching.

The chapter was written before the impact of the current wave of new technologies, in particular web 2.0 tools and services, virtual learning environments and new generations of mobile technologies. These new technologies bring with them a variety of additional affordances; new means of communicating and representing information. E-Learning research has matured over this period of time and is providing valuable insights into how these technologies are being used and their impact (and in some cases lack of impact) on practice. However, despite this increased variety of technologies, it is arguable whether the optimistic coherence in policy and systematic use of technologies indicated by Conole *et al.* has actually been realised. The gap between rhetoric and reality is still evident.

In a related international review of e-learning policy and practice, Conole compared e-learning directives in six international contexts: Europe, the United States, Australia, China and Africa (Conole, 2007). The review shows the influence of the different cultural contexts on how e-learning policies for each country were focussed and the consequential impact on actual practice. Conole then considered the way in which e-learning developments (as instantiated in practice driven by policy directives) have had an impact on higher education, classifying these into ten types:

- The degree of hegemony: the balance between local and global perspectives.
- The degree of urban vs. rural developments.

- The balance of commercial imperatives vs. government directions.
- The types of funding models available.
- The organisational and managerial structures to support e-learning.
- The changing nature of roles as a result of e-learning implementation.
- The increased drive for academics on focus more on research than teaching.
- The unintended consequences arising from e-learning interventions.
- The types and impact of communicative mechanisms used to disseminate e-learning initiatives.
- The degree of self-reflective and evaluation.

Figure 1 provides a summary of these factors considering them in relation to wider contextual factors, specific policy and practice directives in different regions, and consequential impact in practice. It illustrates how the macro contextual factors influencing society generally (i.e. globalization, an increasingly network society, changing societal norms and values and technological advances) provide a contextual force and influence local policy and associated practices and how these in turn result in the ten types of impacts on practices listed above.



Fig. 1: The relationship between context, policy, practice and impact

2 A glimpse into the future

The previous section took a retrospective look at e-learning developments in the last three decades and considered the relationship between different waves of technological development and policy/practice. Can we get any indication of what future developments might be and hence use this as a basis to help steer decisions about future directions for policy and practice? This section will consider four sources of data that provide a glimpse into the future. The next section will then discuss emergent themes that are evident from this research and associated challenges for education. Four sets of research are drawn on: the annual series of Horizon reports, reviews of web 2.0 technologies and their use in education, a report on the future of cyberlearning and an edited collection exploring the increasingly prevalent trend towards ‘openness’ in education (for example - open source tools, open educational resources).

The annual Horizon reports¹ provide a valuable glimpse into the future by predicting which technologies are going to have the most significant impact in one, three and five years time. The preview report for 2010 lists mobile computing and open content as being within the one-year timeframe, electronic books and simple augmented reality within two-three years and gesture-based computing and visual data analysis within four-five years². In each case the report indicates the advantage of each technology within an educational context and provides illustrative examples. Certainly the increased sophistication of the current generation of mobile phones, like the iPhone and new tablet computers mean mobile learning is now becoming genuinely viable. Similarly the Open Educational Resource (OER) movement one could argue has now reached critical mass with institutions worldwide engaged in the creation of OER (Atkins *et al.*, 2007), but despite the opportunities, OER developments also have associated challenges (Hylén, 2006). For example, despite the success of the Open University UK’s OpenLearn initiative, there was little evidence of actual repurposing of OER (McAndrew *et al.*, 2009). Conole *et al.* have argued that this is in part a design issue, arguing that there is still significant work to do in terms of development effective design strategies for the use and repurposing of OER (Conole *et al.*, 2010). With augmented reality (where location-based data is combined with what we see in the real world) and gesture-based computing (which can accept multiple simultaneous inputs such as gesture-based inputs used in the Nintendo Wii) there are indications of yet more fundamental shifts in store in terms of the way we interaction with and use technologies. Two recent reports from the Institute for Prospective Technological Studies provide a rich database of case studies showing how web 2.0 technologies

¹ <http://www.nmc.org/horizon>

² See <http://cloudworks.ac.uk/index.php/cloud/view/2799> for a current debate on the report.

are being used to support both formal and informal learning (Redecker *et al.*, 2009; Ala-Mutka, 2009). In the States a task force considered the implications of new technologies (which they term the cyberinfrastructure) for learning (Borgman *et al.*, 2009). They identified five recommendations including the need to emphasize the ‘transformative power of information and communications technologies for learning, from K to grey’. All of these reports indicate that technologies have the potential to radically transform education. An edited collection by Iiyoshi and Kumar explores one particular aspect of technological impact – namely the growth of open approaches to the development and distribution of tools and resources (Iiyoshi & Kumar, 2008). The case studies described in the book suggest radically new forms of practice and approaches to education, which if taken up more broadly would have an impact on both teaching practice and overarching educational business models. In the forward to the book John Seely-Brown sums up some of the key issues associated with trying to make better use of technologies in education:

...the challenges we face in education today are daunting, ... The world becomes more complex and interconnected at a lightning-face pace, and almost every serious social issues requires an engaged public that is not only traditionally literate, but adept in a new, systemic literacy (Seely-Brown cited in (Iiyoshi & Kumar, 2008).

3 Emergent themes and challenges

A number of trends are evident with emergent technologies and the way they are being appropriated:

- There has been a shift in the last five years or so from the web as a content repository and information mechanism to a web that enables more social mediation and user generation of content.
- New practices of viewing and sharing are emerging, for example sharing of images on sites like Flickr, bite-size, amateur videos via sites such as YouTube and the use of presentation sites like Slideshare for Powerpoint presentations³. In addition there are a host of new mechanisms for content production, communication and collaboration (through blogs, wikis and micro-blogging services such as Twitter). Social networking sites have become increasingly important as a means of connecting people and supporting different communities of practice (such as Facebook, Elgg and Ning); not just socially, but within professional contexts as well.
- A network effect is emerging as a result of the quantity of information

³ <http://www.flickr.com/>, <http://www.youtube.com> and <http://www.slideshare.net>

available on the web, i.e a multiplicity of connectivity due to the scale of user participation.

In a related paper I consider these emergent themes and the associated challenges they bring to an educational context in more depth⁴. Table 1 summarises these – focusing on five challenges and their impact on education. Firstly, the expansion of the knowledge domain and the consequential ‘death of the expert’ naturally challenges the traditional role of a teacher. It can no longer be assumed that the teacher is expert or that the focus should be on transmission of knowledge. Whilst such a shift away from didactic to constructivist approaches has been a dominant discourse in education for many years, the Internet as amplifier of this cannot be underestimated.

Secondly, multi-located/fragmented content and the potential for multiple pathways through content have an impact on how educational interventions are designed. And although such multiplicity offers increased choice, in an educational context this also has the potential to lead to confusion. Hence there is an opportunity for teachers to play an important new role in terms of providing pedagogically grounded learning pathways, to help learners navigate their way through this complexity.

Thirdly, with the increasing complexity of the digital landscape the gap between the ‘tech savvy’ teachers and students and those who are not engaged is ever deeper; the digital divide is very much still in evidence (Norris, 2001; Warschauer, 2004). This is exacerbated because to understand web 2.0 technologies you have to personally engage with them; a hands-on demonstration of Twitter does not really help you fully understand the power of the tool. Technically it is simple; type in 140 characters and press return, but in reality practical application of Twitter requires you to understand how to appropriate it for your own use, to adapt it to your own style or ‘digital voice’. Twitter is also about being part of a wider network, so is only any use if you are connected to (i.e. ‘following’ and ‘being followed’ by) people you are interested in.

Fourthly, the power of the collective has clear potential in a learning context. The user-focussed, participatory nature of web 2.0 practices has immense potential educationally, for shifting the locus of control from the teacher to the learner, and for enabling constructivist pedagogical approaches. The ability to connect with others opens up the potential for dialogic, situated and inquiry-based learning. Social networking sites for example enables you to have ‘just-in-time’ learning moments; posing learning queries that can be answered within moments providing a number of different explanations to aid understanding. Similarly, a student cohort can gather and comment on course-related resources in new ways using social bookmarking tools.

Finally; as discussed earlier, despite the wealth of free educational resources

⁴ <http://cloudworks.ac.uk/index.php/cloud/view/2735>

and tools that are now available it is sobering to note that in reality these are not used extensively (McAndrew *et al.*, 2009). The reasons for this lack of uptake are complex and multi-faceted but to a large extent are because teachers do not have the necessary skills to take advantage of the affordances of new technologies

This section has argued that each new technology brings with it a set of associated affordances that have the potential to influence the way we design courses and the way students learn. However, for every opportunity new technologies provide there is an associated set of challenges that need to be addressed.

TABLE 1
The impact of technologies on education

Technological cause	General effect	Specific educational dilemma
Expansive knowledge domain	Death of expertise/everyone an expert	Challenges the role of the teacher
Multiple co-locations for content	Loss of content integrity	The potential for new learner pathways,
A complex digital landscape	New metaphors needed	Widening skills gap/digital divide
Power of the collective	Social collective/digital individualism	Potential for new forms of learning
Free content & tools	Issues re: ownership and value,	Little evidence of uptake

4 Avoiding the failures of the past

As the previous section has demonstrated new technologies offer much to an educational context but also bring with them an associated set of challenges. I want now to return to the core question posed at this beginning of this paper: Why is it that despite the evident potential of technologies they have had so little impact in practice? Resistance to change is a well-studied phenomenon; Kotter and Schlesinger (1979) identify four basic causes of resistance to change:

1. Individuals are more concerned with the implications for themselves.
2. Misunderstandings – communication problems, inadequate information.
3. Low tolerance of change – a sense of insecurity, different assessment of the situation.
4. Disagreement over the need for change.

All of these are evident in the literature on e-learning failures; barriers are organisational and pedagogical as well as purely technical. Common reactions against change include: ‘I haven’t got time’, ‘My research is more important’, ‘What’s in it for me?’, ‘Where is my reward?’, ‘I don’t have the skills to do

this’, and ‘I don’t believe in this, it won’t work’. Common resistance strategies include saying yes (and doing nothing) or undermining the initiative and/or the people involved. Depressingly classic mistakes are repeated over and over again: an over emphasis on the technologies and not the people and processes; funding for the technology developments but not use and support.

5 A framework for technological intervention

The importance of connecting e-learning policy with practice is now recognised (DCSF, 2009; Borgman *et al.*, 2009; Culp *et al.*, 2005; Attwell, 2009; Guri-Rosenblit, 2006; Conole, 2007). Nonetheless making this connection meaningful and effective is far from trivial. De Freitas and Oliver consider five prominent models of organisational change (Fordist, evolutionary, ecological, community of practice and discourse-orientated) in terms of a case study of a UK university (de Freitas & Oliver, 2005). They conclude that each model has inherent problems, but surmise that whether the change is evolutionary or ecological flexibility and fluidity are key elements of success. Blin and Munro argue that despite the fact that most institutions now have easy-to-use Virtual Learning Environments (VLEs)/Learning Management Systems (LMSs) in place with a range of tools to support the delivery and management of student learning, there is still significant resistance to adoption of technologies by academics (Blin & Munro 2008). Clegg *et al.* take a critical stance to the rhetoric on ICT-policy (Clegg *et al.*, 2003); arguing against:

‘technological determinism... No technologies are neutral. They are always the products of real historical social relations as well as the emergent technical capacities they provide.’

Haynes puts forward a three-part strategy for overcoming technological resistance: a technology should make a user’s life easier (or more enjoyable), it must be easy to use and ultimately should become essential to their practice. He concludes that it is important to make the users aware of the benefits of effective use of technologies. Similarly approaches are suggested in other strategies for supporting the uptake and use of technologies in education⁵. A number of factors are evident across the literature:

- The importance of demonstrating the added value of technologies
- The need to understand and take account of existing practice and culture
- The complexity of the relationship between models for change and their impact on practice
- Recognition that technologies will continue to change/to have new impacts and hence flexibility needs to be a cornerstone of any policy

⁵ See for example (Rosenberg, 2001; Laurillard, 2002; Bates, 2005; Chickering & Ehrmann, 1996; Lepori *et al.*, 2003).

perspectives.

Figure 2 outlines a framework for technology intervention, which captures these factors. The framework illustrates how effective implementation of technologies can only be achieved if policy, research and practice are considered in conjunction. Practice is further sub-divided into teacher- and student-practice. Each node of the pyramid needs to inform the other three nodes and vice versa. So e-learning research and theory should be used as a guidance to inform policy and influence practice. Teacher and student perspectives and their actual practice should also inform policy, but also help to guide future research directions. And policy itself should in turn impact on both research and practice.

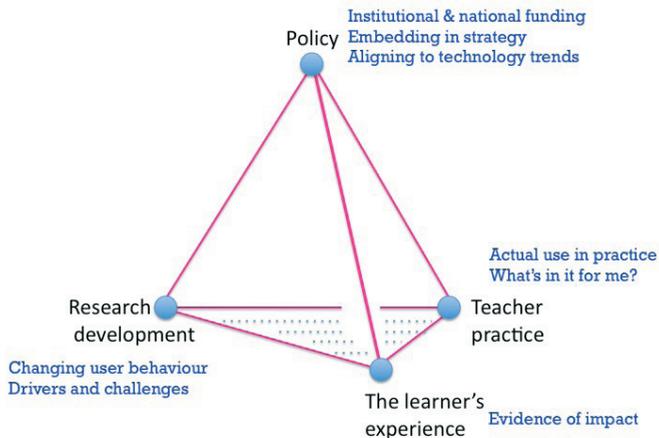


Fig. 2: A framework for technological intervention

The framework is being used within the Open University as part of our OU Learning Design Initiative⁶ and see related research papers (Conole, 2009; Conole, Culver *et al.*, 2008; Conole, Brasher *et al.*, 2008). The work is strategically supported and learning design is embedded into the institution's learning and teaching strategy. A strong body of empirical evidence to understanding current practice underpins the work and this is used to inform the development of a set of tools and resources to enable teachers to make more effective use of technologies in their practice. Evaluation of the tools and resources in turn drives ongoing research activities. We believe that application of the framework has helped lead to more effective use and uptake of technology. The framework acts both as a guide to direct developments and as an evaluative tool to monitor

⁶ <http://ouldi.open.ac.uk>

impact.

6 Conclusion

This paper has focused on the reasons behind the gap between the rhetoric around the potential of technology and its actual impact on practice. It is evident that the reasons for this gap are complex and multifaceted, involving pedagogical and organisational issues as well as purely technological ones. The general resistance strategies associated with any change management context are evident, but are further compounded in an e-learning context by the speed and complexity of technological change. The paper puts forward a framework for successful technological intervention, articulating the co-dependence between policy, research and practice. Only by taking account of all three at once and their impact on each other can effective technological intervention be achieved. Many questions still need resolving before true technological innovation can be realised. Some of the issues arising from this paper include:

- What models and frameworks can help bridge the gap between e-learning policy and practice?
- How can technologies support new forms of pedagogy?
- What is the relationship between technologies and the delivery of teaching (i.e. how are physical and virtual spaces now being blended to support learning)?
- How do we take account of a digital divide that is narrower but deeper?
- What new digital literacy skills will learners and teachers need in the future?

It is evident that technologies are now an inherent part of educational systems. We need to harness them effectively both in our overarching institutional strategies and policies and in what we do in actual practice. Research into the use of technologies is showing the ways in which it can transform education, providing support for more personalised, flexible and learner-centred pedagogies and new means of communicating and collaborating with peers and tutors. Technological change will inevitably continue, bringing additional opportunities and challenges for teaching and learning. True e-learning innovation is likely to need a radical rethink of the curriculum. Are we ready to meet the challenge?

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