Abstract:

As technology is increasingly being used for teaching and learning in higher education, it is important to scrutinise what tangible educational gains are being attained. Are claims about technology transforming learning and teaching in higher education borne out by actual practices? This paper draws upon a critical analysis of recent research literature concerning Technology Enhanced Learning (TEL). It argues that few published accounts of TEL practices show evidence of a scholarly approach to university teaching. Frequently, TEL interventions appear to be technology-led rather than responding to identified teaching and learning issues. The crucial role of teachers’ differing conceptions of teaching and of the purpose of professional development activities is often ignored. We argue that developing a more scholarly approach among university teachers is more essential than providing technical training if practices are to be improved to maximise the effectiveness of TEL.

Keywords:

Technology enhanced learning; student learning; teaching in higher education; scholarship of teaching and learning; technological determinism.

Introduction

In recent years the Higher Education sector has made considerable investments in equipment and infrastructure to support learning and teaching and UK universities now have some form of virtual/managed learning environment. The 2010 Universities and Colleges Information Systems Association survey of Technology Enhanced Learning
(TEL) for higher education in the UK found that “Enhancing the quality of learning and teaching is … the primary driver for considering using TEL” (Browne et al, 2010, p. 8). Teachers, educational developers and technical support staff have expended considerable time and effort in trying to derive benefits from using technology to enhance student learning. However, the benefits for teachers and learners remain ambiguous and contested and it is difficult to find consensus in answer to questions such as:

- What impact is technology having upon the processes of teaching and learning in higher education?
- Who or what is considered to be the agent of any changes that are occurring in teaching practices?
- What is the role of professional development activities in supporting teaching with technology?
- Are teachers (and policy-makers) adopting a scholarly approach to the adoption of technology for educational purposes?

In this essay we reflect upon the many articles, reports, surveys, presentations and case studies that we have encountered in recent years concerning actual instantiations of technology use in university teaching and learning. In the process we hope to provide some tentative answers to the questions listed above.

**What do we mean by a ‘scholarly approach’?**

We do not wish to debate the meaning of ‘scholarship’ at length here. However, we feel that this succinct statement (Hutchins, Huber and Ciccone, 2011, p. 3) captures many key points for our discussion:

> The scholarship of teaching and learning is, at its core, an approach to teaching that is informed by inquiry and evidence (both one’s own, and that of others) about student learning. In this sense, it is not so much a function of what particular pedagogies [teachers] use. Rather, it concerns the thoughtfulness with which they construct the learning environments they offer students, the attention they pay to students and their learning, and the engagement they seek with colleagues on all things pertaining to
education in their disciplines, programs, and institutions [emphasis added].

To explore the issues further, we want to relate accounts of TEL innovations or interventions to one particular model of the scholarship of teaching (Trigwell, Martin, Benjamin & Prosser, 2000). We find the four dimensions they propose (p. 163) to be useful for our purpose:

The extent to which a teacher is engaging in the scholarship of teaching might … be described in terms of these four dimensions as follows:

(a) the extent to which they engage with the scholarly contributions of others, including the literature of teaching and learning of a general nature, and particularly that in their discipline;

(b) the focus of their reflection on their own teaching practice and the learning of students within the context of their own discipline: whether it is unfocussed, or whether it is asking what do I need to know and how do I find out;

(c) the quality of the communication and dissemination of aspects of practice and theoretical ideas about teaching and learning in general, and teaching and learning within their discipline; and

(d) their conceptions of teaching and learning: whether the focus of their activities is on student learning and teaching or mainly on teaching.

A review of the use of technology for learning and teaching in higher education during the period from 2005 to 2010 was undertaken recently (Price and Kirkwood, 2011). It examined peer-reviewed articles in the research literature and case studies published on the HEA EvidenceNet and JISC Infonet websites. To be included within the review, documents had to report upon an actual application of technology for teaching and/or learning purposes in higher education. The journal articles were all written in English, but referred to TEL projects in many different countries. All the documents that were reviewed had to provide some form of evidence of the impact of the innovation or intervention. When examining the literature the following aspects were considered:

- What evidence was being used to drive the innovation/intervention?
- What evidence was gathered?
• What evidence illustrates changes in the professional practice of teachers in higher education?

In the next four sections we reflect on the process and findings of that review in relation to the dimensions portrayed by Trigwell et al (2000).

a) Engaging with the scholarly contributions of others

Although published studies include a review of the relevant existing literature, in many of the reviewed documents there was no indication that findings or evidence from relevant previous studies were considered before introducing their innovation or that it had contributed to the framing of research questions. Few of the online case studies referred to relevant findings from the literature or lessons learned from previous studies. Any evidence that was drawn upon tended to be from published accounts of using the particular technology that the teacher/researcher had selected to employ in their own study. Such evidence was more likely to highlight the general and potential ways in which that technology or tool could benefit learning and teaching, rather than to any evidence of actual learning gains achieved by analogous students in comparable contexts.

b) Reflection on their own teaching practice and the learning of students within the context of their own discipline

More often than not technology was used to address an under-defined issue. In many of the articles and case studies there was no explicit statement of the rationale, i.e. what had prompted the innovation, other than a desire to experiment with a particular technology or tool. Few accounts described a teaching or learning issue that needed to be addressed and hardly any examined educational problems or opportunities that their particular students were facing. Where other studies were cited, there was seldom any consideration of the extent to which contextual factors (discipline, level, student characteristics, etc.) were appropriately matched to the teacher’s/researcher’s own circumstances. Often there was no clear articulation of what was considered to constitute an ‘enhancement’ (to teaching, to learning or to the learning experience), so that it was difficult to know precisely what was being sought and to identify whether or not a satisfactory outcome had been achieved.
c) **Communication and dissemination of aspects of practice and theoretical ideas about teaching and learning in general**

As the review was of published documents, the teachers/researchers had clearly been keen to disseminate the outcomes of their studies. However, it would be difficult to generalise the findings of many of the studies to any other context due to the manner in which the accounts were reported. Often the focus of a TEL innovation or intervention had been on a fairly specific application of a technology (e.g. blogs, podcasts, wikis, etc.), although there are often many ways in which a particular technology can be used for different educational purposes and can vary considerably between contexts. Published reports often provided insufficient contextual detail and the educational design of what had actually been studied was considerably more complex than what is reported (Thorpe, 2008).

**d) Conceptions of teaching and learning**

Few of the studies reviewed contained explicit statements about how teaching and learning had been conceptualised and reference to relevant theoretical ideas or models was uncommon. Many of the TEL innovations aimed to replicate or supplement existing teaching practices without any discussion of the appropriateness of the current approach. It was rare to find any acknowledgement of the potential influence of assessment upon what students actually did. One way of discerning the conception of learning implicit within a study was by considering the types of evidence collected. Most of the TEL projects that sought to replicate or supplement existing teaching practices employed test or course assignment scores to evidence learning gains. That is, a learning enhancement was interpreted as a *quantitative* change. A relatively small number of TEL projects were explicitly concerned with fostering *qualitative* improvements in student learning.

In terms of the model proposed by Trigwell, *et al.* (2000), we suggest that relatively few of the documents reviewed exhibited an approach to teaching that could be considered *scholarly*. So, what are the factors that are driving the use of technology in higher education teaching and what purposes are being served by the massive growth in computer-based systems?
A technology-led focus on teaching and learning?

Among practitioners there does not appear to be widely shared view of what constitutes *enhanced learning* in higher education and how it can be achieved. Strategy and policy documents often provide little in the way of illumination. For example, the HEFCE revised e-learning strategy (HEFCE, 2009) mentions of ‘enhancing learning and teaching through the use of technology’ and indicated that there should be an increased focus on *student learning* in institutional approaches. However, the document provides little clarification to illustrate what types of activity it envisages the term to embrace.

The 2009 document *Effective Practice in a Digital Age* from the UK’s Joint Information Systems Committee (JISC) states that “Effective practice can be defined as employing a range of pedagogic skills to bring about the best possible learning for the widest variety of learners” (p. 8). It suggests that technology adds value to learning by enabling a range of 11 features, the majority of which could be described as ‘operational’ (e.g. providing better accessibility and flexibility for learners; access to resources and connectivity with others). However, the consequential effects upon students’ learning (i.e. *what?*, *how?* and *to what ends?*) are not discussed.

The lack of precision and clarity about the application of technology to educational processes suggests that technology-led conceptions are predominant among higher education teachers in the design and implementation of new forms of academic practice. We are concerned that a large proportion of the published accounts of TEL activities in higher education exhibit a technology-led focus on teaching and learning (discussed at greater length in Kirkwood and Price, 2012). They concentrate too much on technology (rather than teaching and/or learning) as the *object* of attention and as the *agent* of change.

With the sources that we have mainly used (published accounts), we cannot say that those designing and evaluating the innovations or interventions did not take ‘scholarly’ factors and student learning issues into consideration. However, if they were considered, they clearly were not felt to be sufficiently significant to communicate to the audience of practitioner and researcher peers. Very often teachers seem to be asking “What can I use this technology or tool for?” rather than “How can I enable my students to achieve the desired or necessary learning outcomes?”
Just as the content of a book can take many different forms and can be used in a variety of ways for various purposes, so too can most technologies and digital tools support varying patterns of use and activity types. For example, in educational contexts a blog might be used by individual students for their reflections on topics of interest or on their personal and educational development. However, the same tool could just as easily be used as a resource for sharing ideas among all the students taking a module. If a teacher uses PowerPoint or a video-enhanced podcast to deliver a lecture, it does not make it anything other than a lecture. Technology might make the lecture accessible to learners ‘any time, anywhere’, but does not change it into something different. In any educational context, the technology is secondary to the main object of attention, i.e. the educational purpose and activity that is being enabled or supported.

Unfortunately, it is not uncommon to find expressions of technology as agent in the research literature. For example, a survey of teaching staff in a North American university (Ajjan & Hartshorne, 2008, p. 79) was reported to have found that most teachers

feel that integrating Web 2.0 technologies such as blogs and wikis into the classroom learning environment can be effective at increasing students’ satisfaction with the course, improve their learning and their writing ability, and increase student interaction with other students and [teaching staff]; thus changing the students’ role from passive to active learners, allowing them to better create and retain knowledge.

This exemplifies a technological deterministic conception of the educational process – that is, the idea that technological developments are the central determinants of social change rather than social contexts shaping the ways in which technological tools are used. It fails to appreciate the professional role of the academic teacher – the real agent – as creator and designer of educational activities that promote the development of learning. Technological determinism endorses the notion that using technology for teaching will in and of itself lead to enhanced or transformed educational practices. However, TEL projects that put technology first often result in disappointment for both teachers and their students (Kirkwood, 2009). With the multiple demands that are made upon university teachers, it is understandable that they might pay insufficient attention to the findings from existing research literature about teaching and learning with
technology. However, by seriously considering what educational purposes they are trying to achieve with technology and discovering what existing research and evaluation is relevant and appropriate, teachers might attain greater reward for their efforts (see the Appendix for some suggested guidelines).

**Transforming university teaching and learning?**

Some years ago we argued that technology-led innovations do not in themselves lead to improved educational practices (Kirkwood and Price, 2005). We drew upon reviews conducted in a number of developed countries over numerous decades. We suggested that too often technologies had been introduced to university teaching with little or no consideration being given to the implications for student learning. Despite much talk about the potential of technology to transform teaching and learning in higher education, very often the reality is different with much university teaching remaining fundamentally unchanged:

> For the most part, faculty who make e-learning a part of their teaching do so by having electronics simplify tasks, not by fundamentally changing how the subject is taught. Lecture notes are readily translated into PowerPoint presentations. Course management tools … are used to distribute course materials, grades and assignments – but the course materials … and the assignments neither look nor feel different. (Zemsky and Massy, 2004, pp. 52-53)

There appears to be some confusion between (a) effecting changes in the *means* through which university teaching happens, and (b) instigating changes in *how* university teachers teach and learners learn. While we have found many examples of the first type of change; there are far fewer cases of the second.

In the literature, it is unusual to come across accounts of *transformations* of teaching practices: what is more commonly found is that technology is used to *replicate* or *supplement* traditional activities (e.g. Blin & Munro, 2008; Gonzalez, 2009; Roberts, 2003). In the review referred to earlier (Price and Kirkwood, 2011) only a minority of projects reported in the literature or as online case studies could be characterised as focusing on transforming the learning experience. Those projects usually involved not only the development of TEL resources, but also extensive and structural curriculum changes in the redesign of modules. While technology was involved, it is difficult to
estimate the extent to which any enhancement achieved by the redesigned teaching and learning activities was the product of changes in the syllabus and learning design rather than the application of technology as such. Causality is difficult to attribute when several factors have been modified.

Typically, interventions that seek transformative outcomes need to draw upon a range of data sources and the forms of evidence that are collected must be richer than test scores and self-report student satisfaction surveys. Use of a range of data sources enables the triangulation of evidence: it also acknowledges that many interrelated factors influence student learning. It is not only difficult to bring about improvements in student learning within ‘real’ contexts, it is even more problematic to demonstrate what has been achieved and how it has occurred (Price and Richardson, 2004).

**Differing conceptions of and approaches to teaching in HE**

There are consistent findings from research conducted in several countries pertaining to variations among university teachers in terms of what they believe ‘teaching’ to be about (Kember & Kwan, 2000; Samuelowicz & Bain, 1992 & 2001; Trigwell & Prosser, 1996). While some have teaching-focused conceptions, with teaching being considered to be primarily about the transmission of information, skills and attitudes to students, other teachers have learning-focused conceptions that give primacy to promoting the development of conceptual understanding in students. The research has also demonstrated that the conceptions of teaching held by HE teachers are related to how they approach their teaching. So, teachers whose conception of teaching foregrounds ‘the transmission of knowledge’, are likely to adopt a teacher-centred approach and be concerned with refining and developing their own skills and strategies. In contrast, if teaching is conceived as being about ‘promoting conceptual development in learners’, then a learner-centred approach is likely to be adopted, in which the students and their learning and development are the focus of teaching activities. Further, the approach to teaching of individual teachers has been found to be related to both the assessment practices they adopt (Samuelowicz & Bain, 2002) and the approach to learning exhibited by their students (Lindblom-Ylänne, Trigwell, Nevgi & Ashwin, 2006; Trigwell, Prosser & Waterhouse, 1999). It has also been found that a teacher’s conception of teaching is related to their expectations of professional development.
activities and could potentially constrain their development as a teacher (Åkerlind, 2003, 2007). This is an issue to which we will return in the final section.

These variations in teachers’ conceptions of and approaches to teaching can help us to understand differences in the ways in which technology is used for university teaching. It can help explain differences in technology use at both the strategic (i.e. general approach) and tactical (i.e. particular applications) levels. In strategic terms, individuals whose conception is teaching-focused are more likely to use technology in ways that support existing transmissive teaching strategies. Presentational forms (e.g. PowerPoint shows, podcasts of lectures, webcasts, etc.) buttress the practices of teaching-centred teachers. Also, it could be argued that those with a teaching-focused conception would favour use technology to replicate or supplement their existing teaching practices.

In contrast, individuals with a learning-focused conception of teaching are more likely to exploit technologies and tools that facilitate and support the learning and development of their students. Such teachers propose the use of tools that enable students to interrogate sources of information or data, to undertake group tasks, or to reflect upon and demonstrate developments in their understanding (using wikis, blogs, discussion forums, portfolios, etc.). Often these would be associated with attempts to transform the learning experience through active engagement in knowledge building and sharing, and reflection upon learning and development episodes and processes.

In terms of tactical approaches to technology use, variations in conceptions of teaching can account for the different ways in which a particular technology or tool can be utilised (e.g. discussion forums, podcasts, wikis, etc.).

**Drivers for using technology in higher education**

Some of the lack of clarity that we have observed might be attributed to the wide variety of purposes that technology is expected to serve, given the range of different factors presented as drivers for increased use of technologies in higher education. These include such things as costs (usually related to growth in student numbers), increased accessibility and flexibility, meeting students’ expectations, responding to strategic changes, enhancing learning and transforming learning and teaching.
Professional development for teaching in higher education

To senior managers and policy makers, it seems that enabling academic staff to make appropriate use of technology for teaching and learning is considered to be a technical matter. After raising teachers’ awareness about the possibilities offered by new technologies and tools, technical assistance might be necessary to get them up to speed in adopting new practices. Professional development activities are more likely to be concerned with ‘how to’ issues rather than with explorations of ‘why?’ or ‘for what purpose or goal?’ (Price & Kirkwood, 2008). As pedagogical issues and models of learning are infrequently addressed in an explicit manner, the validity and appropriateness of such a technical focus has been questioned (e.g. Benson & Brack, 2009; Oliver & Conole, 2003). If the adequacy of existing beliefs and practices remain unchallenged, technology is unlikely to be used in ways that are not consistent with and supportive of a teacher’s current ways of teaching.

A superficial examination of the problem might lead one to believe that it is simply a matter of putting the cart before the horse, i.e. technology before pedagogy. But a deeper examination of the problem shows that even if pedagogic issues are considered first, the adoption of technology might make little difference to student outcomes if teaching is not reconceptualised in relation to TEL. More fundamental issues are related to beliefs about teaching and whether the teacher is engaged in passing on information or transforming a learner.

We mentioned earlier that a teacher’s conception of teaching can influence their expectations of and engagement with professional development activities. Nicholls (2005, p. 621) reported that in her study of new university lecturers:

Those who associated teaching with the transmission of knowledge, where students had to acquire a well-defined body of knowledge, were most anxious to develop more sophisticated skills to facilitate the transmission. Those who associated teaching with facilitating learning were anxious to understand and conceptualize the learning process, to help their students.

Transmissive teaching beliefs permeate the sector and often determine the teaching context. Even the most reformed and innovative teacher can be constrained by the departmental or institutional context (Hockings, 2005; Pickering, 2006). This is often
evident in professional development programmes that institutions adopt that focus primarily on teaching ‘how to’ approaches with technologies as opposed to engaging activities that support teachers to reflect on and reconsider heir deeply held beliefs about teaching.

**Conclusion**

The term TEL is too often used in an unconsidered manner and many of the published accounts of projects lack a scholarly approach to enhancing teaching and learning. While technology has increasing influence throughout higher education, there is still much to be learned about its effective educational contribution. The ways in which academics conceptualise teaching and learning with technology have significant and interrelated impacts upon their students’ experience of learning (Kirkwood and Price, 2011). Transforming learning is a complex activity. It requires sophisticated reasoning about the goals of any intervention, the design of the evaluation and the interpretation of the results within the particular educational context.

**References**


Appendix.

Some guidelines for evaluating accounts of interventions involving technology for teaching and/or learning

Based on a recent review (Price and Kirkwood, 2011) we present the following set of questions that academic colleagues should attempt to answer in relation to teaching and learning with technology. The questions could be usefully considered:

(a) early in the planning process before implementing a TEL innovation or intervention project, particularly if the findings are intended to be reported and disseminated to inform the practices of other higher education teachers; or

(b) when considering or reviewing any reported/published account of an innovation or intervention that used technology for teaching and learning.

Answering these questions will help ensure that an educational rationale and the necessary contextual details have been articulated and can be communicated to colleagues and peers.

- What is the teaching/learning concern or issue being addressed by the intervention?
- Why does it need to be engaged with – how is the pre-existing situation to be improved?
- What is the topic/discipline and at what level?
- What technology was/will be used and why?
- Have relevant and appropriate published accounts of other studies in similar or comparable contexts been consulted?
- What evidence is used to drive or support the design of the intervention?
- What is the design of the intervention?
- What is the context within which technology is used? (e.g. to support an assessed small-group activity)
- How does the intervention relate to assessment (formative or summative)?
- How many students are involved?
- What is the nature of the evaluation undertaken and/or the evidence gathered?
• What impact has the intervention had (on students’ learning / on teaching practice / on the activities of others)?

• How successful was the intervention at addressing the issue identified at the outset?