The influence upon design of differing conceptions of teaching and learning with technology

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ABSTRACT

This chapter considers some of the theoretical foundations of teaching and learning in higher education and how these are reflected in practice. We consider how varying conceptions of teaching and learning with technology have an impact upon how teachers design teaching and learning. This chapter reviews why these variations are important and how they can affect the design of the curriculum and ultimately what and how students learn. We conclude that promoting increased use of technology does little, if anything, to improve student learning. It is only by attending to higher education teachers' conceptions of teaching and learning with technology and supporting change in this area that significant progress will be achieved. In this chapter we advocate that informed design in the use of technology is underpinned by beliefs about (conceptions of) teaching and learning with technology. To this end the chapter explores some of the theoretical underpinnings of these conceptions and argues that they are fundamental to driving well-informed practice in the use of technology to support student learning.

INTRODUCTION AND BACKGROUND

There is much hope and promise that accompanies the use of technologies for teaching and learning in higher education, but it is challenging to consider what the best possible uses of technology might be in the design of student learning. Why is it that, in certain cases, technology supported learning is successful in actively engaging students and in improving the learning experience, while in other cases it does not?

What is informing the design of successful learning experiences with technologies? We suggest that teachers in higher education need to be informed not only about the technologies available and their potential uses for teaching and learning, but also about other important factors that have considerable influence upon those processes.

University teachers' views of technology have a fundamental relationship with how they use them and what they consider to be a successful use (Kirkwood & Price, 2005). As higher education institutions strive to embrace societal changes in the use of technology and a range of other influences on how they operate, it is important to recognise what factors affect the use of technology for teaching and learning and what may be done about supporting and improving the practices of academic staff.

To date there has been an over-emphasis on technological manifestations (in other words what technologies are used in educational settings) and this has led to the neglect of pedagogical considerations (Katz, 2010; Kirkwood & Price, 2005). For example, why and how might students and teachers benefit from using technologies (Beetham & Sharpe, 2007; Conole *et al.*, 2008; Kirkwood, 2009)? Reviews of technology use in universities in Westernised countries have repeatedly revealed that, despite the widespread adoption of e-learning technologies and online learning environments, the associated *pedagogical* issues have been of secondary concern (e.g. Becker & Jokivirta, 2007; JISC/UCISA, 2003; Zemsky & Massy, 2004; Zenios *et al.*, 2004;).

There is nothing novel about this perplexity. When television was a relatively new medium, McLuhan's assertion that 'the medium is the message' (1964) summarised his view that communication technologies exerted influence upon society to a greater extent through the characteristics of the media themselves than by the content they conveyed. His technologically deterministic view over-simplified the complexity of the social relationship between *medium* and *message* and with society more widely. This is particularly relevant in education, where the deterministic view suggested that media themselves had a greater influence on outcomes than the efforts of teachers and educational designers. However, it is rarely a case of medium *OR* message, but rather the interplay between the two and other factors as well.

In the 1970s Schramm reviewed several decades of educational media research and concluded that there was little evidence to suggest that any particular medium or

technology could, in or of itself, account for enhancing learning outcomes. Rather, he pointed out "a common report among experimenters is that they find more variance *within* than *between* media – meaning that learning seems to be affected more by what is delivered than by the delivery system" (1977, p. 273). While Clark and his associates (see Clark, 2001) sought to identify how media contributed to education by reviewing comparative studies (that is, projects in which various media had been used to *replicate* classroom practices), other researchers focussed on the unique contributions to educational processes and outcomes made possible by different forms of representation through various media technologies (see, for example, Saloman, 1997).

The advent of the Internet and World Wide Web has not only made technologies more ubiquitous in educational contexts, but has been accompanied by the development of an expanding range of media technologies, each with its own particular characteristics and potential for educational use. While any specific technology can facilitate *and* constrain the educational activities that it makes possible, each has the potential to be used for significantly different pedagogical purposes; it is not associated with just one approach and multiple designs can be employed. As Phipps & Merisotis noted in their review of technology-enabled distance education (1999, p. 8)

> "many of the results seem to indicate that technology is not nearly as important as other factors, such as learning tasks, learner characteristics, student motivation, and the instructor".

Underpinning variations in the use of technology in teaching and learning is a conflation of two distinct aims:

- changes in the *means* through which university teaching happens; and

- changes in *how* university teachers teach.

The ways in which teachers in higher education conceptualise both the nature of learning technologies and the role of teaching have significant (and interrelated) impacts upon the way that they and their students are likely to make use of devices and software tools in the design of teaching and learning; that is their *approach to teaching with technology*. In our research and in reviewing the use of technologies in higher education over many years we have found that teachers and managers tend to

focus primarily on technology as the means by which university teaching happens. This tends to be driven by a technological deterministic view of its use, in other words that the use of technology *in and of itself* will improve student learning. Thus the *approaches* to using technology in teaching and learning appear to be underpinned by *conceptions* about the use of technology in teaching and learning. We use 'conception' to refer to an individual's views or beliefs about a particular phenomenon or the meaning they attach to it (Kember, 1997).

We draw upon the 4P model developed by Price and Richardson (2004) to illustrate the relationships between *conceptions of and approaches to teaching and learning with technology* and more fundamental *conceptions of and approaches to teaching*. The 4P model builds upon Dunkin and Biddle's (1974) model, the original Presage-Process-Product (3P) model of Biggs (1985) and research by Prosser and Trigwell (see for example, Prosser & Trigwell, 1999). As the focus of this chapter is on conceptions of teaching and learning with technology we shall draw out this aspect of the model to illustrate relations with conceptions of teaching. Richardson (2008) has made similar connections between conceptions of teaching and conceptions of sign language interpreting for deaf students. He shows that interpreters' conceptions of interpreting influence their approaches to interpreting. This is similar to the relationship between teachers' *conceptions of teaching* and teachers' *approaches to teaching* (their practices). From our review of the literature we posit that there are similar relations between conceptions and approaches to teaching and learning with technology and with more fundamental beliefs and practices in teaching. We have attempted to show these relationships in Figure 1.

FIGURE 1 HERE

Figure 1. Relationships between Academics' Conceptions, Approaches and Teaching Practices

(At present some of the relationships in this model are illustrate as dotted lines as more research is required to establish their causality and direction).

In the following section we will explore variations in the conceptions of teaching with technology and the relationship with approaches to teaching with technology. In a subsequent section we will consider variations in the conceptions of teaching held by

academics and the impact they have upon the approaches to teaching adopted and, consequently upon student learning.

WHAT PERCEPTIONS DO TEACHERS HAVE OF TECHNOLOGY?

Here we use 'perception' to refer to the awareness that people have of a phenomenon; their interpretation of what they experience. It can be difficult to discern what perceptions people hold about technology without careful investigation. However, the ways in which people talk about devices and the ways in which they use them may reflect the ways in which they think about and perceive them and the context of use. In Figure 1 we have illustrated this awareness about technology as 'perceptions of the technological context'. We will start by looking at the terms used to describe technologies before moving on to consider the implications for how technologies are used.

How are Technologies and Tools described – What's in a Name?

In some parts of the world there is a device known as a *cellular phone*, while in other countries the same device is known as a *mobile phone*. It is one of the most ubiquitous digital technologies in the world and has achieved high levels of access in both developed and developing nations. So, is there any significance to the fact that different names have been ascribed to the same device? We believe there is and we consider this to be illustrative of the technological context.

The coining of the term *cellular phone* primarily focuses on the technical characteristics that enable the device to work – messages are relayed over a cellular network that enables wireless coverage to be achieved over a wide geographical area. In contrast, the name *mobile phone* focuses on the manner in which people can use the device for communication; in other words how humans have appropriated the device to allow them to communicate with others wherever they happen to be located. People who use one (or more) of these devices are much more likely to be aware of the fact that they can exploit its functions almost anywhere they happen to be situated (in other words a user-led focus), rather than understanding the technical means by which communication is made possible (that is, a technology-led focus). We are not suggesting that the ways in which cellular/mobile phones are used by people are shaped by the term used to describe that particular technology, but we do feel that the

original naming provides insights into the differing conceptions of the technical developers.

Throughout the educational world the term *technology enhanced learning* is used extensively: in strategy and policy documents, in institutional promotional outputs as well as in the research and evaluation literature. It is the latest in a variety of terms that have been used to describe the application of information and communication technologies to teaching and learning. Other terms include *Computer-assisted learning, e-Learning, Networked learning, Online learning, Telelearning, and Web-based learning*. In other words, the particular term used reflects perceptions of the technological context. Each term has been applied in an imprecise way to describe a diverse range of educational activities and imply a technology-led rather than a user-led focus. For example, the term *networked learning* has sometimes been used to refer to uses of technology to enable communication between geographically distributed learners; in other contexts the term refers to networks of learners working together on collaborative learning activities (Steeples & Jones, 2002). Any reference to the intended users is derived indirectly through the ubiquitous use of the word 'learning'. More often than not, however, it is 'teaching' rather than 'learning' that is the focal point of the educational activity being described.

Unlike the other terms, *technology enhanced learning* implies a value judgement: 'enhanced' suggests that something is improved or superior in some way. However, it is rare to find explicit statements about what the term is actually supposed to mean. How does technology *enhance* learning – what is the 'value added'? What *learning* is being enhanced and in what ways – quantitative and/or qualitative? Is there a widely shared view of what constitutes *learning* in higher education and how it can be *enhanced*? This 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. The implications of this are considered next.

Technology-led and User-led Conceptions Teaching and Learning with Technology

When teachers in higher education consider the ways in which they might exploit digital technologies and tools in designing teaching and learning, some adopt a

technology-led conception – "What can I use this technology or tool for?" Others may adopt a *user-led conception* – "How can I enable my students to achieve the learning that is necessary?" Those who espouse a *technology-led conception* are likely to think about the optimum technical affordances of any particular technology or tool and assume that use of that particular device or tool will *in itself* bring about the desired behaviours and outcomes in learners. It is not hard to find examples of teachers making statements of this kind: 'The use of computer-mediated communication (or a social networking site) will engage students in collaborative working fostering the development of a learning community'. This represents a technologically 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). Very often it results in disappointment for both teachers and their students (Kirkwood, 2009).

In contrast, where teachers exhibit a *user-led conception* their primary concern is with the activities that they and their students have to do to enable the achievement of valued outcomes from learning through the use of digital devices or tools. How best can they design activities for learning that allow their students to engage with technologies or tools to work in appropriate ways towards significant goals?

Many assertions have been made about the disruptive (Blin & Munro, 2008) or transformative (Garrison & Anderson, 2000; Garrison & Kanuka, 2004) potential of technology in relation to teaching and learning practices in higher education. Technologies are often described by enthusiasts seeking to foster educational reforms as catalysts that contribute to radical changes being brought about in university practices and processes: changes not only in the manner in which teaching and learning take place, but also in the nature of the students' engagement and learning. Some descriptions of the *potential* for technologies to help foster active student learning or promote a constructivist approach to educational activities accentuate the role of technology in bringing about such changes, while under-emphasising the responsibility of the teacher in designing appropriate tasks or processes to enable the desired outcomes to be achieved.

In the following sections we shall explore the first of two aspects of university teachers' conceptions of, and relationships with, technologies for teaching and learning: *agency* and *control*.

WHERE DOES AGENCY RESIDE?

The *Oxford English Dictionary* defines the term *agent* as "a person or thing that takes an active role or produces a specified effect" and the associated term *agency* as an "action or intervention producing a particular effect". We think that it is important to consider *who* or *what* takes the active role when teaching innovations are introduced. For more than 20 years much has been written about the potential for technologies to transform educational practices, not only in higher education and not only in developed countries (for example, see http://www.tessafrica.net/). Very often, the potential agent for change is assumed to be the technology itself (device and/or software); if teachers get their students to use a particular technology, then certain educational outcomes will follow. This is a form of 'technological determinism'. Sometimes *technology as agent* is explicit within statements about changes in teaching and learning practices; more often it is implicit within statements that are clearly 'technology-led'. Here are some examples from the web sites of companies or organisations that offer technologies for use in universities:

> At Elluminate, we unify your enterprise technologies – video and web conferencing, instant messaging, phone, learning and content management systems, social networks, and more – *to make learning and collaboration happen better, faster, and more efficiently*. (http://www.elluminate.com/) [Italics added]

> Built by educators for educators, Sakai *provides a student-centered platform* for learning that can *transform the educational experience*. Its customizable and easy to use interface enables effective and efficient development, delivery and management of courses, course content, and collaborative efforts. (http://sakaiproject.org/using-sakai) [Italics added]

In the research literature it is not uncommon to find expressions of *technology as agent*. For example, one study undertaken with teaching staff in a North American university (Ajjan & Hartshorne, 2008, p. 79) provided evidence that

most [teachers in that university] 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.

Less frequently is it recognised that the main agent for change is the teacher, through what they are trying to achieve by using a technological tool. In contrast with the statements from Elluminate and Sakai above, the developers of Moodle™ – an open source course management system – are aware that the teachers who use that system can employ the component tools and facilities in differing ways:

Many of our users love to use the activity modules (such as forums, databases and wikis) to build richly collaborative communities of learning around their subject matter (in the social constructionist tradition), while others prefer to use Moodle as a way to deliver content to students (such as standard SCORM packages) and assess learning using assignments or quizzes.
(From the Moodle™ website: http://moodle.org/about/).

This statement emphasises the fact that technology can be used in different ways for a variety of educational purposes and that the *agent* is the academic as user and creator of opportunities in designing teaching and learning.

The next illustration is drawn from outside the higher education sector. Within the schools sector in Western countries there has been considerable expenditure in recent years on the acquisition of digital interactive whiteboards for classroom use. But as Haldane (2007) has pointed out, it is the teacher rather than the technology that is the agent:

Of course, the digital whiteboard in itself is not and cannot be 'interactive'; it is merely a medium through which interactivity may, to a greater or lesser extent, be afforded. It is the user of the board who chooses whether or not to take full advantage of the digital whiteboard's interactive potential. The digital board simply provides an opportunity for interactivity to occur; it is a medium, a mere

carrier of information and messages, not the creator of the messages or the one to decide how the messages will be conveyed (pp. 259–259).

We argue that the agent is the teacher rather than the technology and that "although ICT can *enable* new forms of teaching and learning to take place, they cannot *ensure* that effective and appropriate learning outcomes are achieved" (Kirkwood & Price, 2005, p. 260). In other words, the use of technologies for teaching does not *in and of itself* lead to improved educational practices. What really matters is the manner in which teachers – as *agents* – have chosen to design teaching and learning with technology, using tools as appropriate to achieve the outcomes that are significant and valued. We will look at the impact of these differing views and conceptions by contrasting some examples of technologies that are used in various ways within higher education.

RELATIONSHIPS BETWEEN CONCEPTIONS OF AND APPROACHES TO TEACHING AND LEARNING WITH TECHNOLOGY

We illustrated in Figure 1 how university teachers' *conceptions* of teaching and learning with technology relates to their *approaches* to teaching and learning with technology. In the following sections we draw upon two examples of technology being used in differing ways to demonstrate variations in design and impact.

Example 1: Podcasting – An Educational Innovation?

For many years radio and recorded audio have been used to reach people learning outside educational institutions (Buck, 2006; Schramm, 1977). Over recent decades, the development of new means of delivering audio recordings (for example from records, cassette tapes, audio CDs to iPods/MP3 players) has given learners much greater control over *where*, *when* and *how* they listen to audio resources. In turn, the increased control that learners can exercise over how they chose to listen has enabled those creating audio resources for learners to change the format and presentation style to exploit those characteristics. So audio sequences no longer need to resemble a linear talk or lecture, but can, for example, consist of several separate sections interspersed with appropriate activities for the learner to undertake or perhaps present primary source material or an audio 'case study' for learners to interpret or analyse using knowledge and skills they have acquired in other aspects of their studies.

Educational audio sequences can be created in which the voice of the 'teacher' is implicit rather than explicit; in fact, it might not be heard at all. Within the context of open and distance learning worldwide, considerable expertise has been developed in the preparation of audio resources that actively engage learners and contribute to them feeling connected to their teachers, even when separated by time and location (e.g. Rowntree, 1994; Thomas, 2001).

Digitisation has not only made it easier to distribute and listen to audio resources across a range of educational contexts, it has also enabled individuals to cheaply and easily record and edit their own audio files. Basically, *podcasting* refers to the on-line distribution of audio files (sometimes enhanced with visuals) to which users can listen via a desktop or laptop computer or a portable digital audio device (iPod or mp3 player). The term *podcast* was introduced in 2004 to indicate the combination of 'broadcast' and 'iPod' (a portable, digital audio playback device). Podcasting brought the use of audio resources to the wider higher education community. Duke University in the USA distributed iPods to over 1600 entering first-year students in 2004 and encouraged teaching staff to make their lectures available as podcasts (Duke University, 2005). Other universities tried similar schemes and with the launch of sites such as Apple's iTunes U ("Learn anything, anytime, anywhere" - http://www.apple.com/education/itunes-u/) no self respecting western university wants to be without a podcasting presence, even if their students are predominantly on-campus.

However, the vast majority of 'podcasts' available from sites such as iTunes U or from an institutional Learning Management System (LMS) or Virtual Learning Environment (VLE) take the form of recorded lectures or presentations – teacher-led didactic presentations (see Rossell-Aguilar, 2007). It is difficult to discern whether or not the academics responsible for creating these audio recordings have been informed by pedagogical approaches for promoting active learning.

Differing Ways of Conceptualising Educational Audio

The euphoria that accompanies the commercial launch of any new technological device or software tool is of great interest to technophiles, or what Rogers (1995) has referred to as *Innovators* and *Early Adopters*. However, enthusiasm with the novelty and potential of new devices and tools seems to induce amnesia among educational

managers and teachers about existing research and evaluations of effective educational use of pre-existing media (e.g. Edirisingha *et al*., 2010; Kirkwood & Price, 2005). Over the last 5 years, the educational podcasting literature has tended to be dominated by technology enthusiasts and new converts to the potential use of audio in university teaching, primarily for making available recorded lectures or supplementary/revision talks. Very often the focus has been technological, with an emphasis on how audio files are distributed and can potentially be accessed in a variety of locations and circumstances. Much is made of 'mobile learning' and 'portability', while evidence from studies of actual student use indicates that a large proportion of campus-based students do not listen to these resources while on the move (Evans, 2008; Lonn & Teasley, 2009; Walls *et al*, 2010). Similarly, while people with a technology-led conception stress the importance of automated syndication (RSS) that distinguishes podcasts from mere audio files/downloads, it is difficult to find evidence that this feature is considered important by students.

The technology-led focus of podcasting – foregrounding aspects of production, distribution and replay – masks consideration of the content or message conveyed and the educational purpose(s) being served. There is relatively little in the literature that:

- demonstrate a user-led conception,

- report on student-generated audio material created for the benefit of either their peers or their teachers (Lazzari, 2009; Lee, McLoughlin & Chan, 2008; Middleton, 2009), or,

- consider audio to provide personalised feedback to students on their assignments (e.g. Merry & Orsmond, 2008).

Some published reports discuss appropriate pedagogies for promoting active learning – see examples on students' digital storytelling and supporting collaborative and reflective learning in Salmon & Edirisingha (2008). Newton & Middleton (2009) caution that

> understanding educational podcasting as a mechanism for adding new content channels to a teaching system, established many centuries ago, neglects the real opportunity. (p. 238)

These relatively recent studies have concentrated on the new educational opportunities that podcasting offers to university teachers keen to transform the student learning experience; the "real opportunity" to which Newton and Middleton refer. Primarily, these innovations are less about the technological aspects involved and more about engaging students in activities that have been designed to be learner-centred to a much greater extent (in other words, are user-led). In general, digital technologies can be utilised for a range of broad educational purposes. Kirkwood (2009) suggests that technologies for teaching and learning have very often been adopted to enable one or more of these functions:

> *Presentation* – making materials and resources (text, data, sounds, still and moving images, etc.) available for students to refer to, either at predetermined times or 'on demand',

> *Interaction* – enabling learners to actively engage with resources, to manipulate or interrogate information or data, etc,

> *Dialogue* – facilitating communication between teachers and learners or between peers for discussion, co-operation, collaboration, etc,

> *Generative activity* – enabling learners to record, create, assemble, store and retrieve items (text, data, images, etc.) in response to learning activities or assignments and to evidence their experiences and capabilities. (p. 108)

Although podcasting is essentially a one-way medium unable to support true *dialogue*, there is great potential for audio or video podcasts to contribute not only to the *presentation* of information, but also to promoting *interaction* and *generative activities*. Unfortunately, the technology-led conceptions that many teachers exhibit, confine them to perceiving podcasts as being primarily about replicating or augmenting their predominantly presentational approach to teaching.

Example 2: Communication and collaboration – What are they for?

Interpersonal communication is an essential element of university learning and it takes place in a variety of contexts, both formal and informal, and fulfils a number of different purposes. It might involve just two people or many and can engender the academic and social integration that is important for student retention (Tinto, 1997).

The main educational intention of a dialogue might be *convergent* (for example when a learner asks their teacher – or fellow students – to explain or clarify something they have misunderstood) or *divergent* (as when learners compare, discuss or debate their different perspectives or experiences relating to a particular event, concept, principle or theory). The tutorial or small group discussion has been a key element of university education for many years, although the roles of the participants and the types of interaction that take place need to be carefully handled to optimise effective outcomes (e.g. Abercrombie, 1974; Anderson, 2005; Northedge, 2003).

With the increased use of blended learning and learning environments in campus-based universities, online communication has become a feature of many programmes throughout higher education. The advent of new interactive technologies enable universities to overcome the lack of (or reduced) direct teacher-student and student-student communication that exist in supporting learners who may study in a remote or blended learning context. Considerable research has explored the *potential* educational benefits of on-line communication as a means to provide more personalised support (Mason & Kaye, 1989; Budman, 2000; Houston, 2008; Joinson, 2003, 2005; McKenna, Green, & Gleason, 2002; Parks & Floyd, 1996; Walther, 1992). This illustrates the flexibility of technology in supporting online learning while increasing contextuality for learners (Koole, McQuilkin & Ally, 2010).

Many terms have been used to refer to text-based, asynchronous communication between learners and with their teachers: computer mediated communication, asynchronous conferencing, bulletin boards, discussion boards, forums, online discussion groups, and threaded discussions. Some of these emphasise the means by which communication is enabled (a technology-led conception), while others highlight the purpose of the communication (a user-led conception). While campus-based students might have ample opportunities to engage in interpersonal communication – both formal and informal – with their teachers and fellow students, there is an increasing realisation that asynchronous text-based communication which is not transient, but extended over a period of time can have a number of advantages. For example

- Participants can contribute 'anytime and anywhere', within the constraints of the particular system used.

- There is time for individuals to consider their question/contribution/response and to review their posting before it is communicated to the recipient(s).

- It enables those students who are less likely to speak in class to contribute.

- A record of the interactions or discussion is retained within the system that can be accessed for review, analysis and future reference.

However, there are differing understandings and views held by both teachers and students in higher education about the role of communication and collaboration (Ellis & Calvo, 2006; Ellis, Goodyear, Prosser & O'Hara, 2006). These give rise to differing expectations among learners and variability in the extent and value of contributions to such events. When communication and collaboration take place online, learners and teachers lack the cues that are often so valuable in face-to-face contexts (Price, Richardson, & Jelfs, 2007).

Differing Ways of Conceptualising Online Communication

In their review of literature about social interaction in computer supported collaborative learning environments, Kreijns, Kirschner & Jochems (2003) identified a common pitfall:

> A majority of educators – consciously or unconsciously – take social interaction for granted. They think that because in face-to-face learning groups social interaction is 'easy' to achieve if not already there, the same patterns will be encountered in distributed learning groups. (p. 340)

Concerns have been expressed, both in campus-based and distance-learning contexts, about how best to encourage learner participation in online discussions. A recent review (Hrastinski, 2008) identified six differing conceptions of 'online learner participation' within 36 research articles. The researchers had looked for different forms of learner activity as evidence of 'online participation'. These ranged from simple criteria such as 'Participation as accessing e-learning environments' and 'Participation as writing' to more complex criteria reflecting the purpose of the participation:

> It was found that research is dominated by low-level conceptions of online participation, which relies on frequency counts as measures of participation.

However, some researchers aim to study more complex dimensions of participation, such as whether participants feel they are taking part and are engaged in dialogues, reflected by using a combination of perceived and actual measures of participation. (p. 1761)

The educational purpose of online communication and collaboration appears to be of secondary importance to educators with a technology-led conception. Sometimes online communication has been added to existing distance-learning courses with the technology-led expectation that extensive discussion would result, and that 'learning communities' would develop: in practice, the anticipated outcomes often fail to be realised (Erlich, Erlich-Philip & Gal-Ezer, 2005; Fung 2004).

When the operation of online communication or collaboration is informed by a user-led conception of technology use, ample consideration will be given to the purpose(s) to be achieved and to ensuring that learners understand the individual and collective benefits that can be achieved through a reasonable level of participation. Further, the assessment criteria will reflect an appropriate weighting for both the process and the product for the activity (Russell, Elton, Swinglehurst & Greenhalgh, 2006).

WHO HAS CONTROL IN EDUCATIONAL TRANSACTIONS?

In an earlier section we examined *agency* as the first of two highly significant aspects of university teachers' conceptions of, and relationships with, technologies for teaching and learning. This section we turn our attention to *control* in educational processes and to what conceptions teachers in higher education hold about teaching and learning.

University models of teaching are rooted in historical models prevalent in the 1920s in Westernised school systems. These were not underpinned by research into how people learned, but by assumptions about learning based around transferring collections of facts and procedures from the teacher to the learner (Sawyer, 2006), which Papert (1993) characterised as *instructionist* approaches to learning.

Failures in the instructivist approach to education are characterised by differences between what is 'taught' by teachers and what is 'learned' by students (Snyder, 1971). The memorisation of facts and figures is ill-matched to the needs of a knowledge-based economy (Bereiter, 2002; Hargreaves, 2003), which requires learners to act as

professionals, able to construct new knowledge and ideas and to take responsibility for their own continual learning during their lifetime (Sawyer, 2006; Sharples, 2000). By the 1980s it became recognised that higher education learners could generalise their learning and apply it to a greater range of contexts when they engaged in learning the concepts rather than memorising facts and procedures (Entwistle & Ramsden, 1983; Marton & Säljö, 1976; Sawyer, 2006; Richardson, 2000). The challenge for learners has shifted from being able to remember and repeat information, to being able to find it and use it appropriately (Bransford, Brown, & Cocking, 2000), and our goal as educators is to support them in that task. Unfortunately, learning in higher education is rarely evaluated in terms of qualitative changes in individual learners.

For many decades educators such as Malcolm Knowles (1975, 1990) argued that most of the learning activities undertaken by adults are conducted in an independent, self-directed manner. The learner takes responsibility for facilitating the learning process, from start to finish. Knowles identified five important steps, although these do not necessarily progress in a neat, linear way. The learner:

- Diagnoses their learning needs

- Formulates learning needs

- Identifies human and material resources for learning

- Chooses and implements appropriate learning strategies

- Evaluates learning outcomes.

Higher education students need to become increasingly self-directed in their learning in preparation for their future personal, social and work-related lives. Higher education processes require deliberate opportunities for the promotion of self-direction and independence in learners. Hence, learners should be empowered to take responsibility for decisions relating to their learning; including acquiring appropriate resources and determining that their own learning outcomes have been met. Boud (2000) argues that "in order for students to become effective lifelong learners, they need also to be prepared to undertake assessment of the learning tasks they face throughout their lives" (p. 152) and that the existing assessment practices in most

educational institutions do little to prepare learners for this. University education should prepare students to fully participate within a 'community of practice' related to their profession or discipline area (Lave & Wenger, 1991).

This has prompted a shift towards the greater use of learner-centred approaches to teaching and expanding the role of constructivism (including social constructivism) (Bruner, 1990). However, many teachers are uncomfortable about developments that would change their role from being *the sage on the stage* to the *guide on the side*. These are interpreted as stripping academics of the control and authority they have traditionally enjoyed and that the balance of power in relationships with their students would shift away from them (Eynon, 2008; Katz, 2010). It is possible that the 'threat' is perceived as being much more detrimental than it actually is, due to their lack of understanding of what is involved in approaches that are alternative to traditional didactic teaching. Hence in order to resist what might be perceived as an eroding of the academic role, transmissive approaches to teaching are more dominant, allowing academics to retain control.

Most of the decisions about *what*, *where*, *when* and *how* students undertake their studies are controlled by teaching staff of the institution and this has significant impact upon the design of the curriculum. Even work undertaken during 'independent' or 'private study' time is predominantly directed towards tasks or activities that have been determined by the teachers, who also formulate the means by which an assessment of the learning achieved will be made. Although student learning is ultimate aim, a large proportion of academic practices in higher education remain transmissive and teacher-centred. This also impacts upon technology use, as providing added freedom to the student in terms of access to and use of technology further challenges their position by going beyond their sphere of control.

What Conceptions do Higher Education Teachers have of Teaching and Learning?

The teaching approaches of academics in higher education and their underlying conceptions and models of the teaching process have been the subject of considerable investigation (Kember, 1997; Kember & Kwan, 2000; Lindblom-Ylänne *et al.*, 2006; Trigwell *et al.*, 1999). Teaching tends to be conceptualised in a range of ways that can be differentiated in terms of two broad categories; either as the *transmission of*

knowledge or as the *facilitation of learning*. Those teachers who hold the first of these conceptions concentrate on conveying knowledge for students to assimilate and absorb. Their teaching practices emphasise presentational methods that provide students with the necessary knowledge, skills and procedures. In contrast, teachers who conceptualise teaching as the facilitation of learning are much more likely to pay attention to learners' needs, thus helping develop their own conceptions, understanding of the subject, and their capacity to become autonomous and self-directed. Figure 1 illustrates this relationship between teachers' *conception of teaching* and their *approach to teaching*.

While digital technologies can be used in a variety of different ways, more often than not higher education teachers use them to support or reinforce their particular conception of teaching (Gonzalez, 2009). However, contrary to the views expressed by some educational policy makers, when technology is used to mediate teaching and learning practices it does not, *in itself*, change the underlying model of teaching. For example, delivering a lecture using PowerPoint or a video-enhanced podcast does not make it anything other than a lecture – often a *transmissive* pedagogy. It might make it accessible to learners in varying locations and at different times, but fundamentally it remains a lecture. Similarly, on-line discussion within a course is unlikely to promote co-operative or collaborative working, if the teaching is predominantly transmissive in its approach and only the products of individual students is assessed. Only when existing educational beliefs and practices are questioned and re-assessed is there the potential for a teacher's use of technology to reflect a more transformative stance.

CHANGES IN HIGHER EDUCATION – THE CONFLATING AND CONFOUNDING OF ISSUES

Despite much talk about the 'transformative' or 'disruptive' potential of technologies for teaching and learning, there is little evidence of university teachers' practices being changed greatly by the use of technologies – in fact, non-transformation (Roberts, 2003; Blin & Munro, 2008) might be more commonly found (Price *et al*., 2007). Even though higher education institutions have expended enormous amounts on the introduction of learning environments and content management systems, there has been relatively little change in the educational methods and processes. Content-

based resources predominate on many systems and "activities that demand collaboration or reflection … are used less frequently than those activities that replicate face-to-face teaching" (Blin & Monroe, 2008, p. 488).

In contrast, Hiltz & Turoff (2005, p. 60) claim that the evolution of online learning is linked to a transformation in higher education. They suggest that

> We are in the process of moving:
>
> **From**: face-to-face courses using objectivist, teacher-centred pedagogy, and offered by tens of thousands of local, regional, and national universities;
>
> **To**: online and hybrid courses using digital technologies to support constructivist, collaborative, student-centred pedagogy, offered by a few hundred "mega-universities" that operate on a global scale.

This line of thought confounds at least three different types of change in higher education and implies that each is bound up with the others. The first type of change concerns the nature of knowledge, teaching and learning processes (epistemology, learning and pedagogy). Another type of change refers to the means by which the teaching and learning take place (face-to-face or technology mediated). The third type of change refers to the organisational structure for higher education (an issue that we do not address in this chapter). These first two changes are often conflated in higher education policy documents and in accounts of innovations aimed at changing teaching and learning in universities. However, we suggest that these changes are *not* inextricably linked: it is quite possible for changes to take place in one area (in other words the means by which teaching and learning take place) without being accompanied by any significant change in another area (the approach to teaching and learning and associated pedagogy).

The introduction of technologies in the design of university teaching and learning has often been accompanied by rhetoric of increasing *learner engagement*, *active learning* and of more *learner-centred* approaches. But any review of how technologies are actually used in higher education reveals that, more often than not, they supplement or replace prevalent didactic teaching practices (for example lectures). *Technology-enhanced* usually means providing more teaching, often intended to compensate for reduced contact time or larger class sizes. Less commonly does *technology-enhanced* signify that the curriculum and teaching approach has been redesigned to increase

learner's opportunities to achieve greater 'self direction' by exercising more control over their learning activities.

Katz (2010) has suggested that teaching and learning in higher education will change as the result of a transition following an innovative shock or disturbance. While in the first phase technologies were predominantly used as instruments or tools to supplement existing practices, the second phase will be one in which "some people cease to use the [technology] as a tool in support of historically defined approaches and begin to reconsider the approaches themselves" (p. 44). In contrast, we have argued in this chapter that technologies are much more likely to enhance the learning experience when higher education teachers do not accept a technologically deterministic view of the process. Instead they need to recognise the centrality of their role in devising and designing activities to promote learning and to use technologies in ways that enable students to achieve desired educational ends. Further, in order to better serve the needs of the current generation of learners their pedagogic practices need to be reconsidered so that they actively *promote learning* in their students, particularly in relation to the use of technology.

FURTHER RESEARCH DIRECTIONS

Most of the research that has been conducted into conceptions of teaching and approaches to teaching of university teachers has not specifically considered these in relation to technology use and their design of the curriculum (for an exception, see Bain & McNaught, 2006). We have illustrated in our review of the literature that there are grounds for arguing *that conceptions of teaching and learning with technology* are related to *approaches to teaching and learning with technology* and that these are influenced by *perceptions of the technological context*. We feel that this omission is in need of attention as it influences and informs the design of the learning. Much of the research into technology use in education is under-theorised and is evaluated in terms of itself rather than in relation to pre-existing research teaching and learning. In particular it warrants an examination of teachers' conceptions of teaching and learning with technology in order to understand the variation and how these might be related to more fundamental conceptions of teaching. This encompasses an examination of approaches to teaching and learning with technology and with more fundamental approaches to teaching. The role of context in influencing perceptions of technology

is also necessary. Designs for the use of learning technologies need to take account not only of *institutional* contexts (including the specific characteristics of learning activities, courses, disciplines, departments, etc.), but also the wider contexts associated with *individual learners* in our 'networked' world (Luckin, 2010). Furthering our understanding of these complex relationships is essential if the potential of teaching and learning with technology is to be realised.

CONCLUSION

Conceptions of teaching and learning with technology in higher education tend to focus on *improving the means through which teaching happens*; these are not focused on student learning and enhancements are *process-driven* as opposed to *learner-driven*. In comparison, conceptions of teaching and learning with technology that are focused upon *improving how university teachers teach* are more likely to be underpinned by pedagogical considerations of how such changes enhance student learning. If we are going to employ technology in a way that enhances student learning, then understanding the variations in conceptions is fundamental to appreciating how we might effect change and how we better design higher education.

Future development for academics needs to consider their underpinning beliefs about teaching and learning using technology and, more fundamentally, their conceptions about teaching. This is important in order to devise strategies that support staff in the difficult task of changing entrenched views toward using technology so that they make better-informed decisions when designing learning activities. For many teachers this would mean a transition from teacher-centred to learner-centred pedagogies and from technology-led to user-led conceptions of technology.

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KEY TERMS & DEFINITIONS

Agent / agency – An *agent* is a person or thing that takes an active role and/or produces a specific effect. *Agency* is an action or intervention producing a particular effect.

Approach to learning / teaching – The *approach* of teachers to their teaching and of learners to their learning refers to the behaviours and practices that they adopt in respect of those activities.

Conception of learning / teaching – The *conceptions* that teachers and learners hold about learning and teaching refer to an individual's views or beliefs about the particular phenomenon or the meaning they attach to it.

Conceptions of learning and teaching with technology – The views or beliefs individuals hold about the phenomenon of learning and teaching with technology or the meaning they attach to it.

Control in educational transactions – This refers to whom or what has responsibility in the social process of learning and teaching.

Perceptions – This refers to the awareness that people have of a phenomenon or their interpretation of what they experience of the phenomenon.

Teacher-centred / Learner-centred – A *teacher-centred* approach is one in which the teacher's concerns determine the nature and form of the educational process, while a *learner-centred* approach concentrates on the development of learning in each individual.

Figure 1. Relationships between Academics' Conceptions, Approaches and Teaching Practices

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│  Perceptions of Academic│ ─────┐
│         Context         │       \
└─────────────────────────┘        \
                                     ┌──────────────────┐
┌─────────────────────────┐         │  Approaches to   │
│ Conceptions of Teaching │ ────────│    Teaching      │
└─────────────────────────┘         └──────────────────┘
            ┆                                 ┆
┌─────────────────────────┐                  ┆
│ Conceptions of Teaching │                  ┆
│   & Learning with       │ ┄┄┄┄┄┐           ┆
│     Technology          │      ┄┄┄┄┐┌──────────────────┐
└─────────────────────────┘          ╳│  Approaches to   │
                                 ┄┄┄┄┘│ Teaching & Learning│
┌─────────────────────────┐     ┄    │  with Technology │
│    Perceptions of       │ ┄┄┄┄     └──────────────────┘
│ Technological Context   │
└─────────────────────────┘
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