Open Research Online

The Open University's repository of research publications
and other research outputs

Enhancing learning and teaching through technology: a guide to evidence-based practice for academic developers

Other

oro.open.ac.uk

Enhancing learning and teaching through technology

A guide to evidence-based practice for academic developers

Linda Price and Adrian Kirkwood

The Institute of Educational Technology

The Open University, UK.

Commissioned by the Higher Education Academy, York

January 2011

1. Why is technology being used for learning and teaching?

There are many ways in which technology can support learning and teaching in higher education. Some university teachers have used technology to *replicate* or *supplement* their existing practices, for example by delivering lectures using PowerPoint slides and making the presentation and accompanying notes and resources available online from a VLE or equivalent. Some teachers have adopted new techniques to help them cope with increased class numbers or changes in the characteristics of their students. Yet others have tried to get their students to engage in learning activities that would previously have been very difficult to accomplish.

Supporting learning and teaching with technology can include a wide range of activities that serve a variety of purposes. The revised HEFCE Strategy for e-Learning[1] identified three levels of benefits that provide a framework that can be used to categorise different types of intervention:

- **Supporting** existing teaching by, for example, making access more flexible for students or making a process such as the provision of formative assessment and feedback more time-effective or scalable.

- **Enhancing** teaching through the provision of additional or supplementary resources or learning opportunities.

- **Transforming** students' learning experiences to enable them to undertake learning activities in ways that have previously been difficult to achieve (or not considered possible).

In our review[2] of recent research literature, reports and case studies we were able to identify many examples of interventions in the first two categories, but we found far fewer interventions that provided any evidence of learning and teaching being transformed.

1.1 Pedagogic considerations or technological determinism?

> *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.*[3]

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[4, 5] might be more commonly found[6].

It is not uncommon to find claims that technology use in education is accompanied by two linked forms of change. The first type is **conceptual** and concerns the nature of knowledge, teaching and learning processes (epistemology, learning and pedagogy); the second type is **practical** and refers to the means by which the teaching and learning take place (face-to-face or technology mediated). We suggest that these changes are *not* inextricably linked: it is quite possible for changes to take place in one area – for example, 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.

1.2 Conceptions of teaching and learning with technology

Underpinning variation 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;

- changes in *how* university teachers teach.

The ways in which HE teachers conceptualise the nature of technology and their teaching role have significant (and interrelated) impacts upon the way that they are likely to use it in the design of teaching and learning. That is, their approach to teaching and learning with technology is influenced by their beliefs about it[7]. 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[8]. 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. Figure 1 presents a diagrammatic representation of these relationships.

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.[6]

1.3 From 'teaching-centred' to 'learning-centred' higher education?

Because teachers hold differing conceptions about the nature of teaching and of technology use, it is usually insufficient for staff development activities relating to the use of technology to concentrate on providing opportunities for familiarisation and/or 'how-to' guidance. Such activities are only likely to reinforce or replicate existing teaching practices. If significant changes are being sought, academic staff need to consider *why* technologies or tools might be used to bring benefits to learning and teaching. A reassessment of individual teachers' existing conceptions and approaches might be the only way to effect changes.
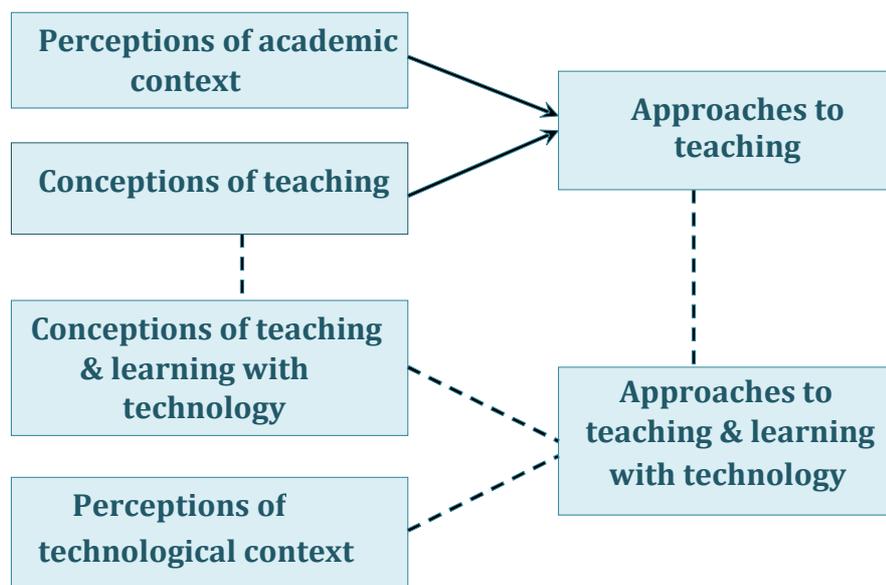

Figure 1: Relationships between academics' conceptions, approaches and teaching practices (from: Kirkwood & Price, 2011[8])

1.4 Why is technology NOT being used for learning and teaching?

The factors that determine whether teachers in higher education employ technologies to change their teaching practices and/or the learning practices of their students are many and complex. The availability of evidence from research and evaluation studies about the particular contributions that technologies can make to educational processes represents only one influence upon teachers' decision-making. Some of the others are briefly considered below:

- *Individual differences in teachers' attitudes to the adoption of innovations*
  The *Adoption of Innovations* model proposed by Rogers[9] suggests that there are different rates at which innovations are taken on within a population. Five groups are proposed, from those people who are very willing to embrace change (*innovators* and *early adopters*) to those least likely to adopt an innovation willingly (*diehards*).

4

- *Individual differences in teachers' conceptions of and approaches to teaching*

HE teachers exhibit differences in their *conceptions of* and their *approaches to teaching* [10, 11, 12, 13]. Technology can support a variety of forms of teaching approaches ranging from transmissive to transformative. It would seem that the way to improve the effective use of technology in HE is to develop teachers' own understanding of their teaching and its impact upon students.

- *Departmental/faculty/institutional ethos and ways of working*

The teaching practices *actually* adopted by individuals are not solely determined by their conceptions and beliefs. Teaching practices tend to reflect the departmental and/or institutional environment within which they are conducted, even if these differ from the beliefs about teaching held by individual teachers[14]. The working environment often fails to support learner-centred teaching[15, 16, 17]. Even if professional development programmes succeed in changing teaching beliefs, changing practices may be difficult because of the institutional or disciplinary context.

- *Competing demands of discipline-based research and administration*

There are demands upon individuals from both their discipline-based community and the institution that employs them to enhance their research profile. The outcomes are highly significant in relation to the funding and status that is derived from the process for future research within disciplines and institutions. Other competing goals relate to the administrative demands that teaching brings.

1.5 Changing individuals – changing groups – changing institutions

What is necessary to achieve an alignment between individual academic practices and institutional strategies and policies relating to learning and teaching with technologies?

Departmental and institutional factors can be just as important as the practices of individual academics when attempts are made to support learning and teaching with technology. Professional development activities should focus not only upon individual teachers, but also upon the relevant middle and senior managers who need to make informed decisions if institutional policies and strategies are to be implemented effectively. Figure 2 presents a framework that might be appropriate.

Group	Role	Purpose of CPD	Aim
Senior university managers	University policy and decision making on the use of ICT	To develop fuller understanding of the effects of university ICT policies and strategies on students, staff and resources. [These might focus on recruitment, accessibility, retention, etc. as well as learning and teaching.]	To promote **strategic** decision making that embeds the necessary support structures and resources to support policy decisions.
Middle managers	Faculty/school/department level policy making on the use of ICT in the overall curriculum	To understand the implications of faculty/school/department level ICT policy and strategies on students' learning and its implications for staff and resources.	To promote **strategic** decision making that supports the coherent application of faculty-/school-/department-level policy in course programmes by providing the appropriate student and staff support structures and resources.
Individual teaching and learning staff	Development of courses using ICT	To develop an understanding of the pedagogical rationale of using ICT in their courses and what the implications of their choices are on students, staff and resources.	To promote contextualised reflective practice and **tactical** choices on pedagogically driven ICT use, aimed directly at improving the quality of the student learning experience.

Figure 2: A framework for continuing professional development (CPD) for using ICT in teaching and learning.

1.6 The role of assessment

The assessment practices exhibited by individual teachers reflect their overall approach to teaching and relate to teaching-centred or learning-centred beliefs[18]. When an approach to teaching is primarily concerned with instruction and transmission, then the associated assessment will focus on ascertaining *how much* has been received by the learners – the *quantitative* transfer of knowledge. In contrast, when the teaching approach is more concerned with enabling learners to develop their understandings, assignments are more likely to enable students to demonstrate *qualitative* changes in their conceptions and ways of thinking.

> *Assessment is the most powerful lever teachers have to influence the way students respond to courses and behave as learners.*[19]

Students are much more likely to give their time and attention to aspects of a course that will be assessed. The ways in which students use technologies for educational purposes are related to how they perceive the assessment demands. Assessment influences not only *what* parts of a course get studied, but also *how* those parts are studied (deep or surface). Interventions often fail to achieve their potential because they are not explicitly linked with appropriate forms of assessment, or they conflict with current assessment practices.

1.7 What is known about students of the 'net generation'?

The use of ICT by students is commonplace for social and personal purposes and most expect to use ICT in educational contexts. However, assertions about the online skills of the 'net generation' need to be treated with great caution[20]. Many young people have considerable familiarity with using a range of technologies, but most of their experience relates to using technology for social or leisure activities, not for the attainment of educational goals[21]. When academics want their students to undertake unfamiliar learning activities, they will need to provide direction on *why* they will benefit (achieving necessary outcomes), as well as *how to* approach the task.

2. Promoting evidence-based practice

Using technology in education can be a costly business, both in relation to the financial investment for infrastructure and equipment and in relation to the personal investment that staff and students make in using the technology in teaching and learning. The sharing of 'good practice' and 'lessons learned' among members of the higher education community can help teachers and decision-makers to concentrate on effective uses of technology and to avoid the unnecessary duplication of effort and expense.

Most of the learning and teaching interventions that take place within higher education institutions are relatively small-scale and it is unlikely that any evaluation or research concerning their effectiveness could be conducted with the rigour of a scientific experiment and produce conclusive evidence.

Cumulatively, however, the lessons learned from a number of similar interventions can provide a useful indication of benefits that might be achieved. Teaching staff are unlikely to seek out and evaluate evidence of what works themselves; they often rely upon the mediation of evidence by academic developers or similar specialists.

2.1 Educational concerns should lead rather than technologies or tools

Many interventions appear to start with a question like 'How can I use blogs with my students?' rather than 'What's an effective way of helping my students to work effectively on group activities?' It is more fruitful to start with an issue or concern that needs to be addressed (engaging with feedback; working effectively in teams; developing learners' practical skills) rather than with technologies or tools.

- **Technologies and tools are transient**
  Particular technologies come, develop and go relatively quickly, while educational concerns tend to be more persistent.

- **Technologies can often be used in many different ways**
  Although accounts often refer to the application of a technology (e.g. podcasts, wikis, etc.) to learning or teaching situations, there are often multiple ways in which a particular technology can be used. Just as a novel, a dictionary, an anthology of poems, a technical manual are all 'books', there are many ways in which specific technologies can be exploited for educational purposes. Use of a particular technology in one context may be very different from another use of the same technology in a different context.

- **Understanding the context**
  What works in one context (discipline group, faculty or institution) might not necessarily work in another. Although research and evaluation reports and case studies about the use of technologies in higher education are often presented in relation to the particular technology or technologies adopted, what has actually been studied and reported is often considerably more complex in relation to the educational design. Thorpe[22] has argued that it is often difficult to generalise findings from one educational context to another:

> *… research might have increased value if it provided more information about the design of the teaching and learning interactions associated with its findings. This would enable the findings reported to be interpreted in relation to the way in which the technology was implemented, and the context of the implementation, rather than to the technology as an abstract concept such as 'computer mediated communication'.* (p. 57)

2.2 What's been done already – what supporting evidence exists?

Our synthesis report[2] and the associated resource tables provide a wide-ranging review of existing accounts of evidence-based practice relating to learning and teaching using technology in higher education. They include brief summaries of the findings and links to the report or account of each intervention.

In our review there were considerably more research reports and case studies that referred to interventions intended to *support existing teaching* or *enhance teaching* than to *transform students' learning experiences*.

2,3 Generating evidence to share with the academic community

Just as you can learn from the reported experiences of others, so too can the academic community benefit by examining any evidence generated from interventions with which you are involved. Whatever means is used to share evidence with others (report, case study, etc.), the benefits will be easier to comprehend if sufficient contextual details are provided to enable those not involved with the intervention to gain a rich understanding. We suggest that the following should be included:

- What was the teaching and learning concern or issue being addressed by the intervention?

- Why did you need to engage with it? How was the pre-existing situation to be improved?

- What was the topic/discipline and at what level?

- What technology was used and why?

- What evidence was used to drive or support the design of the intervention?

- What was the design of the intervention?

- What was the context within which it was used?

- How did the intervention relate to assessed activities (formative or summative)?

- How many students were involved?

- What was the nature of the evaluation undertaken and/or the evidence gathered?

- What was the impact of the intervention (on students' learning/on teaching practice/on the activities of others)?

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

References

[1] Higher Education Funding Council for England (2009) *Enhancing learning and teaching through the use of technology: A revised approach to HEFCE's strategy for e-learning*. Available from: http://www.hefce.ac.uk/pubs/hefce/2009/09_12/09_12.pdf [23 May 2011].

[2] Price, L. & Kirkwood, A. (2011) *Enhancing professional learning and teaching through technology: a synthesis of evidence-based practice among teachers in higher education*. York: Higher Education Academy.

[3] Zemsky, R. & Massy, W. F. (2004) *Thwarted Innovation: What Happened to e-learning and Why.* A report from The Learning Alliance, University Pennsylvania. Available from: http://www.irhe.upenn.edu/WeatherStation.html [23 May 2011].

[4] Roberts, G. (2003) Teaching using the web: Conceptions and approaches from a phenomenographic perspective. *Instructional Science*. 31 (1), 127-150.

[5] Blin, F. & Munro, M. (2008) Why hasn't technology disrupted academics' teaching practices? Understanding resistance to change through the lens of activity theory. *Computers and Education*. 50 (2), 475-490.

[6] Price, L., Richardson, J. T. E. & Jelfs, A. (2007) Face-to-face versus online tutoring support in distance education. *Studies in Higher Education*. 32 (1), 1-20.

[7] Kirkwood, A. & Price, L. (2011) The influence upon design of differing conceptions of teaching and learning with technology. In: Olofsson, A. D. & Lindberg, J. O. (eds.) *Informed Design of Educational Technologies in Higher Education: Enhanced Learning and Teaching*. Hershey, PA: IGI Global.

[8] Kirkwood, A. & Price, L. (2005) Learners and Learning in the 21st Century: What do we know about students' attitudes and experiences of ICT that will help us design courses? *Studies in Higher Education*. 30 (3), 257-274.

[9] Rogers, E. M. (1995) *Diffusion of Innovation*. 4th ed. New York: Free Press.

[10] Kember, D. & Kwan, K. P. (2000) Lecturers' approaches to teaching and their relationship to conceptions of good teaching. *Instructional Science*. 28 (5), 469-490.

[11] Samuelowicz, K. & Bain, J. D. (1992) Conceptions of teaching held by academic teachers. *Higher Education*. 24 (1), 93-111.

[12] Samuelowicz, K. & Bain, J. D. (2001) Revisiting academics' beliefs about teaching and learning. *Higher Education*. 41 (3), 299-325.

[13] Trigwell, K. & Prosser, M. (1996) Changing Approaches to Teaching: A Relational Perspective. *Studies in Higher Education.* 21 (3), 275-284.

[14] Norton, L., Richardson, J. T. E., Hartley, J., Newstead, S. and Mayes, J. (2005) Teachers' Beliefs and Practices Concerning Teaching in Higher Education. *Higher Education*. 50 (4), 537-571.

[15] Gibbs, G. & Coffey, M. (2004) The impact of training of university teachers on their teaching skills, their approach to teaching and the approach to learning of their students. *Active Learning in Higher Education.* 5 (1), 87-100.

[16] Hockings, C. (2005) Removing the barriers? A study of the conditions affecting teaching innovation. *Teaching in Higher Education*. 10 (3), 313-326.

[17] Knight, P. T. & Trowler, P. R. (2000) Departmental-level cultures and the improvement of teaching and learning. *Studies in Higher Education*. 25 (1), 69-83.

[18] Samuelowicz, K. & Bain, J. D. (2002) Identifying academics' orientations to assessment practice, *Higher Education*. 43 (2), 173-201.

[19] Gibbs, G. (1999) Using assessment strategically to change the way students learn. In: Brown, S. & Glasner, A. (eds.) *Assessment Matters in Higher Education: Choosing and Using Diverse Approaches*. Buckingham: SRHE and the Open University Press, pp. 41-52.

[20] Jones, C., Ramanau, R., Cross, S. & Healing, G. (2010) Net generation or Digital Natives: Is there a distinct new generation entering university? *Computers and Education*. 54 (3), 722-732.

[21] Hosein, A., Ramamau, R. & Jones, C. (2010) Learning and living technologies: a longitudinal study of first-year students' frequency and competence in the use of ICT. *Learning, Media and Technology*. 35 (4), 403-418.

[22] Thorpe, M. (2008) Effective online interaction: Mapping course design to bridge from research to practice. *Australasian Journal of Educational Technology*. 24 (1), 57-72.