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A guide to evidence-based practice for policy makers

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Enhancing learning and teaching through technology:
a brief guide to evidence-based practice for policy makers

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

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 identified many examples of interventions in the first two categories, but found far fewer interventions that provided any evidence of learning and teaching being transformed.

Interventions in the first two categories can support institutional strategies and policies for increased flexibility and accessibility; they can also promote efficiencies and enable processes to be scaled up to cater for increased student numbers. However, they are unlikely to contribute significantly to achieving strategic aims such as 'promoting student-centred learning' or wide-ranging changes to learning and teaching practices. For such outcomes, interventions in the third category are necessary.

1.1 Where technology can help: findings that can inform evidence-based practice

We have summarised evidence that has been generated from interventions in relation to the educational purpose being served. The following categories emerged from those accounts:

- the use of technology to support flexibility and widened access to the curriculum;

- the support of more mobile and transient learners, those in the workplace, or those geographically remote from a campus;

- the ability to support students with specific learning difficulties who may find aspects of the curriculum difficult to access;

- the ability to engage students in a variety of ways in their learning;

- supporting appropriate assessment and feedback for students;

- supporting students' skills development and professional practice through virtual environments;

- supporting students' revision and reinforcement;

- supporting students' reflection upon learning and personal development;

- developing students' abilities to link theoretical and practical aspects;

- supporting students' interactions with peers and in engaging them in collaborative work;

- preparing students for life beyond university by developing their networking and discernment skills.

This set of categories should not be seen as being exhaustive. A description of all the interventions in each category appears in our main review report, with detailed references also appearing in an appendix.

1.2 Pedagogic considerations or technological determinism?

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[3, 4] might be more commonly found[5]. Little seems to have changed since an earlier review concluded that:

> *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.*[6]

Claims are frequently made that increased use of technology in higher education brings about two linked forms of change. The first is **conceptual** and concerns the nature of knowledge, teaching and learning processes, while the second is **practical** and refers to the means by which the teaching and learning take place.

This tends to be driven by a technological deterministic view, in other words that the use of technology *in and of itself* will change and improve student learning.

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.

Our synthesis report[2] has shown that that a range of technologies can be purposefully used to support a range of educational goals. However, in the interventions reviewed it was not the technology per se that was the defining factor; it was how the technology had been used to achieve learning goals and how it was integrated with the needs of the students and the context within which the learning and teaching took place. This reflects previous research regarding the role of pedagogy in the effective utilisation of technology[7, 8, 9, 10].

1.3 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. Evidence from research and evaluation studies about how technologies can enhance or transform educational processes represents only one influence upon teachers' decision-making. Some of the others can be more pervasive and are briefly considered below:

- *Individual differences in teachers' attitudes to the adoption of innovations*
  The *Adoption of Innovations* model proposed by Rogers[11] suggests that there are different rates at which innovations are taken on within a population. While some academic staff will be keen to exploit new technologies as soon as they emerge, others will need to be convinced of the benefits that can be derived. Providing evidence of effectiveness and 'lessons learned' is particularly important for the majority who could not be considered to be *innovators* or *early adopters*.

- *Individual differences in teachers' conceptions of and approaches to teaching*
  HE teachers exhibit differences in their *conceptions of* and their *approaches to teaching* [12, 13, 14, 15]. 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.

> *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.*[2]

- *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[16]. The working environment often fails to support learner-centred teaching[17, 18, 19]. 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.

1.4 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[20].

> *Assessment is the most powerful lever teachers have to influence*
>
> *the way students respond to courses and behave as learners.*[21]

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. 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.

1.5 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[22]. 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[23]. Academic staff must lead in relation to *why* and *how* technologies and tools can facilitate learning outcomes that are important in higher education.

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. It is unlikely that any evaluation of their effectiveness could be conducted with the rigour of a scientific experiment to 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 a wiki 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 (e.g. engaging with feedback; working effectively in teams; developing learners' practical skills) rather than with technologies or tools. Use of a particular technology in one context may be very different from the use of the same technology in a different context for another purpose.

However, even if pedagogic issues are considered first, the adoption of technology may make little difference to student outcomes. Just as important are more fundamental issues that are related to beliefs about teaching and whether teachers are engaged in knowledge transmission or learner transformation.

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

In conducting this synthesis we uncovered some issues in relation to the nature of the evidence reported and in finding evidence of changes in practice. Our findings showed that, in general, a weak theory–practice nexus exists. In other words, theory (and research evidence) appears to be having partial impact upon practice.

However, even the most reformed and innovative teacher can be constrained by the departmental or institutional context. Using technology to enhance learning and teaching practices requires more than an adopting of good evidence; it requires a holistic approach to impacting change on the whole educational enterprise.

3. Influencing the institutional culture

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

3.1 Changing individuals – changing groups – changing institutions

The professional development programmes that HE institutions adopt in respect of technologies for learning and teaching focus primarily on teaching individuals how to use particular technologies and less frequently on *why* their use is important. A more effective approach involves engaging teachers in an examination of their beliefs about teaching and the approaches they adopt to determine how they link with the institution's learning and teaching strategy.

As departmental and institutional factors can be just as important as the knowledge and skills of individual academics, professional development activities should also focus on relevant middle and senior managers – those who need to make informed decisions if institutional policies and strategies are to be implemented effectively.

Policy makers need to be clear about the aims and purposes for using technologies in support of learning and teaching. Achieving effective interventions has implications for many different aspects of institutional culture, including:

- policies for infrastructure and technical support;

- policies and strategies relating to student assessment;

- policies for the professional development of academic staff;

- the research and scholarship agenda;

- policies for rewarding/promoting scholarly activities relating to learning and teaching with technologies.

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