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Enhancing learning and teaching through technology

A guide to evidence-based practice for academics

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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-Learning¹ 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 review² 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. [For consistency, we have used the term *intervention* throughout to refer to any instance where technology has been used to support learning and teaching in higher education. We are aware that this term has a variety of connotations, but so too do other words or expressions that have been used in the research and evaluation reports and case studies we have reviewed.]

1.2 Where technology can help: findings of the literature review that can inform evidence-based practice

We have summarised evidence that has been generated in research and evaluation reports and case studies of 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. The order in which they are presented relates broadly to the HEFCE *Supporting – Enhancing – Transforming* levels of benefit described above. A description of all the interventions in each category appears in our main review report, with detailed references also appearing in an appendix. If you want to refer to the original documents, the resource table (available as a separate file to download) provides links to the case studies and details of how to access the journal articles.

We want to emphasise that effective interventions were not determined by the technology per se – it was how the technology was used to achieve learning goals; how they integrated with the needs of the student; and how the learning and teaching context was accommodated.

1.3 Pedagogic considerations or technological determinism?

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.

In our research and in reviewing the use of technologies in higher education we have found that there is a tendency for accounts to focus primarily on the role of the technology (rather than the role of the teacher) and be driven by a technological deterministic view, i.e. that the use of technology *in and of itself* improves student learning. Effective interventions usually involve teachers redesigning teaching and learning activities in relation to goals their students need to achieve, using technology as a facilitative tool.

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.³

1.4 The role of assessment

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. For example, students are unlikely to contribute enthusiastically to a collaborative activity aimed at developing team work skills (using a wiki or discussion forum) if any related assignment rewards only the product of each individual's work and not the group as a whole.

Assessment is the most powerful lever teachers have to influence the way students respond to courses and behave as learners.⁴

Students are much more likely to give their time and attention to aspects of a course that will be assessed. Further, 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).

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 caution⁵. 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 goals⁶. When academics want their students to undertake unfamiliar learning activities, they will need to provide direction on *why* they will benefit (to achieve important or necessary outcomes), as well as practical guidance on *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 by institutions 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 to concentrate on effective uses of technology and to avoid the unnecessary duplication of effort and expense.

Our review² of existing research literature and case studies identified examples of technology use that generated some form of evidence of improved practice that could be shared among the academic community to inform good practice. Cumulatively, the lessons learned from a number of similar interventions can provide a useful indication of benefits that might be achieved. Many HE teachers get advice from specialist academic/learning developers in their faculty or institution who can mediate the evidence about what works well.

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 students with feedback; promoting effective team working; developing learners' practical skills) rather than with technologies or tools. There are a variety of reasons for **not** starting with a technology or tool:

- **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 due to differences in a range of contextual factors. 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. Thorpe⁷ 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)

3. Using existing evidence

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

Our synthesis report and the associated resource table provide a wide-ranging review of existing accounts of evidence-based practice relating to learning and teaching using technology in higher education. We found 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*.

If you are about to initiate or get involved with a learning and teaching intervention involving the use of technology, you need to have a clear articulation of the issue or problem you are attempting to address before looking for a solution. You should consider the following points:

- **What issue are you trying to address through the use of technology?**
e.g. increasing learner engagement during large classes; encouraging collaborative working, etc.
- **What particular educational purpose are you seeking to accomplish?**
e.g. enabling students to achieve a particular learning outcome or goal that it is important for them to accomplish.
- **What have you managed to find out about what others have done in similar circumstances?**
e.g. have you made enquiries with academic colleagues or with learning development advisers within your department or institution?; have you sought out case studies (using the HEA EvidenceNet or JISC InfoNet websites) or appropriate examples from the research literature?
- **What evidence have you found to determine whether other people's interventions have effectively achieved the intended purpose?**
e.g. has the intervention increased participation in group activities?; have richer linkages been made between theory and practical applications?

3.2 What do you need to look for in any existing account?

To what extent does the intervention reported in the literature or case study relate to your own situation – is it highly relevant? For example, how similar are:

- the students – e.g. class size/mode of study/background?
- the subject or discipline area and level of study?
- the type of learning activity that students undertake and its purpose?
- the assessment requirements associated with the activity?

Although inspiration and ideas can be derived from any account of an effective intervention, the likelihood of findings being readily generalised to other contexts and situations depends upon a complex set of factors.

In addition, you need to consider how the originators of reports and case studies have interpreted the term 'enhancement of the learning experience' – what precisely has been 'enhanced'? **How do they know?**

4. Generating evidence in your intervention

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

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