

## **DEVELOPING RESEARCH-BASED LEARNING USING ICT IN HIGHER EDUCATION CURRICULA: THE ROLE OF RESEARCH AND EVALUATION**

### **INTRODUCTION**

The Technology-Enhanced Learning in Research-Led Institutions (TELRI) Project sought to explore and develop the relationship between teaching, learning and research through the use of technology. The project was located at the University of Warwick, with Oxford and Warwick working in partnership, joined at a later stage by Southampton, Durham and Birmingham. This chapter explores the role of research and evaluation in assisting that process, drawing on the implementation work of the TELRI Project across a range of subject areas in a number of research-led universities. The project team found a great deal to reflect on, about what they were attempting to achieve, the way they were approaching it and what happened, and some of the issues that arose are considered here.

### **EDUCATIONAL DEVELOPMENT IN RESEARCH-LED UNIVERSITIES**

Over the last decade in the United Kingdom there has been growth in support for the use of technology within teaching and learning in Higher Education (HE). In particular, since 1993 the Teaching and Learning Technology Programme (TLTP) has promoted the creation of technology-based materials for use across the HE sector. However, evaluations have shown that, in general, staff in research-led universities have been reluctant to take up TLTP-like products. Programmes and teaching approaches are often strongly informed by staff research interests, and at their best may emphasise a research-like approach to learning, in which learners are encouraged to become researchers in their own right. Teaching processes may, therefore, concentrate on developing learners' capacity to be innovative, to work independently, to set and solve problems and to handle large quantities of information in a wide range of media.

The nature of the partner institutions meant that the project was located not only within the broader context of change, but also in a climate where, despite much persuasion as to its multiple benefits, the wider impact of educational technology has remained relatively low. Educational developers are successful when they help to deliver outcomes that are highly valued by the academic staff and students with whom they work. The TELRI project therefore sought to work with the grain of research-orientated academics and turn it to advantage. The project aimed to enrich curricula by deploying technological solutions to develop the research capabilities of undergraduate students.

research and student learning may have in common. Research activity by its nature fosters innovation and can therefore provide a valuable model for developing the higher cognitive skills that inform such capabilities. The research process can directly influence the nature of taught courses if these capabilities are emphasised and explicitly developed in the students. At present, the potential benefit of academics' research expertise as a model for student learning is not always exploited fully in course design and delivery, and this will only change if a conscious effort is made that it should do so. The TELRI project sought to do precisely this. It should be stressed that the improvements in students' learning that the project wished to bring about do not require a research-led environment, and they are largely a re-expression of the goals that many would have for a higher education in general. However, it can be claimed that certain environments, of which research-led institutions are an example (Boyer Commission, 1996), offer particularly valuable opportunities to enhance students' learning, in that the working processes of researchers may serve as a model for - and inspiration to - students.

### **RESEARCH AS PART OF DEVELOPMENT ACTIVITY**

TLTP funding was intended for the support of educational development and not for research. This is, to an extent, understandable, given that such funding was intended directly to produce changes in practice. Further, the focus of the third phase of the TLTP programme was on implementation and not on production of materials, reflecting the quantity of software and related learning materials that had already been produced in earlier phases, and which in many cases had not been much used. Again, the focus is understandable. However, as a project team we realised that they were proposing to work in a field that was under-conceptualised and under-explored. We knew that if we were to do worthwhile work that acknowledged the complexity of what we were dealing with and took account of disciplinary differences, we would have to spend some time in research activity. The project devoted considerable time and effort to formulating a conceptual understanding of what the project was trying to achieve, since we believed the tendency to rush into implementation without laying the necessary methodological ground work would become a major barrier to progress. Such research was approached through literature review and through evaluation of current practice. Specifically, we had coined a term "research capability", which academic staff and the TELRI team found useful and engaging at a common-sense level. However, we needed to identify these capabilities, which required extensive exploration of accounts and analyses of relationships between research and teaching. We were also aware of a vast skills literature, which often appeared to be describing similar learning outcomes to those we were seeking to develop, but without reference to our chosen context. We also took into account a range of literature on student learning, particularly that which explores deep and surface approaches to learning Boud, D. (1988); Bridges, D. (1994); Dreyfus L, Dreyfus, S E. (1986); Kolb, D (1984); Kuhn, D. (1981); Marton F and Saljo R (1984); Marton, F. and Ramsden, P. (1988).

In the TELRI framework, we focused on the cognitive processes of researchers and used this as a model for the development of students' capabilities (Roach, Blackmore and Dempster, 2001). We highlighted two complementary learning processes. The first, which we termed *adoptive learning*, is concerned with established knowledge and approaches and requires students to acquire and apply well-understood subject knowledge and the mastery of tools, techniques and procedures in bounded situations. The second, which we termed *adaptive learning*, is a creative, generative and reflective process, making use of higher order skills in more open situations. It is more difficult to define, especially across subject boundaries. The two forms of learning assist in the distinction between those adoptive skills and abilities which *may* be applied in particular contexts, and those adaptive capabilities which assist in transfer, facilitating the recognition of unfamiliar contexts and enabling understanding and innovation to be applied appropriately. Individuals whose professions require the rigorous application of a discipline, such as researchers, are, it is reasonable to suppose, highly effective in adaptive learning and are potentially well placed both to assist others in developing similar expertise and to assess the presence of such capabilities in others.

For such terms to be useful to academic staff in reviewing their curricula, the team believed that it was necessary to build them into a framework, and so one was designed to provide a generic, cross-curricular approach to the design and evaluation of courses that aim to facilitate the development of research-orientated capabilities. Such frameworks can provide a means for institutions and individuals to make explicit what may currently be implicit and therefore guide appropriate investment in teaching development and in ICT provision. In this case the framework led to the development of course design guidelines (Roach, Blackmore and Dempster, 2000) to support curriculum reflection and review and to guide the project intervention strategies.

## **EVALUATING EXISTING PRACTICE OF ACADEMIC STAFF**

In the first stages of the Project, the TELRI team consulted academic staff across a wide range of departments in research-led universities. This took place alongside the literature review and resulting framework design and helped to inform it, particularly in relation to disciplinary differences. Discussions centred on what the development of research capabilities meant in academics' disciplines and in their own teaching approaches. By this means we gathered understanding of the learning processes a research-based curriculum might help students to develop, across a range of disciplines, and how such courses might be delivered and supported more effectively using technology. There were clear similarities in the learning processes which academics in a range of disciplines described.

There were distinct differences between departments in how quickly the team was able to

Discussion of possible new practice proceeded far more quickly in courses involving tutors from the humanities and social sciences. In general, science departments were concerned with developing approaches in the *delivery of factual information* while the humanities departments were predominantly interested in developing methods to enable student *interpretation* of and *insight* into subject-related materials. It may be that the nature of knowledge in those disciplines lends itself to more discursive approaches to learning. Perhaps ICT support for collaborative learning fits more easily here than in the curricula of the sciences. Furthermore, science-based lecturers often wanted a “total solution” for dealing with curriculum overload and marking and were generally less willing to engage in subject-specific development and adaptation of approaches to teaching (with some refreshing exceptions). It must be said the apparently overloaded curriculum of science subjects and the problems this brings to lecturers can seem a powerful reason not to alter teaching approaches at all. Scientific and other perceived 'content based' courses presented a particular challenge to TELRI. At present such courses are often seen by academic staff as primarily adoptive by nature, because of the quantity of propositional knowledge that they believe has to be mastered by the learner. Questions of relevance, and of the development of broader transferable capabilities may be seen as secondary and in some ways 'not our problem'. Some staff felt they could incorporate the TELRI educational approaches into developing traditional modes of teaching and learning and that they might consider using ICT at a later stage.

## **ICT TOOLS**

TELRI started with an educational idea rather than an ICT tool, and the team believe that this has been a major strength. In considering the potential value of ICT in supporting the development of research capabilities TELRI has used the terms adoptive and adaptive learning to distinguish between uses of ICT tools. Some uses support adoptive learning by making research tools, data and information available, thus contributing to students' disciplinary techniques and knowledge. TELRI has not pursued these. Other uses, those in which TELRI has been concerned, support research *processes* and thus adaptive learning (Blackmore, Roach and Dempster, 2001).

TELRI approaches, therefore, could be used with a wide range of existing tools. There was no intention, at the start, to produce software. Ironically, because so many academic staff had no access to the ICT tools they needed, TELRI found itself obliged to produce a tool, a simple CGI script that enabled publication to the web and critiquing of work. Without such a tool, many interested staff would have been unable to participate.

## **SUPPORTING LECTURERS IN DEVELOPING NEW PRACTICE**

that our intervention was not limited by cultural and policy barriers where staff or departments had control over the design, development and assessment of their courses, both in terms of planning and resources. Only in the cases where all three aspects came together did projects get underway and progress was then quite rapid. Nevertheless, the value of the discussions at all stages for establishing lecturers who wish to be involved is not to be underestimated. This gave us a sound basis for setting out both the educational framework and identifying the change management factors in play.

The project team has often used the terms “*hassle*” and “*enthusiasm*” to describe the dynamics of implementing new teaching and learning practices, particularly apparent with respect to ICT-based development. From our observations supporting educational development, there appears to be a cut-off point at which the “enthusiasm” of the lecturer - even the most devoted ‘convert’ - diminishes as the “hassle” of teaching development rises. (This in turn negates staff development efforts). However, there must be a point at which if you reduce the hassle to almost zero, even a low degree of enthusiasm or indifference might be sufficient to promote uptake and bring about change. (Were it possible to define such qualitative phenomena, exploring such relationships in a range of contexts would make an interesting study!)

In evaluation responses to our dissemination events, academic staff valued the simplicity of the educational ideas and the ICT tools. Staff and educational developers on the other hand were most interested in the evaluated case studies from subject-based courses to use in their own activities.

The majority of lecturers we encountered were at ease discussing the ideas and making their own choices as to how they might inform their own teaching development. Most were interested to explore the TELRI approaches in relation to their own discipline and teaching culture whilst the occasional individual was highly agitated by the ideas and even openly hostile. The innovative approach promoted by TELRI was seen by a few staff as unjustified experimenting with courses. There may also be significant resistance owing to the influence of validation and external subject bodies, particularly in vocational subjects, where academic staff may have power of assessment, but may feel that they do not have control in terms of purpose or external relevance.

The effective integration of technology-assisted methods and materials into courses requires a rethinking of teaching and learning approaches that many lecturers find challenging. However, in the majority of cases, the main difficulties faced by lecturers are to do with lack of incentives to devote time away from research to teaching development, together with the formidable barrier presented by the often inadequate IT provision and support.

The team decided at an early stage to work through institutions' staff developers, and this meant an additional set of relationships that were problematic at times. The project's original intention had been to work one-to-one with academic staff early on, but thereafter to support institutional staff developers in implementing what was intended by then to be a well-trying and documented approach. On reflection, this seems to have been unrealistic. It supposed that staff development units had time available to support the TELRI initiative, although the funding arrangements did not provide them with resources, and it required a high level of commitment to the ideas of the project. In general, the educational framework engaged academic staff in departments more readily than it did institutional staff developers. The resistance of some staff developers to the ideas (or the way they were presented) was surprising to us and provided a potential barrier to discussions with academic staff in those institutions. However, this is understandable, for staff development has a difficult status situation to maintain; it can be a difficult and diplomatic role involving relationships with lecturers that are hard to establish and easy to damage. External projects may propose alternative ideas to those offered by institution-based staff development.

While staff development units are in an excellent position to assist the development of established good practice, they may not be well positioned to promote experimental new practice except in their own teaching development programmes, since courses "belong to" academic departments. Indeed, in some cases, staff/educational developers are seen solely as service providers rather than innovators. To promote new practice it is necessary to be well embedded into the academic culture across the institution, and in this case, to have an existing educational technology focus.

In the light of this experience, whilst retaining its staff development links, the project adopted an alternative strategy for working with institutions. Heads of department were contacted directly and the ideas and approaches were discussed directly with lecturers within a departmental setting. This resulted in a higher degree of interest and an improved level of implementation of both the educational methods and the use of ICT to support them.

## **OUTCOMES**

Implementation in courses across a range of disciplines was generally successful, and a large number of insightful case studies have been generated, although the extent to which the courses are "finished products" varies. This depended on the complexity of what academic staff wished to do within TELRI. In some cases, implementation work has been highly intensive involving considerable time with tutors to identify appropriate resource materials, so courses have yet to run. In others, course approaches required little modification and simple technologies were identified and implemented rapidly and courses were running within weeks. The difficulties that the academic calendar and course schedules imposed on project

The TELRI approaches seem to appeal to many academics willing to shift the practice or culture of their subject, but the operational context for teaching development and use of ICT is extremely restrictive for them. The difficulties for academic staff in changing approaches to teaching are substantial. Academics can change only if they are willing to take on every issue (validation, external bodies, IT issues, and so on), with little support. Reducing the hassle of uptake therefore seems vital, as the motivation to change is generally low. Therefore academic development requires incentives, support and accessibility.

The volume of implementation that can be achieved during the lifetime of funded projects depends on several factors. Firstly, working in institutions will inevitably introduce uncertainties, because a project's work will to an extent depend upon the degree of assistance that the institution can offer their staff, both in access to appropriate hardware and software and in educational development incentive and support. Secondly, the successful integration of new practice in the longer term requires consideration of both the culture of specific disciplines and the institution. Short-term projects, particularly those funded externally, are not always well positioned to deal with this aspect of managing change.

In the TELRI Project, we have been learning the central necessity of examining the purpose behind our implementations. From initial discussions with staff in the participating departments, it was apparent that the primary purpose of embedding research-orientated learning into curricula was often overshadowed by secondary missions driven by political ("seen to be innovative") or technological ("we must use more IT") agendas. As TELRI developed its profile - hand in hand with a research-orientated pedagogic framework – it was easier to communicate to academic staff and departments that we were offering to support them in using technology to achieve the educational ends they recognised and wanted. In particular, TELRI was seen by a number of staff, not only in those disciplines with which we worked, but also in medical education, management training and school-based education, as a practical and sound way forward in the development of transferable skills.

In our strategic approach to institutional change we think we have certainly got something right. We chose to focus on research-led teaching, something which was intrinsically of interest to academic staff and politically important for institutions. The changes we proposed were aligned with academics' sense of what they were doing (or felt they ought to be doing) and institutions' academic missions. We also, we believe, provided a simple means by which learning technologies could genuinely enhance educational quality. Offering a valid and explicit reason for change and showing a simple way in which technology could be used increased enthusiasm and engagement across several levels within the institutions.

## **FINAL THOUGHTS**

does seem to have struck a chord with a significant number of academic staff and to have resulted in uptake of ICT for carefully-focussed educational ends.

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