

Digital libraries in the Classroom Programme Evaluation and Support Study

Final Report

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Disclaimer

While every effort has been made to ensure the accuracy of the information presented in this report, evidence base are not liable for any errors or omissions.

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Executive Summary

In April 2005, evidence base at the University of Central England was commissioned by JISC to undertake a Support and Evaluation Study for the Digital Libraries in the Classroom (DLiC) Programme. Through site visits, interviews and documentation review, the evaluation study has drawn out lessons learned from the programme as a whole.

The Digital Libraries in the Classroom Programme (DLiC) was jointly funded by the National Science Foundation (NSF) in the United States and the Joint Information Systems Committee (JISC) in the United Kingdom. The four projects funded under the programme explore, within different subject disciplines, specific areas where the availability of digital content and the possibilities provided by developments in technology can add value to learning and teaching. The UK/US partnerships provide an added opportunity to share expertise and co-operative planning.

In all, the four projects funded under the DLiC Programme involve twelve partner institutions, seven in the US and five in the UK.

The overall aim of the programme has been to:

“demonstrate how innovative applications of emerging information technology and digital resources can transform teaching and learning”.

The evaluation found that the projects have undoubtedly contributed to knowledge in these areas and have succeeded in making fundamental changes to existing learning and teaching practices. The collaborative nature of the projects has been an interesting feature of the programme.

The diverse nature of the four projects has provided a variety of activity and approach, but also presented a challenge in drawing out lessons from the Programme as a whole. The report gives an overview of the aims and objectives and then looks in more detail at specific aims and objectives and how these have been achieved by the Programme as a whole and by individual projects. It concludes by identifying some common success factors and gives some recommendations for the future.

Innovative use of technology

An interesting feature of the Programme has been the many different ways in which projects have interpreted and responded to the idea of a ‘digital library in the classroom’. Similarly the extent to which technology has been introduced into the classroom experience and the methods employed have varied considerably from the reuse of existing materials to the developments of entirely new resources utilising new technologies to support teaching and learning. It is clear however that the focus of each project has been on pedagogy not technology per se, with the use of technology being to address specific pedagogic issues faced by each project.

Organisational change and infrastructure

The departments found that a project such as DLiC needs to form part of a wider departmental, and possibly institutional, strategy in order to be successful. Future activities to embed the work of the project into the departments involved will further provide indicators of infrastructural requirements.

The DLiC projects have demonstrated the need for technical support within a department if a project is to be properly embedded and seamless for students to use. In many cases, this means that support staff should be fully integrated. However, sustaining such support within a department requires institutional support.

The potential gains for teaching staff include:

- Developing technical, team working and new teaching skills
- Experience of online delivery can be useful for career development
- An opportunity to think about the way they teach and how to get the most out of resources
- In some cases, formal recognition within the institution
- The benefits of collaborative working with colleagues from other institutions
- The opportunity to work abroad
- Crossover into research activities in some cases.

The potential gains for learning technologists include:

- Developing technical, team working and project management skills
- Developing greater knowledge of a subject area
- Experience of a new way of developing resources
- Developing more collaborative working links with colleagues from within the institution and from other institutions

The projects are currently exploring economic models for sustained development beyond project funding. It is clear that institutional support at a variety of levels and the ability of the project teams to champion the project within institutions is an important factor in sustainability.

The impact of the projects on learning and teaching

The emphasis in these four individual projects has inevitably been on the subject-based benefits. Projects have demonstrated how technologies and new approaches to learning and teaching can help assist in overcoming the problems of approaching knowledge pertinent to specific subject areas. There are also some key universal points exemplified by the projects:

- The use of digital resources can lead to a different style of teaching which is challenging and stimulating, with more emphasis on students exploring for themselves
- Repositories (or digital libraries) can be a means of students sharing resources and also of staff and students accessing materials for re-use
- New technology can be employed to help students to grasp difficult concepts and interpret material where their own experience is limited
- There are also opportunities to use these types of resources to help students to discover potential areas for re-interpretation (which is more difficult with polished articles and monographs). This helps them to think differently about the validity of texts

The programme has examined how the classroom experience can be enriched in a number of ways, some of which are described below.

- Tools designed by the projects have challenged students to think about the variety of ways in which a particular event can be viewed, simulating the uncertainties of a real life situation, rather than taking a simple question and answer approach
- A team working approach has been facilitated by the use of student-shared workspace.
- The development of a managed repository with validated resources provides teachers with access to materials that are difficult to obtain from traditional sources.
- In general, project evaluations have found that students react positively to this new way of learning.
- Online delivery can be much less stressful and artificial, and more flexible, than having a class of students in a computer lab
- The use of simulation models broadens students' horizons.
- Online learning can be a good way to introduce complex ideas.
- Online sharing of resources can be more effective than traditional methods of student collaborative working, especially when students are based in different institutions and even different countries.
- The approach to teaching has enabled lecturers to organise their time better.
- The blended approach provides potential for new forms of assessment and can help to ensure that feedback is substantive and timely.
- Digital resources can promote 'conversational learning'. Fears that social interaction would be reduced have not been confirmed, in fact, interaction has frequently increased.

Through their evaluation activities, DLiC projects have developed a better understanding of students' requirements for effective use of ICT, VLE and electronic information resources. The main findings were:

- Students' level of information literacy skills were often lower than academic staff had expected.
- Students may need training not only in how to use a system from a functionality perspective but also how to use it effectively in their studies.
- Staff and students have different needs for repositories so separate systems may be needed for student-shared work and validated resources for teachers to use
- Blogs can be effective, but it may take students a while to understand how to make the best use of them.
- Some students may be more comfortable 'speaking out' online than in class.
- DLiC projects' experience of running completely online courses demonstrates that this is not an easy option, although it may initially be perceived as such by some students.
- A blended approach is more appropriate in the vast majority of cases.
- A wholly online course is likely to need an element of social interaction built in eg a fieldtrip
- Student ownership of resources/systems is important.

Through the DLiC programme, the institutions involved have discovered a variety of ways in which teachers can be assisted in incorporating ICT, VLE and electronic information resources in their courses in appropriate ways, to provide balanced courses for students. For example:

- The role of the learning technologist is crucial.
- A learning technologist with some subject knowledge can be a valuable asset.
- It can take time for people from different disciplinary or professional backgrounds to discover how to work together most effectively.

Collaboration between partners

One of the most interesting aspects of the joint NSF/JISC funded programme is the collaborations it has supported between UK and US universities. Essentially three types of collaboration were evident in the projects:

Technical collaboration

While this has occurred to some extent, it has not been as strong a feature as expected in some projects. While there are examples of collaboration, to a large extent the actual tools or resources produced by each institution can be considered as separate outputs.

Administrative collaboration

All projects were well co-ordinated in their basic administrative support infrastructure, though joint course administration proved a more complex area. Two projects have been successful in collaborative course design and operation.

Intellectual collaboration

Because the results of intellectual collaboration are less tangible and there are no concrete outcomes, these were not always highlighted as success factors. In fact, this has probably been the area in which the DLiC projects have experienced the greatest success and the majority of interviewees were able to provide examples of the benefits of intellectual collaboration.

Common success factors

The identification of common success factors across the four diverse projects was not straightforward, though some common factors did emerge under three general themes.

The development process

- Tools/resources which complement teaching, rather than interfering with the core activity
- Taking an iterative approach to the development of tools and resources
- Communication and discussion (within departments, within teams, between project partners and with the external world)
- Sufficient time to embed projects within the curriculum and working of the department
- An element of external funding

Institutional and departmental support

- Support and active involvement from senior staff in the department
- A high level of interest and involvement in e-learning in general within the department
- Approaches which take account of the structure and ethos of the institution
- Leads/champions in academic departments
- Support at a senior level within the institution

Curriculum planning, development and delivery teams

- Joint input from learning technologists¹ and academics
- In a number of cases, technical support embedded within the department, rather than based centrally, is seen as vital
- Learning technology and lecturing staff work closely together
- Learning technologists who have a basic understanding of the subject area (and of pedagogy)
- A member of the team with both a technology and pedagogy background who can 'interpret' between academics and IT specialists
- The involvement of individuals who really want to examine existing practices and introduce new ideas
- Opportunities for individuals to play to their strengths (i.e. a flexible approach to roles)
- Student input.

Recommendations for the future

Recommendations for future projects developing digital library resources for use in the classroom are based on the success factors identified above in relation to the development process, institutional and departmental support and curriculum planning, development and delivery teams.

¹ The term learning technologist is used broadly here, for example, it might refer to a librarian, editor or web developer as well as what might normally be thought of as a learning technologist.

1. Introduction

The Digital Libraries in the Classroom Programme (DLiC) was jointly funded by the National Science Foundation (NSF) in the United States and the Joint Information Systems Committee (JISC) in the United Kingdom. The four projects funded in the programme are:

Dart – Digital Anthropological Resources for Teaching². This project has two partner institutions: Columbia University (US); and the London School of Economics (UK).

DialogPLUS – Digital Libraries in Support of Innovative Approaches to Teaching and Learning in Geography³. This project is a collaboration between University of Southampton (UK); University of Leeds (UK); University of California, Santa Barbara (UCSB) (US); and Pennsylvania State University (US).

DIDET - Digital libraries for global Distributed Innovative Design, Education and Teamwork⁴. This project is a collaboration between University of Stanford (USA); University of Strathclyde (UK); and Olin College (USA).

Spoken Word – New Resources to Transform Teaching and Learning⁵. This project has five partners, three universities and two other organisations: Glasgow Caledonian University (Lead UK institution); Michigan State University (MSU) (Lead US institution); Northwestern University (US); BBC Information & Archives; and the National Archives and Records Administration (NARA).

The projects explore, within different subject disciplines, specific areas where the availability of digital content and the possibilities provided by developments in technology can add value to learning and teaching. The UK/US partnerships provide an added opportunity to share expertise and co-operative planning.

In April 2005, evidence base at the University of Central England was commissioned by JISC to undertake a Support and Evaluation Study for the DLiC Programme. Through site visits, interviews and documentation review, the evaluation study sought to have drawn out lessons learned from the programme. Although based in the UK, the study team have worked with both the UK and US partners in each project to enable benefits of international collaboration to be explored.

This report begins by providing general comment on the achievement of aims and objectives of the programme. Then each subsequent section looks in more detail at specific aims and objectives of the programme and where projects have contributed lessons to be learned under each of these themes.

² DART project homepage at LSE <http://www.lse.ac.uk/collections/anthropology/dart.htm> DART project homepage at Columbia University <http://www.columbia.edu/dlc/dart/>

³ DialogPLUS project homepage <http://www.dialogplus.org/>

⁴ DIDET project homepage <http://www.didet.ac.uk/>

⁵ Spoken Word project homepage at Glasgow Caledonian University <http://www.spokenword.ac.uk/>
Spoken Word project homepage at Michigan State University <http://www.historicalvoices.org/>
Spoken Word project website at Northwestern University <http://www.at.northwestern.edu/spoken/index.html>

2. Overview of aims and objectives achieved

The overall aim of the programme has been to:

“demonstrate how innovative applications of emerging information technology and digital resources can transform teaching and learning”.

More specifically, to examine:

“how integrating recent technical developments with digital content will improve the learning experience of students and provide new models for the classroom.”

The invitation to tender set out the following issues which it was expected that projects would examine:

- The innovative use of distributed, multi-media, multi-source digital content and advanced network technologies and capabilities in education
- Improving and extending in radical ways how teachers and students approach knowledge in a given subject area; this might involve re-examination of the foundations of a topical area and the methods through which topical knowledge is accumulated, understood and legitimized.
- Examining how the classroom experience can be enriched through the use of innovative applications and access to digital resources for both teachers and students.
- A better understanding of students' requirements for effective use of ICT, VLE and electronic information resources
- How teachers can be assisted in incorporating ICT, VLE and electronic information resources in their courses in appropriate ways, to provide balanced courses for students.
- The institutional information infrastructure required to deliver courses in these innovative ways, including the provision of suitable networks, resources, applications, and the development of strategies to manage all of these effectively
- The organisational changes that will be required to deliver courses in this way and support the staff and students involved, and how these can best be managed by the institutions
- The staff development needs of the teaching staff, the information service support teams and administrators and consideration of the reward mechanisms for staff engaged in innovative activities.
- Economic models for the development, delivery and long-term support and development of ICT-based learning.

(http://www.jisc.ac.uk/index.cfm?name=programme_dlatc_sup)

The projects have undoubtedly contributed to knowledge in these areas. The main objective of the initiative is to apply existing resources and other work to support the teaching process and to “enable institutions to make fundamental changes to the way they teach undergraduates”. In all cases the DLiC projects have succeeded in making fundamental changes to existing learning and teaching practices. Another goal was “to examine the effectiveness of emerging technologies in traditional and new classroom environments”. One of the strengths of the programme as a whole is the variety of classroom environments which it has encompassed. In some cases, whole new courses have been devised, in others, digital elements have been incorporated into very traditional courses. Some elements were delivered online and at a distance, while others emphasised the importance of a blended approach. Many of the teachers interviewed stressed that new technology could be used by teachers using a variety of delivery styles.

It has not been possible for the DLiC projects to meet all of the aims of the programme however. Attempting to assess value for money, however, and the impact on retention, recruitment and achievement in any meaningful way is unrealistic. Whilst the projects have attempted to investigate the implications for students, providing a clear link between a single project and achievement, recruitment and retention would be extremely difficult, if not misleading, especially for those institutions and departments for which the DLiC project is just one of a number of ongoing, complementary initiatives. In order to investigate any of these areas, a longitudinal study would be required extending beyond the anticipated Programme end date. For example, from the evaluation interviews reported here, it was clear that the projects have had an impact on the structure and practice of a number of departments, but the full impact of these, and the implications for the institution as a whole, will only become apparent over a longer timeframe.

It was expected that “International collaboration will offer a greater diversity of partners and approaches, significantly improving the chances of success”. Furthermore, “a key outcome will be an understanding of the lessons that both parties will learn from the others and sharing of experience in different teaching and cultural environments. The partnerships will also enable comparisons of different teaching styles, different staff and student attitudes to the learning process and how the quality of digital infrastructure available to institutions affects the introduction of new methods”. The collaborative nature of the projects has been an interesting feature of the programme and has manifested itself in a variety of different forms which has both brought benefits, and raised many questions, not least, what is meant by a collaborative project.

An interesting feature of the Programme has been the different ways in which projects have interpreted and responded to the idea of a ‘digital library in the classroom’. Similarly the extent to, and methods by which, technology has been introduced into the classroom experience has varied considerably from the reuse of existing materials to the developments of entirely new technologies to support teaching and learning. It is clear however that the focus of each project has been on pedagogy not technology per se, with the use of technology being to address specific pedagogic issues faced by each project.

These features reflect the diverse nature of the four projects within the Programme. Whilst it is appropriate and exciting to have this variety of activity and approach it provides a challenge in drawing out lessons which can be applied as a one size fits all to other institutions and circumstances. Indeed, the DLiC programme has demonstrated how important it is to be responsive to and aware of local contexts where institutional, project and personal circumstances vary and how this has a

bearing on what can be achieved. However, useful lessons have been learned at this stage in the programme which will be of interest to JISC, NSF and the academic community.

It is expected that the experiences and outputs of the projects will be shared widely in the academic community. Through the ongoing dissemination work, it is hoped that these projects will share their enthusiasm and help to inform and inspire others considering embarking on initiatives to introduce technologies and digital libraries into the learning and teaching practice and serve as demonstrators for practical approaches to doing this.

3. Innovative use of technology

The innovative use of distributed, multi-media, multi-source digital content and advanced network technologies and capabilities in education

This section examines how projects have undertaken innovative use of technology and how the notion of a digital library has been interpreted.

Digital Libraries

An interesting feature of the Programme has been the different ways in which projects have interpreted and responded to the idea of a 'digital library in the classroom'. When the original call for proposals (supplementary information) is examined, it is not surprising that each project has a different concept of what is meant by the term 'digital library'. In fact, the 2002 JISC circular (http://www.jisc.ac.uk/index.cfm?name=programme_dlatc_sup#p2) which describes what DLiC-funded projects will be expected to examine, the term digital library does not feature. Instead, broader terms, such as "ICT, VLE and electronic information resources" and "the use of innovative applications and access to digital resources" are used.

Reflections on the way in which each project has interpreted the term 'digital library' are given below.

DART

The DART team at LSE has created a series of 'tools' most of which will eventually be deposited in the JORUM repository (or digital library). These are:

- [What's Going On?](#) A video-interpretation tool used to simulate the collection and interpretation of ethnographic data.
- [Betsileo Rice Challenge](#): A model to simulate the complex series of decisions made by Madagascan rice farmers and the repercussions of those decisions over time.
- [Kolkata Explorer](#): A tool that simulates an exploration of the city of Kolkata in search of ethnographic data. This tool might be considered as a digital library in its own right as it involves following characters on their journey through the city, accessing a wide range of resources on the way, ranging from academic texts to video clips and photographs.
- Criterion: A tool which teaches students about the concept of innateness.

The DART team at Columbia has taken two approaches. The first involves creating a library of resources for a particular course, closely tied to the course syllabus. This

approach which has been undertaken for two courses (South Asia History and Culture and Muslim Societies) includes links to validated external resources as well as materials which have been digitised inhouse. The resources available include maps, photographs/illustrations, audio, video and written materials. The structure created for these courses has been designed to allow the addition of further courses and resources, for example, materials dealing with different geographical areas.

The other website developed has a collection of the fieldnotes of the anthropologist Christoph von Fürer-Haimendorf. This includes editorial content to make the notes accessible to students. Again, this is a type of digital library which the team envisage could be duplicated for other fieldnote collections.

DialogPlus

The Alexandria Digital Library at UCSB was originally expected to have a key role in the DialogPlus project. However, when it was discovered that this would not meet the needs of the partners, the approach was adapted and a range of inhouse and external resources were identified which could be incorporated into 'learning nuggets'. The project has reused a number of existing digital library resources in this way, including those developed through previous JISC-funded projects. Where suitable resources are not currently available the team have designed new materials themselves (e.g. the GPS nugget). Generic versions of the nuggets will eventually be deposited in the JORUM repository (or digital library)

DIDET

There are a number of digital libraries within the DIDET project. At Strathclyde, students use the Laulima Learning Environment (LLE) as a shared workspace for teamwork projects. Students can upload their work to share with others and communicate with members of their team. This can therefore be considered a temporary, informal digital library which is constructed by individual teams to meet their immediate needs while working on a specific project. Material from this which is considered appropriate for reuse is transferred to a managed repository (Laulima Digital Library (LDL)) which contains resources which have been evaluated and validated. The interesting point about both the less planned and more standardised 'libraries' is that the material they contain has been created by students. This is also true of the Informedia-based Digital Video Library used at Stanford which includes videos of student team reviews and tests of designs as well as videos of formal lectures. The Informedia library provides a transcript which can be searched, but the team is also investigating alternative ways of accessing materials through the use of 'power browsing'. In addition, the Stanford team has used the SMETE document library to deposit formal documents such as team reports. These are indexed and searchable by keyword and question type.

Spoken Word

The Spoken Word team at Glasgow Caledonian is creating a digital library of audio, and some video, resources. The method of selecting material for the library is interesting. Resources are digitised on demand, based on the needs of teaching staff involved. The majority of resources are obtained from the BBC, although other resources are created by the team themselves (e.g. recordings of lectures). The development of the repository has been informed by work done by the US partners on Repos and Fedora.

The US partners have focused their attention on developing tools to facilitate the use of digital libraries in the classroom.

The team at MSU has developed MediaMatrix which is a tool which allows students to capture and edit materials (sound, text, written, video) from any digital library and incorporate them into an assignment.

The team at Northwestern has been working on the Project Pad tool which offers students the ability to identify and mark sections of audio and then to create their own audio libraries. The project encourages the use of a number of existing digital libraries such as the National Gallery for the Spoke Word (NGSW), Historical Voices, The Oyez Project, and to some extent, BBC - Information and Archives. It is also working to integrate Project Pad into FEDORA, an open source digital object repository. This will allow users to create and organise new digital library collections within the repository.

4. Organisational change and infrastructure

- ***The institutional information infrastructure required to deliver courses in these innovative ways, including the provision of suitable networks, resources, applications, and the development of strategies to manage all of these effectively***
- ***The organisational changes that will be required to deliver courses in this way and support the staff and students involved, and how these can best be managed by the institutions***
- ***The staff development needs of the teaching staff, the information service support teams and administrators and consideration of the reward mechanisms for staff engaged in innovative activities.***
- ***Economic models for the development, delivery and long-term support and development of ICT-based learning.***

This section explores the ways in which the four projects have responded to the need for organisational changes to deliver courses using new technology and support students and staff. This includes the institutional information infrastructure required, staff development needs and models for long-term support and development.

4.1 Collaborative, multi-disciplinary ways of working

From the evaluation visits and interviews, it is clear that cross-departmental and cross-institutional collaboration is a more common practice in some institutions than in others. For some institutions, or departments, this way of working was a novel aspect of the project. Even where this mode of working was claimed to be more usual, however, for the individuals involved, the DLiC project may have been their first experience of working in this way.

The composition of project teams and the range of departments involved varies from institution to institution. Where the core teams are based in a single department (Leeds, Glasgow Caledonian, Stanford and MSU) they could be considered more homogenous in terms of their background and interests. Elsewhere, for example at LSE and Strathclyde, staff from support departments have become embedded within an academic department. But while at Strathclyde, the lead is very much from the subject department, at LSE, the academic and support department heads are joint project directors and this is something which was emphasised as of importance. Another model has individuals based in different departments working closely

together. At Southampton, for instance, the project is seen very much as a collaborative effort between three academic departments. At Columbia, the research fellows are based in the anthropology department while the project management and support staff are based in Academic Publishing.

An important element of the DLiC programme is the way in which it has experimented with different models of team working and internal collaboration between academic and support departments within an institution. From interviewees' comments it would seem that there is no single 'right' approach, rather the project teams, in particularly the directors and managers, are aware of what would work best for their institution, based on past experiences and the way in which the institution is organised and operates.

It was notable that the way in which teams have developed owes much to the personalities involved. A common example is that the precise nature of roles has been determined by individuals' own interests; had another individual been employed in the same role, the way in the team operated and the way in which work was allocated may have differed.

It is noteworthy that a number of the staff involved in the DLiC projects have dual-career backgrounds; most commonly individuals employed as learning technologists have previously worked as lecturers. This allows them to appreciate the work of the project from two perspectives: the technical one and the pedagogical one.

4.2 Professional development

Involvement in the DLiC projects was seen as beneficial in career terms, and often personally too, for many of the staff involved. Many people said they have gained technical skills, but perhaps more importantly, they have gained softer skills, for example, team working skills. Many of the lecturers interviewed felt that their teaching has improved through involvement in the project, but this was not simply through using the tools which had been developed. Discussing their approaches and pedagogical beliefs both with other academics and also with non-teaching staff, has proved a significant outcome for many. The projects have had a particular impact on the career development of some of the younger staff involved. Among those new to academia a number said they valued the opportunity to work on such a project and felt they had learnt much from the experience. In terms of career progression, however, some thought the benefits were limited as much greater emphasis was still placed on research than teaching experience in many institutions and disciplines.

4.3 The role of support staff in learning and teaching

The precise role of support staff within projects is an interesting issue to explore across the programme as a whole. In some projects, for example, learning technologists are more technology-focused, while in others there are dedicated technical staff who take on this role and the learning technologists helps to bridge the gap between the technical and academic staff. At LSE, the learning technologist works closely with academic staff to implement their ideas for teaching tools, but he is a member of a centre which employs a 'spectrum' of learning technologists, from the technically-focussed to the training-focussed. At Strathclyde, the learning technologist is not responsible for the technical development of the tools, but has a library background so is involved in IPR and information literacy issues. The IT advisers at Glasgow Caledonian, perform a similar role to learning technologists elsewhere and they divide their work so that one has become more technically focussed, while another has more contact with teaching staff to explore how they

could make use of the resources. The editor at Columbia takes on a similar role to that of less technically-focussed learning technologists elsewhere. At Southampton, there are learning technologists embedded within the geography department who have a good technical knowledge and work with academic staff to develop tools to support their teaching. However, they acknowledge that there are times when they would need to consult technical specialists to answer more complex queries. The learning technologists here have experience as lecturers. Likewise, at MSU, a number of staff have a technical focus, but also work as lecturers and have humanities backgrounds.

Support staff from a number of projects said they had gained a much more detailed knowledge of a specific subject discipline through working on the project. Both they and the academic staff felt that this level of understanding, which had been developed through a sustained period of in-depth collaborative working, was vital if they were to fully understand the needs of lecturers and support them effectively.

4.4 The difficulties of multidisciplinary working methods

Some projects had encountered challenges with working in multidisciplinary teams.

4.4.1 Location

While some teams work in close proximity, others are dispersed. The majority view seems to be that working in close proximity is important to ensure a team work together as effectively as possible. Having support staff located within departments rather than in a central unit was seen by some to be necessary and something they hoped to sustain after the project. However, in other cases the teams are more dispersed. This happens on different scales, for example, at Southampton, although there are learning technologists within the School of Geography, some of the research assistants/fellows and senior members of the project team are based in different departments, but on the same campus. At Glasgow Caledonian, the project team is based together, but the academic staff they support are not. Indeed, many of the staff in this team support work in other institutions. At Leeds several members of the team work remotely. In none of these projects does the physical distance between team members seem to have had adverse effects on the project in terms of team working and collaboration as technology has been used to facilitate communication.

4.4.2 Different working styles

Having people from different disciplinary backgrounds working together, often for the first time, meant that differences were noted in working styles and priorities. A number of project staff reported that they had learned much simply from observing how other professions and disciplines work. A problem for some, especially those working on the more technical aspects, was that they felt that other members of the team did not always understand, recognise or appreciate the work they were doing. It was clear that technical staff were very appreciative when others made the effort to at least try to understand their work.

4.4.3 Technical support

The level of technical support the various projects are able to draw on varies and this is evident in the technical sophistication of the tools developed. Although those with less technical support have managed to produce pedagogically robust materials, they are less technologically elaborate.

4.4.4 Speaking different 'languages'

One of the key issues of working in multidisciplinary teams to emerge was the idea that people from different disciplines or professions use different languages, which were not always intelligible to those outside that discipline. This was particularly true when academic and technical staff worked together. In each case where this was mentioned, key personnel were identified, usually support staff, who were skilled at 'translating' between different 'languages'.

4.4.5 A new model of 'academic' working

Interviewees from a number of projects referred to the difficulty some staff might experience because they were not used to working as a team; the more usual academic model was for an individual to create their own teaching material alone:

I know in my department creating educational material is a personal, private activity its not a public communal activity as it should be it isn't that its personal, its something one does on ones own perhaps with the assistance of some graduate students but its never anything or rarely anything that would be put out on the table for others to comment on.

Adapting to a new way of developing learning and teaching resources was something which is bound to take time, especially for staff in more traditional departments and disciplines.

4.5 Summary

One of the important, but perhaps less expected, outcomes of the DLiC programme is the ways in which it has demonstrated that gap between academic and support departments and staff can be bridged. A number of interesting models have been presented which have potential for the future. The Spoken Word is focussed on outreach from support departments at Glasgow Caledonian and MSU to academic staff; this is perhaps a more traditional approach, but the project has shown how it can be done effectively, not only within a single institution, but also between institutions. At MSU, the project is led from a support department, but senior staff are based in various subject departments and split their time between the two. The project manager at Glasgow Caledonian also teaches, so has strong links with a department. Columbia is similar in that it is led from a support department, but here a number of the project team are based in a subject department. However, this is a very different situation because these are junior staff with no previous links to the department and employed on a temporary basis. At Leeds, although no support departments have been directly involved in the project, the academic staff have taken on some of the functions which have been done by support staff elsewhere. At LSE, the learning technologist and research fellows have worked closely together and the project has joint directors from the academic and support sides. At Strathclyde, members of other departments have been embedded into the subject department. Finally, at Southampton, learning technologists have been embedded within geography, but there has also been collaboration with other departments which, although they are academic disciplines, can be seen as having a support function within this project.

A number of project staff thought that having active support for the project from senior staff in the department was critical to ensure success. It would seem to make sense that most of the projects are led, or jointly led, by an academic department as both teaching and technical staff felt that the projects were not especially innovative

in terms of the technology used; the innovative aspects related to the way in which the technology had been used within departments and within the classroom. It was claimed that another advantage of having an academic department leading a project was that it ensured early take up of outputs and buy in to the project and that other academics may be more easily interested in the project through peer recommendation. The exception among UK projects was the Spoken Word. Here it was claimed that basing the project within a support department means the resources are more widely available to people from a range of disciplines. There are obviously pros and cons; it means that there is less impact on a single department, but this project's outputs already being used in a range of subject areas does not face the same difficulty as the others in demonstrating the transferability of the models developed to different disciplines. The project at Columbia is also based in a support department and this has meant take up of the tools within the department they are working with has been slow. However, take up has also been slower than was hoped at LSE where the project had a co-director in the academic department, so this may say more about the discipline involved than about the structure of the project. At MSU where the project is also based in a support department, this has not been a noticeable problem because the centre is well-established and has ready made links to a number of faculties and staff.

5. The impact of the projects on learning and teaching

- ***Improving and extending in radical ways how teachers and students approach knowledge in a given subject area; this might involve re-examination of the foundations of a topical area and the methods through which topical knowledge is accumulated, understood and legitimized.***
- ***Examining how the classroom experience can be enriched through the use of innovative applications and access to digital resources for both teachers and students.***
- ***A better understanding of students' requirements for effective use of ICT, VLE and electronic information resources***
- ***How teachers can be assisted in incorporating ICT, VLE and electronic information resources in their courses in appropriate ways, to provide balanced courses for students***

This section examines how the four projects in the DLiC programme have improved and extended how teachers and students approach knowledge and how the classroom experience can be enriched through access to digital resources. It also considers what the projects have learnt about students' requirements for the use of ICT, VLE and electronic information resources and how teachers can be assisted in incorporating such resources into their courses.

Given the diverse nature of the projects, it is difficult to draw comparisons between approaches taken and form conclusions about the impact of learning and teaching for the programme as a whole.

Another important consideration, which was pointed out by representatives from all the projects was that it was not possible to say whether improvements which had been noted were directly the result of the project. Or, at least, it was difficult to determine whether improvements were the result of what the project had explicitly set out to do, or the result of 'spin offs' which had resulted. To give one example, one of the common themes between projects was the way in which they have stimulated discussion about learning and teaching within the departments involved. It may therefore have been this, rather than the introduction of new learning resources, for example, which had had an impact.

Although the aims of each project with respect to learning and teaching differed, there were some common themes. Most notably, that the types of skills which staff hoped students would develop through engagement in the project were the skills they would require for the workplace and for lifelong learning.

5.1 Technology vs pedagogy

It was interesting that staff from a number of projects stressed that they were keen to ensure that the technological aspects of the project supported, rather than 'interfered' with, the pedagogical aims. It is clear that for all the projects, Digital Libraries in the Classroom has been about pedagogy rather than about technology. However, it was apparent that the use of e-learning generally was something which was seen as more innovative in some disciplines, and in some institutions, than in others. While for some the DLiC work was just one in a series of e-learning initiatives they were involved in, for others it represented a much more radical departure.

5.2 The impact on students

Some interviewees reflected that, at this point, the greatest benefits from the projects have been for lecturers, rather than for students directly; it may be some time before the full implications for students are seen as cultural changes within departments which have resulted from the project gradually feed into teaching.

5.2.1 Student ownership of resources

One feature which did seem to be significant was the level of student ownership of projects. Some staff believed that, where students felt they were contributing to the development of a resource or in some way having a say over the direction of the course, this resulted in positive attitudes towards the learning activities involved.

5.2.2 Students' e-learning skills

From the students' perspective, all the projects have found that most students responded positively, although there were some who were less keen to engage in e-learning. Some interviewees thought that the students who experienced most problems getting to grips with e-learning were generally those who had difficulties with key skills such as literacy or information skills.

There were differing views about the level of skill students had in e-learning. Some interviewees felt that students were coming to expect this approach as the use of VLEs and other online forms of delivery expanded in the school sector. However, others commented that, although students may be used to taking part in online activities in many areas of their lives, learning in this way was still something which was new to many. There was some mention of the fact that at least some students do not yet take e-learning as seriously as more traditional forms of delivery; they assume it will be an easy option.

5.2.3 The importance of a blended approach

Many interviewees thought that the use of online materials in undergraduate courses, would always be limited; a blended approach needed to be maintained:

I think they will be quite amenable to stuff that they can see you can't do any other way...how a river's going to behave in particular climates...they're more uncertain about the idea of engaging in discussion boards as part of their

learning and in accessing online tutorial type material instead of, or in addition to, turning up to lectures... and that will probably persist...

...but obviously people like to teach face-to-face...therefore, I think, the interest is only going to be limited to those that either want to try new ways of teaching or teach by distance anyway...

I suppose if you're really radical, you say, 'Okay, well these sorts of strategies work so well, should we just do everything...but I do wonder if part of the success, if part of the students sort of liking this is, because it's something different, just the diversity within the programmes. It's quite a complicated area, you know, if you did sort of roll it out everywhere, would the students not enjoy it quite so much.

Another interviewee agreed that it was important to maintain a balance between online and traditional delivery methods:

If everybody did all their courses by practical assessment with an online quiz, it would be, you know, as bad as everybody writing a course essay. So, we've got to get a mix of things, and we are trying to increase the way we use our online resources.

In the future, one interviewee thought that interest in e-learning might wane, partly because of pressure from students who expected face-to-face communication with tutors:

I think there will be pressure from students who are paying, if you implemented it too far, I think there will be very negative feelings from students, in that, 'We're paying you to teach us; why are you doing it by computer?' I think that will become a very important issue in the future...in the mainstream I think we've got to be careful not to overdo it or I can see students revolting to a certain degree. I think they don't like necessarily...just being told to get on with it.

While students appreciated the practical benefits of online delivery, they still wanted the 'university experience'.

One interviewee commented that they felt it was important for students to experience distance learning as it developed skills they would need for lifelong learning, but they acknowledged that, at the moment, the traditional idea of campus-based lectures was something which would not be easy to change; students, lecturers and university administrators all expected this. Another interviewee stressed that, while undergraduate courses benefited from some elements of online learning, there was a definite need for face-to-face contact too. However, there was an argument for having one module in an undergraduate course delivered completely online as this would be:

...a preparation for lifelong learning. So, they're going to get out into industry, business, other professions and they want to come back and do a Masters course, they may not be able to afford the year off...they're going to have to think about part-time distance learning, so this is a kind of taster.

5.2.4 Assessment

Where there were particular problems was around the question of assessment. Many students were reluctant to devote time to additional activities if these would not contribute towards their grades. However, finding an appropriate way to assess e-learning activities was something the projects had struggled with to some extent especially in UK institutions. Comments from interviews suggest that students need

to have a clear idea of why they are being asked to do something and how it will benefit them if they are to engage fully.

5.3. The impact on teachers

Most project staff felt that at the earliest stages the biggest impact was being felt on teaching staff.

5.3.1 Changes to teaching practice

Involvement in the DLiC programme offered a number of lecturers an opportunity to experiment with different ways of teaching. Many interviewees commented on the way in which the project had improved their experience of teaching in both pedagogic and practical terms:

In terms of what I've seen and the way things are taught in university, I think we've tried to put a lot more emphasis on students doing things and exploring things themselves rather than receiving pearls of wisdom delivered to them on a plate in lectures or seminars. So that's a novelty in comparison to how I see the majority of university teaching...

One of the huge problems of doing geomorphology teaching is that you can take students to the river and you can show them the river and it's one river one day, of course these are things that adjust over a great deal of time and they're very, very different in different places as well, so I immediately saw the opportunity to be able to innovate by using digital library resources...the simulation model idea to essentially broaden student horizons beyond that same green forest or whatever rivers I happened to show on slides or in a lecture, so it was about broadening student horizons and looking at the potential of digital libraries to do that....It was the idea of going to explore different environments and perhaps using that data to set up simulations and to explore how those environments might respond to environmental change...

...completely exhausting afternoons...students sitting at PCs in a PC class...running round looking over students' shoulders saying, 'No, I don't know', 'That won't work...', 'You need to think about...'. And I used to enjoy that; it was quite theatrical, but it was totally exhausting and my big concern with it has always been...that if there's a big class of students in the computer lab and you're trying to teach them...some of them make a lot of noise and get a lot of attention...some of them really struggle with what's going on and they don't make much noise...they don't really benefit from that environment and it's very artificially regimented and you're always trying to sort through technical disasters that you have no control about...and you've lost this whole chance that can't be re-timetabled. And frankly, I've done away with that whole stressful exercise in my life.

5.3.2 Discussion and debate within departments and beyond

Another benefit of the programme is the fact that it has encouraged greater discussion about teaching and learning within the departments involved:

It is, indeed, innovative to have such a project such as this within the school where you're getting the department to sit together to reflect on what they teach and how they teach it and why they teach it and to identify particular questions about the nature of the discipline and the way it's taught, and then to think, possibly, as to how you may use the technology to reconstruct or

reconfigure courses to address these issues. That process tends, as likely as not, to happen in this kind of way.

In addition, the collaborative aspect of the projects allowed academic staff an opportunity to discuss ideas with colleagues from other institutions:

They're all well known for what they do and therefore it was actually interesting and rewarding working with them, personally I found it more so. The nugget is better because there were more experienced people controlling it so it was good in terms of the special collaboration beyond the scope of the project to work with the people and it made it ultimately a much more usable nugget.

5.3.3 Time

However, a restraining factor on the further implementation of e-learning might be the fact that lecturers would start to realise how much work was involved if they wanted to do it properly in other contexts:

When and if more people get involved and they see how actually difficult it is and how much more work it...they will pull back a little bit.

I think I'm perhaps a little bit more wary of e-learning in a good way in that I realise how much work it is. I think a lot of people perhaps see it as an escape and a time-saver and I think probably to start with I perhaps thought, 'Oh yes, it will be', but actually it's not really in that obviously the production time needs and attention needs is quite upfront, but I think that it will allow us to teach much more effectively than we did before by allowing us to introduce different things.

One of the main benefits of the project for this lecturer was the fact that it had allowed staff the time that is needed to introduce and develop e-learning; opportunities to devote time to this would be limited under normal circumstances in most departments.

5.4 Summary

As one interviewee pointed out, it was difficult to comment about the true impact of the Programme at this stage as to do so would require a longitudinal study. Representatives of all the projects pointed out, dissemination work could only really begin once the tools and methods they had developed had been proved to be robust and methods tested among the core project staff. The activities reported at this point, therefore, represent just the start of this process; for all projects, much more work will be carried out over the next few years.

In all cases, the tools and methods projects have developed have already extended beyond the core project team and this is expected to continue. It needs to be accepted that not all members of a department, institution or discipline the project team are trying to reach will be interested, but it would appear that a significant number are.

In the case of the tools themselves, they have been designed to be reusable to a greater or lesser degree. Although in some instances, other staff may want to simply use a tool exactly as it has been created for the project, it is expected that, in many cases, they will be more likely to take the 'shell' and insert their own content.

In addition to the adoption of project activities beyond the core team, projects are being embedded in departments through links to other external projects and internal initiatives (e.g. use of the VLE and development of learning environments) and also by the continued employment of project staff within departments. A number of departments have brought project staff onto the permanent staff of the department or ensured their continued employment on further projects.

While the projects will continue to use the tools developed in the immediate future, these are not seen as a long-term impact of the project in themselves. It is innovations such as new curriculum development and delivery teams; new ways of learning and teaching; and new working practices which are more significant. Departments and institutions will need to make decisions about which aspects of the projects they wish to sustain beyond the funding period: Which are viable to sustain? Which are really beneficial in the long term?

In addition to interest within the institution, all projects have reported interest from other institutions. At this stage of the programme, there are few examples of a practical transfer to another institution, but project staff feel there is the potential to do this in the near future. There is the possibility that at least some aspects of all projects can be transferred to other subject disciplines, but in most cases, this is untested as yet.

6. Reflections on collaboration between partners

One of the most interesting aspects of the joint NSF/JISC funded programme is the collaborations it has supported between UK and US universities. Essentially three types of collaboration were evident in the projects:

- Technical collaboration
- Administrative collaboration
- Intellectual collaboration.

Technical collaboration

As this programme was centred around the use of digital libraries, it was clear that interviewees expected technical collaboration to be a central facet of the programme. While this has undoubtedly occurred to some extent, it has not been as strong a feature of some of the projects as some expected. In all cases, partners have been working on their own technical solutions in parallel. There has been collaboration in the sense of sharing ideas; interaction between technical staff; in some cases training for each other's technical staff; efforts to ensure compatibility and some exchange of a limited amount of content, but to a large extent the actual tools or resources produced by each institution can be considered as separate outputs.

Authentication is an area where the DialogPlus and DART projects in particular have worked effectively as collaborative teams. A number of interviewees felt that, if the Shibboleth authentication system proves to be a success, this will make collaborative teaching, and collaborative projects generally, much easier in the future.

Administrative collaboration

This includes the basic administrative infrastructure to support the project (e.g. meetings, video conferences) and it was obvious that all projects were co-ordinated effectively in this respect. Administrative collaboration could also include the more

complex area of joint course administration. Not surprisingly projects struggled much more with this, not least because this type of collaboration would require not just the co-operation of a few keen individuals, but major changes from departments and institutions which are not geared towards running joint course. Timetabling, accreditation, differences in course content and learning and teaching styles and different student expectations are just some of the barriers which projects had to face. The DialogPlus and DIDET projects both began with the aim of running a joint course. Although neither managed to achieve this, both have experienced considerable success in collaborative course design and operation. DIDET have held an experimental joint class which involved students from Strathclyde and Stanford, and Olin College and Stanford working in global teams. The team is currently working on a co-designed course which will form a joint three week project within separate courses being run at the three partner universities. DialogPlus has successfully shared students, that is, students from one of institution are able to study a course run by another partner. The team has also collaborated on the design of a joint learning nugget and shared another nugget, repurposing it to tailor it to the specific needs of their own institution.

Intellectual collaboration

This has probably been the area in which the DLiC projects have experienced the greatest success; it provides some of the most interesting examples of collaboration and highlights the unique benefits of groups of academic and other staff from different universities working together. However, perhaps because the results of intellectual collaboration are less tangible, this was not always highlighted as a success of the project by interviewees. Intellectual collaboration might involve collaborative course (or learning activity) design as described above. It might also simply refer to the sharing of ideas, experiences and viewpoints. It was clear from talking to those involved in all the projects that the opportunity to work with people in the same field and discuss issues was highly beneficial. Although it may lead to outputs such as joint papers, more often the results were often not seen directly as an output of the project. Common topics of discussion mentioned included pedagogy, digital infrastructure, institutional culture, the changing student population and the management of departments and centres as well as more detailed subject issues. It would be disappointing if the lack of concrete outcomes of collaborative ventures was to overshadow the real, but less obvious, benefits of intellectual collaboration, of which the majority of interviewees were able to provide examples.

7. What common success factors can be identified across the Programme?

The diverse nature of the four projects which make up the DLiC Programme made the identification of common success factors difficult. However, it was possible to draw out some common factors which projects felt made a significant contribution to their success under three general themes:

- The development process (work within the project to develop e-learning tools and resources, introduce these into courses and evaluate their impact)
- Institutional and department support for the project activities
- The composition of curriculum planning, development and delivery teams

The development process

Some success factors identified in this area were:

- Tools/resources which complement teaching, rather than interfering with the core activity
- Taking an iterative approach to the development of tools and resources
- Communication and discussion (within departments, within teams, between project partners and with the external world)
- Sufficient time to embed projects within the curriculum and working of the department
- An element of external funding

While the DLiC Projects obviously had a strong technical element, it was significant that none of the projects felt that their main achievements had been in the development of new technological advances. It was emphasised that teaching came first and the aim was to introduce new technology in a way that enhanced students' experiences, but did not interfere with the core pedagogic activity.

Time for reflection is something which many interviewees commented had been an important benefit of the project. Through involvement in DLiC they had been given an opportunity to discuss their teaching with colleagues from their own institution and elsewhere in greater depth than was normally the case. The role of the project in stimulating and facilitating discussion in this way was not highlighted as an expected outcome at the start, but is, nonetheless, a significant aspect of the programme.

In addition, involvement in DLiC has given departments, and individual staff members, the opportunity to evaluate their teaching in much greater depth than they might normally do through standard course evaluations. The data collected about students' views of e-learning have been important in helping the projects to develop and have provided individual lecturers with highly detailed feedback on their teaching. One interviewee felt that the fact that these projects were breaking new ground in many areas meant that evaluation was important so that lessons could be learnt and shared with others:

Quite a lot of that [money] goes down to paying for evaluation, which some consider you don't have to do, but you do have to do it. While it's still leading edge stuff, you still need to be evaluating it pretty closely.

The DLiC projects are all five year projects. This recognises the complexity and time consuming nature of the process of designing and developing resources and tools; introducing these into courses; and starting to embed work within curricula, departments and institutions involved and beyond. A number of interviewees reflected on the difficulty of doing this within the timescale of the project, for instance, resources needed to be developed at the same time at which they were being used with classes, which is not ideal. One interviewee expressed concern about the possibility of shorter projects, feeling that this would not be appropriate for the DLiC Programme and similar projects because of the length of time it took to establish the multidisciplinary team:

...it took a year and a half to get the team to develop a common language and understanding of the issues, and if it had been a year, a two-year, project, we wouldn't have been able to have really progressed...because of

the nature of the project...it raises questions for JISC, I think, about the length of project...

Unsurprisingly, the funding received through the DLiC Programme was seen as crucial for e-learning developments and all the partners were keen to seek external funding from other sources to continue various aspects of the work begun under the programme. Although it was acknowledged that some work could be done with much less money, possibly even supported within a department, this would only ever be on a very small scale:

...you could do it, but it would be much, much harder for a pool of interested people to keep creating new content and collaboration if you had no funding for it.

While some interviewees felt that similar projects might be carried out with less funding, others thought that the level of funding provided for these projects was crucial to ensure their success. One interviewee thought that a 'critical mass' of successful work at an early stage was needed:

...critical mass of success in the front part of the project...the snowball is not a bad analogy because then, you know, it becomes so large, it just keeps rolling. Whereas I suspect if this was a relatively small resourced project with, you know, one or two items here and there, it doesn't really fundamentally change the way in which a significant number of people work...

To achieve the changes which have been witnessed in the DLiC projects over the timescale, external funding is required. It is also important to remember that it was the presence of external funding which allowed institutions to engage in the exchange of ideas and approaches to the extent to which led to new innovations and many considered essential for the success of the project.

Several interviewees stressed that all the outputs of the projects, not just the tools developed, needed to be considered when looking at the value for money which had been derived from the projects. Outputs such as a change in culture within a department, career development and the opportunity to engage in 'blue skies thinking' all needed to be taken into consideration too.

Institutional and departmental support

Success factors identified in this area were:

- Support and active involvement from senior staff in the department
- A high level of interest and involvement in e-learning in general within the department
- Approaches which take account of the structure and ethos of the institution
- Leads/champions in academic departments
- Support at a senior level within the institution

Departmental support

As one interviewee pointed out, getting projects such as these was only really worthwhile for the department and the institution if it fitted in with its overall aims:

You have to get a project that you really want and you really want to do because whatever the money is, you're going to spend three times as much time on it. So, you can't afford to waste time on things you don't want to do. Therefore, you have to make sure the project connects with things you're interested in; that in your institution is interested in, that aligns with its strategy and you have to make connections between projects.

It is not surprising that a number of the teaching departments involved in the programme already had a strong focus on e-learning and new technology and thought that this helped to ensure the success of the project; it was compatible with other initiatives they were involved in. There was also a feeling that these departments were, perhaps, more willing to try new ideas generally in their approaches to learning and teaching:

I think Leeds geography has been quite technology driven for some time...I think there's a higher bar of IT-savviness when it comes to trying new things. In different departments there's going to be a different culture of trying new methods of teaching, especially if the teaching is involving online methods, mixed methods...

The Head of the School of Geography at Southampton University commented on the way in which DialogPlus fitted in with the overall direction of the school:

DialogPlus and the other projects are consistent with what we do...that's why we applied for them, that's why we've gone through it...what we try and do, is if it's an area that we want to continue to be in, and obviously development of e-learning generally is an area we want to be in because we can see all the benefits of it, then we'll continue seeking external support for that.

DialogPlus is just one of a series of e-learning projects of varying scale and length which the School is involved in. Even interviewees from outside the School commented on the strong interest in e-learning which they had witnessed among geographers:

So they were ready, they were already working in e-learning. They were already interested in it. So it aligned with their own professional interests and that's the key. And that's why you've got a lot of people involved in this project who aren't being paid by the project but are doing it because they are interested in it and want to engage in it.

Similarly at Strathclyde, the DIDET project fits closely with other work DMEM is involved in:

There is the fact that progression from things we'd been doing anyway... the video project with Clyde Virtual University...So we'd done quite a lot of experiments with interactive teaching and trying to access distant resources in our teaching programme...

One interviewee felt a key factor was ensuring the active support of someone with influence at a strategic level within the department.

Likewise at Stanford, involvement in DIDET was clearly just one of a number of linked initiatives for the Center for Design Research and was aligned with its key research interests such as knowledge management and global team working.

At MSU too, the Spoken Word project was linked to other initiatives MATRIX are involved in and clearly contributed to the broader work of the centre. In institutions, where there was less prior involvement in e-learning, the staff involved in the project seemed to feel more isolated from their colleagues and that the necessary support was not always in place. The difficulties of embedding work carried out through DLiC within the department are much greater in such instances.

Institutional support

It was felt that the level of institutional backing for such projects was significant. For instance, at Strathclyde, the DIDET team were confident of strong support from senior management:

If you start off with a university which doesn't really want these things in the classroom then as soon as the funding finishes, they're going to finish.

The Vice Principal interviewed provided further evidence of this support:

Clearly, we don't embark on these projects if we don't think we have methods of sustaining them after the external funding has expired and so we...have a strategy fund which the Principal holds and, it has to be said that it can hardly be used to support research but there's no doubt it's been used in the past to support teaching initiatives... we are acutely aware that, you know, it's not just a case of having a project for two or three years and you know, that's it... We have to sustain it.

The situation was a little different at Southampton, which is a highly federated university, so a strong lead from the centre was much less important. However, the project director at Southampton and the lead in the School of Education are responsible for taking forward an institutional e-learning strategy.

At LSE, it was noted that one of the Deputy Directors is supportive of e-learning initiatives and keen for the university to become more actively involved. At Glasgow Caledonian, the project director is a Vice-Principal of the institution and believes that the project is, "absolutely central to the sort of pedagogy I'm trying to develop at the university".

Curriculum planning, development and delivery teams

The main success factors identified in this area were:

- Joint input from learning technologists⁶ and academics
- In a number of cases, technical support embedded within the department, rather than based centrally, is seen as vital
- Learning technology and lecturing staff work closely together
- Learning technologists who have a basic understanding of the subject area (and of pedagogy)

⁶ The term learning technologist is used broadly here, for example, it might refer to a librarian, editor or web developer as well as what might normally be thought of as a learning technologist.

- A member of the team with both a technology and pedagogy background who can 'interpret' between academics and IT specialists
- The involvement of individuals who really want to examine existing practices and introduce new ideas
- Opportunities for individuals to play to their strengths (i.e. a flexible approach to roles)
- Student input.

Personalities and individual enthusiasts are clearly important to the success of the collaboration. The importance of employing the right staff on such projects cannot be underestimated. According to interviewees from a number of projects, quality of staff was a crucial issue. As well as the qualities of individual staff, the way in which the project staff worked as a team and also worked with other staff in the department had significant implications for the success of the project:

...that's the key, I suppose, in the relationship between [the learning technologist] and the two [research] fellows...crucial factor...But it kind of goes on from there, you know, now I would say the relationship between [the learning technologist and a lecturer] is very important because it's really the first time we've so heavily involved a fellow member of staff who knew nothing about the project...so obviously this becomes a pivotal relationship...

This has been recognised in a number of institutions where project staff have been given permanent contracts within the department. One interviewee who had a number of years' experience in this area and had worked in a number of institutions pointed out that there was no single ideal answer to the question of how to provide support for the introduction of new technology into the classroom:

There are lots of models in terms of having central support and then people seconded into department or out of department and all these kind of things. And I think that is really important. You need both. There isn't one size fits all I think. It has to be aligned with the culture of the institution and where the institution is at one time...I think they do need to constantly keep looking at this, but clearly for e-learning to work you need multi-disciplinary teams and you need 'buy in' from the academics.

One issue for learning technologists, as one interviewee pointed out, is the lack of career progression opportunities at present:

The trouble is you've now got learning technologists who are mature learning technologists who have incredible breadth of expertise and understanding the subject disciplines and institutional things and what works but there's no career progression for them...What do you do when you get to that stage? Well, you only at the moment, have two choices. You either become mainstream service orientated, so you become Head of ISS or what have you or Head of Staff Development or what have you, or you become an academic.

She felt that there was a need for more people at a very senior level in institutions who had a learning technology background and had an understanding of the issues and "the complexity of what needs to be done".

One interviewee reflected on the different types of learning technologist which might be seen in the future:

What we want to develop are hybrid-type posts which are partly in the learning technology department and partly within the individual departments and the hybrid post at one end may be a teacher fellow type post, academic post very much, would be someone who could concentrate on teaching but has an interest in supporting learning technology. At the other end of the spectrum, it might be someone who's much more technologically orientated and perhaps is doing little direct teaching but may be more in discussion groups or whatever, and then there'd be different elements in between, and that, where the person would be on the spectrum would be a matter for discussion within the individual department; I can't prescribe a model...you then need a number of these hybrid posts within the department which have very strong links with the learning technology centre, but also are actually embedded within the department in this culture.

Another referred to the 'technical' and the 'nurturing' ends of the learning technology 'spectrum'.

As one interviewee said, what was needed to sustain these types of projects was:

...someone very much at the sort of technician/technical level to be doing lots of that day to day...it requires a good brain to be doing so, but not necessarily an academic...so it's not as costly, but you do need them [technical staff] for a reasonable length of time...it's got to be for at least six months...

The projects where staff issues seemed to cause the fewest difficulties were those where the staff working on the project were already members of the department, or at least familiar with the department. Of course, this is not always possible and when staff have to be brought in from outside, consideration needs to be given to the time it will take for all members of the team to get to know each other, understand each other's role and decide how they can best work together.

Maintaining the knowledge base which had been built up through a project was seen as a key challenge:

I think if you disperse a team completely then it's much harder to restart it again when you get another opportunity to do something.

However, in order to do this, a continuous source of funding was necessary, if not from then institution, then for an ongoing series of projects. As one interviewee pointed out, this had been a failing of many previous projects:

I don't know how many of these different technology projects there have been over the years. There have been huge ones...people dissipate, the expertise dissipates, they all get caught up by the next project.

A final point is that a number of projects highlighted the importance of student input into the development of resources. Not only did this assist the project team to develop and improve materials, but it also gave students a sense of ownership of the resources which, according to several interviewees, led to more positive attitudes towards their use. Input might be provided by formal or informal feedback from students and by the use of student workers within the project team.

8. Recommendations for the future

Following on from the success factors identified in Section 7, the following recommendations can be made for future projects developing digital library resources for use in the classroom.

The development process

- Focus on developing tools/resources which complement teaching, rather than interfering with the core pedagogic activity
- Take an iterative approach to the development of tools and resources, rather than having a very rigid set of criteria from the start
- Work to encourage communication and discussion of e-learning and pedagogy generally (within departments, within teams, between project partners and with the external world)
- Allow sufficient time to embed projects within the curriculum and working of the department
- Seek an element of external funding, for example, to assist with buying technical expertise and staff development time

Institutional and departmental support

- Ensure the project has support and active involvement from senior staff in the department
- Work to encourage a high level of interest and involvement in e-learning in general within the department, for example, by ensuring involvement in teaching activities is rewarded
- Devise approaches which take account of the structure and ethos of the institution
- Identify leads or champions within academic departments
- Seek the support of staff at a senior level within the institution

Curriculum planning, development and delivery teams

- Ensure that there is joint input from learning technologists and academics
- Provide means for learning technology and lecturing staff to work closely together, for example, by embedding technical support within the department, rather than being based centrally
- Employ learning technologists who have a basic understanding of the subject area (and of pedagogy), or develop the skills of existing staff in this respect
- Ensure there is a member of the team with both a technology and pedagogy background who can 'interpret' between academics and IT specialists
- Make sure the project involves individuals who really want to examine existing practices and introduce new ideas
- Provide opportunities for individuals to play to their strengths (i.e. have a flexible approach to roles)
- Provide opportunities for student input into the development process.