

**A case study of two courses in the  
Faculty of Arts and Social Sciences  
which use the WWW as the medium  
for the delivery of learning resources**

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# Introduction

The main body of this report offers a study of a project that explored a possible role for on-line technology within a university course. It came out of a view that both the availability of computers, their ease of use and the quality of electronic communications have reached a state of maturity that allows their use as an integral means for course delivery, instead of as simply being an additional resource. The participants took the view that (a) for such an approach to be sustainable, it had to be possible for non-technical people to manage the use of technology, both for delivering and accessing materials; (b) that the pedagogical implications of using technology in this way were explicit and had the support of those involved; and (c) genuine educational benefits were indicated from adopting technology based teaching. To explore these issues, the CAL Unit worked with the English department to design a new course, the Classical Literary Tradition, which would incorporate the use of learning technology from its inception. Lecture notes were made available on a WWW server, and on-line discussions between staff and students took place on a local Newsgroup. These were in addition to normal lectures, seminars and tutorials. Apart from the initial setting up of technology and the training of lecturers, secretaries and students in the use of the WWW, the system was managed by departmental staff, including all HTML editing and server management.

The project has made it possible to recommend an approach for non-technical departments to begin to incorporate on-line technologies in their courses, and also to identify next steps for a department that has already begun to do so.

A smaller study of a parallel and similar initiative is also included in this report. This took place in the School of Psychology, where the use of computers has a much longer history, and where technical staff are employed to manage the use of technology. This will allow the comparison between different stages in the adoption of technology, particularly with respect to the questions that emerge.

# Background

## On-line learning

On-line systems have been used for the delivery of learning in various forms for many years. In the early seventies centralised mainframe systems like PLATO provided drill style courseware for mathematics. In the eighties Viewdata services like PRESTEL and NERIS allowed worksheets and simple CAL software to be downloaded for off-line use. Each example and experiment embodied a pedagogic model, whether explicit or implicit, and promoted a particular organisational style. NERIS, for example, took the form of a central Viewdata facility containing professionally written materials for school education, thus embracing the traditional publisher - teacher - learner model. The ITEC Training Materials Network, on the other hand, involved each participating institution running their own Viewdata host system on which teaching staff placed their own materials to be accessed by their students, but then integrated all the systems into a network, thereby enabling the exchange and joint development of materials and promoting a more collaborative model of teaching, while also supporting open and flexible learning (Liber 1994).

Exploration of the use of conferencing systems for learning also began in the eighties, most notably by the Open University (Mason and Kaye 1989). These promoted a more conversationally oriented pedagogic model, allowing students to discuss their learning with each other and their lecturers or teachers.

There were several obstacles to the successful use of these systems. Bandwidth constrained the nature and quality of on-line materials; the cost of technology was prohibitive; and user interfaces were often unfriendly. These prevented the emergence of a critical mass of educational actors (teachers and learners) necessary for the viability of any technological learning system. Developments in the nineties promise to change that. Computers are now widespread in all levels of education, and are more powerful and simpler to use. But most importantly the emergence of the internet, particularly the WWW, enabled by enormous improvements in bandwidth, have made the electronic delivery of multimedia materials a viable option. In addition the internet has provided the possibility for the integration of the delivery of learning materials and conferencing, bringing together the two central activities involved in teaching and learning.

The features of the World Wide Web have been extensively described (eg. CTISS, 1995), but in summary, it enables materials in electronic form to be structured in a variety of ways, and to include combinations of text, graphics, photographic images, video, sound and computer programs. This means that these materials are easily accessible to a student using a computer and that s/he can have access to them at all times, and can follow them at their own pace. It also means that connections to related materials

elsewhere in the academic community can be searched for and made, providing a richer learning experience than might otherwise be possible. Providing resources in this way offers students a rich range of relevant materials, more control over their learning and a route through the plethora of materials on the Internet. It potentially enables lecturers to keep track of their students' work, and enables students to use the same client software to interact with them through email when they cannot contact them directly, and to work collaboratively with other students. The integration of computer conferencing will further enhance this process, enriching interactions between students and lecturers.

## **Context**

### **TLTP Project**

In March, 1994 a project entitled 'The Implementation of Computer Aided Learning (CAL) Across the Campus' began, based in the CAL Unit at the University of Wales, Bangor, and funded by the Teaching and Learning Technology Programme (TLTP). The aim of the project was to develop an appropriate infrastructure and cultural context for the widespread use of CAL at the University of Wales, Bangor (UWB). Part of the Project's role has been to co-ordinate the range of CAL initiatives taking place at UWB into an institution-wide approach in order to allow colleagues to take advantage of each other's work and expertise.

### **On-line Learning Resources Project - a feasibility study**

It was clear early on in the TLTP project that the WWW and its application to the delivery of on-line learning were highly significant developments. The Computers in Teaching Initiative (CTI) and the TLTP recognised the importance of the WWW by adopting it as the favoured method of on-line delivery in March 1994, and many Higher Education Institutions throughout the UK and beyond have done the same. The Joint Information Systems Committee (JISC) acknowledged its importance in a recent issues paper (JISC 1995).

In October 1994, the Enterprise in Higher Education (EHE) initiative at UWB was approached and agreed to fund a feasibility study to investigate the relevance of the WWW for the management and delivery of on-line learning resources at the University of Wales Bangor (UWB). The WWW has mainly been used for the dissemination of information to a potentially global audience, for the searching of and 'surfing' through this information; however, the intention of this study was to focus on the application of this technology to the sharing of materials locally, its use as an interface to learning materials of a wide range of types, and its ability to enable students and lecturers to collaborate. This way of using internet technologies has recently been termed the 'Intranet', and is being increasingly adopted by business (Computing, 16 May 1996). It was envisaged that it could provide a new channel between lecturers and students, allowing new forms of teaching and learning to take place, complementary to

traditional teaching methods. The study did not concern itself with issues of control or copyright, which it saw as being more directly the concern of those managing a Campus Wide Information System (CWIS) (Kelly, 1995).

The study investigated factors affecting the adoption of this technology, including the state of the technology, its availability, functionality, stability and ease of use. It examined the practical issues involved in creating materials in appropriate formats, installing them on WWW servers, and allowing students access to them. A number of academic departments were helped to start to explore the use of servers for the provision of learning materials, thereby uncovering the practical, pedagogical and organisational implications of this approach.

The study concluded that although it was clear that it was feasible to use the WWW to deliver learning materials within the university, there are pedagogical, technical, organisational, financial and institutional issues that need to be addressed if such an approach is to be successful. Most crucially, this method of delivering education must be pedagogically sound. The normal teaching and learning process involves iterative interaction between teacher and learner which may take a range of forms - presentations, discussions, experiments, explorations, and so on. The richness of these interactions depends on organisational constraints - timetables, length of lectures, laboratory availability and so on. The technology explored in the study can lift some of these constraints, by allowing access to learning resources at any time and in any place, by providing computer aided simulations, and by supporting interaction through electronic mail and computer conferencing. (This is elaborated later in this report).

The study suggested that with careful planning, involvement of all stakeholders and appropriate investment, networked learning could make a large contribution to student learning, lecturer effectiveness, organisational flexibility and institutional competitiveness, but the many issues involved need to be addressed at all structural levels of the university to ensure its successful adoption. Its recommendations identified what these were, and how they should be tackled, and were targeted at lecturer, department, institution and service levels. (Liber 1995)

As a result of this initial study, further funding was granted by the Teaching and Learning Committee to take this work forward at UWB by developing a framework for managing learning resources using the WWW, supporting pilot on-line courses in departments, and enabling the College to move towards developing a strategy for the delivery of on-line materials, whilst ensuring a coherent pedagogy. One of the on-line courses developed as part of this project is the subject of the following case study.

# Case Study 1: Department of English

## Rationale and background

The Department of English planned to offer a new, first year, course, The Classical Literary Tradition, in the first semester of the 1995-6 academic year. The CAL Unit was approached with a view to developing this new course in an on-line form. It was felt that this could act as a pilot for a more extensive use of on-line delivery of learning materials and other information in the department in the future. This course also offered an ideal opportunity to explore many of the issues identified in the feasibility study described above.

A decision was therefore made by the CAL Unit to focus on the development of this course and to look at a number of issues, including:

- non-technical users as authors, managers of information and learners
- the implications for support, training, technology
- the use of newsgroups to support electronic communications
- resource requirements
- the management of learning
- the organisational implications

and to identify more general questions raised by running an on-line course using the WWW.

It was also hoped to identify some of the factors affecting the success or failure of these courses, including the time commitment required from both lecturers and students, access to computers, access to the network and what it might mean to be a 'non-traditional' user. The students were taking a non-technical subject, and would therefore not be expected to be interested in the technology for its own sake. It would therefore be necessary to look at both their, and their lecturers', attitudes and expertise.

## The issues

The Department is being confronted with the universal problem of rising numbers of students and finding this is affecting the quality of individual attention a student can expect in seminars. Lecturers were interested in how the use of on-line learning materials might enable them to cope with this situation. The course to be offered would be in a traditional form including two lectures and a seminar.

The lecturers were interested in the possibility of putting lecture notes on-line a week or so prior to the lecture taking place. They were interested in the effect this might have on the learning process if students had seen the notes beforehand, and whether this might allow the lecture to take a different format. Another advantage of doing this included saving on the great, and increasing, expense of photocopying, and it might offer further advantages such as students saving text to disk and annotating it later. They were also interested in other possibilities, such as exploring the potential offered by hypertext, and the use of additional resources through the WWW.

After discussions with staff from the CAL Unit, it was agreed that it would be important to explore the use of on-line discussions which would be integrated with the on-line materials. If part of the problem was the increasing numbers of students, perhaps electronic discussions in between lectures, and the possibility of contacting each other and the lecturers by email might offer another channel for communication.

The department had no identified technical support, other than that which is provided centrally through the Department of Information Services (IS). It was therefore agreed that staff from the CAL Unit would support the development of the course, provide some technical support, training for the staff and students involved, and support in the process of course design. It was intended to explore the issues raised by the Department running its own Mac-based server, and how this compared with using a centrally run UNIX server. It was agreed that the Departmental administrative staff would mark up the text used, and manage the materials on the server. It was essential that by the time the course had been offered once, it could be offered again with a great deal less support. This would be put to the test as it was planned to run it again in the second semester.

## **What took place**

### **Course planning and design**

Meetings took place to look at the materials to be made available on-line, how these should be structured and how navigation should take place. These took place at the same time as the Department established a server for Departmental information, so it was important, whilst integrating with this, to recognise the different purpose and use of materials for learning.

The final structure was a simple one which offered the lecture notes sequentially in a menu, with buttons at the bottom of the screen linked to the discussion group, and an email link to the lecturer. It was felt that the notes should offer a framework for the lecture along with factual information, but they should avoid being too long, and there should be no question of them offering an alternative to attending the lecture. There were ongoing discussions about making more

links within the notes to other materials or sites, thereby increasing the complexity of the structure. It was felt that at this stage it would be desirable to incorporate links to images, but not to other sites as yet. Other CAL materials are being looked at, and these may be useful in the future.

## **The technological infrastructure**

### **Server(s)**

Two options were available for the choice of server technology. The department owned an Apple Macintosh Performa 475 which was subsequently networked. It was capable of running a WWW server, and a shareware WWW server (MacHTTP 2.2) was installed. IS also offered to provide space on one of its UNIX servers running the CERN HTTP daemon. The issues involved in doing this were explored particularly the nature of the support that could be provided. It was felt that the Macintosh server provided the opportunity for English Department staff to familiarise themselves with the function of a WWW server, thereby demystifying the process, (an important aspect of this pilot) and it was finally decided to pursue both options, with some students accessing the Macintosh and others accessing the UNIX server. This created an additional responsibility for the English Department administrative staff, who had learn how to put files on both servers and to ensure that the data on both was perfectly synchronised. However using both allowed an assessment to be made of their relative benefits and drawbacks.

The Macintosh server was installed and configured by CAL Unit staff. The machine was set up so that the server was launched whenever the machine was started up. This meant that if any problem was ever encountered, restarting the machine would solve it (apart from major hardware or software failure). A single directory for all HTML files was set up, preventing callers from accessing any other files on the disk, and making it simple to maintain integrity with the UNIX server. A File Transfer Protocol (FTP) program, Fetch, was installed on the machine, and configured to make it straightforward to copy all new files to the correct location on the UNIX server. The UNIX WWW server was set up by an IS officer on an existing UNIX box and a directory for HTML files was created, to which all HTML documents created had to be copied, using FTP.

Running both servers required extra care in the naming and linking of files. The Macintosh operating system is not case sensitive, and allows spaces in filenames; UNIX is case sensitive, and does not allow spaces in filenames. In practice, the secretary involved ensured that the two servers were indistinguishable from each other throughout the pilot.

### **HTML Editing**

It had been decided by the department that for the duration of the pilot, most of the HTML editing would be undertaken by secretarial staff, and that source

material would be supplied to them in plain text format by academic staff. Both administrators involved used PCs on a daily basis, and had no experience of Macintoshes. Until recently HTML editors on the PC had been limited in their quality and ease of use, but recently Wordperfect had released a free extension to Wordperfect 6.0 that supported the creation of HTML documents. This was an obvious choice for this project. The alternative was to use HTML\_Editor on the Macintosh, a simple and easy to use editor. The choice was left to the administrators, who ended up choosing the Macintosh editor.

Once the structure of the server had been designed by the academic staff, templates for the pages were designed by CAL Unit staff. A standard methodology for navigation with an associated set of graphical icons were designed, and instructions on their use were included in the user notes.

### **Newsgroup**

No system for computer conferencing exists at UWB, apart from Newsgroups. These are intended for use across institutions to exchange news and views on a range of subjects; they are not intended for sophisticated discussions, and have few tools for their management. There are basically two options - to leave them open to all users to read and contribute to; or to route all contribution through a nominated moderator who approves their posting (or not, as the case may be). Once posted, no editing facility is available to the moderator, nor is there any information available on who has read any contribution and when. A further difficulty is that because of shortage of file storage space, the UWB News server was normally set up for contributions to be displayed for only one week before deletion, however, as a result of many lecturers wishing to explore their use around the campus, this was changed during the life of the project.

The main advantage of using Newsgroups for discussions is that the same program used for accessing the WWW, Netscape, can be used to access Newsgroups, making it possible to provide links from the WWW server to the discussion group at appropriate places, and for students to use a single program for both activities. A request was made to IS for a Newsgroup to be established for this project, and an extended period before deletion of any contribution was negotiated.

### **Training**

Once the needs of project participants had been established, it was possible to design appropriate training. Because all participants were new to this technology, only the training that was necessary to "do the job" was offered. There was no attempt to be comprehensive in explaining all aspects of HTML editing or server configuration. However, key principles were explained, and sources of further information or documentation were provided.

## **Secretaries**

### *HTML Editing*

HTML documents are text files that have been "marked up" - have had special "tags" inserted in the text. These instruct the browser to perform certain actions, either concerning how text is displayed, or whether an image or another document should be loaded. This means that the original text file tends to look very different from document when viewed with a browser. These tags can be inserted in the text by hand, or special HTML editors can be used. Until recently most of these inserted the tags to achieve the various effects, but another program was needed to see the effect. Later editors attempt to display the effect and hide the tags from the user.

As the secretarial staff given the job of HTML editing for this project both used Wordperfect on the PC, it made sense that they should use its integral editor. Before it was introduced, however, it was felt that the concept behind HTML editing needed to be explained, so that they would be able to create satisfactory HTML documents without a special editor. The first training session was devoted to this. Subsequent sessions introduced the Wordperfect editor, but for a number of reasons, both staff preferred raw HTML editing. HTML\_Editor on the Macintosh was also introduced, and over time, this became the editor of their choice. It supported both WYSIWYG and raw editing modes, and because it was on the same machine as the server, involved less time in installing and testing the documents.

### *Running the server*

The HTML Editor was set up to default to the server's root directory, making editing and installation a seamless process. The server was configured by CAL Unit staff, and needed no administration; if any problems were encountered, staff were told to restart the machine, which automatically reloaded the server software.

Midway through the project, it was decided by academic staff that lecture notes should only be available to students following the CLT course, but that all other pages should have open access. This was achieved by adding two lines to the configuration file, which made any files containing the string "cltlec" require a password from the user. All lecture notes were then given titles that began with this string (e.g. cltlec3-2.html). The server program then had a single user name and password added from its main screen, which all students on the course used. It was felt that this was simpler than giving each student an individual user name and password. Staff were shown how to add users and passwords, and this was included in the documentation.

Running a Macintosh based WWW server is extremely simple if only basic features are needed. For this project, this was sufficient, and so training was kept to a minimum, but documentation on its more advanced features was provided.

#### *Uploading to the UNIX server*

Since it had been decided that for the duration of this project, a UNIX based server would be used in parallel, staff were shown how to upload all documents to the appropriate directory on the server's host machine. A file transfer program called Fetch was used, and was set to default to this directory. Consequently, uploading simply involved launching Fetch, selecting the documents to upload, and clicking on the appropriate button. Once again, training was limited to the tasks that had to be performed; none of the intricacies of the file transfer protocol were addressed.

#### **Lecturers**

##### *HTML Editing*

One of the academic staff was a Macintosh user, and was given the Macintosh HTML Editor along with a short introduction to its use. He had some experience of SGML, on which HTML was based, and so understood the concepts behind this approach. Consequently he edited his own lecture notes, and handed them on a disk to the secretaries, who added navigation links and installed them on the server.

The other lecturer simply provided her lecture notes in word processed format, which were then marked up and installed by one of the administrative staff.

##### *Newsgroups - how to use them*

Staff Development sessions were provided on using Newsgroups, and how their use might be incorporated in the delivery of the course. Reference was made to other courses which had explored this approach (Duffy et al, 1995)

#### **Students**

Training sessions for all students were incorporated into the course. Two sessions in computer labs were run in the normal timetabled slot for seminars on the first and third week of the semester. These aimed to teach the students how to use the network and Windows, to access the WWW and to use the Newsgroup. They did not intend to teach anything beyond what was required to access the notes and the Newsgroup. 'Surgery' sessions were then offered at a regular slot every week for the next 4 weeks, which were rarely used by the students so these were eventually stopped, but contact details of the CAL Unit staff were given to them to use if necessary.

#### **Monitoring**

Once the course had started, weekly meetings took place between the lecturers and the CAL Unit throughout the first semester, to monitor developments,

introduce new aspects and enable problems to be dealt with as they arose. Questionnaires were issued to students at the beginning and end of the course to discover their confidence, competence and attitudes to the use of computers.

## **The experience of the course**

About 50 students enrolled on the course for the first semester. There were a number of problems identified by students but these were mainly to do with gaining access to computers in often busy labs, and printing out their notes on an already heavily used printer. Some students clearly managed to take the whole course without ever using the on-line materials or communications. It had been intended that this should be possible for the first run through the course as it was new for all concerned, and it was not clear what the problems would be.

The following sections explore the experience and views of the participants in the course. There are many aspects it would be useful to explore in greater depth, but it does make some issues clear, and enables a number of observations and recommendations to be made.

### **Lecturer 1**

#### **The course itself.**

This was a completely new first year course with lectures and seminars, and they were not sure what the numbers of students would be. The lecturers' primary experience was outside the field of Classical Literary Tradition, and they wanted to write new materials anyway. The framework was quite different from the original course in Classics which this was replacing, it therefore had the advantage of being a new project anyway.

#### **Lecture notes**

Lecturers in the department have been becoming increasingly alert to the difficulty first year students have with dealing with lecture material, and it was clear that the most successful bit of the experience was the 'most primitive bit' which was the delivery of lecture material on-line, which gave a framework and the structure of the argument. It would not have been possible to have handed these out in printed form because of costs. It was clear which students had read these before the lecture itself. It was disappointing that most of the students were printing out the notes, as he had expected they would be saving them to disk to work on and annotate themselves.

#### **Electronic discussion**

The discussion group worked better the first time round with the larger group, perhaps because there was a critical mass, and he wondered if it might be a minority interest. The second semester group in a final discussion said they hadn't realised how easy electronic discussion was, and in particular how easy it

would be to have a direct dialogue with the lecturer. There had not been much dialogue around the lecture material. The group said they would be taking advantage of this in the future. Perhaps they were not clear enough that this could be a route into a private discussion with the lecturer. This is a real advantage of such a system, the possibility of this kind of dialogue taking place with a student despite the larger numbers they are having to cope with. He was not worried about the amount of his time this would take, it would be quicker for the student than finding him. He felt that these advantages have not yet been realised but they are very clear.

There were also problems because one of the lecturers was not connected to the network for the first half of the semester which obviously limited the progress of the use of on-line discussions.

Students learnt from each other, and he regularly observed them going off in a group to work, the results of this could be seen in the discussion group.

### **The future**

This course:

It is intended to elaborate the lecture materials with images, and further develop the use of electronic discussions.

Other courses in the Department:

It is intended that there should be something on-line for all courses in the department, including the use of electronic communications. Some courses have very large numbers of students. This will inevitably represent a change in practice. Some courses may have more elaborate materials such as historical documents and manuscripts. There is a specific course in Women's Writing which it is intended to offer in Distance Learning mode as part of the interdisciplinary Women's Studies degree.

### **Lecturer 2**

She had no previous experience of using the WWW, and little of using Windows before undertaking the teaching of his course and felt she was a 'reluctant recruit', but Lecturer 1 was keen to explore offering the course in this way. It was appropriate as it was a new course anyway, and not at the 'heartland of the English Department'.

Hardware had been a big issue for her because of the difficulties she had getting connected to the network during the first semester so this clearly hampered her use of the discussion group in particular, and her more general familiarisation with the WWW.

### **Lecture notes**

She received a great deal of support from the Departmental secretary who was mounting materials on the WWW server and maintaining it, and she felt she had been dependent on her for this, often 'having to work against the clock'. She felt that one of the implications of making materials available some time before the lectures themselves was that it 'sets your deadlines backwards' so notes cannot be finished at midnight the night before if necessary! She felt that there were many issues raised by the provision of lecture notes, on-line or not. They should be short and basic, containing facts, information, difficult spellings etc. There was one example of a student misusing the materials made available but it was very obvious to the lecturers that he had done this. This could however be a problem if several lecturers were involved in a course. It was more efficient and cheaper to deliver lecture materials this way because of the stacks of photocopying that would have been involved otherwise.

### **Discussion groups**

She was very positive about the use electronic discussion groups and communications, but there were many problems with the use of Newsgroups because they felt they needed more control over editing, and the structure of contributions (some were duplicated, others made in the wrong 'thread' etc.). However using them was also easier than she initially thought. The discussion group was the significantly different aspect of what they did, and they would like to pursue this more next year

### **Further comments**

She saw the WWW as 'just a new filing cabinet', the difference being that it is public, and that the 'mechanism has been confused with the substance'. She questioned the idea that this had put something new before people as slightly odd. One of the problems for both herself and the students was that when there was a problem 'with the hardware' they did not know the nature of it, so did not know what to do next, and became rapidly discouraged, and fell back on older, familiar systems. She felt one could not overestimate how easily students could become discouraged.

She felt that lecturers were used to being frugal with resources, but that it was essential that the introduction of the use of computers was properly resourced, with the right sort of support, and then there would be long term benefits. There was a real problem with proper resourcing, there needed to be clear benefits as a result of using an approach like this, and it must be done properly, especially if it is to be done campus wide.

### **Secretary**

Discussions took place with the team involved about the project over June and July 1995. Detailed planning about the implementation of the server then took place shortly before the beginning of term, and the structure and pages were set

up. Both the areas of the server concerned with Departmental information, and the on-line course materials, were set up at the same time. Although two secretaries were involved at this point, one became heavily involved in setting up a database, so most of the rest of the work was undertaken by one secretary. This involved putting departmental information on the server, and also marking up lecture notes and putting these in the on-line course section on a weekly basis. These were uploaded from the Mac server to a UNIX box in such a way that the materials were identical to the user.

She felt that as long as you were computer literate, you could pick up HTML editing, she 'thought it was going to be more difficult than it actually was', and she knew support was there if she needed it (from the CAL Unit). The approach taken was for them to learn all the HTML 'commands', then after a few weeks they were set up with 'a programme on the Apple which did it automatically'. She thought it was easier to use the editing programme, but also thought it was useful to have the grounding. It was a bit fiddly remembering bits, but useful if you went beyond what the editing programme could do. She didn't get to do any of the graphics or scanning aspects as the departmental scanner was not set up at that stage, but it is now.

She felt happy with the overall experience of running the system (as long as she knew backup was there), and in fact she rarely had to call on this. She felt they had a good model because they had sat down and thought carefully about what the structure should be, and she thought it was essential to do this. She found that it took more time than she had expected to mark up lecture notes (could be half a day sometimes), and it was an extra thing for them to do at a very busy time. She thought that the training had been adequate given she was computer literate, but it would have been useful to have known more about the WWW more generally as she does now.

## **Student Questionnaires**

Questionnaires were issued at the beginning and the end of the course to elicit feedback from the students. A transcript of comments made at the end of the first questionnaire may be found in Appendix A. Data for the first can be supplied if requested from the authors, and that from the second may be found in Appendix B.

### **Initial questionnaire**

The questionnaire issued to the students on the course was one which was circulated to all new first year students at the beginning of the autumn term in 1996. Of the students on the course, 62% were female, 24% were over the age of 21, and only 42% said the last educational establishment they had attended was school. However 78% had taken 'A' levels. When asked about the use of computers, only 2% said they had never used a computer ever, 18% said they

never used one now, and 20% owned their own. The overwhelming application used was word processing (70%), followed by games (54%), whilst 16% said they had used email, and only 6% said they had used the WWW. When asked how confident they felt, 30% said 'neutral', 36% said 'a bit nervous' and 18% were 'terrified'. Only 18% expressed some confidence. When asked how competent they felt, 52% felt 'poor' or 'hopeless', 19% said 'average', 10% said 'good' and no-one said 'expert'.

This therefore challenges the notion that new students are arriving both computer literate and experienced in using the Internet, although it complies with a view that students choosing to study in the Humanities are likely to be also making an active choice to avoid technology-based subjects. This has important implications for increasing the use of computers by students in Arts-based subjects, and appropriately designed training is essential.

Despite this, as may be seen from their comments in Appendix A, most were positive and some rather idealistic, about the possibilities offered by the use of computers. 90% thought that it would be helpful for making lecture notes available, 52% for explaining concepts, 54% for student-student communication, and 60% for student-lecturer communication. Only 40% thought they would be useful for revising. The most positive views were therefore about lecture notes and communication, both the areas where the on-line course had focused (before this survey took place!).

### **Second questionnaire**

Only twenty one students filled the second questionnaire which means that an incomplete picture was obtained of how the students experienced the course. However there were some clear trends. Students had some difficulty gaining access to computers, with a third indicating considerable difficulty, and only a fifth experiencing little difficulty. About three quarters of the students were generally satisfied with the training and support they received.

The great majority (85%) looked at the lecture notes regularly, with over half (52%) looking at all of them. They seemed to find it easy to access the notes, and the vast majority (71%) printed them to read later. 62% thought that it was very useful to have lecture notes provided in this way, and only 14% disagreed.

This positive picture changed somewhat when looking at the discussion group. Few respondents said they looked at or contributed to the discussion group. This did not in fact reflect the experience of the staff involved as some considerable activity had taken place in the Newsgroup, both in terms of seminar-type discussion as well as organisational communications, but it had also been clear that the numbers involved had not been substantial. 57% felt that the discussion group facility was not useful, and no-one appeared to have contacted the

lecturers by email. 62% felt the course had not affected their confidence in the use of computers.

## **Our views**

### **Technology**

From a technical standpoint, the project was successful - the technology delivered all that was expected with a satisfactory level of performance. Both the Macintosh WWW server and the UNIX WWW server performed well, and no problems were reported. The Macintosh server software was simpler to use, and this was made evident when the decision was taken to restrict access to lecture notes. On the Macintosh it was relatively simple to password protect pages or directories that contained a given string of letters, and could be easily amended by the secretary who managed the server. On the UNIX server it was more difficult, and required the involvement of the UNIX systems manager. This minor point suggests that if servers are to be run by non technical staff, then they should have tools that make such customisation as easy and intuitive as possible; UNIX systems administration skills are not widely available! New tools are becoming available that make server management more straightforward, both for the Macintosh and Windows NT.

Netscape Navigator 1.1 was perfectly fine as the student browser, but as the interface to the Newsgroup was less than perfect; several students duplicated their contributions through not remembering to reload the Newsgroup index after sending their first effort.

As far as email was concerned, Navigator only provided half the answer. While students were able to send mail to their lecturers using the mail facility, they had to use a dedicated email program to receive mail. Not surprisingly, these students did not use email very often for this course. Navigator 2.0 and later have since resolved this issue by incorporating full email and Newsgroup facilities.

The use of a Newsgroup as the conferencing system for the course was less than ideal, particularly because of the lack of edibility, moderation or administration tools. Students' duplicated contributions could not be removed except by the UNIX systems administrator. Further it lacked any security features, allowing students from other departments to read and contribute to this discussion. A dedicated and fully featured conferencing system like FirstClass would have been much better.

### **Access to computers and training**

There are a number of themes that emerge from the surveys. Sufficiently easy access to computers and to support is essential if students are not to be discouraged, and possibly disadvantaged by delivering materials in this way. Appropriate training is of crucial importance to enable them to identify the type of problem they are confronted with and therefore what to do next. Printing lecture notes only defers the problem of providing paper from the department to the central service so cannot be a long term solution, although it is also arguable

that people like to read text on paper. If students are to gain full advantage of digital text and be able to manipulate it, they need to be comfortable with handling files, copying and pasting text, switching between applications, and with word processing. For many students, this requires a significant level of training which needs to be integrated with their academic studies. If students are to begin to use information on other sites on the WWW, then there are further training needs in information handling and retrieval, navigation and other research skills. The problem of being diverted from the task at hand when using the WWW is well recognised and needs to be addressed in training.

### **Course design**

It is essential that planning takes place well before any implementation so that the role that on-line materials and discussions are to play in the course is clear. It maybe that these are to be offered in addition to the usual activities, or they could be entirely replacing them. It is inevitable that moving in this direction will begin to raise some profound questions about the learning process and these should be anticipated; the pedagogical approaches discussed later can enable this to be a positive process. There are many advantages to starting carefully without being too ambitious, then allowing development to take place in an evolutionary way..

Electronic discussion and communication for seminar purposes require as much facilitation as when they take place face-to-face, and there are further obstacles because all the usual non-verbal cues are absent. This therefore means that they unlikely to take off or be significantly useful without careful planning, identification of the role they are expected to play, and ongoing attention. Training and staff development are therefore essential in this area, as well as identifying appropriate conferencing software, as newsgroups have a number of off-putting features.

## **Discussion**

### **The effect of this trial**

The main focus of this case study has been the use of the WWW for accessing learning materials and in using computer conferencing to support discussions about the course. Accessing lecture notes in this way allowed students to prepare for their lectures, and this affected the manner in which they were delivered. No doubt this would be further affected if the on-line materials were richer, with hyperlinks to additional sources, and supported by multimedia resources. Secondly, despite this being most of these students' (and lecturers) first use of conferencing and thus not as well used as it potentially could have been, their reaction was very positive, suggesting that future experiences will be richer. It is felt that as an approach to helping non technical users to use on-line learning, this was a good method, and worth repeating. It has also led to those involved

identifying for themselves the new facilities they would wish to use and to offer to students. These include a better conferencing environment, hypertext links in the learning resources, going beyond lecture notes. Most interestingly, there has even been a tentative suggestion that course materials could link to materials in other related subject areas - 17th century literature could link to 17th century history materials.

This approach has helped all those involved feel a sense of ownership over the technology. They are now able to engage in conversations concerning on-line course design, specify their needs, determine technological functionality, and even solve some of their own problems.

We would suggest that this integrated approach offers a number of advantages over the provision of fully fledged, off the shelf systems designed elsewhere. It will support a richer variety of teaching and learning models and approaches and is therefore more likely to lead to a successful uptake of CAL.

### **Some pedagogical thoughts**

The approach used for this case study is only one example of the way communications technology can be used for learning. The study was concerned with pedagogical and organisational issues around the use of technology, and the course design was informed by conversation theory; the model suggested by Laurillard, describing the necessary activities and processes involved in academic teaching and learning and the relations between them, was particularly useful (Laurillard 1993).

Traditionally in the context of a university, the teacher presents their conception in lectures, and students present theirs in tutorials or by writing essays. At the level of actions, teachers prepare or suggest experiments or other activities that students should undertake to help them deepen their understanding, which allows them to then represent their conceptions. However, the channels between lecturer and student are somewhat narrow in the formal situation. A lecture is a "one-off" affair - it cannot be re-run by the student, except in the memory. Likewise students' access to lecturers for discussion is limited to a few tutorials before the next idea is introduced. Experiments and activities are similarly constrained by timetables and availability of staff and resources. So, while all the aspects of this model are covered in the formal situation, interactions lack richness.

Using technology to supplement this approach can help improve the situation. Presenting the teacher's conception by providing resources on the WWW allows the student to control the pace and timing of the delivery; email and conferencing enable a rich and ongoing conversation between a group of students and a lecturer that allows the conception to be thoroughly explored, unconstrained by timetabling restrictions. Interactive CAL materials,

microworlds or simulations can be designed by lecturers and also delivered via the WWW, and could allow students to explore new ideas. Using this blend of technologies can enrich the interactions between students and lecturers by freeing them from the constraints of formal sessions.

Information systems...can act as a catalyst of change: promoting active and flexible, rather than passive, learning and engendering a deep, rather than shallow, approach to learning. (JISC, April 1995)

However, to fully adopt this approach would have serious repercussions on lecturers' work, the organisation of courses, and the overall management of the institution. These need to be carefully considered, and an appropriate programme of action designed. To approach the adoption of learning technology in a piecemeal way, could lead to the worst of all worlds - the disruption of normal teaching, but with inadequate benefit from expensive technology. The following need to be addressed:

- the technological requirements to deliver learning in this way; these should include minimum hardware configuration, number of machines, and network access and bandwidth
- the extent of lecturers' training requirements to be able to deliver learning materials
- the need for all students to be trained in the use of these new approaches to learning
- the design of courses and the change in departmental organisation to reflect new methods of learning
- the impact on institutional organisation, especially the structure of modular courses, permissible combinations, and the effect of these on cost centres

## **Conclusions and Recommendations**

It is felt that the approach that was taken was successful in its aims. Once the WWW server was set up, and training provided, the department was able to maintain the server with very little support, and lecture notes were successfully edited and added to the server weekly with no problems. Anyone who is competent in the use of word processors and a computer's file system should be able to set up and maintain a WWW site running on a PC or Macintosh. WebStar on the Macintosh is particularly straightforward to manage. Running a departmental server allows greater scope for exploration and rapid adaptation than having to depend on central and often overworked computing staff for all changes and updates, and is to be recommended. Employing someone with the specific task of developing this approach has many advantages, but much can be achieved if this is not possible.

The following points provide a checklist for those thinking of exploring such an approach. The sequence in which they are addressed would depend on the specific circumstances of the institution involved.

### **Identify sources of support**

- Contact your CAL Support Unit (or equivalent) if you have one to find out what support they can offer you

### **Course design**

- Spend some time exploring the WWW until you feel you have an understanding of the underlying idea.
- Identify the course in which you wish to explore/use an on-line approach
- Decide on the model you will be using, how technology fits in and what features it will have, i.e.: the sorts of materials to be used (lecture notes, images, CAL materials etc.) the nature of any on-line communications to be taking place etc.
- Identify the resources you will use and the design and structure of the WWW site (indexes, materials and navigation) well in advance of going live.
- Keep it simple to start with.

### **Technology**

- Check with Computer Services that you have a computer capable of running a WWW server, or they can offer you the equivalent
- Check that you and your students have adequate access to machines that can access the WWW.
- Find out from Computer Services whether your institution runs a news server, or other conferencing systems, and ask for one of these to be set up for your course.
- Find out how links to the Newsgroup/conferencing system are made from your WWW pages, and set them up in appropriate places.
- Make sure that all students and staff involved have email and access to newsgroups/conferencing system
- Nominate one person to take responsibility for maintaining the server, checking its structure, accesses and updating.
- Make sure that you have someone you can turn to if things do go wrong!

### **Implementation**

- Design and set up your WWW pages, set up links to the Newsgroup/conferencing system

- Make sure all the links work and the structure is sound
- Test it on someone who has not been involved in its creation, but who understands what it is for

### **Training**

- Make sure you know the basics of HTML editing, either by attending a course, or reading some of the on-line documentation.
- Identify the training needs of your students and a way of meeting these (e.g. do Computer Services run courses or will you have to organise these yourself?)

### **Development**

- Ask your CAL Support Unit staff to keep you regularly updated on developments in on-line learning as new tools are being developed constantly

Some hand holding will be necessary for the first few weeks, but once the issues above are sorted out, you will be able to set up and run courses from your departmental server with minimal support from central services.

## Case Study 2: The Department of Psychology

The following short case study is included in this report to illustrate the kinds of learning activities that may take place once a department has gone beyond the "beginner" model described in the last section. The School of Psychology has a much longer history in the use of computers for learning, and employs technical staff for this purpose. The department has run its own WWW server for some time, and consequently the use of internet technology is quite advanced. In this study the approach taken was to use the WWW to focus on a particular task.

### Searching the World Wide Web in Health Psychology

One of the long-standing aims of my final option course introducing health psychology has been to familiarise students with the sources of information on psychology. As an applied area much of the research information is published outside psychology outlets, especially in health journals and books.

The Internet is an increasingly important repository for such information <<http://www.qmw.ac.uk/~rhbm001/bmjguide/NET0.HTM>>. In this session I decided to include an introduction to finding relevant information sources on the web as a formally taught and assessed component of the module. I will describe how this was done and report on some of the difficulties encountered and summarise student feedback on the exercise. The 50 students taking the course have a reasonably high familiarity with (Macintosh) computers which they use for document preparation, statistical analysis, email, and computer assisted learning packages. Although they had access to World Wide Web browsers in the year prior to taking the module (1994-95), they had not been instructed in how to use them nor had they received much encouragement to do so. Nevertheless there were a few enthusiastic experimenters. The instruction consisted of a lecture on the Web and demonstration for one hour in the lecture room. This was followed a week later by one hour hands-on tutorial sessions for 25 students in the departmental computer lab (thirty Macintosh 6100s running Netscape 1.1N). The module home page <<http://www.psych.bangor.ac.uk/courses/P3H01/index.html>> has pointers to health sites as well as course bibliographies, past papers, and administrative information. It also contains a pointer to the assignment.

The assignment consists of a set of questions about health related topics. These seek factual information. For example:

The Cochrane Collaboration facilitates the creation, review, maintenance and dissemination of systematic overviews of the effects of health care. Where did it get its name?

There is an on-line form to complete to submit the answer. This is implemented using Netforms 2.0 on the departmental web server running WebStar 1.0. Students can choose between searching the web themselves using a search engine or subject directory (examples of which had been demonstrated/bookmarked for them) or asking for hints on the topic. Each question has four hints associated with it. The more hints a student asks for the lower the mark they receive for their answer. The hints are graded. Typically the first hint advises on how to categorise the question. In the example given above, the hints were :

- 1) This area of study is known as health services research
- 2) The University of York is a major centre for such research in the UK
- 3) They maintain the <link>HSR Superhighway guide<link>
- 4) The question is answered in a <link>FAQ at the Collaborations main server<link>

Hints 1 and 2 help the student develop a search strategy, but still require the student to use a search engine or form the URL. (Conventions such as <http://www.place.ac.uk> for British universities had been discussed.) In hint 3 a very highly targeted resource directory is directly linked. Finally hint 4 takes the student directly to where the required information is published. The exercise was designed to lead the students through development of a search strategy. Sometimes it's very much more efficient to take some hints but it generally is possible to reach the information without doing so. The hint level requested was automatically recorded with each answer submitted.

Of the 50 students taking the module 49 submitted assignments. All of the responses recorded were correct. The majority of students (28) did not request any hints. Relatively few requested all four hints for any question. There were some technical difficulties in getting the server to work as proposed. Students experienced frustration with the occasional inaccessibility of either the departmental server or the external servers they were trying to reach. The assignment was also delayed because it took me longer than anticipated to prepare all the hints in HTML. I am also concerned that the system may not be sufficiently secure. As presently configured it is possible to accept the hints and then use the browser's 'back' button to return to the "no hints" page and submit the assignment from there, though this is not very obvious to the casual user. (I did have one student ask me on the evaluation for technical information about how I had set up the system).

Twenty students attended a follow up course revision lecture (after the assignment was completed) and gave feedback on the assignment. Only one recommended that the web assignment be dropped from the course next year, the rest supported its continuation, though most of them had recommendations for improving it. The biggest category of change requested was that the questions posed bear more directly on the general course contents. ("More would have been learned about health psychology if the questions were more connected"). Related to this was a feeling that the assignment only dealt with specific kinds of information. ("There was some interesting stuff that I have gone back to since but the nature of the assignment and the fact that it took so long meant that I concentrated solely on finding the answers and not reading the articles"). Of course one can only draw on resources which are already out there but presumably this requirement will get easier to meet as the resources on the web increase (or come to my attention!). Students also expressed frustration at how time-consuming searching the web can be. This was partly through technical, network delays. ("Would have been good if there weren't so many hitches and shut downs and fatal errors and waiting so long to connect to new USLs (sic)"). However it may also reflect the fact that relatively few students took hints - using the library would be much slower if students did not have bibliographies for their lecturers. Several students asked for more extensive demonstrations/tutorial help. As students are now being introduced to the web from first year onwards this is less likely to be an issue in future years.

Overall the exercise has been successful. I expect that it will evolve from year to year with less emphasis on the mechanics of using a browser and more discussion of search strategies, types of resources available and how to evaluate the validity of information published on the Internet. It is also envisioned that students will begin publishing materials which they generate in the module on the Internet and engaging in web mediated dialogue with other students of health psychology.

## Summary

The main case study in this report illustrates how departments with minimal technical knowledge and skills can rapidly learn to set up and manage their own facility for delivering learning materials, and begin to engage in online discussions between staff and students. The second case study demonstrates one of the many ways in which the use of the WWW can be used in a flexible and inventive way to suit the requirements of a particular course. (see Appendix D. for more sources).

The report has suggested an approach by which technology can be somewhat demystified, and has tried to shift the focus to pedagogy by demonstrating how learning technology can be put at the service of specific teaching approaches. By beginning with a very simple model of usage, technological tools are put into the hands of those delivering courses, thereby enabling them to engage in thinking about how these tools might be developed to enrich the teaching and learning experience while remaining under the control of those involved in the educational process.

## Appendix A - Initial Questionnaire

### Student Comments:

- Computing is definitely something I want to learn, but I fear IT to be rather complex - hence my apprehension in regard to this subject.
- Writing out essays/dissertations.
- Using Email for access to information about plays etc.....
- I don't particularly like computers, but I'll have to learn to use them eventually, so it might as well be now.
- Essentially I am somewhat fearful of technology, and do not really possess any urge to learn how to use computers. However as I have friends very apt at using them, and have seen to time saving quality, I am very willing to learn.
- The possibility scares me. I would feel of a gross disadvantage. I would prefer my studies to be on a more personal level than working and communicating through a computer. Maybe I'm stuck in the 19th century, but I wish the course could be completed without computers. However, with sufficient training I'm sure to feel more confident at least.
- I would use a computer for general info to aid essay writing etc.
- It seems as though it could be useful but then again it may just be a great big hassle I hope not!
- Could be very helpful but may lack enthusiasm and clarity of a lecturer.
- I would use a computer in order to make my studying more efficient and to make resources more available, but in general I object to having to use a computer too often - and prefer books and talking to people.
- I don't really like using computers I find writing much easier, but I suppose they can do a lot more. I don't mind as long as it's not compulsory.
- Ready to try methods - although have not used computer before as an aid to study.
- Scarey
- I am uncertain to whether it will actually be of benefit except to make lecture notes and additional information available.
- I hope to be able to use computers to my advantage during the course, since word processing etc. are very useful tools to anyone who must write a great deal.
- Could be useful if lectures missed, may be quicker than using books.
- Good idea but may take a bit too long to explain to really benefit the course. If everyone was competent I'm sure it would be very helpful.
- The idea of using a computer seems a good one if it is guaranteed to improve my studies and my communication skills. If not, then I would feel that the whole point of a computer, would seem a little pointless.
- Fine as long as I understand how to use them.

- A computer course would be helpful. I am also doing a single module IT course on Word processing, computer literacy, so I will gain more experience from that course as well.
- I think its a useful inclusion and it would be a good learning experience.
- I think using the computers would be good for making lecture notes available.
- Would save time with essays, and would improve their presentation.
- A BRILLIANT IDEA! There are endless possibilities to be explored especially with the internet and the WWW - which I've already had some access to. Also email is a really goo idea.
- Not all that keen because of my inexperience with computers but I can see their advantages in some areas.
- I feel it would benefit my work on the course and enable me to gain some competence with computers which will be an advantage.
- Good idea.
- Whilst understanding the need to incorporate computers into the learning process I am still convinced that student/lecturer contact is the best way to learn a subject.
- Suppose it might be useful but in the end you can't use it as a substitute for reading/learning the subject. Hope stress on using computers does not detract from the content of the course. Garbage in - garbage out!
- It will be useful for having the lecture notes in advance but may lead to laziness as part of the work will already be done for the student.
- As an English student I feel computers will be useful in drafting papers and seeking information.
- Could be useful.
- Sounds a good idea, more interesting and convenient.
- Enlightening!
- I feel it is a good idea to be able to have lecture notes available via computers, therefore do not have to take notes during lectures - will be able to concentrate easier.
- I think having access to a word processor would be very helpful.
- It would allow us to gather more information on the subjects we were studying.
- I think it's extremely useful - particularly as emphasising visual learning, not just making constant notes at lectures.
- I think computers will be a good help in helping me with my studies.
- Indifferent.
- The possibility of having notes and communication available in an easily referenced format certainly appeals, allowing greater accuracy and understanding.
- I think they will be very useful.

## Appendix B. - Second Questionnaire results

Question	A: 4		B: 7		C: 10	
1. Which group were you in?	Male: 14		Female: 7			
2a. Are you:	20 or younger:14		21 or over: 7			
2b. Is your age:	Mac: 3		UNIX: 12		Don't know: 6	
3. Which server did you use during the course?	V. hard	Hard	Avge		Easy	V. Easy
4. How easy was it to find a free computer?	2	8	7	2	2	
5. Which location did you tend to use?	CLTR: 8		CLR2: 10		CL: 9	
6. Did you find your training satisfactory?	V.Poor	Poor	OK	Good	V.Good	
7. Was the help you received satisfactory?	V.Poor	Poor	OK	Good	V.Good	
8. Did you look at any lecture notes on the computer?	Never	Rarely	Some-times	Often	Always	
9. How easy was it to find the lecture notes?	1	3	5	2	11	
10. How did you read the lecture notes?	V. hard	Hard	Avge		Easy	V. Easy
11. How easy was it to print lecture notes?	1	2	2	4	12	
12. Was it useful to have notes provided in this way?	Screen: 8		Print: 15		Save: 2	
13. How often did you read the discussion group?	V. hard	Hard	Avge		Easy	V. Easy
14. How often did you contribute to the discussion?	5	3	6	1	5	
15. How easy was it to use the discussion group?	No use	Little use	Fair	Useful	V.Useful	
16. Did you find the discussion group facility useful?	2	1	1	4	13	
17. How often did you send email to the lecturers?	Never	Rarely	Some-times	Often	Always	
18. Did you find the email facility useful?	5	4	9	4		
19. How has this course affected your confidence with computers?	Never	Rarely	Some-times	Often	Always	
20. How often did you read the discussion group?	5	4	9	4		
21. How often did you contribute to the discussion?	13	5	3	1		
22. How easy was it to use the discussion group?	V. hard	Hard	Avge		Easy	V. Easy
23. Did you find the discussion group facility useful?	4	5	5	1	4	
24. How often did you send email to the lecturers?	No use	Little use	Fair	Useful	V.Useful	
25. How often did you send email to the lecturers?	7	5	5	2	1	
26. Did you find the email facility useful?	Never	Rarely	Some-times	Often	Always	
27. How often did you send email to the lecturers?	17	3	2			
28. Did you find the email facility useful?	No use	Little use	Fair	Useful	V.Useful	
29. How has this course affected your confidence with computers?	10	5	3		4	
30. How has this course affected your confidence with computers?	V. Neg	Neg	None	Pos	V.Pos	
31. How has this course affected your confidence with computers?	2		13	5	2	

## **Appendix C: Technological developments**

At the time of writing we are aware of a number of developments concerned with the management of online learning. The following are examples:

### **Web Educational Software Tools (WEST)**

This began as an add on to WebStar for the Macintosh, written by the University of Dublin. It is now multiplatform, and offers a range of additional tools for education. It supports student registration, provides tools for course structuring, and provides a simple discussion facility. Its use requires some training for secretaries and lecturers, and its performance is somewhat slow except on powerful hardware.

### **Reseau D'Enseignement Multimedia (REM)**

The University of Wales, Bangor's School of Education is co-ordinating a large European Framework IV Telematics Applications Programme project to develop a multimedia rich distributed learning environment for telematic learning, aimed in the first instance at teacher education, but ultimately generalisable. More information may be found on <http://weblife.bangor.ac.uk/rem/rem.html>

### **Toolkit for the Management of learning**

The CAL Unit at UWB has been funded by JISC under the JTAP initiative to develop a toolkit for the management of learning. This proposal leads on from the growth of on-line learning at UWB, and will provide a range of tools to support:

- (a) on-line interaction between student and tutor to allow the negotiation and creation of study programmes
- (b) the management, categorisation, browsing and searching of computer based learning resources
- (c) the creation of individualised learning programmes from these resources
- (d) the creation of student profiles consisting of grades, comments and suggestions based on students' use of resources and other learning activities
- (e) the sorting, searching and querying of these profiles to allow the creation of further study programmes.

This will add significant functionality to the approach described in this study. In addition to lecturers being able to provide materials and participate in on-line discussions with their students, they will also be able to enter into detailed on-line conversations with their students to design appropriate learning programmes, based on records of previous learning.

## **Appendix D - Further sources of information**

The following offers a small selection of the wide range sources of information and resources related to the use of the WWW in learning and teaching.

### **An online course**

<http://www.netskills.ac.uk/TONIC/>

An online course of instruction on using the Internet

### **A selection of TLTP Projects using the Web**

#### **STILE**

<http://indigo.stile.le.ac.uk/>

STILE is creating an ever-growing resource base of learning materials that are available to students over the World Wide Web. These materials include images, texts, bibliographies etc.

#### **INTERACT**

[http://gorgon.eng.cam.ac.uk/TLTP\\_EXHIB/DEMOS/index.html](http://gorgon.eng.cam.ac.uk/TLTP_EXHIB/DEMOS/index.html)

A number for applications which can be run standalone or integrated into the Web when the simulation appearance and state can be tailored to suit different levels of expertise.

#### **Bionet**

<http://www.leeds.ac.uk/bionet/teach.htm>

Some of the Bionet Courseware is Web based. This site offers some examples of how it is possible to implement highly interactive learning resources as WWW services.

#### **INSURRECT**

<http://av.avc.ucl.ac.uk/tltp/>

A programme which involves students undergoing surgical training in a collaborative programme using interactive video teaching and learning techniques over the new high speed data network SuperJANET

### **Other resources**

#### **New Tools for Teaching: J.J. O'Donnell**

<http://ccat.sas.upenn.edu/teachdemo>

This page leads to others that introduce, describe, and exemplify new Internet-based resources for teaching that are already available and in the main astonishingly easy to use. It discusses all the issues and the technologies, and

gives pointers to other sources of advice.

### **Using the Nets for Learning and Teaching**

<http://gpu.srv.ualberta.ca/~tanderso/learn.htm>

These links were created by Terry Anderson to provide pointers to, and examples of educational applications on the Net.

### **Using the Internet for Teaching and Learning**

<http://141.163.121.36/TeachingLearning/NetTeaching/intro.htm>

A Web based staff development course on using the Web.

The purpose of this course is to introduce you to the way that the Internet may be used in teaching, learning and assesment. The aim is help you decide whether you want to make use of the Internet in your teaching and how you can go about it.

### **Conferencing on the Web**

<http://freenet.msp.mn.us/~drwool/webcon2.html>

This is a chapter from the book "World Wide Web Unleashed". It describes various Web based conferencing systems.

### **Instructional Design in Computer Conferencing**

<http://cvm.tamu.edu/~vaph/klemm/instruct.html>

A discussion of various ways of making use of Conferencing in your teaching.

### **W3Lessonware**

<http://www.comp.it.brighton.ac.uk/w3lessonware/>

The W3Lessonware project will produce an integrated suite of tools to enable the visual authoring of HTML+ documents specifically geared towards educational use on the world wide web (W3).

### **Question Mark Web**

<http://www.qmark.com/qmweb>

Using QM Web in conjunction with Question Mark Designer for Windows, universities, companies and other organisations can set up tests, assessments, surveys and questionnaires on the Web

### **TML: Tutorial Mark-up Language**

<http://www.ets.bris.ac.uk/ets/resource/tutorial/tutorial.htm>

A system which has been written to allow delivery of tutorial question and answer type material over the WWW. This system is based on a file format called the 'Tutorial Markup Language' or TML for short

### **waMCQ**

<http://www.dundee.ac.uk/MedEd/mcq/>

The system provides a 100% point-and-click GUI interface MCQ delivered through any frame-compliant Web browser

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