

8: Practical implementation issues

Kathy Buckner & Greg Stoner

Having identified both a need for using leaning technology and the availability of appropriate Learning Technology (LT) materials (software/packages/courseware), consideration must be given to a variety of practical issues relating to the actual implementation. These include assessing the availability and appropriateness of physical resources and staffing, ensuring the provision of adequate student support and dealing with political and funding issues.

Physical requirements: availability and appropriateness

It is essential to ensure that there are appropriate physical resources available to you and your students within the institution where the chosen software can be run. This involves ensuring that there is hardware available in the institution that is capable of running the chosen software both for student use, e.g. in computer labs, and staff use, in lecture theatres and other teaching rooms. For student use it is also important to ensure that there are sufficient suitable computers available to your students for the class being taught and any resulting self study needs.

Computer Specifications

The minimum hardware and operating system specifications required to run a piece of software are normally specified by the software developers/suppliers. The basic systems specifications that you should check include the following:

- Basic system requirements: e.g. PC 486; Mac Performa
- Processor speed: e.g. 66 MHz
- Monitor/display requirements: e.g. SVGA; 800x600 screen resolution
- RAM: e.g. 8Mb
- Disk space required: e.g. 20Mb available on hard disk or on network drives
- Operating system: e.g. Windows 3.1, Windows 95, System 7.5.2
- Networks Supported: (where relevant) e.g. Novel, TCP/IP
- Other devices: Sound cards, speakers/headphones, CD drives etc.
- Printers supported by the application (not normally an issue in a Windows or Mac environments)

Remember that the basic specifications quoted for a product are likely to be the minimum specifications. On such equipment the software may run at an unrealistically slow speed or may require that other applications (including certain network facilities) are not running at the same time. It is therefore advisable to check that the software will run adequately on your systems before committing yourselves, even if your equipment does meet the technical specifications quoted, particularly if you are intending to use the software in a networked environment. Check for recommended specifications as well as minimum specifications, these are often a more reliable guide to the equipment needed.

It is likely that you will need to consult with you technical support personnel at an early stage to ensure that you won't have technical problems. It may be sensible to get your technical staff to speak directly to the suppliers technical staff to avoid getting involved in the technical details yourself.

Hardware or software upgrades may be needed if the current hardware is insufficiently powerful or if old versions of operating systems are in use. Network requirements should be investigated if the software is to run from a file server. If using World Wide Web or Internet facilities with students you will need to ensure that the computer lab that you intend to use is connected to the external networks and that the set-up is sufficiently robust and reliable to work with a number of students all accessing external sources at the same time. Reliability under load should be tested before the first groups of students begin using the computer lab. In most cases local computing support services should be able to assist in the specification and acquisition of computing facilities.

Remember that to use your LT materials students will probably also need, or at least want, access to other peripheral equipment, especially printers and increasingly CD drives. The physical provision of this equipment may only be part of the problem. For example, the running costs of unregulated printer usage can be significant, therefore it may be necessary to invest in the equipment needed to collect funds from users.

Computer laboratory availability

If resources are already available in an appropriate computer lab it is worth checking that you can book the room at the times when you want to teach your students and that students will be able to get enough access to the labs outside of formal class time when it will be required. This normally means planning ahead, particularly in situations where computer labs are in high demand. Some institutions have long lead times for timetabling of computer facilities and the need to integrate computer lab bookings with bookings for lecture theatres or other teaching facilities may complicate matters even more.

If there isn't an appropriate lab available you may have to start bidding for additional resources either through departmental or other institutional channels. This may entail the preparation of proposal documents, including the development of a rationale and the specification of requirements and costings. It may be necessary to "lobby" particular individuals within the institution to get them to support your application for additional resources. Time delays can often be experienced in getting bids accepted and also in seeing these through to the purchase (large capital bids will usually have to go out to tender which will add to the delays) and setting up of labs, so planning ahead is essential.

Many computer labs are run on an open or drop-in basis and booking rooms for teaching may not exclude others from using spare machines. In some cases this may be acceptable but if you wish to discuss learning materials with the students and hold their attention the presence of other students may make this more difficult.

Clear instructions on access to computer labs should be provided to students. They need to know how, when and where they can make individual bookings. Out of hours access may also be required and security of the computing equipment may be an issue if the lab is unsupervised. Students will probably need to "sign in" if using the facilities out of hours for reasons of safety.

Consider how you, or whoever manages lab usage, is going to deal with the demand that will arise from your students, bearing in mind that they are all likely to leave their work to the last minute and then complain that there is not enough lab time. Will you attempt to ration students' usage? Is your booking system adequate to cope with students who attempt to "cheat" - booking excessively, not turning up to booked sessions? To a large extent these problems become less so if you set out the rules in advance and get the students to help you to police booking system abuses.

Computer laboratory design

Even if you don't have any influence over the design of computer labs you may have a choice of facilities and lab design can be an important issue in implementations. The factors to consider depend on the mode in which you intend to use the LT materials; basically are you expecting the students to be supervised or taught in the class or are students working on material independently. Often a mixture of these modes are appropriate for different stages in students' use, hence it may be appropriate to use different labs for different sessions.

In supervised/taught classes it is important that you are able to view the students' monitors while they are interacting with the LT materials. One way to achieve this is to provide sufficient space for the lecturer or supervisor to walk behind students while they are working on the computers. Some labs are designed with the screens embedded into the desktops at an angle which can be conveniently viewed by both the student and the lecturer. Other labs are being designed so that the lecturer can interact with the students via a console at the front of the class, similar to the way in which lecturers in language laboratories interact with their students. Laboratories can also incorporate a feature which enables either one computer display (usually the one the lecturer has access to) or any computer display (including the lecturers') to be switched to a connection to an overhead viewer so enabling the whole class to view that particular display. This facility is advantageous when trying to demonstrate a particular point to the whole class.

For independent student usage many of these considerations are less important. However, in all circumstances it is important that labs are designed with enough desk space to allow, even encourage, students to take notes and to consult any documentation that they need to use the courseware. This is often a problem where labs have been designed to fit as many machines as possible into a small space.

If you are expecting students to use LT materials on group based projects or exercises expect them to want to use machines together or to cluster together around one computer. Is there enough space in your labs to allow this and are there enough seats?

Computer availability in teaching rooms & elsewhere

Within most HEI's only a small proportion of the teaching rooms will be equipped to demonstrate LT materials or to use computer based presentation tools. Alternatively it may be possible to take your own/departmental equipment to use or to book equipment from central computer &/or audio/visual service departments. The problems will however be greater if you need a live network connection. Ensure that you make the necessary arrangements/bookings well in advance and that you make sure that you give yourself enough time to set-up and test the equipment.

Additional difficulties will arise if you intend to support student access to LT materials from computers at remote sites (e.g. other campuses or home) or from computers on different network systems. These issues are likely to require specialist technical support and pre-planning, probably on an institutional basis.

Staffing issues and support for students

Student support and staffing requirements are intrinsically linked. Good preparation of students, materials and equipment can pay dividends in terms of the support problems encountered by you and your colleagues.

Preparing students for using LT

Advising students on how the computer based learning material will be integrated into the rest of the coursework is very important. Issuing course guides with a clear indication of how, when and where they can access LT materials will be helpful. An indication of the relevance of the LT materials to the content of the course being studied will also be helpful in creating motivation.

Students may require support in getting started with the LT materials provided. It is possible to demonstrate learning materials to the whole class either in a lecture or computer workshop using a projector or LCD panel. This will help familiarise the students with the courseware before they sit down in front of the computer and will help to allay any fears they have, as will general computer familiarisation sessions for students who have not used the type of computing environment that you are expecting them to use. Consider assessing students' IT skills on, or before, entry to a course that requires them or stating the skills requirements as a prerequisite for the course. Offer access to relevant IT skills courses to students who do not have the required skills. Here it may be possible to utilise courses provided centrally within your institution.

The better prepared students are the less they will require support later.

First-line student support

Getting this aspect right is a key element in successful implementations of learning technology. Students who don't know what to do and can't get immediate help are likely to lose confidence and interest in their computer based work and create extra demands on staff time to put things right later. This is particularly so in the initial stages of using LT materials, and close to submission deadlines.

There are a variety of ways of providing this "first-line" support. Often the lecturer taking the class will be expected to provide this support. However, this is rarely efficient as academic staff have offices away from the labs and/or are not "there" when required. Wherever possible first-line support should be available from the computer staff who manage/supervise the labs or by others such as student demonstrators or research students. An alternative might be for support to be provided over e-mail which could save interruptions in the office, though the timeliness of support is likely to suffer.

Academic staff

Ensuring that course and/or module providers have sufficient time to integrate LT materials into their teaching can sometimes be a problem. The initial stages of implementing teaching into the curriculum can mean a fairly substantial investment of time at the outset, particularly if new or supporting materials have to be produced. Other staffing requirements on the academic side may include the need for staff development courses and the

need to train computing staff, demonstrators or research students in the use of the software and supporting materials so that they can provide adequate first-line support.

Technical staff

Technical support for the hardware and software must be provided. If students have problems or difficulties in using the LT material because of technical deficiencies they may well be put off using the LT materials and may conclude that because the technology is inadequate so are the LT materials. In many cases technical support can be provided by either central computing services or by departmental technical support services, this should be sought in advance. Technical support personnel may have to work with software/courseware suppliers if difficulties arise at the installation stage.

Technical staff are often the ideal people to offer first-line support provided they are adequately trained to deal with students' likely problems. Given the difficulty students often have differentiating between technical problems and "learning material problems" and of getting hold of academics it is often the technical staff who will be approached for first-line support in any case.

During open access sessions and access outwith normal working hours it will still be necessary, or at least desirable, to provide appropriate support to ensure the smooth running of networks, computer systems and software. If technical support is not available at such times, because of resourcing issues, this should be made clear to students so that they are aware that there may be some degradation of service.

Funding, politics and people

Funding, politics and people are all central to getting anything done within an organisation and whilst the practical issues will vary both in their nature and how to deal with them between institutions there are a few observations that are worth making in relation to the use of learning technology. Also the way that you approach these issues will of course depend on your position and attitudes.

Funding & politics

Being aware of your institutions IT strategy and the opinions of the influential people in the computing support department will help you to obtain access to resources or funding to acquire them, as you will be better able to produce a case to support your request. Further, many institutions (or devolved funding units - schools, departments, faculties) have separate funds earmarked for innovative teaching. Even if they don't, similar considerations may well be taken into account in equipment bidding procedures. Find out about the institutional structures and the funding/bidding rules, then use them to your advantage. Also be aware of external funding opportunities, there have been several funding initiatives in the UK in the past few years including, for example, TLTP & ITTI on a UK basis and UMI in Scotland.

Consider who (else) has a vested interest in the use of LT in general and if possible the LT or IT resources that you want to use. Other academics in your own field/discipline either in your own or other departments are obvious candidates. Less obvious are staff in support services, e.g.. computing service, the library and staff development or learning support departments. Some of these people may be interested in the applications or equipment directly or may be interested in the job opportunities or interest that your using the facilities will provide to them. Pool your resources to fund acquisitions &/or to lobby for the resources, interdisciplinary co-operation is often favourably considered.

Also consider the positive impact of having "your" labs full of students - it provides evidence for your lobbying for more resources.

Departmental politics & personnel

All academic departments are under pressure to teach more &/or to produce more research. In this context it is important to consider departmental politics and the attitudes of your colleagues. Often teaching is a secondary priority, therefore avoiding the efforts of change can lead to resistance to innovative teaching. Also funding for teaching developments may have to compete against research projects. However, it may well be possible to use arguments relating to institutional strategy, teaching quality assessment, quality audit and departmental image & marketing to overturn those objections.

Other possible impediments include colleagues with computer phobia, or a reluctance to use computers in teaching for other reasons, and potential problems with workload allocations. Using LT may mean you spend less hours in contact with students, but more time preparing material and no reduction in marking. If this is not reflected in work load models, e.g. those based solely on contact hours, there is a possible disincentive to using LT.

There are however other potential benefits to using LT at a personal and departmental level. For example the opportunity to carry out publishable research on the effects of using LT, increased satisfaction due to improved student results and attitudes and the longer term effects on overall workload and increased perceived teaching quality. In general it is probably true that short term returns are likely to be poor but in the longer term they may be significant. It is, therefore, an advantage to be thick skinned & purposeful.

Other considerations

Academic standards

Ensuring academic standards are maintained may mean that there is a requirement to rewrite course or module documentation to indicate where and how LT materials have been incorporated. Writing the appropriate documentation takes time as do the administrative procedures required to get revised documentation accepted by the relevant committees. Plan ahead to ensure that your course or module can run in its revised mode as and when you require.

Systems security and integrity

It will be necessary to integrate systems security features into computer labs which are accessed by classes of students. Seek advice on security issues from the institution's and/or department's computer support staff, particularly where network systems are employed. Virus infection can cause serious disruption to both data, program and system files and it is essential to keep upgrading the virus checkers to protect against new viruses. If computer based assessment is being undertaken it will be necessary to ensure that students do not have access to the data files containing the test materials. Sensitive data files such as these should only be stored on the network when required and it is advisable to store them in an encrypted format for greater security.

Systems should be set up in such a way that student work is not normally stored on the hard disks of computers. In some instances students will require access to hard disks for the creation of temporary files but an automated disk clearance system will help to maintain the integrity of the file system on the hard disks.

Summary

Careful planning at an early stage of introducing learning technologies into the curriculum will assist in the development of effective implementations which are robust and well managed. Well planned implementations are also more likely to be well received by students, one of the reasons that teaching with LT can bring its own rewards and is worth the effort. Political and funding issues may present significant barriers to LT implementation, however some of these may be less real than they appear and others can be overcome, though it may take time to do so. Solving resource issues in terms of staffing (both academic and technical support staff), technology and course design will assist in the timely integration of appropriate learning technologies and help to ensure that students are presented with LT material which will be of value to them in their studies and with which they feel at ease.