



# Education Departments' Superhighways Initiative

Group B: Vocationally-Focused Projects

# Final Report

**Computer Based Learning Unit School of Education**
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## Evaluation Methodology and Procedures

1. The evaluation procedures for the projects in Group B necessarily varied according to the context of individual projects, however the following general methodology was employed for all projects.

2. All educational institutions involved in the ten projects were visited by members of the evaluation team, though where a large number of institutions was involved (e.g. London Colleges Multimedia Initiative) a large representative sample was visited.

3. Data was obtained through the use of observation of teaching and learning, through semi-structured interviews with participants at all levels, and through the use of questionnaires using fixed and open-ended response items. Emphasis was placed on eliciting and representing the views of a range of those involved in each project, from learners to teachers and managers.

4. In addition, the evaluation teams analysed project documentation, students' work and minutes of management meetings and, where possible, a member of the team attended project management and steering group meetings.

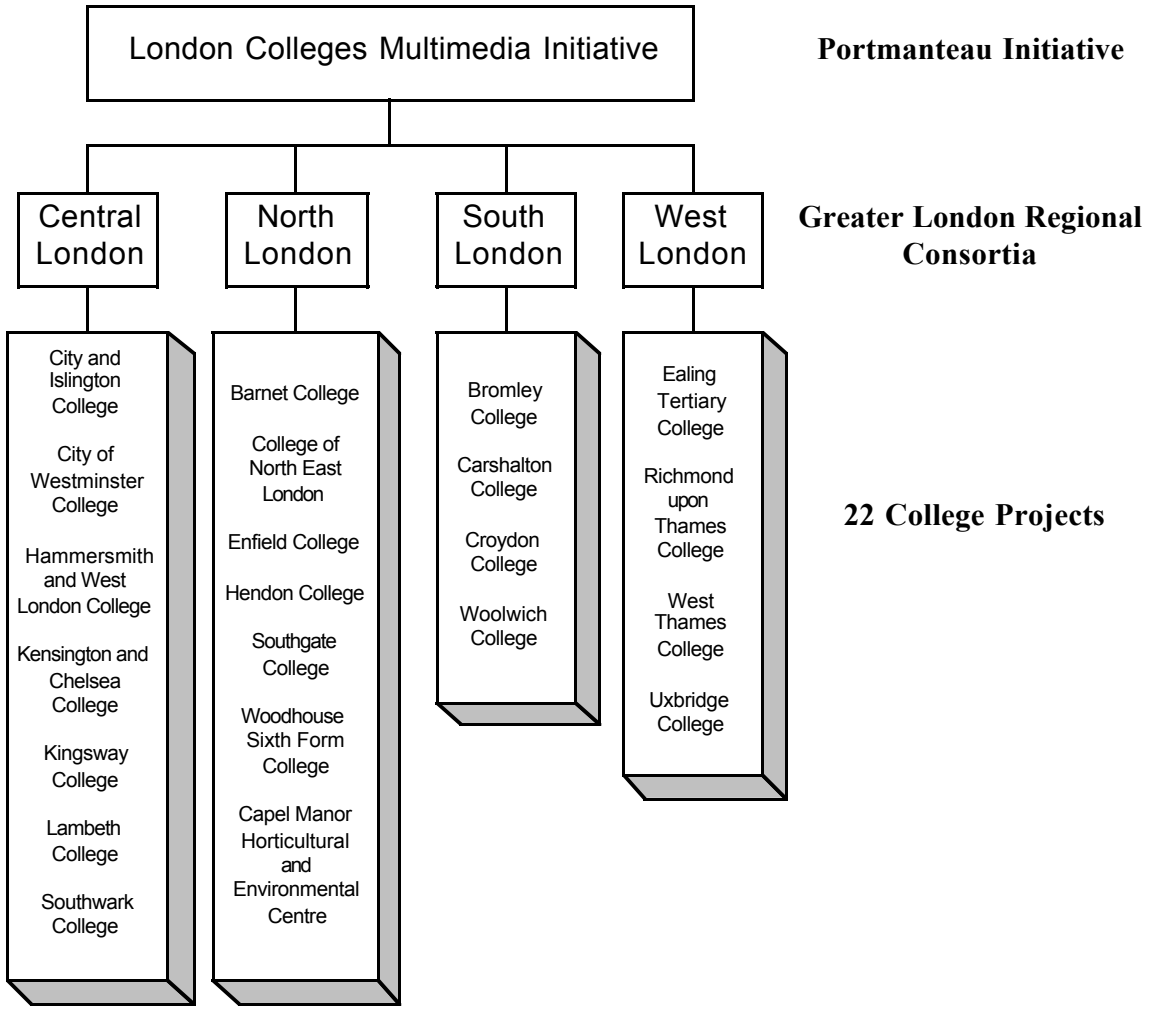
5. Regular evaluation team meetings were held to ensure a commonality of approach and to inform and refine the methodology adopted and the evaluation foci as findings emerged.

# 5. THE LONDON COLLEGES MULTIMEDIA INITIATIVE

## Project context and description

5.1 The London Colleges Multimedia Initiative is a large and complex scheme with many partners, based on a confederation of the Greater London Training and Enterprise Councils (TECs) and 22 colleges funded by the Further Education Funding Council (FEFC). The colleges are grouped into four regionally-organised consortia (see Figure 1), formed on the area of influence of one of the sponsoring Training and Enterprise Councils. The 22 colleges are grouped into the four regional consortia in which they collaborate on the devising of projects to fulfil the broad aims of the London Colleges Multimedia Initiative. The consortia form a loose federation and each individual project within each consortium is autonomous as, ultimately, is each college. However, it was envisaged that project materials developed would be made available to other consortia partners.

*Figure 1.*




5.2 The initiative began in August 1995, although planning for funding bids had taken place earlier in the year. Subject to continuing funding, which depends upon the attainment of targets, the project will continue for three years. This evaluation covers the initiative during the period from February 1996 until

February 1997. In September 1996, the initiative was enlarged by the addition of a further 32 colleges, giving a total membership of 54 of the 61 FEFC-funded establishments in the Greater London area. These additional colleges do not form part of this evaluation.

5.3 Each of the 22 college projects is funded from the FEFC Competitiveness Fund, a three-year initiative to encourage and assist FEFC-funded colleges to work together. In the Greater London region, the prime aim of the initiative is to contribute to improving the region's competitive advantage. Key areas identified as having priority were multimedia, telematics and the information superhighway, together with the devising and exploiting of new ways of teaching and learning, and delivering learning materials telematically.

## Project aims and objectives

5.4 The aim of the initiative is to develop the competitiveness of business within the region, increasing access to high-quality vocational training, harnessing new technologies to improve the flexibility of training provision, and responding better to the needs of employers and individuals for continuous skills development and lifetime learning.

5.5 The intended outcomes of the initiative are that learners will be able to undertake their studies in more flexible and accessible ways, and utilise to the full their skills of handling and communicating information acquired through their studies. In line with the Government's objective, the initiative will contribute to the goal of ensuring learners are adequately prepared for initiation into, or return to, working life in the understanding and use of new technologies.

5.6 Learners will also have improved access to support through the flexibility of broadband connectivity to enable them direct and immediate interactive communication with their tutors and other teaching services, together with the facility for on-line assessment and management of learner responses.

5.7 The specific outcomes sought include:

- the establishment of an information superhighway as a catalyst for lifelong learning and skills development for the individual, in order to enhance the economic performance of businesses in London
- the development of broader use of technology for information interchange, and promotion of the use and benefits of the Internet information highway to colleges, schools, businesses and other agencies such as careers service partnerships, employment services and TECs
- support for the National Education and Training Targets through the development of work-based learning systems allowing development through the NVQ Level 3 qualification in priority skills areas
- support for the development of new learning methodologies, both for colleges and for employers, by using technology to provide open access to vocational-skills training
- the promotion of vocational training and qualifications across organisations within the region, encouraging increased investment in future skills development
- the maintenance of current levels of vocational education and training in construction and engineering-based industries

- economic growth through vocational-skills development in identified priority areas in both large organisations and Small and Medium-sized Enterprises (SMEs)
- highly cost-effective vocational-training provision within the workplace and within the colleges
- increased access to flexible vocational-training provision in the workplace for home-based students and in areas of special need.

5.8 It is intended that such a wide range of outcomes will ensure that vocational education and training contribute significantly to improving competitive advantage in London by their ability to:

- widen access to provision, including particular specialisms within any college
- enrich curriculum content by improved access to resources
- foster a more versatile approach to the development of core skills in both academic and vocational courses
- promote collaborative ventures with the local community, including employers and schools; and between UK colleges and their counterparts in other countries
- gain access to sources of information on vocational needs to improve responsiveness of colleges to changing vocational requirements, both in the UK and in Europe
- provide information, advice and guidance to prospective students, especially adults wishing to re-enter education.

## Project evaluation

### *Evaluation visits and procedures*

5.9 The evaluation team allocated one day to each college visited in the London Colleges Multimedia Initiative in an attempt to determine the way in which the college was implementing its project aims and activities. During the course of their visits, the team sought to find and identify good practice which is replicable in similar establishments, capable of being scaled, innovative and entrepreneurial, or having commercial potential.

### *Funding and sponsorship*

5.10 It became evident early in the evaluation that there were often several separate but linked initiatives taking place simultaneously in the colleges visited and, in many cases, funding had been obtained from a variety of sources (Further Education Funding Council, European Social Fund, Single Regeneration Budget, college funds, etc.). Often, the equipment or facilities provided by one project fund were the factors which enabled the second project to operate.

5.11 Collaboration is the mechanism which enables the colleges to bid for finance through the Government's FE Competitiveness funding programme. Guidance from the Government Office for London indicated that the bids must be collaborative, that funding must be spent in a collaborative way and not shared out between colleges, that employer involvement was essential and that matched funding was the basis for the allocation of any finance. Bids are made annually to, and allocated by, the London Regional Group which

comprises representatives from business, the FEFC, the Government Office for London and the DfEE.

5.12 The Competitiveness Funding arrangements have thus been responsible for many of the initiatives which have occurred in the London Colleges Multimedia Initiative and, indeed, it is through this fund that many thousands of pounds have been spent. However, the funding model does contain a number of disadvantages. Colleges do not know how much they will receive for their projects from one year to the next. Each has to bid for finance through the consortium. Each bid is carefully evaluated to ensure that funding criteria are complied with, before funds are ultimately allocated on decisions made by the Competitiveness Funding board. Thus, colleges may receive only a small proportion of the funds they wish to spend and, whilst this procedure may make sound financial sense in terms of supporting approved bids only on a yearly basis, it does not help with long-term planning, since there is no guarantee that an initiative, once started, will be subsequently supported. This procedure may result in a short-term attitude to project development. Indeed, many of the staff who were interviewed, whilst acknowledging the need for financial controls and constraints, felt that such a method of funding often led to decisions being made on a 'quick win' basis and precluded longer-term strategies being employed.

***Management issues***

5.13 The London Colleges Multimedia Initiative has an overall steering committee comprising representatives from each of the London Training and Enterprise Councils, the four consortia and the colleges. A senior manager from one of the constituent bodies is chosen to chair the committee. The committee holds meetings at regular intervals to consider issues relating to membership of the Initiative, finance, the writing of bids, allocation of resources and Initiative and Consortia project strategy.

5.14 Each individual consortium has a steering committee headed by a senior manager, either from a partner college or the sponsoring Training and Enterprise Council. In one consortium, there is a paid consultant acting as consortium project manager and, in another two, remuneration has been made to the colleges for the time and services of the senior managers who have assumed consortium managerial responsibility.

5.15 Within a consortium, there is co-operation between colleges which may involve shared staff development, shared use of equipment or shared expertise. However, most of the colleges serve very different clientele and, thus, the programmes of work developed are often quite specific to the perceived needs of these clients. There was, nonetheless, collaboration on the shared task.

5.16 For example, in the West London consortium, membership of the group comprised one staff member from each of the four colleges together with the consortium project manager as chair. Four project areas were chosen, with each college taking responsibility for one project.

5.17 At the college project level, an effective project-management structure which was observed had a strategic group chaired by a vice-principal to guide the project and an operational group led by an enthusiastic member of staff to co-ordinate the day-to-day activities of the project.

5.18 As a measure of its commitment to the project, Southgate College seconded a member of staff to act as full-time college project co-ordinator. During the first year of the project, a senior member of the academic staff occupied the position where he was instrumental in establishing the project, setting up the

necessary infrastructure to support and sustain it. At the beginning of the second year, a graduate in English and Communication Studies, who had gained multimedia-production skills during his undergraduate course and who had worked as a technician supporting the college Information and Communications Technology (ICT) computer facility, was appointed as co-ordinator.

5.19 Effective management structures have been established in all the colleges visited. The dual system of having both strategic and operational committees is very effective, particularly so where a member of the college senior management champions the project's cause. It was noted that, in those colleges where a full-time project co-ordinator had been appointed, more rapid progress was being made towards attainment of project objectives.

***Multimedia-production activities***

5.20 Whilst a very wide range of project activities was in evidence, the principal focus in many colleges was on the design and production of multimedia learning materials, for delivery through a mixture of CD-ROM and broadband media. One common reason put forward for this emphasis was a desire to move towards more Computer-Based Learning (CBL) as one method of reducing the unit cost of courses. To this end, colleges were developing or adapting CD-ROM based teaching materials which will eventually be networked within colleges and subsidiary sites. In many cases, the material was designed to be used by SMEs.

5.21 Most of the development work during the first year has been devoted to equipping the colleges with the essential equipment for the production of CD-ROM based learning materials and enabling staff to develop the necessary skills for authoring.

A wide variety of ICT-based learning materials has been produced. Some of the materials were made available on CD-ROM and some on the Internet or the college intranet. A range of production methods were used, and materials were produced and obtained from several sources:

i) non-course specific materials purchased from and produced by a commercial organisation

ii) course-specific materials purchased from and produced by a commercial organisation

iii) material produced by a college for internal/consortium use

iv) material produced by a college in collaboration with commercial organisations

v) material produced by college staff as a development exercise

vi) material produced by college students as a learning exercise

vii) Internet bookmarks to enable students to access learning materials quickly and effectively.

5.22 Producers of multimedia learning materials identified several questions that need to be addressed by other intending producers.

- By whom will the materials be used?
- Is there a proven need for the materials?

- Will the materials be appropriate and relevant?
- Is multimedia CBL the best way of presenting the materials?
- Will the quality be good enough?
- How long will it take to produce?
- Who will produce it?
- What pedagogic analysis skills are required for the production of learning materials?
- What authoring skills are required?
- How long will it take to acquire these skills?
- What resources are required to support the wide range of skills needed?

5.23 Several authoring programs were seen. Most establishments had adopted one as a simple introduction to authoring but were often experimenting with others which were more sophisticated in the features offered. One most interesting experiment was a software-development exercise being undertaken to provide Hammersmith and West London College with a 'shell' program which could be used by the average member of staff to produce good teaching materials with a minimum of training and technical support. A different approach had been taken by other colleges which had taken the step of employing designer/multimedia authors on a contract basis to develop the learning materials required.

5.24 Many colleges had standardised on the Windows-based Master Class Authoring program and one consortium has purchased a site license at a cost of £5,000, together with a fee of £1,000 for unlimited sale and distribution of programs authored with it. This program was considered by several interviewees to be easy to learn and powerful, but non-intuitive. As a package for non-experts, it was found to be useful but it lacked some of the features required by sophisticated authors. For more advanced authoring, Macromedia Director, Macromedia Authorware, AimTech IconAuthor and AimTech CBT Express were among favoured packages. One consortium had arranged for several producers of authoring packages to demonstrate their software, leading to discussion of features together with hands-on experience so that informed choices could be made.

5.25 Bromley College had decided not to develop its own teaching materials but to use those developed by other colleges or commercial producers. It is currently using a series of commercially-produced, vocational, CD-ROM based learning packages in Beauty Therapy; Motor Vehicle Engineering; and Electrical Installation, mostly at NVQ Levels 2 and 3. The packages provide a thorough course to supplement the classroom, salon and workshop activities, and assist students with revision.

5.26 To illustrate the width of multimedia learning materials designed, the following CD-ROM learning packages were produced by Southgate College in the first year of the project:

- a unit on 'Colour Theory' for GNVQ Advanced students in Art and Design

- a unit on the electrical principles of automobile spark ignition systems for GNVQ Advanced courses in Motor Vehicle Engineering.

5.27 In the following year, a second cohort of staff was trained in multimedia-authoring skills and the materials being developed comprised:

- Multimedia Authoring and the Personal Computer
- Soil formation (on behalf of another college in the consortium)
- Networking Principles
- An Introduction to Book-keeping
- Semiconductors and the p-n junction
- Understanding Three-dimensional Visual Language
- DNA Protein Synthesis and Mutation
- Health and Safety
- Marketing Further Education.

5.28 Examples of the work in progress were examined, and the quality was of a high standard and comparable to the best materials available commercially.

5.29 At Barnet College, a lecturer in IT had produced a CD-ROM learning package called 'Network Builder' which was designed for use by IT GNVQ Advanced and Intermediate students, though it could also be used with all vocational areas as part of the IT core-skills unit. The program illustrated the concepts of computer networks and the related terminology and methodologies. These areas were presented by giving the user the opportunity to explore the construction of a network against an unknown budget. The treatment of the material included use of colour, graphics, video, text and animation. It was produced in Master Class and, depending on the path chosen by the student, it could replace two hours of conventional teaching. The author estimated that approximately 150 hours were taken in development.

5.30 The courseware-development model adopted in Barnet College was to operate a workshop in which staff could produce computer-based learning materials. The equipment comprised the college multimedia development specification platform together with two 486-66 MHz networked computers. A Hewlett Packard scanner was available, as were a camcorder and a tape recorder. The room had a very large pin board (4m x 2m) on which details of the production process were illustrated. Authors were expected to storyboard and document each step in the development of their program, and a directory of staff in the college who were subject experts or who possessed skills in the areas of graphics, video production, sound recording and authoring was kept so that expert help was fairly readily available.

5.31 The North London Consortium had as its project co-ordinator a member of staff who has had extensive prior experience in the commercial production of CD-ROM based learning materials. Based in one of the colleges, she acted as a facilitator for the training of staff and as co-ordinator in the production of learning materials with colleges in the consortium.

5.32 In many cases, the multimedia learning materials demonstrated were of good or adequate quality and had been produced by enthusiastic staff mostly in their own time. It needs to be acknowledged by management in colleges that projects of this nature, while requiring the support of technology, should not

be technology-led. Investment in experienced personnel with pedagogic, managerial, technical, authoring and graphical skills is essential in order to enable the production of teaching and learning materials which are comparable to those produced professionally. It must be stressed that the design and production of multimedia learning materials is no trivial task and has to be carefully planned and executed in a co-operative venture rather than through the supported effort of an individual. Key factors were identified as technical support and teamwork.

### *Teaching and learning activities*

5.33 As anticipated across such a large project, a very broad scope of teaching and learning activities was encountered, ranging from general ICT courses for local residents aged 60 and over, through specific skills training for SMEs to the use of an integrated multimedia language laboratory.

5.34 An exhibition of some of the work carried out at Kingsway College showed how the Internet and multimedia were being used in several curriculum areas. One of the exhibits formed part of the first year of a franchised degree course involving the study of English Literature. As part of their general IT skills, the students learnt how to use the simple multimedia authoring program MM-Box 2. This program is a subset of the more elaborate Asymetrix ToolBook, to which students can progress if required. One example of a student's work was the germ of a potentially excellent multimedia presentation on the life and work of William Blake. It was an example of a project which developed all the conventional essay skills and more.

5.35 At the City of Westminster College, a targeted group of Advanced GNVQ Travel and Tourism students are using the Internet as part of an exercise designed to help them appreciate how to find travel information. The exercise requires the students to assist a client who is planning a business trip to the USA. The client is self-employed and has a certain amount of latitude regarding dates, but some meetings are fixed. There are a number of other criteria involved regarding a brief holiday visit. The client has certain preferences regarding the standard of hotels and other facilities. The student is required to produce a full itinerary for the client. The tutor provided the students with a list of over 30 Web sites which provide information on airline flight times, hotels and the facilities they offer, information regarding countries, tourist resorts, business travel, etc. The scheme looks fascinating and is one of the more imaginative pieces of work which uses the Internet to train students.

5.36 A number of colleges offered superhighway training courses. City and Islington College had devised, planned and developed a variety of courses at several levels to teach aspects of the Internet and the use of HTML for developing WWW pages. The courses are at an Introductory level, or at Level 1 or Level 2 of the London Open College Federation course scheme. The introductory courses are provided for unemployed/retired people and are currently funded on a concessionary basis to residents of local boroughs. Additionally, an evening drop-in workshop was provided for students to use the college facilities to consolidate their authoring and design skills. There was seen to be a great demand for such evening courses devoted to the Internet, and a number of students from one Internet authoring course have produced their own contributions to the World Wide Web which were then loaded on to the college server as part of an electronic CV. Thus, when the student applies for a job, perhaps by e-mail, a potential employer can see directly examples of the kind of work the student is capable of producing.

5.37 Carshalton College had initiated a course called 'Women in Multimedia', funded jointly by the Further Education Funding Council and the European Social Fund. The two-term course was established as a result of labour-market research which showed that there is a need to retrain and/or update people with photographic and media skills with the new skills required in the area of digital media. During the first term, the course covers areas such as DTP, graphics, and TV and video production for use in marketing. In the second term, the students are introduced to digital media on the PC and learn how to produce multimedia presentations. The preferred tool for this work is Macromedia Director. The course is ambitious and ends with a short period of work experience.

5.38 A wide variety of teaching and learning activities were observed and examined. There was ample evidence that the technology of multimedia and the Internet was being used by good teachers to support their teaching by providing yet another resource for students and, in all cases, the quality of the learning appeared to have been enhanced by the imaginative use of Information and Communications Technology. In other cases, students were learning how to develop the skills required to create multimedia and Internet materials, thus giving a sound foundation in, and background knowledge of, these new media and, in turn, enhancing their employment prospects. It is worthy of note that many of the courses of this nature have been designed for members of the community who require re-skilling in order to compete in the job-market.

***Teaching and learning issues***

5.39 Across the project, there was a deliberate move away from the classroom, workshop and laboratory to the learning-resource centre, workplace and home. These new methods of learning are seen by colleges as being more economical to deliver, more flexible in use and less prone to bureaucratic whim. With flexible learning telematically delivered, it was felt that the virtual college could be open seven days a week, 24 hours a day, with on-line help available.

5.40 Carshalton College had acknowledged the need to keep a close watch on development in teaching and learning in the college because of the way in which technology is moving and the speed at which it moves. The college considered that the quality of learning had improved through use of multimedia-based learning resources. The internal quality-assurance schemes in the college confirmed this belief and indicated that learning gains are occurring. However, in some cases, it was noted that students were simply placed in front of a computer without any adequate preparation. In extreme cases, traditional technology had totally disappeared. In response, the college is now developing new teaching programmes which pay more attention to student needs.

5.41 West Thames College decided to focus on the telematic delivery of course materials. The college manager for ICT had explored several ways in which teaching materials could be delivered and, ultimately, together with 18 students from a BTEC National Diploma course, piloted the delivery of a module on Modern Communications, either in students' own homes via the Internet or on the College Network. The format of the course encompassed several different areas of the Internet:

- a series of screens of information written in HTML
- a series of documents held for reference and downloading in a File Transfer Protocol (FTP) area

- class discussion managed using the *mirc* Internet Relay Chat program (the *mirc* program can be used freely for educational purposes)
- software considered likely to be useful to students was also provided in the FTP area.

5.42 Colleges' experience in the development of distance-learning materials in projects such as this was very encouraging and staff are convinced that these modes of delivery will expand rapidly in the near future. The college in question is investigating ways in which public facilities, such as those in local libraries or available via private providers, could give access to Internet resources which the students might not otherwise have.

5.43 The development of distance-learning materials and delivery of them via the Internet will probably expand rapidly in the near future. Work being done in a number of establishments will enable staff to develop the expertise required. However, it is imperative that, where new technology is used, it is seen as adding to the armoury of learning resources available to the learner rather than replacing some. A good teacher will carefully choose the most appropriate tool for the enhancement of learning, rather than employing one just because it uses new technology. Equally, managers should assist staff awareness of the whole panoply of materials, techniques and technology available to them so that an informed choice can be made.

***Students with learning difficulties and/or disabilities***

5.44 Two programmes of work for students with learning difficulties and/or disabilities were noted at Kingsway College. The first involved college tutors working with Year 11 pupils from a local school which caters for pupils with special needs. The short course organised by the Foundation Unit of the college involved the pupils in making their own multimedia package using a program called MM-Box 2 (similar to a simplified version of Asymetrix ToolBook). The pupils went out and about with their tutors and recorded images and sounds using a video camera and a tape recorder. Upon returning to college, they recorded their impressions orally and in writing. Finally, using the authoring program and with help from their tutors, each pupil put together his/her own program. Key factors in the success of this kind of activity were identified as having the right equipment; knowing how to use it; having someone available who has a good working knowledge of the authoring program; technical support and teamwork.

5.45 A second learning programme for students with learning difficulties and/or disabilities was funded by the European Union and involved 14 adults with various severe disabilities (cerebral palsy, sensory impairment, spinal injuries, etc.). The project catered for the specific requirements of each student and allowed them to work towards an appropriate IT qualification. The college provided each participant with a PC and appropriate peripherals to use in their own home. This allowed the student to access multimedia material available on the Kingsway College network, to access the Internet, and to use e-mail. There was easy communication with tutors and provision was made for a weekly tutorial visit to the student's home. All students also attended the College on two days each week. Telephone bills, taxi fares, etc. were all included in the funding. The project allowed some participants some form of professional life, for example, one was able to work as a translator and another worked in the design field.

***Links with business***

5.46 It is acknowledged that, in the UK, there is an urgent need for many employees in SMEs to develop new skills or upgrade those used at present.

Because of the nature of an SME, it is often difficult to justify the absence of key workers to participate in external training courses. Consequently, there is a perceived need for on-site, on-demand training. A number of colleges, together with the Training and Enterprise Councils, are actively engaged in conducting training-needs analysis of local SMEs and, subsequently, developing appropriate programmes that can be telematically delivered into the SME premises. In some cases, significant marketing plans have been adopted.

5.47 A course for local SMEs which was provided by one college was designed to raise awareness about the Internet and closely associated topics, and another college had established courses for the staff of SMEs to assist with the development of multimedia presentations using Microsoft PowerPoint augmented by the use of images obtained from both video cameras and digital still cameras.

5.48 Several colleges had developed courses specifically targeted at Web site production for SMEs and local industry, thus showing an admirably quick response to perceived needs of industry and commerce. Several sessions which were observed during the evaluation provided excellent examples of good practice.

5.49 The College of North East London had experience in developing multimedia materials for the commercial market in collaboration with various external agencies, such as Eastern Electricity and the Association of Furniture Manufacturers, and offers an authoring facility to the external agencies on a contract basis.

5.50 Experience at both Richmond-upon-Thames College and Ealing Tertiary College had led to the conclusion that there was a need for flexible training in the workplace and that one of the most flexible and economic methods of delivery was the use of CBL materials delivered telematically to the workplace.

5.51 The Enterprise Manager at Woolwich College, who organises college dealings with local SMEs, gave a lucid and sympathetic account, some of it based on her own past experience as manager of a small business, of the problems facing such enterprises. She explained why many courses for such firms (a) would have to be tailor-made to their requirements, and (b) would have to be delivered either down the line or by visits from a college tutor to the firm's premises, and perhaps at non-standard times. It remains to be seen whether such courses can be economically free-standing, that is financed by the small businesses themselves, without any input from other agencies.

5.52 There was certainly felt to be scope for providing business with specialised cable or ISDN applications such as video conferencing. However, it was noted that, in several colleges, there had been a slow build-up of interest. One college principal believed that more research is required into what SMEs want and what they are prepared to pay.

5.53 Several large national and international firms were represented on one college's governing body. This certainly gave the college a ready-made link to the local business community which the college was exploiting by providing appropriate courses. However, no such easy access to SMEs was found to be possible. So an approach, made to the college by a consortium of local pharmacies to provide on-line, tailor-made courses, was welcomed and a pilot scheme, whereby the pharmacies can communicate and collaborate together to their mutual advantage, has been established. Beyond this, the college is currently investigating ways in which course materials can be downloaded from the server via a cable ISDN link to a client in an SME. The client would

use the package to complete any related assignments and then telematically return the completed used package for assessment.

5.54 Every college visited was fully aware of the need to provide SMEs with appropriate training materials. If these materials can be delivered telematically, then it is seen as being of great benefit to all. However, there is a distinct lack of appropriate learning materials that can be delivered telematically, though the Further Education National Consortium is looking to convert much of its paper-based resources to CD-ROM format with a view to ultimately providing their learning materials on the Internet, albeit with access restricted to members.

5.55 The development of good, computer-based learning materials for delivery telematically or otherwise is, however, a time-consuming task and not one to be undertaken lightly. It would appear that the development of such materials is, ultimately, a task which should be organised collaboratively with extensive national market research taking place into the needs of SMEs.

5.56 The economics of supporting the work of SMEs point to the clear advantages of dealing with a developed consortium of SMEs, an example being the work carried out by Southgate College with the North London Garages Group. Similar arrangements are surely possible in most other parts of the country. These would overcome many of the problems, including those of finance, which make links between colleges and SMEs so difficult.

***Staff development***

5.57 The overall emphasis on staff development has been variable, though generally the colleges had all set up programmes to develop the experience and expertise of their staff in ICT, and all the colleges visited organised programmes of staff development which were available to *all* staff employed by the college.

5.58 The courses observed or examined were of three types.

(i) Introductory awareness training for staff

The courses were generally short and provided sufficient knowledge and skills to enable self-learning to proceed.

(ii) Specialist training for staff

Staff taking these courses were encouraged to do so in a variety of ways. Sometimes remission time was given, sometimes overtime was paid. In one college, staff were loaned a high-specification multimedia PC to use at home.

(iii) Organisation of conferences for staff from schools and colleges within or outside the project

Kingsway College organised a half-day regional conference, 'Using the Internet and Multimedia in the Classroom', in conjunction with the University of London Institute of Education Post-16 Education Centre. The conference was attended by more than 70 participants from schools and colleges.

5.59 By way of example of college staff-development provision in this area, Hammersmith and West London College had used TEC development funding

to devise a staff-training programme in Information and Learning Technology intended to meet the following requirements:

1. To meet the need for teaching staff, including new staff, to have the basic ICT skills, to the level required by their job in terms of:

   - standard software such as Word, Access, Excel, PowerPoint, DTP
   - specialist and 'leading-edge' facilities, including the Internet and multimedia.

2. To extend ICT into the curriculum. The first step was to introduce and gradually train teaching staff across the college to use learning technology in their everyday teaching, and facilitate student use of the technology in their own learning, for example standard software, the Internet, CD-ROMs and multimedia materials.

3. To meet the specific targets of the Central London Colleges consortium project (Competitiveness Fund):

   - to use the Internet within student assignments on a range of courses
   - to work in partnership with one other college in one vocational area to produce a joint module which involves student-staff communication on the Internet
   - to train staff in one vocational area to produce multimedia teaching materials as a pilot initiative.

4. To keep specialist ICT and technical staff sufficiently skilled in the new technology now available in the college.

5.60 A specific training plan was established in order to reach these staff development objectives which comprised:

(i) a menu of 10-hour modules to train staff in a range of software, and also the Internet and multimedia, with a piece of student coursework as the outcome for each trainee

(ii) training focused on the teams involved in the two Consortium curriculum development projects

(iii) induction for new staff on management information systems (MIS), teaching network and ICT in the college

(iv) training for staff who want to use the specialist facilities of the college multimedia/Internet room to teach their students ICT

(v) external specialist courses for IT technicians, learning-resource assistants and IT staff as required

(vi) external conferences and events on ICT and the curriculum

(vii) open learning in standard software in the College Open Learning Centre, with the addition of some taught introductory sessions and self-training in multimedia.

5.61 All the colleges visited appreciated the need to ensure that staff are aware of the opportunities to enhance the delivery of teaching and learning offered by ICT, and gave staff development a high priority. It was acknowledged that

some staff only required the skills to use the new technology whilst others were eager to embrace the challenge of the opportunities offered by the new technology to develop new and novel learning materials. However, college management should appreciate that the development of new learning materials is a task which requires time as well as dedication and suitable structures need to be developed to enable those staff who have the necessary skills to be offered appropriate remission time or some other incentive.

### *Cost benefits*

5.62 In common with most other educational establishments, colleges face the challenge of working with cash-limited budgets and have sought different means to cope. One of the innovations has been a move to reduce class/teacher contact hours, increase class sizes and to place the onus on students to become more responsible for their own learning by using the new multimedia and broadband technologies.

5.63 The colleges in this initiative have sought to integrate these new technologies and ways of teaching and learning into their existing structures, curricula and practices. This is to be welcomed; however, owing to the multiple source of finance, this cross-fertilisation and integration makes it difficult to identify direct links between costs and benefits within the terms of the EDSI project criteria. What can be stated, though, is the wholehearted commitment of management and staff to exploring and developing forms of delivery via multimedia and the superhighway. The potential for telematic forms of teaching and learning is acknowledged by all, and is testified to by the substantial commitment made by the teaching and technical staff of the colleges.

5.64 Many colleges had, however, also invested considerable project resources in multimedia/CD-ROM development. As noted above, this enterprise, whilst valuable in terms of tailor-made, curriculum-focused materials did require substantial co-ordinated effort. The ratio of production hours to single-user student usage hours for multimedia teaching materials was found to vary from 75:1 to 600:1. It is likely that the ratio of production hours to student usage hours may be too high in some cases. However, if student numbers are sufficiently high, then in-house production can become cost-effective.

5.65 It should be noted that many developments, though progressing with a good degree of success, have yet to reach the stage of curriculum delivery. It is not until the new forms of teaching and learning enabled by these development costs have been evaluated that the true benefits can be weighed against the costs.

### *Technical issues*

5.66 All of the colleges visited had their own internal college networks. Sometimes several networks existed on the same site and on separate sites. Most colleges are now moving towards a rationalisation of network provision. Where there is a single college network for both academic and administrative purposes, there is an appropriate firewall to prevent unauthorised access to sensitive and confidential information. Other colleges have installed completely separate networks for academic and administrative purposes.

5.67 Most colleges had connected their academic networks to the superhighway in order to give staff and students access to the Internet and to e-mail facilities. In many cases, excellent connectivity had been achieved and a variety of models were in place:

(i) private wide-area network

(ii) connection through the University of London Computing Centre (ULCC)

(iii) connection through a local university:

a) via a BT Megastream connection (2Mbps)

b) via microwave link

(iv) connection through a local cable supplier

(v) connection via an ISDN line.

5.68 West Thames College had invested in an Internet server and a 64Kbps leased line to connect to a cable company giving access to the Internet, and enabling delivery of learning materials to anyone with an Internet connection. Students who live within the cable company area and have an appropriate computer can connect to the college, and can access the Internet and college learning materials.

5.69 In the Central London Consortium, all the colleges have had a 2Mbps circuit installed either by BT or cable companies. The University of London Computer Centre (ULCC) evaluated the service providers, negotiated pricing, managed the installations and co-ordinated the installation of the college-based routers and modems. These are connected by the 2Mbps lines to ULCC and give connectivity to the Joint Academic Network (JANET) and the Internet. JANET membership has been arranged, with each college becoming an affiliate site. Domain name registration was applied for, providing a domain name for each college and enabling them to have a Web presence.

5.70 The ULCC/College co-ordinator concluded in a recent report:

*"The first year of this project has gone well, with its primary target (the installation of a 2Mbps connection to each college) having been achieved on time and to budget. ULCC has proved a willing and capable service provider, with whose guidance the project has safely established manageable and effective Internet services to all sites. The first year's progress represents value for money and a workable basis from which services can be consolidated and expanded. The year-two plan covers significant areas of integration of services into the mainstream of college IT provision. ULCC has targeted its support to enable FE sites to become self-sufficient by the end of the project. The participation of the Central London Colleges Information and Learning Technology Partnership has proved that the whole is greater than the sum of the parts, and cross-fertilisation of solutions and technical development has been of major benefit."*

5.71 This connectivity had meant that the colleges in this consortium could enjoy many of the benefits associated with more prestigious academic institutions.

5.72 Of significant interest is the use of radio by the College of North East London for establishing connectivity to JANET and the Internet. This system is novel and certainly of relevance to other organisations which may be seeking a solution to connectivity other than by cable. The college recognised that, in order to maintain and increase its technological edge, it required access to the Internet. As an associate of Middlesex University, an establishment already provided with a major Internet node, it was decided that the logical method for accessing the Internet would be to connect to the University.

5.73 The high recurrent costs and low throughput rates associated with leased Kilostream and Megastream lines prompted technical staff at the college to

look for alternative connection methods. Two methods which were considered, apart from cable or connection via the PSTN, were the use of optical or microwave links since there was line-of-sight between the sites involved. After testing both methods, a decision was made to use a microwave system because of the relatively low capital cost, ownership of the connection, lack of recurring rental charges and ease of connecting separate college sites in an urban area. The optical system was found to be subject to interference because of such phenomena as atmospheric conditions, tree leaves and other vegetative growth.

5.74 The initial installation was a 500 metre wireless link between Middlesex University and the College of North East London, with subsequent additional links between the college, Bounds Green Campus, Tottenham Campus and the Lee Valley Technopark. Each site has a transmitter and receiver, allowing connection to the college LAN and the Internet via a similar microwave connection to Middlesex University (see Figure 2 below).

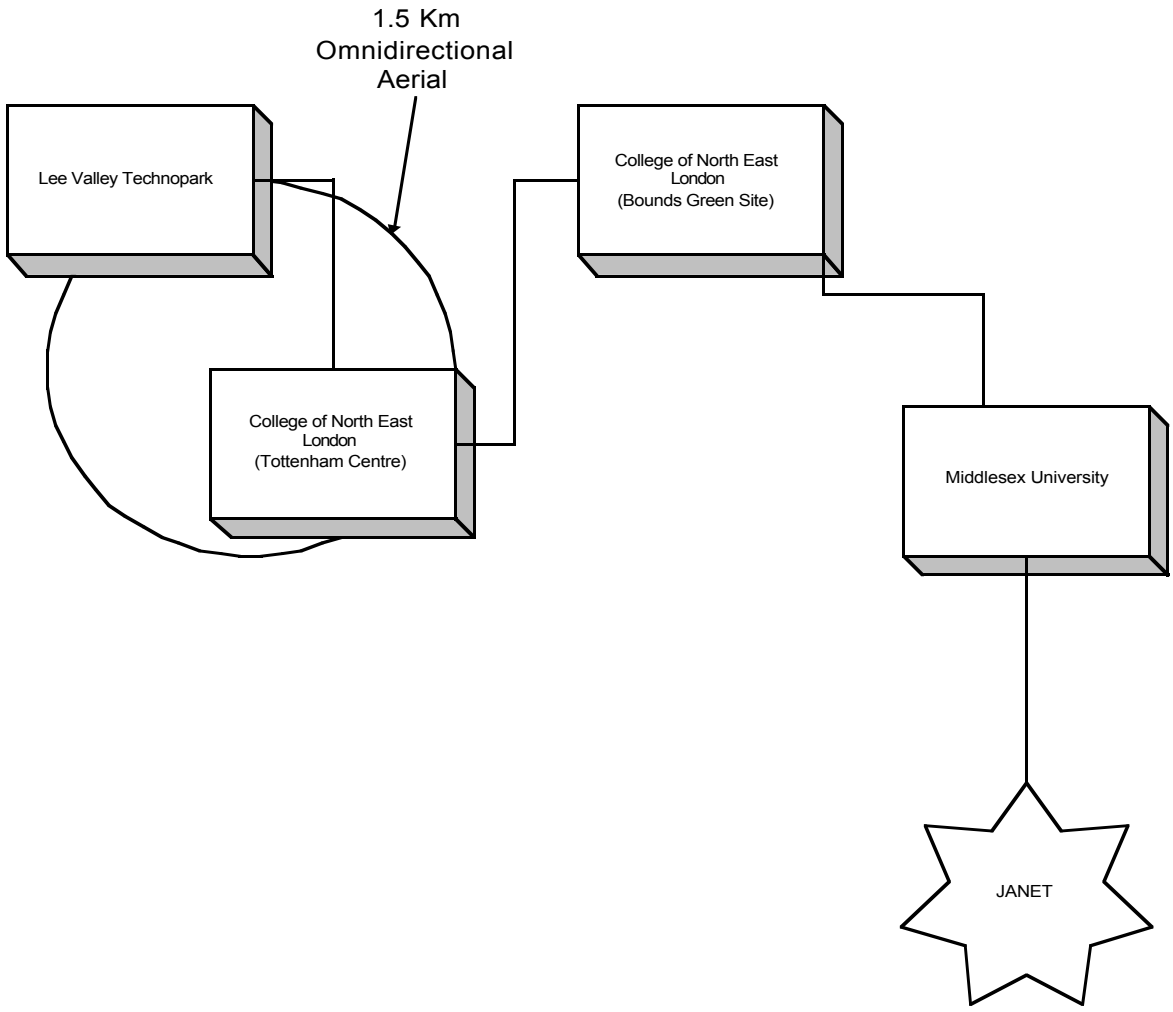
5.75 The main four-kilometre campus installation, including modified AT&T Wavepoint campus-bridging equipment, cost in the region of £7,500. Installation was carried out by contractors who liaised with the College Computer Manager. The only disadvantages of the system are that it has a limited range of about 4km and needs unrestricted line of sight. Adverse weather and atmospheric conditions do not appear to degrade performance. An additional link was supplied by Middlesex University to Southgate College.

5.76 The systems are as easy to set up as a standard Ethernet or Token Ring network. All major network drivers are available, as is immediate network connection without disruption.

5.77 The Tottenham site has an omni-directional aerial which means that other educational organisations within a 1.5km radius and a line of sight to Tottenham can use the college/University Internet service.

5.78 The College is using the links not only for Internet and e-mail access but also for administration systems between campuses. Further plans for this wireless infrastructure will enable other local establishments to access educational services supplied by the College, which may mean that the current technology will need to be upgraded from 2Mb to 4Mb links.

*Figure 2*




5.79 This was an innovative solution and indeed the quality of the technical expertise of many of the IT managers at the colleges visited has been impressive. The IT manager at the College of North East London is certainly one such manager. The process by which he and his team arrived at the solution of linking the three college sites with each other and with Middlesex University by microwave signals seems exemplary. It would be a useful model for many similarly-placed institutions.

***Equipment location and maintenance***

5.80 It is to be noted that the FE colleges in the London Colleges Multimedia Initiative do not suffer the accessibility problems experienced by some schools, since most have networked access to the Internet and some have networked access to CD-ROM libraries. Consequently, integration of such facilities into the work of the colleges is relatively straightforward.

5.81 All the colleges visited had internal teams of technicians to maintain their networks and computer stock. Many colleges had college computer managers, well-qualified senior-staff members who managed the whole of the college computer provision, the college networks and external connectivity. They

were in charge of teams of technicians and, sometimes, programmers. In some colleges, the technician staff had installed the internal network(s) to the appropriate high professional standards and specifications. The consequent advantages for maintaining and upgrading are clear.

***Commentary and recommendations***

5.82 It is difficult to generalise about an initiative which is a portmanteau for four consortia comprising 22 separate college projects, each of which embraces key players and issues. The EDSI project emphasises the broadband nature of the investigation, but the title of the London initiative is 'The London Colleges Multimedia Initiative' - there is no mention of connectivity. That having been said, all the colleges visited have installed LANs, most have connection to the Internet and produce their own Web pages, and some have produced net-based learning materials. The London Colleges Multimedia Initiative policy statement gives prominence to the use of telematics to deliver teaching, learning and training materials to a variety of clients, including SMEs. At this stage in the initiative, there are only a few colleges who are providing this kind of telematic tutoring, but the number is increasing. The learning programmes seen, though few in number, are of high quality. The road to effective delivery is a long one. Teaching materials have to be developed and then produced either as Web pages or telematic multimedia presentations. These presentations are, in many respects, like CD-ROM learning packages, but must be capable of being delivered over a network and should allow for learner/trainee interactivity.

5.83 If the superhighway is to be used to deliver learning materials efficiently and effectively away from colleges, it is necessary that, in addition to the development of the learning materials, investigation needs to be made into methods of on-line tracking of student progress through the learning process. Equally, there is a need for the development of techniques for on-line measuring and recording of student learning gains and achievement. Few colleges visited have investigated these areas and their research is inconclusive.

5.84 College management is becoming increasingly aware that the development of *high-quality* teaching and learning materials requires enthusiasm, talent, technical and graphical skills, project management skills, adequate funding and time. By and large, good materials are not developed by individuals but by dedicated teams. Colleges wishing to enter the arena of telematic multimedia teaching must be prepared to devote adequate levels of human and material resources.

5.85 Work has been done by some colleges in identifying and targeting the SMEs which could potentially benefit from the telematic delivery of training materials.However, much work is still needed to identify the SMEs, to help them decide on their training needs, to suggest the type of training suitable for their needs, devise the appropriate packages, if necessary, and ultimately decide on the delivery mechanism. It is acknowledged that this is a complex task.

5.86 Many staff in colleges need to be educated and motivated to experiment with ICT as a means of delivering and enhancing the curriculum, and staff development is now beginning to provide the necessary initial training. Staff who are using ICT in their teaching and wish to develop their skills further should be able to find courses which will give them the necessary advanced skills.

5.87 Adequate funding should be made available for technical staff to upgrade their skills in the developing technologies which they are expected to maintain.

5.88 It is worthy of note that some of the colleges involved in the project are small and do not have the same access to resources that some of the larger colleges have. Consequently, it was pleasing to note that, in several areas, inter-college co-operation was taking place.

5.89 Students in further education may be considered to be in one or other of two separate groups. Firstly, there are the 16-19 year olds progressing from school to either a vocational qualification or towards progression to higher education. The majority of these students have had some form of experience with computers at school, in the home, or as a leisure pursuit. To these students, the use of computers for learning and presentation is virtually second nature. Members of the second cohort are more mature and come from groups who missed the opportunity for further education on leaving school, or from groups who feel that they need to acquire new skills. Both groups appreciate that the ability to use IT is essential for any aspiring job-seeker and seem prepared to embrace ICT and use it purposefully.

5.90 During this evaluation, a large number of students and staff from London colleges were interviewed. Without exception, all were enthusiastic as to the potential for learning that is offered by the use of the new technology.

5.91 In conclusion, one of the major thrusts of the London Colleges Multimedia Initiative is to enable the delivery of highly cost-effective vocational training. Useful experiments are taking place in most colleges in devising a variety of teaching materials which can ultimately be delivered telematically. So far in this project, good progress is being made in devising and producing learning materials, often by volunteers, enthusiasts and occasionally by paid contract developers and authors. It is in the succeeding phases of the project that the challenge of delivery will be faced.