


Education Departments' Superhighways Initiative

Group B: Vocationally-Focused Projects

Final Report

Computer Based Learning Unit School of Education
The University of Leeds

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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.

3. THE GEMISIS 2000 SCHOOLS PROJECT

Project context and description

3.1 GEMISIS 2000 (Government, Education, Medical, Industrial, Social Information Superhighway) is a partnership between the University of Salford, NYNEX CableComms and the City of Salford which seeks to explore the economic, sociological and technological potential of the Information Superhighway. There are two projects linked to education: (i) the Virtual Workplace Project (see Report B2.1), and (ii) the GEMISIS 2000 Project which involves two secondary schools in Salford, namely Little Hulton Community School and The Swinton High School.

3.2 It is anticipated that the project will be extended to include Eccles Sixth Form College and two primary schools, and, ultimately, to provide broadband connectivity to all schools in Salford, but there are no plans for any further extensions until an evaluation of the project has been completed by the GEMISIS project team.

3.3 GEMISIS is a large project amongst whose chief objectives are to develop information technologies which achieve maximum benefit to the community, and to develop the University of Salford as an international education and training and consultancy centre for the new telecommunications and cable industry.

3.4 The GEMISIS 2000 Schools Project is designed to explore and demonstrate the ways in which broadband connectivity between schools and the University of Salford can be used to enhance the curriculum, particularly through the use of a central CD-ROM library (termed the virtual library), which is held on a server at the University, and also through video conferencing, the Internet and e-mail.

3.5 Connectivity is achieved through fibre optic cable, which has been supplied as part of the cabling infrastructure by NYNEX in the Greater Manchester area.

3.6 In the initial development plan, it was intended that the project be developed in three phases: Phase 1, Internet access; Phase 2, the addition of CD-ROM and e-mail access; Phase 3, the addition of video conferencing. Each phase would be accompanied by a specific training programme for selected school staff.

3.7 A recent innovation to the GEMISIS 2000 Project in November 1996 has been the appointment of a group of doctoral researchers at Salford University, each of whom has been allocated a research topic associated with one or more of the individual projects.

Project objectives

3.8 The project has four specific research objectives:

- to demonstrate tangible benefits of the cable network and associated equipment to the schools sector
- to investigate the suitability of video-conference systems to meet the stated need of providing the target schools with access to a diversity of foreign language speakers
- to investigate the type of information source, off-line or on-line, which may be the most effective basis for an educational virtual library

- to provide a demonstration project for GEMISIS 2000.

3.9 Emphasis was to be placed upon the general use of the technology for video and data collaboration between schools (for example a joint magazine project using shared DTP applications), joint access for schools to a common CD-ROM resource for cost effective use of teaching support material (located at the University of Salford), links between the schools and the University for access to native speakers of foreign languages (French, German and Spanish) for language development and access to the Internet.

Project location

3.10 The project is located at Little Hulton Community High School, The Swinton High School and the University of Salford. Little Hulton Community School is a small comprehensive school of 440 pupils on the outskirts of Salford, close to a large housing estate. The Swinton High School is an 11-16 Mixed Comprehensive School with more than 700 pupils and 40 staff. The school has a projected target of 1,200 pupils within the next few years and to accommodate these pupils there is an extensive building programme under way.

Technical issues, hardware and connectivity

3.11 The equipment used by the schools for the project comprises (at each school) three multimedia 486 ICL PCs, all of which have Internet connectivity, with one PC also equipped with a Nokia video-conferencing board, with the camera and microphone built into the monitor. Both schools have with their project hardware shared printer facilities which are not networked to existing IT equipment.

3.12 Connectivity is via the NYNEX fibre optic cable, which is part of the cabling infrastructure provided by NYNEX in the Greater Manchester area, with PIPEX as the Internet provider.

3.13 E-Mail facilities were initially provided by the University of Salford, but these tended to be unreliable and have now been made available through the Internet provider.

3.14 In terms of video conferencing, connectivity is restricted to within the NYNEX cabled region, that is there is no physical connection beyond the NYNEX region to schools in other parts of the UK or abroad.

Links with other projects

3.15 The two schools involved in this project are also linked with another project, namely the Integrated Multimedia Project (IMMP). The chief objective of IMMP is the integration of multimedia services and service architecture for both residential and business users, focusing on the overlaps and synergy between the two. At a technical level, the project aims to develop a trial international network utilising multiple existing networking and Asynchronous Transfer Mode (ATM) switching, to enable experiments with integrated multimedia services to be made. This network will ultimately be connected to European ATM networks through respective national hosts. The two schools have been used in trials, particularly in respect of video conferencing. The results of these trials have been discussed with members of the IMMP team and lesson observations have been included in this report, as they are particularly relevant to the GEMISIS 2000 Schools Project in terms of possible applications of video conferencing in the classroom.

Project evaluation

Evaluation visits and procedures

3.16 In addition to the standard evaluation visits and procedures, the evaluation team has attended two meetings of the Schools Project Committee and discussions have taken place between members of the evaluation team and representatives of NYNEX, ICL and Systems Integrated Research (SIR). A visit was made to SIR at Belper, Derbyshire.

3.17 Discussions have also been held with representatives from the Integrated Multimedia Project (IMMP), which is based at Salford University. This project, which is also based at Little Hulton and Swinton Schools, is concerned with exploring the technical and pedagogical problems associated with video conferencing and is financed by the EC.

Project Management and Steering Group representation

3.18 There is a clear hierarchical structure of management stemming from the GEMISIS Project Director and the top level management committee, which comprises representation from the three partners (NYNEX Cable Comms, Salford University, and Salford City Council) to the individual project committees. In addition, there is a small co-ordinating group which meets weekly to co-ordinate day-to-day activities and to liaise between the different project groups. The Schools Project Committee meets approximately every four to six weeks and comprises a representative (usually the headteacher, deputy or head of IT) from each of the participating schools, representatives from Salford City Council, NYNEX, Salford University and Salford Educational Advisory Services. This committee is chaired by the Principal Education Adviser for Salford.

3.19 There is representation from the Schools Project Committee to the GEMISIS 2000 Project team.

3.20 Occasional meetings are also held between the heads of IT at the schools and a representative of the City of Salford Educational Advisory Services.

Technical issues concerned with the use of broadband connectivity

3.21 For the duration of the project, video conferencing could take place only between the two schools and, for much of this period, was unreliable, in terms of picture quality and sound. There has been no video conferencing with Salford University and, consequently, the planned usage in Modern Languages with native speakers has not occurred. It was only after the inclusion of the two schools in the IMMP project that the initial equipment was changed and the ICL/Fujitsu/Nokia system installed, and video conferencing became possible, and then only between the two schools. Although there is useful curriculum work which can be undertaken with a single nearby school, it is somewhat limiting in scope. The very fact of having equipment with the potential of enabling communications to be made on a national or worldwide basis does raise expectations and the lack of external connectivity serves as a dampener on enthusiasm. As a consequence of this significant problem, measures are being considered, including connectivity via Salford University, which will need to be adopted if this aspect of the project is to be developed.

3.22 Shortcomings of the technical equipment for class-based video conferencing were apparent in a series of lessons described later in the report (see paragraphs 3.32-3.39), in that the sound quality was poor. For such activities, at least two cameras are required, which should preferably be mobile and incorporate a simple mixing/switching device, so that a producer

can choose the appropriate camera. A zoom facility on the cameras, again under the remote control of the producer, would also help to provide a better quality of image. The 17-inch viewing screen was too small for a class of 15 pupils.

3.23 It should be added that the Nokia equipment does not support application sharing and whiteboarding. If these facilities were available, they would enhance the potential of this equipment for the video conferencing of class teaching.

3.24 The e-mail facilities have not been without problems, being initially achieved through the use of a mail box belonging to a member of staff at Salford University. Communication through this medium has been so unreliable as to be unworkable as a school resource for the major part of the project. It is only very recently, in January 1997, that e-mail has become reliably available. After some initial teething problems, Internet access has been available as a reliable resource since the 1996 Spring Term.

3.25 The virtual library, effectively housed on a server at Salford University, has been in operation since the 1996 Autumn Term. This has functioned well since it was installed: however, it appears to be more reliable at The Swinton High School than at Little Hulton, probably because of the inexperience of the staff at Little Hulton where there is only a part-time technical assistant helping with the IT facilities. The Swinton High School employs a full-time IT technical assistant who is well-trained in the use of the Internet and in dealing with the everyday problems of school networks. The materials available for the virtual library are very much in the development stage and, apart from the OILS (Open Integrated Learning System) supplied by SIR and installed by ICL, the other materials such as Encarta are essentially for reference purposes. Recently, Yorkshire Interactive Thompson Multimedia have made some of their CD-ROM-based learning materials available to the project.

3.26 One of the problems with having different firms involved in supplying equipment and connectivity is the overall management and oversight, since one firm may decide to alter some component of the system, and this may cause problems elsewhere. One such problem occurred when a technician altered the drive configuration of the OILS materials on the server, causing an apparent breakdown in the system.

3.27 Decisions to alter components have been made without prior warning, and this has seriously affected the running of the system for a short period whilst staff became accustomed to the changes which had taken place. An example of this was to change the PCs to ICL/Fujitsu/Nokia equipment. This occurred without any prior notice being given to the staff at the schools and there was no initial training provided to smooth over the change.

3.28 The schools have a helpline service for the OILS materials and this has proved particularly useful. Since November 1996, a help service has also been provided by NYNEX, and there are now named personnel at NYNEX who have the responsibility to respond to requests from the schools. In the early months of the project, such assistance was largely ineffective (a fact which has been admitted by NYNEX). The indications are that NYNEX have recently given this project a greater priority and higher staffing levels, and it is hoped that any problems which now occur will be speedily resolved.

Access and location of hardware in the schools

3.29 At Little Hulton School, the three project PCs are housed in a modestly-sized room adjacent to the school's IT centre. It would be difficult to arrange for a whole class to use the facilities in the room because of size restrictions which

determine the organisational methods and type of curricular activities that can be used. The room is timetabled for seven periods per week, and, outside these times, there is open access for staff and supervised access for pupils. For security reasons, the room is normally kept locked when not in use. There is the clear dilemma between providing open access and the consequent possibility of misuse through lack of supervision, and that of restricted though supervised access which occurs when the equipment is located in a classroom. The solution provided at Little Hulton is perhaps one way in which this problem may be resolved.

3.30 At The Swinton High School, the hardware is located in an IT classroom, and positioned in a corner of the room on a purpose-built table, with the central-viewing TV screen set behind and about one foot above the central PC which is used for video conferencing. This would enable a group of about 15 to 20 pupils to be able to see and perhaps hear when the video conferencing was under way. The siting of the equipment in a heavily-used classroom does prevent video conferencing from being undertaken without the room being specifically booked for this purpose. Although the school is not on a split site, there is a considerable distance from the classroom where the project equipment is located and other parts of the school, such as the English/Humanities and Science block.

Project activities

3.31 In this section, we look at what activities have occurred in the schools, in terms of curriculum applications of the broadband technology, and the effect on the schools in developing the IT capabilities of the staff and pupils. The section starts with a report of the video-conferencing experiment which was conducted as part of the IMMP project.

Report on a video-conferencing lesson between Little Hulton Community High School and The Swinton High School

3.32 An experimental lesson was observed between the two schools involved in the project. It is important to note that this activity was *not* part of this project, however it is included here since it was concerned with video conferencing and involved using the facilities which had been provided as part of the GEMISIS 2000 project.

3.33 The reported lesson took place one week after a previously video-conferenced lesson during July 1996. The observation was at The Swinton High School, with a group of Year 10 pupils.

3.34 Prior to this lesson the Salford University IMMP group had attempted their first video-conferencing session with Year 10 pupils between The Swinton High School and Little Hulton Community High School. In that session, a member of the Physics Department at Salford University had given a lesson at The Swinton High School with approximately 14 Year 10 pupils. This lesson was transmitted over the NYNEX cable link to Little Hulton School where a similar group, in terms of age and number, received the lesson and interacted with it. Prior to the lesson, each pupil had been given a pre-test on the subject matter of the lesson and afterwards each pupil taking part (on both sites) took a short post-test. The tests were intended to test the comprehension and quality of learning related to the video-conferenced lesson. Subsequently, the tests were collected and analysed.

3.35 Preliminary results indicated that many of the pupils had not grasped the concepts which were central to the theme of the lesson, which was on pendulums.

3.36 This second session was designed to clarify and reinforce the topics from the previous week. The arrangements were virtually the same as the previous week with the major exception that the teacher was at Little Hulton rather than at Swinton. The lesson was given to the pupils at Little Hulton, and was captured by a fixed camera attached to the video-conferencing equipment at the school.

Presentational and pedagogic issues

3.37 Several presentational and pedagogic issues emerged:

- Diagrams and illustrations need to be rigidly supported, maybe using a separate camera, as application sharing is not yet possible with this equipment. Holding up a sheet of paper is inadequate.
- Experiments will need to be carried out into the legibility of typefaces and fonts used, line thickness for diagrams, use of black and white or colour in diagrams, and type of pointing device. Consideration could be given to pre-prepared diagrams and the use of the video conference 'whiteboard'.
- Ad-hoc experiments/demonstrations by the teacher, which in a normal classroom situation add to the information content of the lesson, are not always easy to see during a video-conferencing lesson, often for technical or presentational reasons.
- There is difficulty in conducting a teacher-pupil dialogue over a video-conferencing link since the teacher is unaware of the visual and binaural clues and cues from pupils.
- Equally, it is very difficult for the distant teacher to single out a specific pupil to address and question, hence, questioning tends to be general and not focused. It is virtually impossible for the teacher to use the 'teasing out' technique of getting a pupil to think through and clarify an answer.
- It is often confusing to the pupils as to whether the teacher is addressing pupils who are physically present or those who are telematically present.
- The teacher spends most of the time addressing a camera and looking at the screen, and rarely addresses those pupils who are physically present.
- At times, it was difficult to know what was happening, particularly when the teacher disappeared from the screen.

3.38 One interesting result of this experiment was that pupils at the remote site showed greater learning gains than those in the actual lesson. The reasons for this result are not at all clear and further experiments are required.

3.39 This lesson provided many useful pointers for the future, in terms of the difficulties which need to be resolved before such lessons can become commonplace. The current equipment was clearly inadequate to cope with the requirements for video-conferencing lessons, as significant problems occurred with the sound, the camera view and the screen size for the output at the remote site. This is an interesting use of video conferencing, and one which no doubt will grow in the future, but the problems associated with video conferencing lessons effectively will need more careful research, in addition to expenditure on more sophisticated equipment.

Teaching and learning issues

3.40 As has been indicated previously, this project has suffered considerably from technical problems concerned with connectivity and, as a consequence, these difficulties have hampered developments in the schools. Video conferencing is still possible only between the two schools; Internet access has been available to both schools for almost a year; the e-mail facilities have only recently become possible and the virtual library which came on stream during the Autumn Term of 1996 comprises essentially OILS and reference materials. Technical problems have occurred most frequently at Little Hulton School and, as a result, developments there have been less pronounced than those at Swinton.

Development of skills and curriculum applications

3.41 In terms of the development of skills, there has been ample evidence, at both schools, that being involved in the project has led to both the pupils and staff at the schools acquiring considerable IT skills. Whilst this has been on a restricted scale to what was imagined when the project was initially outlined, there are good signs, now that the technical difficulties have been resolved, that this work will be further developed.

3.42 What has been particularly impressive has been the work of some Year 11 pupils at Little Hulton School who had designed and produced World Wide Web pages for their school, taking stills from a video of their teachers which had been freeze framed using the Nokia video-conferencing software and then converted into Joint Photographic Experts Group (JPEG) files at appropriate compression levels, and with information from the school brochure, and information which the pupils knew themselves, the material was put into Hypertext Markup Language (HTML) format and eventually became the school's Home Page.

3.43 At Little Hulton, three departments (English, Modern Foreign Languages and Mathematics) are planning to bring the OILS materials into their curriculum on a regular basis, chiefly as support for their other classroom-based work, through small groups of pupils being removed for short periods for consolidation or enhancement purposes. Cross-curricular usage of the Internet had not been developed significantly at Little Hulton School, and there were only isolated examples of its use, for example, Year 11 pupils researching slavery, and Romeo and Juliet.

3.44 At The Swinton High School, the cross-curricular usage of the technology was beginning to grow. An excellent lesson in Geography was observed, where the pupils showed skills in using IT, including CD-ROMs, word-processing, spreadsheets and the Internet, all of which were woven into the lesson so that IT appeared as a natural resource to use. The staff were less enthusiastic about the OILS materials, with the Special Needs Department the only one which had a regular committed use of this resource.

Staff development

3.45 The OILS courses which had been organised by Systems Integrated Research (SIR) had been particularly well received by the staff at both schools. Courses in Mathematics, English and Modern Foreign Languages were attended by staff from both schools. The Mathematics course was of one-day duration and the other two courses were for half a day. The courses were given by staff from SIR, and covered all aspects of the software, including loading the OILS materials from the server at the University of Salford.

3.46 Discussions have been held with a representative from the SIR organisation who was responsible for the staff development at the two schools. It was

indicated that, ideally, the materials should be used as class sets, with up to 16 pupils using them at a time. It is interesting to note that, at Little Hulton School, the teachers (Mathematics, English and Modern Languages) all felt that they would use the materials with small groups of two to four pupils, withdrawn from the normal lessons for consolidation or enhancement purposes; a point of view which possibly stems from the fact that the school has limited access and, with more hardware available, class usage may develop. At Swinton, the materials were used only by the Special Needs Department (essentially for English) and, although the hardware in the school limited the number of pupils who could use the materials, the hope was that, eventually, all the pupils in the group would be able to work with the SIR resources.

3.47 The original implementation plans for the GEMISIS 2000 Schools Project included a strong commitment to staff development and, in September 1995, three members of staff from each school, which included the heads of IT, attended a one-day course on the Internet organised by Salford University. A further course was held in June 1996 at Salford University, again focusing on the use of the Internet, and providing background information on the development and organisation of the Internet, as well as giving course members opportunities to perform Internet searches.

3.48 All members of the current staff at The Swinton High School have undergone an Internet training course organised at the school. This has taken place on a faculty basis, with some initial help provided by postgraduate students from Salford University.

3.49 There have been no such internal IT-related courses at Little Hulton School. Until September 1996, the IT Department was experiencing staffing problems and, with the technical difficulties encountered with connectivity at the school, it was felt that to raise any expectations concerning the use of the Internet may have been counter-productive. However, it is hoped that a series of INSET courses for the staff at Little Hulton will commence within the very near future.

Support

3.50 With the introduction of such new technology into schools, it is important that a support infrastructure is developed so that IT staff know who to turn to for help, both for technical and pedagogic matters. Staff at the schools also expect a good measure of support as they develop ways of using the technology in their respective curriculum areas.

3.51 The initial development plan for the project highlighted support as an important feature of the project and, indeed, there was a system outlined by which the schools were expected to contact named personnel in NYNEX to deal with any technical difficulties. From discussions with staff, particularly at The Swinton High School, it was evident that initially these procedures did not work, but the support service has now been reorganised, with NYNEX in particular giving this project priority. The support service now appears to be working satisfactorily.

3.52 When the OILS materials became available to the schools, ICL/SIR instigated a call-out help system for the schools. This has proved effective and, as a consequence, the schools now have technical support from both NYNEX and ICL.

3.53 Both schools have technical assistants, at Swinton full time, at Little Hulton part-time, who have specific responsibility for IT. It would perhaps be beneficial for such staff to be provided with training specifically related to the

use of broadband and the OILS system so that trivial difficulties could be overcome at the schools and, in addition, the ICL and NYNEX technicians would also have staff in the schools whom they could instruct, possibly over the phone, and thus avoid any unnecessary call-outs.

3.54 At The Swinton High School, staff are given every encouragement to use the Internet. A list of bookmarked sites has been prepared, together with a booklet of exemplar materials (colour printed) from the WWW. A handout is available on the use of the Internet, chiefly concerned with information about access, terminology and searching procedures, for members of staff and pupils. The IT Resource Manager is also available to help any member of staff who requires assistance.

3.55 There is no comparable full-time IT Resource Manager at Little Hulton School, however the technician at the school will devote his time fully to IT within the school.

3.56 With the technical support in place, some form of pedagogical support would be useful, particularly concerned with integrating the use of the technology into the curriculum. At both schools, there are staff who are enthusiastic about using IT in their lessons. Other staff are more reticent, for a variety of reasons, and it is now time for the development of some form of support system whereby the experimental work which is being undertaken in the schools can be monitored, and ideas more widely disseminated. Hence, it is recommended that a project staff development group be formed, with the remit to monitor the developments which have taken place and, more importantly, to instigate experimental work in curriculum use.

Copyright issues

3.57 There are copyright issues concerning the use and distribution of the materials which are held on the central server at Salford University. The dissemination of the OILS materials has been sanctioned by SIR for the duration of the pilot project but only involves the two schools. Once the evaluation period is complete, it is hoped that other schools will join the project. Thus, all the software which is held on the central server will become available to these schools, and this will include the OILS materials as well as such Microsoft titles as Encarta.

3.58 The copyright issues related to possible widespread distribution via the broadband will need to be resolved. Distribution from a central server allows multiple access, and it is likely that these schools will have to pay some form of license fee to ICL/SIR for the right to access the OILS software.

3.59 Currently, it appears that the laws relating to copyright are unclear concerning distribution from a central server to a possible large number of users. It is acknowledged that campus-wide licences are used for distribution over Local Area Networks (LANs), but licensing for the distribution of software via the broadband cable to distinct premises, often separated by several miles, has yet to be agreed. One obvious way is for the licensee to pay for an agreed number of users, as is the case with LANs and, if this number is exceeded at any one time, arranging for some form of distribution guillotine to be activated.

3.60 In brief, copyright issues are important and, as has been noted in the report on the Link Centre at Queens' School (see Report B2.10), the copyright over distributed software needs clarification and, perhaps, special agreements taken out with publishers once projects develop beyond their initial boundaries. Another issue concerns the copyright of WWW-based resources when these are incorporated into students' or teachers' pages and documents.

Costs and cost benefits

3.61 As indicated in the report for Project 1, the overall funding for the GEMISIS 2000 Project has been provided by the European Regional Development Fund. Additionally, the Little Hulton area of Salford has recently acquired Single Regeneration Budget (SRB) funding, part of which is for a telematics project in which the school hopes to become involved.

3.62 For this present project, the network infrastructure has been provided by NYNEX. ICL has provided the applications hardware and software, including the file server and OILS (Open Integrated Learning Systems) software at Salford University. The video-conferencing equipment and associated applications software have been provided by Nokia.

3.63 The schools have not been charged for the use of any hardware, software or support during the duration of the project. Thus, for them, the project, with all the equipment and access to the Internet, etc., has involved no capital or running costs.

3.64 The major benefits which have occurred have been in the development of IT skills within the staff and pupils in the schools, skills which will grow as the project gains momentum and more cross-curricular applications are realised. Additionally, the resolution of the technical difficulties which have been responsible for the delays in the project have meant that considerable expertise has been gained, particularly in terms of establishing procedures for sustaining reliable connectivity and support when there is a shared responsibility for a project.

3.65 Limitations in the use of the schools' video-conferencing equipment have also been clearly demonstrated to the extent that, in its current specification, the equipment is unsuitable for anything other than small-group usage.

Progress and achievements

3.66 In terms of the specifications detailed in the GEMISIS 2000 Schools Project Implementation plan, the project is considerably behind the envisaged timetable. For example, the CD-ROM virtual library was scheduled to be accessible during the second phase of the project in May 1995. It was available only in September/October 1996, and it was only recently that this became a relatively trouble-free resource for the schools. The video conferencing is still possible only between the two schools, and there has been no firm date given as to when this facility will become less constrained in terms of its connectivity. The introduction of a reliable e-mail facility has also suffered a considerable delay and, only in the latter part of 1996, has this become a usable feature of the project. The Internet service has, however, been available to the schools for almost the duration of the project.

3.67 The slow progress undoubtedly led to a measure of dissatisfaction amongst the schools. However, with the support services now in place and working, the project should gain considerable momentum.

3.68 In terms of the original project objectives, the project is effectively at the beginning and has not yet achieved its aims. The technology is in the schools and, apart from the video conferencing, it is now at the stage where the benefits are beginning to be seen. It must be stressed that setting up from scratch a collaborative project of these dimensions is complex. It is easy to under-estimate difficulties, and much effort has gone into establishing a reliable working system and support services, and into developing classroom practices.

3.69 The pupils themselves have developed considerable skills in IT, for example, three Year 11 pupils at Little Hulton have acquired enviable skills through creating a WWW page for their school. The OILS materials are now being used in different curriculum areas and the teachers report on the benefits which this has brought. We have also seen an excellent example of how the Internet has been used in a Geography lesson at Swinton. As yet, these examples are few, but there is little doubt that, given appropriate support and technological reliability, within a few months the initial work will have been developed considerably.

3.70 Whilst the majority of the comments above relate to the technology and the curriculum, there are important lessons to be learned from the organisational infrastructure and its operation. From a management viewpoint, this project has had its difficulties in that, although the representational links were in place between the different institutions/partners who were involved, and between the different working committees and the GEMISIS Project committee, problems which arose were not easily resolved, particularly in the early stages of the project. It is important that the areas of responsibility are carefully delineated and accepted by all who are involved in the project.

Project replicability

3.71 This is not a project which is likely to be replicated. It grew up out of a partnership between a university, a city council and a large industrial company which was involved in providing a cabling infrastructure in the city and the nearby area. It was a project designed to indicate the benefits of using broadband technology in education, and was funded largely by the EU and by the industrial partner. It was at no cost to the schools, in that they did not have to consider connectivity charges to the Internet, nor telephone bills to BT. All the equipment was provided, and the schools were, for their part, expected to supply the curriculum examples in the use of the technology. Such a partnership is commendable and clearly very useful for all the partners; indeed, many benefits have been listed in this report and others concern the research activities which have been generated at Salford University, and the improved public relations which will accrue to NYNEX. The project cannot, however, be seen as a commonplace occurrence.

3.72 The project reported here is only one of several which appear under the GEMISIS banner, and is a relatively small project, effectively linking two schools and a university with broadband connectivity, and a very modest amount of equipment (one Personal Communication Computer (PCC) and two PCs in each school). It is in fact a pilot project, an experimental test bed in two schools whereby the benefits of the new technology, and also the problems, can be evaluated, and as such it is not a project which is designed for replication, but rather a project which will generate developments in terms of the proven outcomes which may occur.

Commentary and recommendations

3.73 The project is almost one year behind schedule, chiefly because of delays in the connectivity provision. The original Implementation Plan should be replaced by a more up-to-date series of short-term goals in line with the original objectives.

3.74 Full connectivity for video conferencing is still not present (the schools may video conference only with each other) and, whilst this has led to an interesting and useful experiment (albeit with a different project) from which many issues arose, both concerned with technology and the pedagogy, it is now most important that plans are made for this aspect of the project to be given priority. The proposed use of video conferencing between the schools

and student native speakers of foreign languages at Salford University was an exciting proposal, and one which would be looked at with interest by other projects, in terms of its effects on the curriculum and also for the fostering of links between schools and higher education. This part of the project now requires both the technical will and political support in order for it to move forward.

3.75 The other three facilities, namely e-mail, the virtual library (containing the OILS materials), and the Internet, are all now in place at the schools, and although two of these (e-mail and the virtual library) are comparatively recent additions there are good indications that the schools are beginning to make use of them. It is interesting to note the different attitudes of the staff to the use of OILS at the two schools. At Little Hulton, all the staff interviewed looked upon the OILS materials as a way of helping the less able or the more able pupils, through a form of withdrawal from lessons. These staff felt that, rather than have access to, say, 16 networked broadband computers, they would prefer two in their classrooms, so that they could have access as required. At Swinton, the staff appeared to be more reluctant to use the materials. The Mathematics and Modern Languages departments, in particular, expressed some reservations about their use, and it was only with the Special Needs Department that there was any enthusiastic reception for the OILS software.

3.76 The effects of the broadband connectivity upon the curriculum of the schools have so far been quite limited, more so at Little Hulton than at Swinton. However, there is strong evidence that plans are well developed to take advantage of this technology. Experiences are being gained, and the way in which IT was used in a Geography lesson at Swinton is a good example. As usage begins to grow, there is a need for what may be termed 'cross-fertilisation' between the schools. Experiences should be shared, so that knowledge and expertise is disseminated through the project. For example, the use of the Internet is less well developed at Little Hulton School as compared with Swinton and, perhaps, some of the results from the work which has already been done at Swinton (for example bookmarks and the introductory booklet) could be shared. What appears to be substantially lacking, and now needed in this project, is pedagogical advice as to how to use the technology appropriately. It is the responsibility of the management to organise meetings at which ideas can be pooled, and to instigate some form of small-scale action research so that the project develops along a coherent path and the benefits of using the technology are fully explored. The recent appointment of a doctoral research student will help considerably, in that she will be able to visit each school on a regular basis, as well as monitor the project. However, it is felt that a more formal structure should be in place, whereby staff from the schools can meet, say twice a term, to examine ways in which the project should be evolving.

3.77 The location of the hardware has had a significant effect on its usage and accessibility. Location problems are not easily resolved, and it often amounts to a balancing act between easy open access and supervision, but for many schools, of which Swinton is one, there is also the pressure on room space. At Swinton, the location of the hardware is in a heavily-used IT room, thus access can be only through negotiation with the teacher who is currently timetabled for the room. The room is also a considerable distance from, for example, the English block and, although the school is on a single site, the logistical problems do deter staff from using the facilities. At Little Hulton, the problems are less acute, and access is generally readily available for staff or pupil use since the room is only timetabled for seven periods in the week. It is

necessary that staff and pupils have ready access to resources, and measures should be taken so that such issues are not a deterrent to the exploitation of IT.

3.78 In the initial Implementation Plan, staff development was recognised as an important feature of this project. Some of this has taken place, with the Internet and OILS training being given at Salford University, but training was restricted to a small number of staff from both schools. Thus, the need now is to extend the training to the rest of the staff under a staff-development programme. This has, indeed, occurred at The Swinton High School, but less so at Little Hulton, because of connectivity and technical difficulties which prevented a reliable facility being available. It is important that the staff development emphasises the teaching and learning aspects of the technology, and how it can be used to enhance the curriculum, and not simply be an exercise in acquiring operational skills, although of course these should not be neglected.

3.79 The external support services provided in the project are now working well, and both schools are satisfied with both NYNEX and ICL in this respect. At the school level at Swinton, there is a full-time technician available, who has considerable expertise in IT, as well as a well-qualified Head of Department, who in turn provides enthusiasm and leadership in the use of IT in the school. At Little Hulton, the Head of IT is comparatively new to the post, although he is a very experienced member of staff with a similar interest and enthusiasm in the use of IT. Currently, at technician level, there is only part-time help available and, consequently, much of the day-to-day running of the hardware and resolution of difficulties become the responsibility of the Head of IT. In the near future, it is intended that this post will become full-time. If usage is to grow in the schools, it is important that the staff at the schools are able to refer to someone for advice and help, that is someone who is readily available, and hence it is seen as a priority that the technician at Little Hulton is provided with appropriate training.

3.80 The project management has been carefully planned and there is representation at all levels. The Schools Project Committee meets on a regular basis and on that committee are representatives from all of the institutions involved. However, although the model appears to be sound, the functioning of this hierarchical structure has only of late become effective, in that the responsibilities which go with project involvement, particularly concerning the main industrial partner, have only recently been realised and some priority given to the project. This has been particularly welcomed in the schools. The Schools Project Committee meets in a Teachers' Centre in Salford, a location which is convenient to staff from both schools, but it may be useful in the future to have occasional meetings in the schools themselves. In this way, a fuller representation from the schools would occur, with IT staff as well as a headteacher or deputy attending the meeting.

3.81 It is unfortunate that developments have been subject to some delay within this project, but, now that most of the difficulties have been resolved (apart from the video-conferencing connectivity, which must now be given a priority), it is possible to look forward to some of the objectives of the original proposals being fulfilled, particularly if the recommendations of this report are put in place.