


Education Departments' Superhighways Initiative

Group A: Curriculum Projects in England and Wales

Final Report

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The evaluation

1. This evaluation concerns seven curriculum-focused projects that were based mainly in the primary and secondary sectors in England and Wales. Two further projects in the group were located in Scotland, and were the subject of a separate report produced by the Scottish Council for Research in Education (SCRE). The projects were extremely diverse in scale, ranging from a single infants school with two machines to a group of around 30 secondary schools and sixth-form colleges exploring a range of technology. Projects also varied greatly in their organisational and technological structure, and their aims and objectives. What united the group was a classroom focus, with teachers and pupils exploring the potential of a range of ICT technologies to enhance teaching and learning.

3. THE KENT BROADBAND LEARNING PROJECT (KBLP)

3.1 Following an initial round of visits to the participating schools, and meetings with representatives from the partner organisations, three visits to each school were conducted during the Summer and Autumn terms of 1996, and in the Spring term of 1997. Additional visits were made throughout the period of the trial to observe training sessions and project events. Further meetings were also held with representatives of the various commercial and educational partners.

Description of project

3.2 The Kent Broadband Learning Project (KBLP) involved two 11–18 secondary single-sex girls' schools and one 7–11 junior school. The junior school was a feeder school for one of the secondary schools in the project. The schools were initially selected for their whole-school approach to curriculum development and a strong commitment to cross-curricular use of IT, although experience of communications technology prior to the project was very limited.

3.3 The KBLP grew out of discussions within the Kent Education Forum, consisting of representatives from the Kent Training and Enterprise Council (TEC) and Kent LEA. An approach from United Artists (UA), now Telewest Communications, who have the franchise for cabling in the Medway area, coincided with interest generated by the Superhighways Initiative, which in turn gave rise to the KBLP. Telewest already had an agreement with Research Machines (RM) to experiment with cable modem technology, originally planned for another county. The nature of the bid in terms of curriculum areas and choice of technology was decided at informal project meetings chaired by the Project Co-ordinator, an external consultant appointed for the duration of the trial, and the headteachers, with two or three other staff from each school and two officers from Kent Education Authority.

3.4 The KBLP examined the effects of implementing new communications technology on a small group of schools whose staffs were, at the outset, relatively unsophisticated with respect to Information and Communication Technology (ICT). Specifically, KBLP sought to investigate the potential of a range of broad, intermediate and narrow band technologies in enhancing the curriculum. These technologies included access to Cable TV, the Internet for publishing and information retrieval, electronic mail and a remote CD-ROM library. Curriculum areas in the early stages of the project included English and modern foreign languages (MFL), media studies and sociology, although as the project developed schools moved towards incorporating more curriculum areas. In addition to curriculum and staff development, the project also planned to explore links between primary and secondary schools, and to investigate the possibility of using the technologies for home-based learning. The KBLP was itself part of a wider, national broadband project involving RM and Telewest.

Sponsors and other parties involved

3.5 Kent Education Support Services, including the Kent Curriculum Services Agency (KCSA) and Education Information Systems (EIS) and the IT units within the Education Support Services worked directly with the schools to develop and monitor the educational aspect of the project. Telewest and RM also made considerable IT infra-structure investments as part of their research into the delivery of communications facilities to homes and education. BBC Education provided advice and support in curriculum and staff development. Initial funding, and the overall management of the project, was undertaken by Kent Education and Kent TEC. These agencies also provided funding for a full-time project manager during the specified period of the trial.

3.6 A total fund of around £70K was made available for the project, which included contributions from Kent County Council and Kent TEC.

Size and type of institution

3.7 The first secondary school (S1) and the junior school (J1) were close to one another, such that J1 was a 'feeder' to S1. For reasons described below, the other secondary school (S2), which was in the build area of the cable planned for the term, was brought into the trial just after the initial project steering meeting. S2 was located in a different town about 9 miles distant.

3.8 S1 is an 11–18, local authority maintained, girls-only secondary school that operates a sixth form co-operatively with the neighbouring boys' school. During the period of the trial, the school was granted Technology College status. At around 1500, the number of pupils on roll was well above average for secondary schools and S1 ranks among the largest secondary schools in shire counties. The school is situated in an area with a broadly average socio-economic mix. Around 10% of pupils are entitled to free school meals and about 2% have statements of special educational needs (SEN).

3.9 S2 is a selective grammar school for girls with approximately 900 pupils on roll. The majority of pupils in the school are from professional homes although a number are from less financially secure or educationally experienced backgrounds. Pupils at the school are selected according to LEA selection procedures and on scores in standardised tests in English and mathematics. The range of ability is fairly wide, with about 25% of the pupils achieving at the lower end of the selective standard in one or other of the subjects. Around 2% of pupils are entitled to free school meals, and less than 0.5% of pupils have statements of SEN.

3.10 J1, a feeder school to S1, is a 7–11 school, with just over 200 pupils on roll, nine full-time staff including the headteacher, and is situated on the edge of a large, mainly private housing estate. Approximately 30% of the pupils are entitled to free school meals.

Technical details

3.11 In the original plan for the project, J1 and S1 were to be connected to the local cable network. However, because of changes in the cabling company's geographic and commercial priorities, this proved not to be possible during the specified period of the trial. For this reason, another school, S2, which did have access to cable, was brought into the project slightly later in the planning phase.

3.12 At the commencement of the project, J1 and S1 were limited to 28.8 Kbps dial-up connectivity via the telephone network. This was later upgraded to network access via ISDN2 in S1 at the start of the fourth term of the project. J1 used 28.8 Kbps dial-up for Internet access for the whole project, but installed ISDN2 for video conferencing during the project. S2 had access via broadband fibre-optic cable but for the first three terms was limited in bandwidth by a 64 Kbps link. This connection provided rapid Internet interaction, access to a remote CD-ROM bank of multimedia learning/teaching materials, originally located in Essex, now in Kent, and to cable TV educational programmes.

3.13 During the lifetime of the project, a number of developments occurred. All three schools installed ISDN2 lines, which allowed them to conduct video conferencing, and which also gave faster Internet access for S1. Limited by funding constraints, however, J1 continued with a single machine for Internet access and video conferencing. S1 considerably expanded their facilities, from a single dial-up capability to three independent ISDN2 lines connected, respectively, to an

individual machine in the modern foreign languages department, a cluster of four machines in English, and a network of 28 machines in two IT rooms. Towards the end of the evaluation, as money was released as a result of Technology College agreements, the school invested a considerable sum in upgrading and extending networked facilities. In the later stages of the trial, the school was also involved in the Schools On-line Project.

3.14 S2 had invested considerably in modern IT facilities, operating a system of 80 RM PCs over a Novell network with a mixture of network, stand-alone and multimedia machines, a network of Apple Macs, including a Power Mac PC, an ion camera, flatbed scanner, video overlay, character recognition pen, and laser and colour printers. Via the school network, a wide range of up-to-date software, including multimedia authoring tools, was available. The superhighways component of the facilities consisted of 16 PC workstations that had fast access to Internet via a 2Mbps cable link, limited by an intermediate link to 64 Kbps for the first year, located in a dedicated IT suite that also contained a similar number of machines with no Internet access. The school also invested in video-conferencing facilities using Picture-TEL on a stand-alone PC.

3.15 Within a very tight school budget, funding for IT at the start of the project was very limited indeed. J1 had recently installed a second-hand LAN of 17 186 PCs and various peripherals, which it had purchased from S1. Funding for IT competed strongly with other school priorities, and as a result equipment, both stand-alone and networked, consisted of a mixture of old and newer technology, including 186s, 386s and 486s. J1 had one machine on loan from the Kent European Project Office and RM had given three to the school, making a total of only five computers capable of running MS Windows. The communications component consisted of a single workstation with dial-up access to the Internet and, later in the project, a video-conferencing machine that used an ISDN2 line.

Background and experience of staff

3.16 This varied considerably between the schools. The secondary schools were committed to externally provided training for staff, including newly appointed staff. Before the project, one member of staff at S2 had experience of Internet e-mail using text-based access via a university. Several staff had limited Web-browsing experience. Staff at S1 had some experience of Internet e-mail. At J1, at the start of the project there was an IT co-ordinator who had had that role in a secondary school. The network room benefited from this technical experience, and IT teaching tended to be left to this teacher. In May 1996, this teacher left the school, and project co-ordination fell to a non-IT specialist, who conscientiously trained herself through attending evening classes. The new co-ordinator then introduced a new approach, opening up the network room and encouraging all staff to use it with their classes, and to learn, as she did, with and from the children. This resulted in all staff using ICT within two terms.

Project timetable

3.17 The original timetable specified the school year 1995/96 as the period of the trial, with the evaluation period beginning in January 1996 and ending at the end of the Summer term in July, following infrastructure/cable connections in the Autumn term 1995. In practice, however, initial technical delays and setbacks meant that for the purposes of this evaluation, the Kent Broadband Learning Project, as originally proposed, was still in existence up to and including the Spring term 1997 with plans for further extension being considered.

Aims and objectives

3.18 The main stated aim of the project was relatively broad in scope, namely to explore the role of information and communications technologies in the enhancement of learning. These technologies included broad, intermediate and narrowband access to the Internet and a remote CD-ROM library, as well as video conferencing and cable TV. Further aims were to develop links between school and home in order to extend the opportunities for learning and for staff development, and to encourage the involvement of parents and ultimately the wider community by raising 'awareness of and participation in learning opportunities' and through advice and information on the suitability of services.

3.19 A key objective of the project was to develop a positive collaborative relationship between the various educational and commercial organisations, so that the lessons learned through the trial could be disseminated to other schools and colleges. It was envisaged that this process could lead to the development of a local service for the delivery of employment and training information, with the intention to extend this to other institutions and agencies 'as resources became available'.

3.20 Stated criteria for gauging the success of the project included the degree of 'added value' that the technology contributed to both pupils' learning and to staff development, the success of the developing relationship between the various educational and commercial partners, and the cost effectiveness of the project for each of the partners involved.

Evaluation

Project initiation

General comments

3.21 The KBLP was an interesting and successful project that went through several phases as the new technologies were explored and opportunities for curriculum applications were realised. The initial phase was very much one of exploration and discovery. As the IT skills of staff and pupils developed, so did the curriculum opportunities they were able to create, with the result that the scale and scope of the project increased term by term.

3.22 The initial stages of the project were subject to considerable delays. The first 6 months of the project were spent in considerable frustration on the part of S1 and J1, as the anticipated cabling did not take place and then equipment was not available. Once these difficulties were resolved, the first phase of the project proper was, for these schools, based upon relatively limited and narrowband access.

3.23 S2 joined the project just after the start of the planning cycle, for reasons explained earlier (see paragraph 3.11), and partly because of this the major aims of the project were not initially clear to the school. As a result, the school had focused upon building and developing their current programs in international modern languages and e-mail communications. With a fuller understanding of the role of the Internet in the project, their activities might have taken a different focus, concentrating at an earlier stage on exploring its potential. Because of the existing links between S1 and J1, and because the school was introduced later into the project, there was less of a sense in S2 of being part of a collaborative project, although problems and ideas were shared between all of the schools. The school was also part of another Superhighways initiative, the Superhighways in Education Project (see Report D2.3), which was being evaluated in parallel with the KBLP.

3.24 Video conferencing was not part of the original project plan, but schools became interested in exploring its potential after a demonstration link-up with schools in Helsinki, organised by Telewest to celebrate Europe Day in May 1996.

Initial training

3.25 There was no overall planned or progressive training programme. Instead, schools were able to select the courses they needed from the EIS and KCSA menus. In general, schools felt that more support would have been welcome in the early stages and this included access to technical advice as well as hands-on training. In J1, however, any such concerns were aggravated by the regular failure of the e-mail technology. Although part of the failure was apparent, rather than actual, as a result of staff inexperience with the new software, as far as the schools were concerned it did not meet their expectations. There were some improvements once the schools had made their feelings known. However, there was evidence of certain tensions between the schools and some of the educational and technical partners. In the schools' view, much of the difficulty arose from poor communication, and in particular they were highly critical of what they saw as a lack of effective project co-ordination. Feelings were high, such that one school felt that but for the efforts of the school co-ordinators in particular, the project would have failed at a very early stage.

3.26 A number of courses were run by EIS and KCSA, for example on the Internet, managing Windows, control technology and so on. There were also one-to-one training sessions provided by EIS in each school during the project. However EIS agreed that, as would be expected in projects exploring new areas, they were uncertain about the nature and level of training needed by the schools, and felt that staff were unable to identify their needs at that stage. At the beginning of the project, most of the teachers would have described themselves as 'non-technical' and had not yet developed an understanding of the opportunities in their subject areas offered by the new technologies, nor the IT skills they would require. Although EIS and KCSA rapidly got to know the staff in the three schools well, no formal audit of teachers' skills or curriculum needs was conducted which would have enabled a programme of more targeted and effective training.

3.27 Much of the initial training in the Kent project was thus highly dependent on the schools and in particular the school project co-ordinators, with some on-site training from local educational agencies, and commercial partners supplemented differently in the three schools. Internal INSET developed with the project via a number of formal and informal workshop-type sessions, usually provided by the IT co-ordinator, and informal sessions where teachers would share knowledge and expertise, or explore an application, process or scheme of work.

3.28 The co-ordinator at the junior school who took over after two terms, was an IT novice, at the level of 'wanting to know how to switch on'. Much of the training that was selected by the school was at a level somewhat higher than this, and accordingly she took the decision to attend IT evening classes at her own expense, as well as undertaking much self-directed learning, with support from the co-ordinator at S1. For this co-ordinator, IT-expert pupils became a major source of support.

Technical and educational training

3.29 The three schools were committed to continued training for all staff, and there was a general emphasis on curriculum-focused exploration rather than technical skills.

3.30 S1 strongly supported teachers who wished to extend their knowledge and skill base by attending INSET courses, mainly provided by a local HE institution. In-house training, both formal and informal, on a wide range of applications continued

throughout the project, such that by the end of the Autumn term 1996 it was reported that 'almost all' of the teachers were very familiar and confident with ICT within the school. The emphasis here was contextual learning, that is focusing on the use ICT for particular curriculum-based activities. Peer tutoring was also encouraged, and was seen as especially relevant since collaboration was now a curriculum requirement in certain subjects. This had worked especially well with more able pupils working with pupils with special educational needs (SEN), but the approach had also been used in staff INSET sessions, where more expert ICT users were paired with less experienced colleagues.

3.31 In S2, the project co-ordinator organised a range of training sessions in school time when teachers' lessons were covered. These were adapted to teachers' individual levels of expertise and resulted in a high proportion of staff increasing their IT confidence with only two reported reluctant learners. In addition, the network manager provided INSET specifically on using the Internet. On one of the staff development days, all staff had some experience of using the Net. A potentially important staff development vehicle here was the formation of a Internet 'research group', which consisted of seven staff, one per faculty, with some IT expertise. The group would meet with a trainer from EIS on a monthly basis and focus on curriculum development and pupils' research skills.

3.32 The J1 co-ordinator continued to attend evening classes, and completed an IT diploma. The project co-ordinator from S1 also supported this process, highlighting the importance of the collaborative association between the two schools. Considerable importance was given in this school to the children themselves tutoring both their peers and their teachers, a strategy that was beneficial in a number of respects, including practical, educational and social.

3.33 A major concern in the schools was the cost of further staff training, particularly in the primary school where training used almost all of the initial project funding.

Training for pupils

3.34 There was a clear recognition in S1 and J1 that pupils needed guidance and training in using communications technology effectively, although the Y12 and 13 pupils at S2 needed no encouragement to get started. Accordingly, there was an emphasis on teaching effective search and research strategies, both in using the Internet and for other interactive resources such as CD-ROMs.

3.35 At S1, a progressive system of training was being developed, so that in the lower school, for example, pupils would be introduced to the resources gradually and with a high level of structure directing them towards particular sites and linked sites/topics that were required in order to complete an assignment or contribute to work on a core module. For each successive year group, the structures became progressively less directional, coupled with an increase in the amount of self-directed research, with the aim that A-Level groups, for example, were able to work fairly independently, and make informed decisions about the suitability and relevance of materials. Although there were examples of pupils taking a less structured approach, in general this format led to a focused and intelligent approach to research,

3.36 There was a less formal approach to IT at S2. Pupils were introduced to using the Net by exploring sites that were relevant to a particular topic, some of which had been previously identified by the teacher or network manager. Some teachers took a structured approach, but in general pupils were encouraged to discover for themselves by active exploration. Perhaps inevitably, this more open approach led to a certain amount of random searching. For example, in one observed introductory session, only a handful of pupils had actually recorded or printed out

any information about the topic in question, despite the availability of a wealth of highly relevant material. However, as one teacher put it, this was not 'wasted time' as the girls were learning valuable lessons about navigation and about the scale and type of resources available. This view was not universal, however. The design and technology teacher at this school, for example, felt that the ICT should be regarded as a tool, so that just as pupils are not encouraged to 'discover' the function of a hammer or a drill, so too should WWW research be specifically taught and structured.

3.37 Teachers have to consider also the time they can allot to particular aspects of the curriculum, and the relative importance of Web searching, as against other demands. These demands are likely to be different in different curriculum areas. In general, the evaluators concluded that there is value in both approaches, and the issue is about finding a balance, which takes into account level of pupils' understanding and experience, the specific curriculum objective, and the teaching style of individual members of staff.

3.38 In J1, there was a high level of peer-tutoring. Two timetabled periods per class per week were led by the project co-ordinator with the help of more experienced Y6 children as needed. The older pupils prepared step-by-step instruction programs for particular applications for Y3 children, who then tried them out, observed by the Y6s. The instructions were then modified to take account of the Y3s' difficulties. It was interesting to note that the most IT-proficient Y6 children had the greatest difficulty in preparing a successful instruction programme, demonstrating, as elsewhere, that IT competence and confidence often operates relatively independently of other abilities. The Y6 girls at the school also ran a lunch-time computer club.

3.39 Although external support was made available, it was clear that the schools wanted more, particularly in the early stages. What is evident, however, is that, given sufficient motivation and a clear vision of the aims of a project, it is possible for schools to organise a high level of training for both staff and pupils; and in the case of the junior school, with little initial expertise or experience with IT. What was absolutely central to the success of this process was the enthusiasm and commitment of the school co-ordinator in encouraging other staff to participate, and the support of the senior management for providing opportunities for them to do so. At S1, for example, one teacher in each of four departments was given a half responsibility point specifically to develop ICT within their curriculum area. In the junior school, encouraging and developing pupil–pupil support was a key element in the rapid transmission of skills throughout the school.

Management strategies

External

3.40 The project was managed by a steering group chaired by the Project Co-ordinator, comprising a representative of each of the commercial partners, Telewest, Kent TEC, BBC Education and RM, someone from Kent Education, and one of the headteachers. Over time, this group became proactive and a forum for wider ICT issues to be discussed. A Project Group was also formed, also chaired by the Project Co-ordinator, comprising all three headteachers, the IT co-ordinators and active staff with KCSA and EIS staff. These and other management meetings were held after school hours at the schools' request. At the end of 1996, the contract of the Project Co-ordinator came to an end, and the major co-ordinating role was taken over by the EIS curriculum projects manager.

Internal

3.41 The project has been managed differently in each of the three schools according to their internal structures.

3.42 At S1, the main co-ordination of the project was managed by the Head of English, strongly supported by senior management staff. There was a whole-school approach to ICT in the school. In addition to a cross-curricular IT group, which met regularly, there was also a group that met to explore the incorporation of Internet and other interactive technologies into each curriculum area.

3.43 At S2, a recent reorganisation of the school management structure, with the introduction of seven faculties in place of subject departments, provided the project co-ordinator, as head of the Business and Technology Faculty, which incorporates business studies, IT, DT and the resource centre, with a broad vision of whole-school needs and a strong line of influence to develop the project. This contrasts with the model of an IT co-ordinator working alone who has to compete with the other departments for development funding. As at S1, there was an Internet group, supported by EIS, with a similar remit. Sessions tended to have a 'theme', for example examining the different functions of various search engines. The school employed a network manager who supported staff using the IT suite.

3.44 In J1, the running of the project was the responsibility of the IT/project co-ordinator with full support and participation from the headteacher. The new project co-ordinator had made a point of opening up the school's IT facilities to all staff, and pupils and staff were encouraged to use IT to support activities within curriculum areas.

Obtaining and installing equipment

3.45 With respect to the KBLP, the three schools represented very different starting points in terms of IT provision. The project therefore provides valuable exemplars for other schools, both secondary and primary. Mainly as a result of the change in the cabling company's plans, S1 and J1 were required to start small, with single-point, dial-up access to the Internet. Because both schools were committed to extending provision for both staff and pupils, ways were found to add to the existing facilities as the project progressed, but costs, particularly for J1, were a major factor.

3.46 For J1, the major development was the installation of an ISDN2 line mid-way through the project and the purchase of a multimedia workstation upgraded for video conferencing. For S1, three ISDN2 lines and the purchase of extra workstations allowed multiple and faster Internet access as well as video-conferencing facilities. In both cases, equipment and connectivity costs were found out of school budgets, and/or small grants and funding arrangements, for example the Kent International Initiative funding for developing MFL. S1 was able, on the basis of moneys from matched funding as a result of Technology College status, to plan for a considerably extended networked access in the Spring term of 1997. In the same term, a network manager was appointed who was given a curriculum development as well as a technical role.

3.47 S2 was the only school of the three with cable connectivity. The school was already strongly committed to extending and modernising its IT provision. At the outset of the project, governors authorised £10K to upgrading the internal system, which itself had been upgraded only 18 months earlier, to meet the higher loading on the network produced by rapidly increasing use by pupils of both the Internet and existing software. As already mentioned (see paragraph 3.43), the school employed

a full-time network manager, who had overall responsibility for the whole-school system, as well as Web site management.

Implementation at project and institutional levels

Creating cross-institutional relationships and support

3.48 S1 and J1, the two schools originally scheduled to participate, had well-established cross-phase links in place to support children as they transferred from the primary to the secondary school. These links were considerably strengthened as a result of the project. The letters that had been exchanged between Y6 and Y7 children in previous years as an English cross-phase initiative were replaced by e-mail. Later, a literary theme was introduced to provide a common focus. Both year groups read the same novel, *The Diddakoi*, around which joint project work was developed using e-mail and, later in the project, video-conferencing links. This led EIS to provide an e-mail address to a Russian school as part of an expansion of book research on gypsies, evacuees and refugees. The success of the project, despite some technical setbacks, may owe a great deal to its having a school-based foundation. The two schools also collaborated at a managerial level, and the S1 co-ordinator supported the J1 co-ordinator in skills training.

3.49 The schools worked together at a managerial level, and for the development of joint activities and display work for conferences and exhibitions to disseminate their findings to other schools. While S1 and J1 had existing collaborative links, the project objectives did not, however, anticipate inter-school curriculum collaboration between all three schools.

Maintaining equipment

3.50 Maintenance at S1 was mainly the responsibility of the IT co-ordinator, with support from EIS. Later in the project, the school created the post of network manager. The appointee was responsible, in collaboration with the IT co-ordinator, for installing and managing the recent additions to the school network, and eventually for working with teachers in developing curricular materials, identifying sites, and for Web-site management. S2 already employed a full time, non-teaching network manager whose role it was to maintain equipment, support all pupils and staff, and deal with technical problems by contacting the relevant agency. RM also provided a 'troubleshooting' service and, with Telewest, maintained the cable modem link.

3.51 At J1, technical support was provided by Kent EIS in response to calls from the co-ordinator. The frequency of the engineer's visits reduced from two per week in the early stages to occasional visits as technical problems subsided and familiarity with the system increased. As the project developed, technical support was needed on a more assured basis. Collaboration between J1 and S1 in sharing the cost of dedicated technical assistance or to fund a classroom assistant to attend a technical course was under consideration.

Implementation at classroom level

3.52 The original curriculum foci of the project in the secondary schools were English and modern languages. As the project progressed, this widened to take in a number of areas, including sociology, history, geography and media studies. In J1, the project initially focused on extending cross-phase links and with English work.

3.53 Generally speaking, in the secondary schools at least, once a teacher had experience of using the WWW, their curriculum area quickly became a target area for development. In general, teachers were very clear that the use of these technologies should be grounded in curriculum needs. As explained earlier, teachers at S1 were

invited to bid for funding to develop specific proposals for incorporating ICT into the schemes of work for their curriculum area. In English, ICT was already built into schemes of work and it was well on the way to exploring cross-curricular links by the end of the trial. Cross-curricular developments were also being recognised within curriculum areas at S2. The MFL e-mail project was itself already cross-curricular in nature (see paragraph 3.56) and possibilities were recognised in English too. For example, the use of the Net to find commentaries on set books tended to highlight the possibility of cross-curricular themes, such as hypertext links to materials on the geographic and historical context of the texts. This kind of exploration is to be welcomed, but at the same time it is recognised that the faculty/departmental structure of secondary schools, coupled with the requirements of examination syllabuses, limits opportunities for sideways dissemination.

Quality of work and relevance to the UK national curricula

3.54 Given the relatively short period of time of the trial, compounded by the early setbacks for S1 and J1, it is difficult to point to clear and unequivocal evidence of added educational value as a direct result of the ICT, although the schools conducted in-house surveys that indicated some improvements in a number of areas, for example increased grades in A-Level Sociology and GCSE English Oral. Furthermore, it was difficult to discriminate between the specific effects of communications technology and those of IT generally, since the focus on the one had an effect on the frequency of and confidence in the use of the other. In J1 particularly, there was a clear view that the two were not separate, but mutually reinforcing.

3.55 There were, however, numerous projects involving ICT, and many examples of pupils gaining from the use of e-mail, the Internet, video conferencing and CD-ROMs. Examples of each are given below.

E-mail

3.56 While much of the communication conducted by e-mail for various projects could, in theory, have been conducted via surface mail, the immediacy of e-mail added considerably to pupils' interest and involvement. At S2, for example, e-mail correspondence as part of a modern languages project took the form of correspondence and surveys with European penfriends. Some of these had developed as a consequence of a demonstration video conference with Finnish schools earlier in the year. Pupils also arranged work-experience placements in Germany by sending details, CVs and so on, written in German, via e-mail. These links provided good opportunities for pupils to work with authentic materials to fulfil significant aspects of the National Curriculum, in particular the raising of cultural awareness. There were intentions to extend some of these contacts to video conferencing, although there was some difficulty in finding schools in France with suitable facilities. EIS were planning to loan the relevant hard- and software to one of the French partner schools to enable this development to take place.

3.57 S1 also used e-mail for modern languages contacts, as well as developing a project with a Welsh junior school, which was to result in a cross-phase Eisteddfod in the Summer. Links with schools in Canada and Israel to produce a multicultural anthology of poetry were also being developed.

3.58 A-Level students also used e-mail for sociology and English and were extending this to include geography and maths. Many subject areas have gained from e-mail surveys, for example a biology eye colour survey at S2, now incorporated into the biology SoW. The results of various A-Level sociological surveys were put up on the school Web site.

3.59 As part of their Second World War and Evacuees project, J1 pupils e-mailed schools in Russia and Finland. The children in Russia had asked their grandparents about their evacuation experiences and some sent detailed and tragic accounts of their recollections that revealed much more directly, as they were 'personally' addressed, the distress of parents losing track of their children as a result of evacuation. In addition to the remit of the project, information was exchanged about geography and climate, social backgrounds, history and lifestyles, and because the e-mails were written by their European peers, they represented a rich source of information in a form that was more readily understood by this age group than that which was generally available on the Internet (see paragraphs 3.61–3.65).

3.60 As is discussed elsewhere, an established programme of joint activities relating to transfer between J1 and S1 was considerably enhanced by the use of e-mail as well as video conferencing, which largely took the place of previous surface mail exchanges, and both were looking to extend this activity to other schools, both in the UK and abroad. Although links with European schools were well established in S2, the more local, transfer approach was less feasible, since the school admits pupils from a large number of institutions over a wide geographic area, few of which had e-mail facilities.

Internet/WWW

3.61 Internet access for most subjects has been explored by both secondary schools, and as well as extending their range of available resources has helped to develop IT and English skills, meeting the National Curriculum requirement for opportunities to apply and develop IT capability, as well as key skills such as editing, planning and drafting. The Internet was much less used by J1, mainly because a great deal of the material was not pitched at suitable level. There was concern, too, that searching the Web could be an expensive activity requiring a large quantity of telephone call time. Finding time to do this was, in any case, a critical issue here. When, however, an e-mail from the Finnish children gave the address of the Web site of a 'snow castle' near their school, this gave a real purpose for looking on the Internet and led on to much more frequent use in J1. This illustrates well the value of having a real purpose for a sometimes rather open-ended activity.

3.62 Although Internet resources were initially most extensively used by A-Level students across all subjects in both of the secondary schools, there was a general movement towards involving all year groups as the project went on. At S2, sociology students were able to access very up-to-date social, political and cultural sources, including access to information from UK and US academic sites. By the end of the evaluation period, a number of departments had explored the potential of the WWW for research purposes. These included, for example, design and technology, where pupils were pursuing a kite design project and used the Net to explore the development of kite design; the biology department, in which each year group took a different focus; and geography, where Y9 studied tropical rain forests thorough the WWW, and Y7 studied environmental pressure groups.

3.63 The use of Internet materials was a key element in a variety of projects, and core GCSE modules. Y9 English groups studying *Of Mice and Men*, investigating a site about the author, John Steinbeck, were able to also explore linked sites that related to issues raised by the text. In each case, bookmarked sites and relevant CD-ROMs were used in combination. In S1, the same year group also used Internet materials for their 'Heroes & Heroines' module, and Y8 pupils explored zoo sites for their year core-module. In S2, Y8 pupils conducted research on a project about the Amazon rain forest. In both cases, as with many other examples of this kind in both schools, pupils of all yeargroups were excited by the wealth of materials that was available. A-Level students were generally given freer range to explore the WWW, for example a media studies group found information for their film studies

assignments, such as reviews of new releases, which was not available anywhere else, and English A-Level students conducted research on a wide variety of texts. During the Spring term 1997, WWW sites relating to the imminent General Election proved to be a rich resource for project activities, and at S1, Y8 pupils were involved in 'Project X', a schools-focused general election initiative set up and organised by BT, and used this as an opportunity to work with Year 5 children at J1, who interviewed the local general election candidates over the video-conference link.

3.64 Schools generally praised RM's Internet for Learning, which gives relatively unhampered but filtered access to Internet sites. It was generally regarded as being well organised and intuitive, making it easy for children to navigate. The fact that it was a relatively open system, rather than a walled garden, did, however, give some concerns about both the quality and security of the information retrieved. Even with an organised strategy, a search would often return hundreds, or on occasions thousands, of sites, leaving pupils with impossible decisions about which to explore. One strategy for reducing this was to identify and bookmark suitable sites as starting points for more thorough searches. Since most teachers were also keen for pupils to explore for themselves, they were also encouraged to draw attention to relevant sites that they had discovered. Pupils were also taught explicit search techniques. On numerous occasions, in fact, pupils found information on a topic that had eluded the teacher.

3.65 How to allow children to search freely for information while at the same time protecting or preventing them from accessing inappropriate sites was not simple. Even with a filtered system, it was possible by design or accident to come across unsuitable materials. The approaches adopted varied among the schools, but the overriding conclusion was that supervision was sufficient to deter all but the very determined. Supervision could be 'virtual' as well as actual, so that one of the schools warned pupils that all searches were recorded automatically, and were monitored by staff. Whether or not this was actually possible was not the issue, since it appeared to be a strong enough disincentive to misuse. For older students researching for media and film studies, with the possibility of sites containing challenging materials, for example one of the films was *Boyz N The Hood*, the school obtained informed consent from parents.

Video conferencing

3.66 Video conferencing arrived in the schools at a relatively late stage of the project. Despite this, considerable progress was made in S1 and J1. S2, partly because it received its video-conferencing equipment later in the project, was still in an early stage of exploration of this facility by the end of the evaluation period, although a number of initiatives were being planned. These included extending the MFL e-mail projects, especially in the sixth-form groups, and for language-exchange partners to communicate with one another before travelling to each others homes.

3.67 The interest in video conferencing was sparked off mainly by the link with Finnish schools at Telewest studios in May. Although mainly limited to an exchange of basic information, the event demonstrated the potential of real-time audio-visual cross-cultural links. Many of the pupils who took part were pleasantly surprised to discover that Finnish children were 'just like them' in many respects, but also were keen to learn about those aspects of Finnish culture that differed from theirs. The conference led to e-mail correspondence between the junior schools in the two countries, which led to further inter-school project work. S2 also followed up the contact to develop e-mail correspondence, and were planning to video conference with their Finnish partner in the Summer term 1997, but the very recent installation of the equipment meant that video conferencing was not yet established. The school had, however, persuaded its partner school in Germany to invest in video-

conferencing facilities, which were due to be installed by Summer 1997. All three schools also took part in a European school conference in Maastricht, linking with Dutch students as a demonstration of the equipment for European delegates.

3.68 As well as the video conferencing and e-mail between S1 and J1 for transfer activities, informal contact between the two occurred on a regular basis, facilitated by the fact that at J1 the system is permanently 'on'. The schools capitalised on a Kent pilot initiative to introduce French for Y6 children, with lunch-time exchanges in French between children at the two schools. While observed sessions were relatively unstructured, for example it became clear that the Y6 children were already at a higher level than that assumed by the older pupils, both groups clearly enjoyed the experience. Teachers at S1 are looking forward to comparing the language ability of this Y6 group with those from other schools when pupils transfer to secondary school next year. The school was also hoping to develop links with French schools, although schools with appropriate equipment had proved difficult to locate.

3.69 Schools were also looking to explore the use of video conferencing for remote tutoring, both as suppliers and consumers, and one had established links with a Gloucestershire school and BBC Education to this end.

CD-ROMs

3.70 The original project plan would have enabled all of the schools to have access to a library of CD-ROMs held on the remote server. However, because S2 was the only school with cable connectivity, this was a service only available to them. Remote access was supplemented by individual CD-ROMs held at the school, after RM discovered not all CD-ROMs would work with this central model. There is also a throughput limitation with the CD drives that is inadequate for a remote CD-ROM library with high user demand. RM approached this by copying the contents of the 10 central CD-ROMs onto the remote server's hard disk storage with its much higher access rates. Thus, in the strict technical sense, the CD-ROMs were not being accessed remotely.

3.71 After some initial teething problems, the system was reported to be extremely reliable. The service allowed the school to access various titles, some of which were deliberately chosen to be suitable for lower-school use. As well as regular items such as encyclopaedias, some titles were subject specific, for example World Climate or Aspects of Religion. The chief advantages of the remote service were that it allowed multi-user access, simultaneous access to any one title being possible for every one of the 16 workstations, and that it enabled regular updating of titles. CD-ROMs have the advantage of being fast, reliable and capable of being thoroughly vetted, which cannot necessarily be said of the Internet. The use of CD-ROM-based materials, from whatever source, stand-alone or networked, was frequent and often in concert with or to supplement materials from Internet searches. Together, the two technologies provided a powerful and extensive source of interactive, up-to-date research materials capable of supporting all curriculum areas. Although the two other schools did not have access to a networked service, CD-ROMs in stand-alone mode were used frequently, again as a complementary resource to the Internet.

3.72 S2 also had cable access to TV channels. These did not feature heavily in the project, largely because of the difficulty in finding reliable programme guides. Published schedules were altered at will and it was not possible to plan with confidence a teaching programme based on such relative instability. However, in conjunction with EIS and Telewest, S2 did produce a guide to locating educational materials on cable TV channels.

Evidence of increased motivation

3.73 There were abundant examples of children being highly motivated by using the technology. The opportunity to use communications technologies added a new dimension to the more general IT applications. For example, the excitement of finding an interesting or useful Web site was made all the more so by the possibility of transferring it to another application, to edit it, and to print it out. Once motivated, pupils learned very quickly indeed, to the point where they often outstripped their teachers. As in other projects, the ability to switch and transfer data from one application to another was often effortless and seemingly entirely natural. This, of course, was not true for all pupils in all situations, but it was the case for those who had used the technology for any length of time. The knowledge that work and materials might appear on the schools' Web site was also very motivating. Where free access was allowed, usage was heavy, and varied from curriculum project work through extra-curricular school projects, to using the Internet for recreational use, for example looking for sites on favourite pop groups or football teams. Although some teachers disapproved of this type of activity, it was an indicator of the readiness that pupils had to use the technology.

3.74 Even very young children made rapid and dramatic progress in their confidence with both IT in general and the ICT technologies in particular. For example, Y3 children at J1 were so confident with IT that the teacher felt that they were beginning to make independent decisions about how to incorporate IT into their work, and see it simply as a natural part of the curriculum. The teachers were happy to accept that many children even at this age are more skilled and knowledgeable than themselves, and so a joint learning process has developed. The ability and opportunity for pupils to 'teach their teachers' has the potential to have a profound effect on their confidence and self-esteem.

3.75 A majority of teachers were found to be highly motivated to use ICT, and learned most quickly where there was a direct application to their curriculum area or teaching practice. Once this occurred, it was not unusual to find teachers moving rapidly from sceptic to enthusiast. For pupils, the technology was often simply motivating in itself, and some of the children's own words speak volumes. One Y6 boy, who's comments appear on the school Web site, talked about his experience at the Kent IT (KIT) '96 exhibition:

> *At first I felt WOW! BIG! But I've recovered now. I sent nine e-mails, changed the Web page with the help of some girls (from S1) and showed them how to e-mail. I also surfed the net.*

And to quote one 16-year-old girl, on finding a particularly interesting site, although it has to be said, not entirely connected with her studies:

> *Wow - the Internet is so COOL!*

Productivity gains

3.76 As with educational gains, it is difficult to report with any assurance at this stage gains in productivity. With any innovation, there will be periods, particularly during the familiarisation stage, when productivity decreases and time taken increases, as both teachers and pupils learn to use the technology effectively. This project was no different, and teachers mentioned time as the most limiting factor in developing the full potential of ICT. The answer to this was for some teachers to devote a considerable amount of their own time to exploring sites, setting up contacts with other schools, training, discussing cross-curricular or cross-phase initiatives, and so on. In each school, this was particularly true of the project co-ordinators, who worked tirelessly to move the project forward.

3.77 Decisions about the productivity of, for example, a session on the Internet, were dependent to a considerable extent on teachers' expectations. As already mentioned (see paragraph 3.36), there were differences of opinion, so that some teachers felt that gaining experience of using the Internet was valuable in itself, and did not necessarily look, at this stage, for more concrete outcomes. Other teachers were more concerned about this, however, and set specific objectives, for example by directing pupils to specific Web sites, or requiring them to find out particular information.

3.78 Some teachers and managers were very aware that ICT presents a real challenge to schools, and that networking skills will be increasingly needed by pupils and teachers as the technology develops. As in other projects, the sheer scale of materials on the WWW raised new issues about strategies for pupil research. These included decisions about the suitability and appropriateness, both academically and otherwise, of materials, and about how far to allow pupils to develop independent research skills against the need for structure and control. The former at times leads to ineffective use of time and effort, where pupils spend time surfing, rather than searching, the Net. On the other hand, too much control over searching strategies, for example directing pupils to particular, pre-identified sites, does not foster the skills necessary for independent research. In general, the most productive sessions were those which incorporated elements of both strategies, that is where teachers provided pupils with a structured task with clear goals, but which also allowed for autonomous exploration of the resources. One school introduced a gradual progression from guided research to independent investigation in line with the age of the pupils moving from preparation for GCSE into their A-Level studies. This was a very effective approach, particularly where pupils benefit from guidance. At the same time, one of the great assets of ICT is the way that able pupils can rapidly move into more advanced searches and use applications with some sophistication. Therefore, whilst a progressive approach provides a learning framework, and teachers need to ensure that pupils have procedures and structures to use, at the same time they must avoid inhibiting fast learners' application of intuitive approaches. In exploring the use of new technology, all users' approaches must be considered.

Changed teaching styles

3.79 The last point highlights a particular issue about a shift in classroom practice, and the way in which teachers organise learning, which may result from the use of ICT. The nature of communications and interactive technology, in particular the WWW, has the potential to change the teacher's role, so that it becomes one of facilitating independent learning, rather than as a provider of knowledge or resources. We saw considerable evidence of this, and a clear strategy to move from dependence to autonomy as the age groups progressed. One teacher felt that the move towards independent learning was challenging for both teacher and pupils in a school where direct instruction was a more common teaching style. Another teacher in the same school said that pupils were achieving higher levels in certain curriculum areas where they were being encouraged to learn independently.

3.80 However, such a shift can be threatening to teachers generally, as is the realisation that many pupils are more skilled than themselves. The fear of 'losing control' of the learning situation is very real for some teachers in approaching teaching with the new technology, so that such changes need to be introduced carefully and sensitively, with support in the form of training and guidance as to best practice. As suggested in reports on other ICT projects, this may be a particular issue in secondary schools, where the relationship between teacher and pupil is usually more formal than often pertains in primary schools. In J1, for example, the model of peer-tutoring was taken a stage further in the project co-ordinators' class, so that

pupil and teacher learned together. The teacher went so far as to say that the relationship had moved from teacher/pupils, to friends.

3.81 One interesting development occurred in S1, where the IT teacher left the school at the end of the Autumn term. The four teachers who were responsible for developing ICT within their curriculum area took turns in standing in during the Spring term. Because none was an actual IT teacher, they taught the use of the technology within a curriculum context, so that the lessons became more like using IT in, for example, English than completing an English exercise in IT. It took pupils some time to adjust to this new approach, since they felt that as it was an IT session, they should be 'doing' IT for the whole time. However, teachers reported that after a while they became more enthusiastic and produced better work than with the more traditional style. As a result, the school was seriously considering not replacing the IT specialist.

Pupils with special educational needs and disaffected learners

3.82 There were few examples of ICT programmes or activities that were specifically targeted towards pupils with SEN. There were, however, numerous individual examples of changes as a result of using communications technology, such as the very quiet and withdrawn child from the junior school who became much more confident and began to make friends after e-mail exchanges with children from other schools. Video conferencing was also a powerful tool for increasing the confidence and communicative skills of less able children.

3.83 As in other projects, there was a very noticeable 'levelling' effect, so that these motivational effects and gains in confidence applied equally to pupils of all ages, abilities and backgrounds. Where there were differences, these were largely related to the task, or the accessibility of the material, rather than the technology. As a result, pupils were able to demonstrate mastery of ICT that was on a par with their more able peers, considerably raising their self-esteem and reducing isolation.

3.84 The role of ICT in special needs provision was being actively explored at S1, where some 18–20% of children were on the SEN register. One initiative, which grew out of existing liaison work between the school and its feeder primaries, was to establish a mentoring scheme, so that the primary-school children would each be partnered with a pupil in Y8. The potential for extending the e-mail and video-conference links between themselves and J1 was regarded as an obvious way of enhancing this process. The school was also considering the use of Integrated Learning Systems (ILS) software, although that was, at this stage, largely exploratory, examining what was offered by different packages.

3.85 Towards the end of the evaluation, S2 began a project whereby certain pupils with special educational needs or severe learning difficulties were provided with a multimedia PC with Internet access. One girl reported that she had made considerable use of the facility for homework tasks, exploring materials on the WWW and on CD-ROMs. While this was a very recent initiative, the initial signs were that it was already producing gains for the pupils involved.

Development of information-handling skills and other new skills

3.86 Pupils in all of the schools became extremely expert in using a variety of applications. One of the best examples of this is the children at the junior school who were completely confident in taking or returning a video 'call' without the need for teacher intervention. The skills required to successfully 'conference' are numerous, and go well beyond technical mastery of the system. These include turn-taking, clear diction, taking account of the delay, speaking to the camera rather than the screen, and so on. Generally, pupils developed expertise rapidly, and often quite independently of specific instruction, although a representative from BBC Education had spent a day at the school during May 1996 filming the children and offering them support and guidance on presentation skills.

3.87 The least developed skill was that of effective and intelligent searching of the WWW. Pupils tended to choose a search engine at random, and often had a favourite that they used most of the time. In many cases, there was little instruction about the differences between engines, or techniques, such as the use of Boolean operators (and/or/not), to refine searches. Where teachers did introduce such factors, often tied to a specific search task, such as finding information on a particular topic, searches became much less random and more effective.

Access and equity issues

3.88 In both of the secondary schools, IT in general had a high profile. At S1, access to the Internet and e-mail was, initially, severely restricted by the single dial-up connection. The sole machine was located in the Learning Resource Centre, which meant a strict booking system was in operation. The advent of more access points with the arrival of the ISDN2 lines greatly increased access for pupils, particularly in English.

3.89 S2 were more fortunate, having network access to the Internet, so that from the beginning pupils had regular timetabled access to the machines, as well as free access during breaks and lunch-times. The network manager had to institute a booking system to schedule pupils wishing to use the PCs in the central facility in 'free time'. Experimentation with the technological facilities was an evident learning activity and seen as positive by the staff. There was interchange between the pupils to give advice or help regarding the usage of different system functions.

3.90 At J1, the children displayed voracious energy in their use of IT. They readily corrected/taught each other about how to use the system. Children had free access to e-mail from 8.00 a.m. after designated 'experts' had opened the e-mail. Video conferencing was also allowed, under supervision. Access to IT generally was also free at lunch-time. When a video call occurred during the lunch-hour, a regular occurrence with the secondary school, Y6 children confidently 'took' the call, whilst younger children would watch.

Gender issues

3.91 Research (Bradshaw, J (1992) An investigation into gender bias in educational software used in English Primary schools. Paper given at *Gender and Science and Technology (GASAT) Conference*, Eindhoven) has demonstrated that, while the gender gap in computer skill increases with age, it is still evident in even very young children. In the junior school in this project, however, there was no discernible difference in the attitudes or ability of the boys and girls. The encouragement of sharing, co-operation and skill sharing, and the introduction of peer-tutoring arrangements, were important factors here.

3.92 As two of the schools were girls-only, gender difference was not generally an issue, although the girls displayed a high level of expertise and worked with

confidence and skill. However, in both schools there was a mixed sixth form, and teachers reported that the boys were noticeably less confident and skilled than the girls, particularly in using the Internet, and there were numerous instances of girls tutoring the boys in basic skills. Girls were therefore gaining considerable IT and network skills, as well as confidence, in an area that has traditionally been regarded as a male domain. This has clear implications for higher education and career development. Of note also was that the headteachers and project and IT co-ordinators at all three schools were women, as was the network manager at S2.

Services and applications

Data speed

3.93 Strictly speaking, S2 was the only school to which broadband communication was available, and this speed of data communication was used for remote CD-ROM access. However, for Internet use, the speed of the optical fibre cable was initially limited to 64 Kbps by a leased-line connection later in the chain. This gave S2 the same speed of Internet access as the ISDN2 connection in S1. After three terms, a true broadband connection was achieved in S2 with potential speeds of up to 2 Mbps. In practice, the speed of the Internet itself was the limiting factor, and one teacher pointed out the significant difference that this made to the work that pupils in afternoon groups could achieve, compared with those in morning classes. The difference experienced by S1 when their original dial-up access was replaced by ISDN2 was enormous, and demonstrated the need for at least this level of bandwidth if ICT is to really have an effect. Nevertheless, as a first and affordable step, S1 believed dial-up access to be a reasonable option, and managed to conduct a number of projects, and create Web sites, with basic facilities.

3.94 The two secondary schools used very different implementation procedures and were equally convinced of their effectiveness. The high-speed connection of S2 clearly allowed for a great deal more activity, in particular simultaneous multi-user access, and remote CD-ROM access, and the school argued that a suite of computers was essential for effective teaching with the Internet. At S1, whilst much was achieved with a single access point initially, there was a demand from both staff and pupils to expand facilities. This was planned as clusters of workstations, which meant that, if the system 'fell over' in one area, other facilities were still available.

User friendliness

3.95 In general, the pupils were very comfortable with the equipment and the software tools that were available for them to use, and this is evident in other sections of the report that discuss usage. Much the same can be said for individual members of teaching staff who used the facilities. Few complaints, other than those relating to speed, access or technical matters, were reported.

The aims and outcomes

3.96 The project was successful in meeting the primary aim, which was to explore the role of broad, intermediate and narrowband access to ICT. Despite early difficulties and delays, and, in two of the schools, narrowband access for the first half of the project, a great deal was learned and achieved though the variety of uses explored with each of the communications technologies. With the exception of Cable TV, all of the technologies made a significant contribution to the learning experience of the pupils, and to the professional development of the staff.

3.97 Despite small beginnings, S1 made a clear decision from very early on in the project to fully explore the potential of ICT, and to integrate it as much as possible into the curriculum. This is a very large school, and is to be commended for the enthusiasm and commitment shown even when there was a single machine with narrowband

access. From the initial focus on one curriculum area, the expertise developed spread both horizontally, across different curriculum areas, and vertically, across the whole age range. During the project, their existing collaborative links with J1 grew considerably, facilitated in large measure by e-mail and video-conferencing links. As the school expanded its facilities, pupils and teachers were, by and large, prepared and keen to develop ICT further. At the end of the evaluation, the school was looking forward with excitement to the prospect of networked access to the WWW across most of the school.

3.98 S2 had developed its use of the WWW, in parallel with extending existing links with European schools, using e-mail. Most of the early use was with the sixth form, but other years were using ICT much more regularly towards the end of the evaluation. Because few of the European partner schools had video-conferencing facilities, and because there was no other natural focus for video-conference exchanges, such as the cross-phase link with S1 and J1, this aspect of the project was only just beginning in the school.

3.99 J1 experienced a dramatic change during the project, from a school in which IT was relatively low priority, and with an under-experienced staff, to a point where e-mail and video conferencing, as well as IT generally, was very much a part an integral part of school life. The children who used it became expert users of ICT, and clearly gained much from its use both in terms of their school work and socially and personally.

3.100 A second aim, to develop relationships between educational and commercial partners, was partially achieved. The existing collaborative links between two of the schools were considerably strengthened as a result of the project, although the third school operated much more independently. At a managerial level, however, collaboration worked well. There was evidence of dissatisfaction on the part of the schools with the initial level of service and support that had involved an external appointment on a contract basis, but for its second year, KBLP was managed by Kent Education staff, which appears to have made a positive difference, and there is a clearer sense of partnership between the various participants. All of the various players are very keen to develop and extend the project.

3.101 A third aim, to develop links between school and home in order to extend the opportunities for learning and for staff development, was not achieved during the lifetime of the project, but remained very much on the agenda for future developments. However, S2 had moved towards providing senior management with laptops and modems, enabling them to link from home to the school, and in all three schools some staff had, at various times, had access to e-mail and the Web from home-based machines loaned by the school. Some pupils with special educational needs had also, at the very end of the evaluation, been provided with computers with Internet and e-mail access, although this was too late on to determine any outcomes of this initiative.

Costs and cost effectiveness

3.102 The £70K made available for the project included the salary costs for the Project Co-ordinator, who was appointed in a full-time capacity for the duration of the project. Direct financial support to the schools was in the region of £15K, with a further provision of £7.5K in Autumn 1996, although major infrastructure elements were provided by Telewest and RM. A further grant of £18K was obtained by the schools for the Kent International Initiatives Fund in Summer 1996 for a parallel European communications project. No further external funding was given directly to the schools for the project, although 20 person-days from KCSA and EIS, above that funded by the project, were made available in the way of advice and technical help. BBC Education also made available the equivalent of 27 days of their

Education Officers' time for the project for curriculum and staff development over an 18-month period. Schools therefore had to finance the majority of the initial programme, as well as all subsequent developments, from their own budgets, and through attracting sponsorship and/or 'gifts' from commercial providers and manufacturers. Additional sources of funding included moneys tied to specific areas, for example the Kent International Initiative funded programmes relating to modern languages, and, in the case of one secondary school, matched government funding as a result of achieving Technology College status.

3.103 From a cost-effectiveness point of view, the fact that two of the schools, one secondary and the primary, had only dial-up facilities at the beginning of the project allowed them to experience 'starting small', with a single workstation and dial-up modem. While this arose by accident rather than design, the schools were very clear that this represented a feasible way for schools to get on-line at relatively little cost. However, where this may be a strategy for start-up initiatives, it cannot be considered a feasible solution to the problems of integrating ICT across a school or group of schools. Following initial successes, both schools were committed to seek funds to expand and upgrade their facilities, considerably so in the case of the secondary school.

3.104 The example of J1 in particular shows also how institutionalised low expectations of primary schools and IT, such as 'primary schools don't have networks', can be overcome. The school is small and funding for technological capability could not be taken for granted. Their financial approach had to be one of extreme prudence, with IT competing strongly with other school needs. Nevertheless, the schools were also clear that they wished to extend and expand facilities if and when resources allowed. Conviction about the benefits of ICT as a result of KBLP had made IT a spending priority in all three schools, and all three were investing considerable sums in further development of their facilities.

3.105 By comparison, S2 was well resourced. As well as enhancing teaching and learning, a high ICT profile also played a part in the school's improving image, since they were in competition with another selective girls' school in the area, a factor that needs to be considered in attempting to evaluate cost-effectiveness. Technology was very apparent, and, in general, funding was made available to achieve the school's objectives. For example, the school was able to fund a full-time and increasingly knowledgeable network manager, which greatly facilitated the smooth day-to-day operation of the project. S1 moved towards this model in the Spring term of 1997, although the impact of this appointment was difficult to judge in such a short time.

3.106 In schools with a larger budget such appointments are possible, but smaller secondary schools and most primaries are not in this position. J1 had to combine this role with the normal teaching duties of the co-ordinator, which naturally placed much greater demands on staff, along with the financial constraints of being a smaller school.

3.107 A major concern in the schools was the cost of further staff training. A single day's INSET course cost £100 per teacher, plus cover, typically a further £100. In the case of J1, for example, this had used almost all of the initial project funding.

Conclusion

3.108 The KBLP represents a very successful project that illustrates three different and yet realistic approaches to the educational use of ICT, each of which fulfilled the main aims of the project. While the more technologically advanced school made significant progress in incorporating the technology into the curriculum, the successes of the other two schools were equally noteworthy, despite the minimal

facilities that they were obliged to begin with. The progress made in the relatively small junior school is particularly positive. The approach taken by EIS was to allow the schools to explore the technology and work out their own needs. Although schools were not made sufficiently aware of this philosophy at the outset, it eventually proved to be a valid strategy, so that, after some initial phases of uncertainty, clear institutionally relevant plans emerged. Finally, having evaluated their own progress, the schools had begun the process of disseminating their expertise to other schools in the LEA.