


Education Departments' Superhighways Initiative

Group S: Curriculum Projects in Scotland

Final Report

Scottish Council for Research in Education

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THE EVALUATION

1. This report describes the findings of an evaluation carried out by the Scottish Council for Research in Education (SCRE) of two Scottish projects included in the four UK Education Departments' Superhighways Initiative (EDSI). The two projects were *Modern communications for teaching and learning in Argyll and Bute* and *Superhighways Teams Across Rural Schools (STARS)*. The evaluation was managed by the Scottish Council for Educational Technology (SCET) for the Scottish Office Education and Industry Department (SOEID), and ran from January 1996 to March 1997.

2. We wish to acknowledge the help and co-operation of a number of people: in particular, the project co-ordinators and all the teachers in Argyll and Bute and in the STARS project who spent a considerable amount of time answering our questions and explaining their uses of electronic communications. We would also like to thank our advisory committee for sharing their expertise and ideas with us.

3. We are grateful to Bob Munro of Strathclyde University, consultant to the project, who provided technical expertise and also undertook some of the fieldwork. We also thank our secretary, Kay Young, for her support and expertise.

2. SUPERHIGHWAYS TEAMS ACROSS RURAL SCHOOLS (STARS)

Description of project

2.1 This project was designed to create a network based on existing electronic communications equipment in small rural primary schools in the north of Scotland, with the aim of enhancing provision for able pupils. The project co-ordinators, based at Northern College in Aberdeen and Dundee, developed a set of tasks which aimed to promote critical and creative thinking and problem-solving skills. Some of these were designed as stand-alone tasks, and others to encourage children from participating schools to collaborate with each other in finding solutions and agreeing on the presentation of responses. The principal form of electronic communication technology used was a FirstClass™ computer network. Towards the end of the project, some schools were also involved in work which introduced the World Wide Web (WWW).

2.2 The project ran from January to December 1996 (although there were still some 'finishing off' activities taking place in January 1997).

Sponsors

2.3 The project was supported by a consortium made up of Northern College and the various Education Authorities involved in the project. The Authorities contributed £1,250 to the project collectively, and Northern College 0.1 FTE for each of the three members of staff involved. Support of other members of staff in the College, particularly technicians, programmers, research assistants and lecturers, could also be drawn on, on an ad-hoc basis.

2.4 Video production has been supported by a commercial video company, AVC, which provided £3,000 for video preparation. In addition, the College allocated between £8,000 and £10,000 to this project for studio production, on the basis that the team will learn from the STARS work and may be able to develop commercial applications.

Size and type of institution

2.5 The project was co-ordinated by the Centre for Online Education and Communication (COEC) at Northern College, and involved three co-ordinators from different college departments: COEC itself, primary education and educational psychology. An advisory group made up of members of the College, representatives of education authorities in the north of Scotland, AVC and Grampian Enterprise helped to select schools to participate in the project and to support developments over the year.

Hardware and software

2.6 All schools had to have regular access to either an Apple Macintosh 475 or an IBM 486 (or better) and a 14.4 Kbps modem (or better). FirstClass™ software was supplied by Northern College which already had a well established FirstClass™ conference site.

External connectivity

2.7 Most schools used the conference site purely to contact other schools engaged in the project. However, it was possible to make contact with other users of the Northern College Intranet, and for other users to make contact with the schools. World Wide Web access was offered towards the end of the project but for a variety of reasons, few were able to take up the offer.

Participants in the evaluation

2.8 Initially, 18 primary schools were identified as participants by education authorities across the north of Scotland. One school was unable to participate as it proved impossible to connect it to the Northern College conference in time. Two schools were withdrawn by their education authority at the end of Phase 1. In the second phase, one new authority joined the project, involving one new primary school. Two secondary schools also took part. Thus, 17 primary schools were actively involved in Phase 1 and 16 in Phase 2.

2.9 All of the primary schools had to be 'small', i.e. to have four teachers or less. This criterion did not apply to the two secondary schools. The smallest primaries were one-teacher schools with a total pupil population of under 20. All the schools also had to be rural, and a number were in particularly remote parts of the country.

2.10 Within schools, teachers had to identify the able pupils who were to benefit from involvement, and could then decide whether they wanted other pupils to participate as well. Most selected a group of pupils which included able pupils among others. Pupils were in the upper primary age range P4 to P7, i.e. from 8 to 12 years old, with most from P6 and P7. The numbers of pupils varied from two to nine per school.

Aims of the project

2.11 The overall aim of the project was:

- to demonstrate how learning for pupils and professional development for teachers and other professionals can be enhanced by the use of multimedia resources made available over existing and emerging communications networks. [STARS Information Sheet]

2.12 The co-ordinators suggested that specific areas for evaluation included:

- the extent to which appropriate learning benefits can be provided to meet the special needs of isolated able pupils
- the extent to which different communications technologies and IT can be integrated to deliver relevant and effective training and professional development opportunities
- the comparative performance of different service and carrier technologies.

2.13 Specific outcomes anticipated by the co-ordinators included:

- teams of pupils collaborating on line
- IT expertise being developed to enable this process
- creation of a problem-solving environment.

Outcomes

Establishing a networked environment

2.14 The project has been successful in linking a number of schools across the north of Scotland. The network is based on a FirstClass™ closed-conference system which allows pupils and teachers to communicate with each other using e-mail for one-to-one or one-to-many messages, conferencing for many-to-many communications and group collaborations, and 'on-line chat' for one-to-one or group communications in 'real time'. The system therefore supports synchronous communication with on-line chat and asynchronous communication with e-mail and conference mail. Asynchronous communication has proved to be more popular. Plans to include video conferencing had to be abandoned because of the diversity of equipment in use in the schools and uneven levels of technical skill among teachers. Some participating schools made use of the Internet. Some already had access, while others had it provided by the project co-ordinators.

Supporting and challenging able pupils in remote rural schools

Defining and identifying able children

2.15 The project co-ordinators encouraged teachers to think about the range of ways in which high ability might manifest itself and about the particular needs of able children. Both the able pupils and others involved in the project benefited from the stimulation of working with able peers.

Creating a problem-solving environment

2.16 Most teachers agreed that the project had been particularly effective in creating a problem-solving environment within their schools. It was generally held that the project had shown teachers and pupils how problem-solving and critical thinking skills could be applied to a wide range of tasks. Teachers felt that the explicit focus on these approaches had been stimulating for pupils, and in a number of cases it was reported that pupils' learning behaviour had changed. While teachers were unsure whether they would be able to sustain this kind of work unaided, most agreed that they would be keen to participate in further projects of this nature.

On-line collaboration in teams

2.17 Although all schools had access to the conference at local telephone rates, a number of teachers perceived this as being too expensive for extensive 'real time' on-line work. For small schools, the telephone bill may already represent a substantial proportion of the unallocated budget and large increases cannot be absorbed. A number of schools had only one telephone line and had to detach the telephone in order to be able to link to the computer network. Clearly, it was not feasible for them to do this for long periods of time.

2.18 Schools devised ingenious methods of communicating which did not involve extensive time on line. By the end of the project, the preferred method of communicating was to send e-mail messages or conference communications which could be downloaded when convenient, with replies devised at the pupils' own pace and then uploaded and sent. In many cases, pupils sent attachments with their messages, and in the process learnt how to use Rich Text Format (RTF), as the word-processing software used by schools participating in the project was not compatible in all cases. Although the process was somewhat cumbersome, this method of working seemed to fit in best with diverse timetables and restricted access to computers and telephone lines.

Relevant and effective training and effective professional development

2.19 Teachers agreed that they had benefited professionally from the project by developing technical skills in relation to electronic communications and in thinking through how the technology might be used in future work. Time to devote specifically to training was limited. Teachers felt that pupils should be given priority, particularly where time on the computer and on-line access was limited for reasons of cost and competing needs, as outlined above. A training session at Northern College in the later stages of the project was widely appreciated and further opportunities of this type would have been welcomed. Nevertheless, many teachers noted that the 'hands-on' approach which they and their pupils had had to adopt had been an effective training strategy.

2.20 In addition, teachers' awareness of teaching strategies to draw on in working with able pupils, such as problem solving and creative and critical thinking, increased. More generally, the project encouraged teachers to question their assumptions about the meaning of able and to recognise that work which makes considerable demands on pupils can challenge not only the very able but can be used with others too.

Development of IT competences among staff

2.21 Teachers' initial IT competence varied considerably. Some had extensive experience and had been involved in other collaborative projects before, while others had no experience of electronic communications. This latter group benefited considerably from the project. By the end, all were competent in using e-mail and had developed their ideas about how electronic communications might be used to enhance the curriculum. Teachers who had access to World Wide Web sites had also developed their own skills and those of their pupils in accessing and using information from this source.

Performance of different service and carrier technologies

2.22 FirstClass™ has, on the whole, proved to be a reliable communication medium for the purposes of the project, in spite of a crash in the early stages of the project and some difficulty in working off line with the version of FirstClass™ in use during the project. Apple Remote Access software was used to provide access to the Internet via Northern College, but the co-ordinators commented that they would not use this route again.

Evaluation

Project initiation

2.23 The project originated with a small group of lecturers from Northern College. Their intention was to combine their interests in the uses of communications technology, making provision for isolated able pupils in rural schools, and developing materials which would stimulate pupils' critical-thinking skills in a single initiative. This would involve pupils of upper primary age in rural schools across the north of Scotland working together collaboratively on a series of tasks devised by the project co-ordinators and circulated to schools via Northern College's FirstClass™ closed-conference system.

2.24 The project co-ordinators contacted advisers from education authorities in the north of Scotland. At the time, these included Grampian, Highland, Orkney, Shetland, Tayside and the Western Isles. Apart from Tayside, all of these authorities were formally linked to Northern College through the Northern Authorities' Group which

was represented on the College's Rural Education Centre. The advisers identified 18 small rural schools which would benefit from participating in the project.

2.25 Each school was asked to identify the pupils who would be involved in the project. The co-ordinators made it clear that teachers should use their own judgement in identifying able pupils. There was no all-encompassing definition which could be applied, although extracts from a recent HMI report (*The Education of Able Pupils P6-S2*, SOED, 1993), which discussed the range of characteristics likely to indicate high level ability, were circulated to teachers. In addition, teachers could select other pupils who would work with the able child on the tasks. In some cases, this group constituted all the upper primary age pupils in the school, particularly in very small schools, where this might mean only four or five pupils; in others the group was selected on either social or ability grounds. Once the selection of pupils was complete, the co-ordinators circulated the first tasks.

Training for teachers

Technical training

2.26 The project presupposed that teachers would be competent in basic technological skills, as there was no scope to train teachers. The fact that participating schools were expected to have a minimum level of equipment implied a certain level of prior experience. In practice, teachers' skills varied considerably. A number had a well-developed interest in IT, but others were less confident. While basic training was the responsibility of the authority concerned, and such provision varied from one authority to another, the project co-ordinators and technical staff at Northern College were also able to provide support over the telephone or via the conference site. It is undoubtedly due to the high level of support from the College that teachers who experienced a number of technical difficulties at the beginning of the project did not withdraw their schools in the early stages of the initiative.

2.27 The co-ordinators considered introducing other forms of electronic communication, including video conferencing and tasks which would require pupils to make use of the Internet, into the project in Phase 2, September-December 1996. However, a number of problems, including the fact that teachers' existing skills were so uneven, and the varying level of support from authorities, meant that this aim had to be scaled down. A small group of schools worked on an Internet-based task, which included an element of training for both staff and pupils. It was not possible to introduce video conferencing primarily for technical reasons, such as lack of access to ISDN lines, but also because a substantial number of teachers did not feel confident enough with the basic technology to begin to use more complex tools.

Educational training

2.28 One of the key aims of the project was that it should explore the nature of support teachers needed to sustain collaborative work with other schools, and that the development of teachers' expertise in the course of the project should be a priority. Stimulus material was posted on the teachers' conference site. This material was designed to encourage teachers to discuss, for example, the identification of able children. In addition, a meeting of all of those involved in the project was held between Phases 1 and 2 to review progress and determine future work. This meeting is described in more detail in later paragraphs (see paragraphs 2.48–2.50).

Training for Pupils

Technical training

2.29 Teachers were responsible for ensuring that the pupils involved in the project had the basic skills needed to participate in the project. These consisted of:

- gaining access to the STARS conference
- checking for and downloading new messages
- preparing and uploading work to be sent to other participants
- responding to new messages by e-mail, including sending attachments where appropriate
- contacting other schools or responding to others using the on-line chat facility, conferences and e-mail
- gaining access to the World Wide Web in some cases.

2.30 Some teachers adopted a cascade model, whereby pupils who had been involved from the outset trained those who joined the project later on.

2.31 Though some pupils experienced difficulties at the beginning of the project, these were resolved relatively easily either by teachers or by the project co-ordinators. Teachers reported that pupils learnt to use the technology quite quickly, although some problems were experienced with downloading and uploading, and users had to learn to use RTF for attachments. Most teachers agreed that pupils had become considerably more skilled in the use of the technology as a result of the project.

Educational training

2.32 Most schools reported that both teachers and pupils had become more aware of the possibilities of electronic communications to enhance learning. For the schools concerned, the World Wide Web task had opened up possibilities for pupil access to information and had helped them to develop the skills to make use of it.

2.33 As a result of the project, pupils became more conscious of problem solving and creative and critical thinking approaches. There is some evidence to suggest that they were beginning to apply what they had learnt from the STARS project to other aspects of their work in school.

Management strategies

External

2.34 The project was co-ordinated by the three members of staff from Northern College who originally developed it. The progress of the initiative was supported by an advisory group which included senior managers from Northern College, representatives of participating education authorities in the north of Scotland, AVC and Grampian Enterprise.

2.35 The principal means of contact between the project co-ordinators and teachers has been via the conference site, which included a section headed ‘STARS Staffroom’, where teachers could contact each other or the co-ordinators. Use of this facility varied. Some teachers made regular use while others only very occasionally. The co-ordinators could also be contacted by phone or by fax, and some teachers preferred this route.

2.36 The co-ordinators were initially asked not to involve teachers very closely in project planning or in materials development, and this appears to have affected teachers’

overall commitment to the project. The face-to-face meeting between teachers at the beginning of Phase 2, in September, was called to re-establish contact and to determine the directions in which the project might develop in the Autumn term. This enhanced links between teachers and co-ordinators and among teachers. Most teachers at the meeting opted for a 'consolidation' period, retaining the same type of task, using only the conference site as a means of communication.

Internal

2.37 Teachers have adopted a range of strategies for managing the work. In one-teacher schools, it is common practice for the teacher to set work for small groups of pupils to tackle independently, while the teacher works with others. In some of these schools, the pupils involved in the STARS project often worked independently of the teacher and involved the teacher only when problems occurred. In other cases, the teacher implemented a range of strategies in order to be able to devote 'quality time' to the project, while ensuring that other pupils were occupied.

2.38 Some teachers were more proactive, monitoring the conference site so that they knew when new tasks had been posted or messages from other schools had arrived. Some assessed what resources would be needed to complete the tasks set and prepared these for the pupils in advance. It is important to achieve a balance somewhere between 'interference' on the one hand and 'neglect' on the other.

Obtaining and installing equipment

2.39 Schools already had a basic level of equipment. Northern College already had its own well-established FirstClass™ conference site, of which STARS was a part, and supplied the software to participating schools at the start of the project. They also supplied software to allow access to the World Wide Web for three schools. Authorities were asked to ensure that the equipment and software were working.

2.40 Several problems relating to the variety of provision emerged over the course of the project. Firstly, schools were using different types of software for word processing, graphics, etc., and some schools had difficulty in downloading attachments as a result. This meant, ultimately, that all schools had to adopt a 'lowest common denominator' standard which those with relatively sophisticated equipment and skills found frustrating. The co-ordinators acknowledged the problem, but also felt it was important to recognise that this will, inevitably, be a feature of a project which attempts to link schools over a wide geographical area and several authorities.

2.41 A number of schools experienced considerable difficulties in maintaining channels of communication because of lack of access either to telephone lines or to computers, or both. Several schools had only one telephone line, and, therefore, to communicate via the computer, had to unplug the telephone. Clearly, it was not feasible to do this for long periods of time, and there were also times of day, such as early morning, when the number of calls usually received meant it could not be done at all. Similar problems occurred when the computer used by the children was also the computer used for administrative and secretarial work. Some of the schools concerned had devolved school budgets and would therefore have to pay for additional telephone lines or computers themselves, and could not afford them. Others had to approach the authority in question for additional resources. In at least one case, a headteacher successfully negotiated a second phone line in return for participating in the project, but other heads were unconvinced that this was a possibility for them. Problems of this nature seriously affected the ability of some schools to continue to participate in the project, and it is a measure of the support

which schools received from the project co-ordinators that they decided to persevere in spite of their difficulties,

2.42 A third problem was uneven access to ISDN lines. This was a major factor in the decision not to go ahead with plans for video conferencing. Video material which the co-ordinators had hoped to use interactively, using WWW pages via the Internet, was eventually sent to schools on cassette by post.

Implementation at project and institutional levels

Creating cross-institutional relationships and support

2.43 The co-ordinators employed a number of strategies to encourage schools to develop a working relationship. Pupils participating in the project were asked to write descriptions of their schools and to post these on the conference site. Informal use of the on-line chat facility also enabled pupils to contact each other and exchange personal information, and many took advantage of this opportunity.

2.44 The co-ordinators set up collaborative partnerships in an inventive way. Pupils in individual schools were invited to apply for jobs on a space ship as scientists, navigators, communicators, counsellors, 'space anthropologists' or 'sparkies' (engineers), and were then grouped with pupils in other schools, depending on their choices. This approach provided a motive for collaboration and went some way to ensuring that pupils were linked with others with similar interests or abilities, and appears to have been successful.

2.45 Initially, pupils assumed that they would collaborate on line with each other. However, this was more difficult than had been predicted, for technical, administrative and resource-related reasons. As they became more experienced, children learned to send attachments to each other and deal with these at convenient times, as well as becoming more proficient in general computer-based skills.

2.46 Teachers were committed to making the project work and were concerned to find solutions to problems, hence the development of collaboration via e-mail and group conferencing, using attachments where necessary. They were impressed by the quality of the materials circulated to the school and the stimulus which this provided for their pupils. They praised the co-ordinators' positive responses to pupils' work and their encouragement to take things further. These were among the principal factors sustaining collaboration across schools.

2.47 Establishing links between teachers involved proved more problematic, initially because of the education authorities reluctance to impose demands on teachers. Technical difficulties also had a part to play. Although Northern College's FirstClass™ conference system was well established, the system crashed very shortly after the project started, and the delay contributed to teacher confusion about their role in the project. The initial stages, in which contacts were to be made, had to be telescoped as a result. Finally, in some cases, problems of access to the computer meant that some teachers felt that they should spend the minimum amount of time on line themselves and thus had little contact via this medium with their counterparts in other schools.

Further training and support

2.48 A meeting was held at Northern College between the co-ordinators and participating teachers at the beginning of Phase 2 of the project. Participants were asked to evaluate the work so far and to decide how they wanted to proceed in the second phase. They were also given demonstrations of the new technologies which could

be incorporated in the second phase, video conferencing and the World Wide Web. It was also intended that teachers and co-ordinators would get to know each other better as a result of the meeting.

2.49 Teachers found the session useful for 'putting faces to names', and sharing experiences and ideas. Several commented that this had changed the way they worked subsequently and made it easier to contact the others. It became clear that a number of teachers would prefer to consolidate the work they were already engaged in, rather than to introduce newer technology. Other teachers were interested in trying new approaches and it was decided that this group would become involved in work involving access to the World Wide Web.

2.50 This meeting was the only formal training session in the project, but the project co-ordinators and technicians from Northern College maintained support by e-mail and telephone and usually managed to resolve technical difficulties in this way. Throughout the project, teachers praised the level of support they received from the co-ordinators.

Maintaining equipment

2.51 Basic maintenance is not the responsibility of the project, but of participating authorities. Issues relating to maintenance have not been raised.

Implementation at classroom level

Raised standards

2.52 The project aimed to create a problem-solving environment and to develop pupils' critical thinking skills. Evidence suggests that it has been successful. Teachers have, on the whole, been extremely enthusiastic about the work and its effects on how pupils tackle other tasks.

2.53 Pupils were also conscious of changes in their approach to learning. The co-ordinators had made the aims of the work explicit to the pupils as well as to teachers and thus encouraged pupils not only to think about the tasks themselves but also to think specifically of how they were tackling them. There was a deliberate decision not to remove the 'jargon' of the work.

2.54 Although the project was designed specifically to support isolated able pupils, and the work was therefore 'difficult', teachers had different views on the composition of the group of children who would work on the tasks. Pupils who had been included in the group for social reasons had also benefited significantly and in unexpected ways from the project.

2.55 For example, one of the principal benefits of the work for one- or two-teacher schools is that children have the opportunity to interact with and learn from other adults. Without this kind of stimulus, they become very accustomed to one or two people's ways of working and can find it difficult to adapt when they go to secondary school. Teachers also become accustomed to seeing their pupils in a particular light. In some cases, seeing them respond to different types of task set by others made teachers realise that their pupils had unexpected or untested talents.

Increased motivation

2.56 Pupil motivation was high, and for some teachers, was one of the main reasons they persevered with the project. Working with different people was a stimulus, particularly as the co-ordinators responded quickly to queries and solutions,

praising the children's work and encouraging them to take things one step further. Such support is particularly valuable for pupils in isolated rural schools.

Productivity gains

2.57 The project has extended the curriculum in ways which individual schools might have found difficult or impossible to do on their own. Thus, its value lies not in enabling children to do the same work as before more quickly or more efficiently but in increasing the range of activities and the scope for learning. Among a number of examples of resources developed in the course of the project which helped in achieving this was a set of 240 questions compiled by pupils across the project schools which might be asked of beings from another planet. These are of anthropological derivation. As the co-ordinators point out, it is unlikely that pupils in any one small school would have been able to develop this resource on their own.

Changed teaching styles

2.58 Some teachers became aware of unrecognised abilities in the pupils they taught, and undoubtedly this has had an effect on how those teachers subsequently worked with those pupils.

2.59 Most of the teachers have become more aware of the potential of a critical thinking/problem-solving approach to teaching. None of the teachers with whom the evaluators had contact had previously considered teaching this approach in the overt way in which it was introduced in the project, but many have become enthusiastic and wanted to continue to develop this type of work with at least some of their pupils.

2.60 Many of the teachers involved hoped that they could continue to use electronic communications, and some planned to maintain contact with other schools. Teachers in very small schools were particularly convinced of the value of enabling their pupils to work collaboratively with others because of the difficulty of finding suitable peers within the school. However, it was widely recognised that without the structure and the purpose for communication which the project had provided, it could be difficult to maintain links on a casual basis.

Enfranchisement of previously disaffected learners

2.61 Some teachers selected children who were not only able but also capable of working well with each other and independently of the teacher. In these schools, disaffected pupils were not therefore likely to be included in the group. Other teachers used different criteria, including one who had specifically selected children who were not reaching their potential. In these cases, there were mixed results. Some pupils surprised teachers by their enthusiasm, others quickly professed to being bored with the work.

2.62 The size and composition of the group may affect individual pupils' experience. In one school where three pupils of the same age were selected and worked independently on the tasks, the pupils were knowledgeable and enthusiastic. Where the groups were larger, with eight or more pupils, and of mixed ages, it seemed more likely that some would feel excluded or be less engaged with the work.

Learners with special educational needs

2.63 A principal project aim has been to support the special needs of isolated able pupils. Among the more problematic qualities of some able pupils are:

- exceptionally low level of social skill
- attention-seeking behaviour
- apparent boredom with regular classwork (SOED, 1993 – see paragraph 2.25).

2.64 What teachers have primarily found difficult with these pupils is providing enough work at a high enough level to keep them motivated, thus avoiding the onset of either boredom or attention-seeking behaviour. In this respect, the project was regarded as highly successful by teachers.

Development of information-handling skills

2.65 The tasks required pupils to draw on a wide range of sources of information in order to complete them. These were rarely electronic sources as most schools did not have access to the Internet. The tasks required them to:

- recognise that they needed additional information about a particular issue
- identify possible sources of the information
- frame the question to which they needed answers
- find the answers
- apply the information to the task.

2.66 Having done their own research, pupils needed to present the information to others and to discuss it with them, and ultimately to agree a joint presentation of the result. The co-ordinators kept a close eye on progress at this stage and were able to guide pupils.

Fundamental new skills

2.67 The principal skills developed by pupils in the course of the project have been:

- problem-solving
- critical-thinking
- collaborating (within and across schools)
- communication and presentation skills.

2.68 None of these, apart from collaboration across schools, can be regarded as fundamentally new skills required for learning via electronic networks. Rather, the project made use of electronic communications to enhance skills which are appropriate in many contexts.

Use and relevance of information to the 5-14 initiative

2.69 All the tasks developed by the project co-ordinators were tied into maths, technology or language strands of the *5-14* curriculum, and planning materials made available to teachers showed where the work could be fitted in. However, it was relatively difficult for teachers to integrate the work into their own curriculum planning. In the first phase of the project, teachers commented that they had not had enough time before the project began to be able to do this. In the second phase, it became clear that even with advance warning, other constraints on their planning made it difficult to integrate the work.

Access and equity issues

Benefits and disadvantages for small schools in rural areas

2.70 All of the primary schools in the project were small, with four teachers or fewer, and all located in rural areas, precisely because the co-ordinators were aware that such schools faced particular difficulties in supporting able pupils, and, more generally, as a result of their isolation.

2.71 The principal benefits for small rural schools include:

- an external stimulus for pupils who may have worked with the same teacher for a number of years
- the opportunity for children to work with others of the same age and ability from other schools, particularly where a child is the only one of a particular age or of high ability in the school
- the opportunity for teachers working in relative isolation to come into contact with others in a similar situation.

2.72 Small rural schools are at a disadvantage, in participating in projects involving electronic communications because:

- Small budgets, whether devolved or centrally administered, often mean that their equipment is barely adequate, and apparently inexpensive additions, such as a second telephone line, or indeed telephone bills, are unaffordable.
- Access to the infrastructure, particularly to the possibilities of broadband communications, is limited or non-existent.

Implications for learners with special educational needs

2.73 The project focused on able pupils. There is less evidence of benefits for pupils with other types of special need, although a number of teachers commented that pupils for whom they had expected the work would be too difficult in fact rose to the challenge.

Gender issues

2.74 Gender was not raised as an issue by teachers. An audit of pupil names on messages sent to the conference shows 35 girls and 32 boys participating, though there were a number of other un-named participants, and it also seems that able pupils were as likely to be girls as boys. When making video material involving some of the schools, the co-ordinators took care to ensure that boys and girls were shown as equally involved.

2.75 Few schools appeared to have policies or practice promoting equal access to equipment, and most teachers recognised that some pupils made more use of the equipment and had thus become more competent than others by the end of the project, though differences in competence were not necessarily linked to gender.

Services and applications

Principal services and applications in use

2.76 The principal service used by the project has been the STARS FirstClass™ conference site. The versions used in the course of the project were 2.7 or 3.1.

Frequency and type of use of facilities

2.77 The conference site was used for two types of communication, firstly to send e-mail and conference messages and secondly for pupils to communicate with each other on line, using the chat facility. We have no quantitative data on the extent of on-line chat use, but it appears to have declined over time for the reasons discussed previously (see paragraphs 2.43–2.47).

2.78 E-mail and conference messages were used extensively. Analysis of the conference site, which shows communications between schools and the co-ordinators, but not communications between schools, shows that 952 messages were sent in the course of the project, originating almost equally from the project co-ordinators and the participating schools. Some schools made frequent use, with over 30 messages in the course of the project, while others did so very infrequently (under 5).

2.79 Most messages from schools were sent by pupils and were brief (1 – 2Kb in size). Messages of this length made up 83% of all traffic. They were usually brief requests for help, comments or answers to questions. Longer messages tended to reflect administrative activity, such as passing on details of the project to staff, or the setting up of a major task for pupils.

Usage times on and off-line

2.80 Most conference messages were sent between 9am and 5pm, with a greater number of messages sent in the afternoon than in the morning. Messages after 4pm were mainly from teachers and co-ordinators. On a number of occasions, the co-ordinators sent messages late at night, reflecting the fact that much of their work on this project was done in their own time.

Interoperability with other networks

2.81 Once the initial problems relating to the different software used by different schools was resolved, the conference worked well internally. In the context of the project, there was no need to communicate with others outwith the Northern College network, although some of the schools were making use of other communications networks for other purposes.

Data speed

2.82 Schools were restricted to narrow-band communications over conventional telephone lines. Modem speeds and methods of connection varied.

User friendliness

2.83 Teachers and pupils do not appear to have experienced particular difficulties in using FirstClass™. Opinions on its user friendliness varied. While most found it relatively easy to use, there was some frustration with the fact that it was difficult to work off line. Some teachers with experience of other e-mail providers found FirstClass™ somewhat cumbersome in comparison, but acknowledged that the pupils were not particularly concerned by this.

2.84 A more serious problem has been software incompatibility among schools and consequent problems in downloading attachments sent by other schools. Though this has been resolved for texts, it has not been possible to exchange graphics. Some teachers felt that a purely text-based medium for communication was limiting and would have liked to make use of video conferencing.

Costs

2.85 The aim of the STARS project was to make use of electronic communications technology already in existence in the schools that were selected to take part in the project. In this sense, there were therefore no substantial costs involved in setting up the project. Some schools succeeded in 'anticipating' some of the equipment they were due to be allocated in any case, on the strength of their involvement in the project, and one or two were able to use their invovlement to justify requests for additional expenditure, such as an extra telephone line. More notable, however, is the fact that these schools were in the minority. The majority do not appear to have gained, in terms of acquiring additional hardware or software, from taking part.

2.86 Schools were linked together using the existing FirstClass™ network at Northern College, simply by setting up a new conference site within the network. Costs per school, principally in supplying the appropriate software to be used, were small (under £5) and borne by the College.

2.87 The three project co-ordinators were allocated 0.1FTE of their College timetables to support the project. In reality, they spent considerably more time than this on developing materials and in making sure that they were available to deal with problems and to respond to pupils' messages. This latter element tended to be more intensive at certain points in the course of the project and less so at others. A number of teachers also spent a significant proportion of their time on the project. Some commented that, while they had enjoyed the work and had found it very stimulating, they could not have continued to devote such a substantial amount of time had the project continued. It was, therefore, a relatively expensive project in terms of person hours, although the precise cost in this respect is difficult to quantify.

2.88 The Education Authorities involved in the project contributed £1,250 collectively at the outset of the project. This money was used for a variety of expenses incurred in the course of the project, including the preparation of resources for the teachers' seminar and the subsidising of some activities undertaken by schools which the schools could not fund themselves. In addition, the Authorities supported teachers' attendance at the seminar, including the cost of cover, at approximately £120 per teacher, and travel expenses. Northern College provided hospitality for the meeting at a cost of approximately £500 for the day.

2.89 Some £12,000 was allocated jointly by AVC and Northern College for video development and production. This money was spent partly on the production of materials for the project and partly on a video about the project, for future use as a professional development tool.

2.90 The costs borne by schools were relatively small, though in their terms high. The difficulty some schools faced in acquiring necessary telephone lines has been discussed (see paragraph 2.41). Telephone charges were also a concern. Schools which were actively involved in the project estimated that their bills increased by 50% when pupils were engaged in project work, and a number of teachers commented that they would not have been able to sustain these costs had the project continued. In some schools, worries about increased telephone bills meant that teachers, and consequently pupils, were very conscious of the amount of time spent on line, and this may have affected progress.

Cost effectiveness

Teaching and learning

2.91 In spite of the financial difficulties experienced by some of the schools involved in the project, teachers were convinced of the gains which they and their pupils had made, particularly in relation to understanding and applying problem-solving and creative and critical thinking approaches. They also gained IT skills which would probably have developed more slowly if they had not been involved in the project.

Professional development

2.92 The project showed that professional development via electronic communications is feasible and may be a cost-effective approach in areas where it is difficult for teachers to meet at a central location. However, it is also clear that teachers required a degree of social interaction with each other and with the project co-ordinators, and it is therefore important to achieve a balance between distance learning and face-to-face contact.