


MICROSCOPE -

► Special

► Summer 1994

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NEWMAN COLLEGE with MAPE

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© Newman College/MAPE 1994
ISSN 0264-3847

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MAPE is grateful to Acorn Computers Ltd and Thomas Nelson and Sons Ltd for their generous sponsorship of this Multimedia Special.

MAPE (Micros And Primary Education) is open to individuals and institutions. The current subscription of £15.00 pa UK, £20.00 pa overseas, includes direct mailing of *MICRO-SCOPE*. Application forms from: Mrs G Jones, 'The Old Vicarage', Skegby Road, Normanton on Trent, Notts NG23 6RR

Published by Castlefield (Publishers) Ltd

Individual copies from: Castlefield (Publishers) Ltd, Castlefield House, 12 Headlands, Kettering, Northants NN15 7HP

MAPE reference for Income and Corporation Tax relief on membership fee: T1644/23/1968/MT
Charity Commission reference: OSP-292898-R Reg No 292898

VAT Number: 544 8661 18

Produced by The Castlefield Press, Kettering, Northants

MICRO-SCOPE

Multimedia Special

Introduction

Chris Robson
Editor, MICRO-SCOPE

In the years since computers came into our lives, there has, alas, been no reduction in the amount of jargon which they generate. One of the latest words to confuse us is **multimedia**. The *Concise Oxford Dictionary* defines *multi* as meaning 'many' and *media* as 'intervening substances through which impressions are conveyed to the senses'.

Some years ago, I was involved with the MEP Primary Project in the production of what we then termed 'multimedia packs' of materials for in-service training. These comprised booklets, software discs, overhead transparencies, slides, audio and video tapes. In order to make full use of these 'intervening substances' you needed: a computer, disc drive and monitor, a tape recorder, video recorder, slide projector, overhead projector and screen – and a hired van to transport them all.

However, the development of more sophisticated machines with audio and video capability has now given us the power to store all these different media in one form, such as the compact disc, and to access them using only one machine, the micro-computer; consequently the meaning of the word *multimedia* is evolving all the time, and is currently used to include systems such as interactive video, Compact Disc Interactive and the best known, CD-ROM. Text, sound, still pictures and video from a variety of sources can be combined, manipulated and controlled using one of the many authoring packages now available, with a versatility which has much to offer teachers and pupils.

As has so often been the case, education has viewed these developments with enthusiasm tempered with caution, refusing to be beguiled by the technology and wanting evidence that there are genuine educational benefits to be gained. DfE initiatives in 1991 and 1992 allowed many secondary schools in England to evaluate CD-ROM and a

few suitable discs began to appear. Regular visitors to the annual BETT exhibition noticed the rapid increase in the number of stands displaying CD-ROM materials and although discs suitable for primary schools were still few and far between, their possibilities became apparent with the appearance of RM's *Anglo-Saxons* and CSH's *Frontier 2000*. It was after BETT '93 that the idea of a Multimedia Special was born. Colleagues in MAPE, in LEAs, in higher education and at NCET, together with various hardware and software producers, were enthusiastic about the project; all offered much advice, suggested articles and useful contacts and so I began to collect the material which follows.

There are case studies and articles from MAPE members in Surrey, South Glamorgan, Portsmouth, Northamptonshire, Berkshire, Hampshire and Norfolk, representing Acorn, Research Machines and Apple platforms, and showing how well the flexibility of multimedia applications fits into the primary curriculum. MAPE also has many members in higher education, represented in articles by Jackie Disney, Mike Wald and Jon Coupland.

There are two articles from the publishers' perspective: Brian Richardson's article on *The Making of Frontier 2000* first appeared in *MICRO-SCOPE 40*; his vivid account of the trials and tribulations involved in developing a major package attracted a lot of interest and gives some indication of the commitment needed to produce a worthwhile educational program. However, it is not just software publishers who are producing CD-ROM materials; CD-ROM is an ideal medium to handle the vast quantities of information in books, encyclopaedia and newspapers, while its interactive, multimedia nature adds an exciting new dimension to the printed word. In his article

about CD-ROM and the teaching of reading, Professor Ted Wragg reflects on the impact that both this and future technological developments are likely to have; the new reading scheme, *The Flying Boot*, which Professor Wragg has been writing for Thomas Nelson, has had a series of CD-ROMs built in from the beginning. Tesco are again repeating their successful *Computers for Schools* scheme, which this year includes CD-ROM drives and CD-ROM titles from Thomas Nelson including *Max and the Machines*, the first of these discs.

MAPE colleagues, together with other members of the primary IT community, have been actively promoting the case for CD-ROM in primary schools and so we were pleased to see schools given the opportunity for a large-scale evaluation with the DfE's Primary CD-ROM Pilot Project, announced in February. NCET's André Wagstaff is managing the project and gives its background in his article.

And so I come finally to our opening article! Acorn, Apple and Research Machines have, as hardware manufacturers, provided us with the

sophisticated platforms which support multimedia, but more importantly, have invested heavily in the educational expertise necessary to ensure that the technology is serving educational objectives, and not vice versa. Roger Broadie, Acorn's Education Marketing Manager, echoes the thoughts of many of us in talking of the 'New Literacy' which future generations will need, and which Acorn, together with others, have been instrumental in promoting. Roger has been an enthusiastic supporter of MAPE for many years, and of this Special from its inception; we are most grateful to him for his efforts in securing sponsorship from Acorn and Thomas Nelson to help in its production.

I hope that this *Multimedia Special* will provide food for thought, ideas for teachers and contributions to the continuing development of multimedia in our primary schools. Copies are being sent to MAPE members and to all schools participating in the DfE project; I look forward to hearing from many of you in the next year or so.

The New Literacy

Roger Broadie

Education Marketing Manager, Acorn Computers Ltd

You may think that computer technology in education has arrived. In many ways it has, but believe me – much more is on the way. It will appear in all sorts of guises too, not just multimedia systems, but in computers like the Acorn Pocket Book, in spellcheckers and translators and in Photo CD. Soon we will see much more widespread communications technology in schools and homes, linking to TVs and even to the next generation of games consoles!

All this brings change, which can be considered frightening or an exciting opportunity, depending on how you view it. To me the real excitement now is how schools working with multimedia have found this provides powerful stimulation and support for children in developing their literacy and communication skills. As we have seen in the Horizon project, creating multimedia texts and presentations can raise children's confidence, bring coherence and a sense of audience, can lead them to economy of words and improved style and help them in many other ways to produce expressive work of a higher quality.

Those teachers I have met who are using multimedia feel that the educational benefits more than compensate for having to learn to manage a few new bits of technology in the classroom.

Many commentators on education have called recently for schools to help children develop an enhanced literacy. Our children will live in an IT-rich world and must be able to communicate effectively through the use of IT. While all the sound bases of literacy and numeracy must continue to be developed, there are some revolutionary changes in approach that will happen. A comment like 'there is a requirement for a new and broader definition of "text"' (*The future curriculum with IT* – NCET) points the way in one area. I am collecting statements like this that question the way we think – and pondering how changes will affect teaching.

The key issue is that the communication skills needed are now much wider. Information is received through the use of combined media and the opportunities and mechanisms for communicating your ideas to others are increased manyfold through IT. Think about TV, with its use of images, sound, graphics and text combined in rapidly moving ways; advertising with its visual messages;

multimedia as used in business to present to colleagues and customers. Think about the sources of information available – CD-ROM databases and encyclopaedias with images, video and sound as well as text. IT is changing much of the information that children receive already.

Multimedia is beginning to be widely used for business and promotional activities because it is effective. No business would allow its employees to spend time creating multimedia presentations purely for the fun of it – they do it because it is often the most effective way to communicate information and ideas. At Acorn we make a great deal of use of computers, multimedia presentations and e-mail. Once you get used to having these facilities always available it changes the way you do things. It makes greater demands on all staff to be competent communicators and presenters of information and ideas – but it makes it easier to get your ideas across.

Schools are the prime places where our children can both experience and use these new methods of communication. They need to be able to use them creatively to express themselves, not simply be receivers. Using all the new ways available to bring the power of their developing literacy to bear, they will begin to appreciate the particular benefits and ways of communicating that are possible through multimedia – and will be able to compare this with 'traditional' ways.

At Acorn we are using the phrase 'New Literacy' to refer to this whole area of enhanced literacy, using new technology to benefit learning. We would like the whole country to understand this need, to applaud schools for the great strides they have taken so far in this field of literacy through IT and to support them in developing further. There is much change yet ahead.

I have a vision for the future. I think it is vital that children can imagine themselves in powerful, creative roles. I believe computers have already helped here. I see children thinking to themselves:

'I can do that too! I can write a book.'

'I can use the word processor to help me to write my ideas down and to spell properly and to print my story. My book can look as good as anybody's.'

And how many children are now including pictures in their 'books' too? Perhaps now, with the growing availability of multimedia CD-ROM systems, children can use video and sound as well. I can see children watching TV and thinking:

'I can do that too! I can make TV programmes and commercials. I can be one of the important, creative people who make TV happen.'

If your school has only just got its first CD-

ROM system, then children using video clips in the multimedia presentation that they are creating may be a year or two away yet. But I wonder . . .

How will you react the first time a child in your class comes into school carrying a shiny Photo-CD disc or a video cassette, and says to you 'please can I put these pictures of Granny into my story'?

But I am sure it will be you who helped her believe she could do that in the first place!

Multimedia in primary schools

Mike Treadaway

General Adviser (IT), South Glamorgan

The early days

Oddly enough, it all started with NERIS. Back in 1992, a few intrepid explorers were introducing CD-ROM systems to the natives of secondary schools. NERIS, a system set up to provide a national database of educational resources, had been available for some time as an 'on line' service. This meant that to get information you had all the hassle of modem and telephone connections to overcome before you could get anywhere. CD-ROM seemed to be the ideal medium for NERIS since it could provide storage of previously unheard-of quantities of information on a 'desktop' computer system.

When NERIS became available on CD it was, like the few other CDs available at that time, marketed with secondary schools in mind. There was, however, just as much information on the disc of potential interest to primary schools. At this time we had just introduced PC286 computers (with a massive 1Mb of memory and 30 Mb hard discs!) to 14 pilot schools. Following negotiations with the Welsh Office, funds were made available to add a CD-ROM drive to each of these systems and to pay for a one-year subscription to NERIS.

Well, the reaction to NERIS was not entirely favourable. One teacher spent 20 minutes searching for information, only to find that the only relevant item described a worksheet, costing 5p, which he could get by sending a SAE to the Orkneys! Despite the thumbs-down to NERIS, the existence of these systems meant that we had a platform on which we could trial other CDs as they became available. Initial trials were with six discs:

Mixed-up Mother Goose
World Atlas
Grolier Encyclopaedia
World Book Information Finder
Mammals
North Polar Expedition

Whilst the reaction to these discs was generally favourable – apart from the *North Polar Expedition* and the level of language in most of *Grolier* – one particular event took us by surprise and gave further developments real impetus. In one of the trial sites, a large primary school with over 500 children, they were looking at three discs over the period of half a term. The system had been with the infant staff for two weeks to trial *Mother Goose* and was then going to the juniors to test the use of *Grolier*. Following this trial the infant staff went 'en masse' to the headteacher to demand that a CD drive be purchased for one of their computer systems. Demanding access to 'cutting edge' technology was not normally the reaction of large numbers of staff so it was interesting to explore their reasons for such a reaction. The main reason was language development – the disc had been such a stimulus for discussion, writing and visual communication that they felt £500 (thankfully much less now) spent on a CD drive was justified even for just the use of this one disc.

The reaction of these teachers, although surprising in its intensity of expression, confirmed in my mind the potential of CD-ROM systems in primary schools and provided the basis for the next stage of development. It also provided a useful response to those who looked at what we

were doing somewhat disparagingly with comments such as 'why trial CD in primary schools when there are no discs for them to use?'.

Real multimedia

Despite some difficulties – often technical, to do with nasty things like memory, device drivers and other ugly terms – the reaction of the pilot schools was sufficiently favourable for CD-ROM to be added as an option to the systems we were supporting through GEST funding. Word had begun to circulate locally and a number of schools decided to invest in this technology. Remember that, at this time, multimedia PCs were still a figment of the imagination – these were systems which derived any sound from the CD by connecting a pair of speakers directly to the CD drive.

A further pilot now took place – in a nursery school. Given the reaction to *Mother Goose* with infants it seemed a good idea to try it out with nursery-aged children. This proved to be possibly the most interesting of all. The school was based near the docks area of Cardiff and served a multi-ethnic community. The impact upon the children was almost immediate. One girl, who had only been at the school for two weeks and was having some difficulty integrating, would only speak to her teacher and to no other adult. Within a few days of using the *Mother Goose* disc she was so excited that she talked about it to anybody who walked in the door, and communication has not been a problem since. The disc was again felt to be an immensely useful stimulus to language development (despite the American accents). The reaction of the nursery staff after about three months was particularly interesting. Part of using *Mother Goose* can involve the option of looking at a map to help locate where you are. The ability of three-year-olds to hold a picture of the map in their heads and then describe and draw it later came as a surprise to all of us. This has now challenged the staff to think about what they do with the children and their expectations of what can be achieved.

Meanwhile, things were moving on in the primary sector across the LEA. In 1993, full multimedia systems became available. These were a vast improvement on the systems used previously since they had a CD drive, a sound card and a decent amount of memory and hard disc space all built into the main computer box – eliminating lots of wire, tangles and extension sockets in one fell swoop. The release of *Windows 3.1* with support for sound, animation and video meant that, at last, the IBM PC environment had a system capable of providing the sort of facilities that users of Apple

systems had been taking for granted!

From now onwards, I'll use the term MPC as shorthand for 'Multimedia PC'. This means an IBM-compatible computer (we generally use the RM S-Series) with 4Mb of memory, 170Mb or more of disc storage, a CD-ROM drive and a Sound Card all of which conform to the MPC specification.

Coupled with this was a significant growth in the number and range of CD titles with potential for educational use. The majority of the discs, though, were designed to run as 'DOS' discs rather than being designed to take advantage of the Windows environment.

Growth since 1992

Things were beginning now to develop nationally – but only for secondary schools, with a pilot study in England funded by DfE and organised by NCET. In Wales we had satellite systems in secondary schools. Without any specific initiative (other than GEST funding used to support the cost of systems generally, with MPC being one of the choices) the momentum for using these systems in our primary schools continued.

Early in 1993 another pilot began in seven schools to look at the potential of 'cheap' networks – using *Windows for Workgroups* on RM PCs in some schools and Apple Mac systems in others. One of the aims of this pilot was to investigate whether such networks could be used to share CD-ROMs between computers.

Across schools generally, there was now a great deal of evidence that many teachers were finding the multimedia systems easy to use and far more attractive than the IT systems they had previously used. Teachers who were using IT only because the National Curriculum and/or their headteacher said they must were transformed into 'enthusiasts' who wanted 'that system' in their classrooms as often as possible. Why such enthusiasm? Was it that they had suddenly all become 'techies'? No, the answers which came back when the question 'why use multimedia?' was asked, tended to focus around language development, spatial awareness, discussion, information skills, motivation and so on.

All of this came as a useful antidote to the concerns some of us were feeling about the effects of assessing IT (SATs and related drudgery). Whilst assessment seemed to be having some positive effects (in terms of teacher understanding about progression and what to look for) the negative influences seemed to me to outweigh the benefits. When teachers of Year 2 children express what they have done with IT more in terms of the IT that children have learned than in terms of the

gains in language, mathematics, concept development and so on then serious questions need to be asked. Hopefully, Sir Ron's approach will allow us to get our priorities right – depending upon how 'basic skills' is interpreted – but that's another story.

Recent developments

The availability of MPC systems in our primary schools has continued to grow, with approximately 70 per cent of schools now having one or more such systems with some up to five or more. Generally, once a school has acquired its first MPC it tends to want more and/or to upgrade earlier systems to MPC specification.

With the rapid growth of systems using *Windows 3.1* worldwide, the number of discs which run fully under Windows has grown dramatically. Recent releases such as *Encarta*, *Art Gallery* and *Dinosaurs* show how sophisticated this medium has now become. Discs which are fully 'MPC compatible' are much easier to install and are, in general, easier to use. It takes all of five minutes, for example, to show teachers and children how to use *Dinosaurs* or *Art Gallery*.

Particularly interesting is the move to develop material for the home market. The discs referred to above all have their opening screens emblazoned with the logo 'Microsoft Home'. I've already heard of conversations in Dixons along the lines of 'What do I need to run that?' from customers looking at *Art Gallery*. It looks as though the home PC market may, at last, be driven by something other than purely games. What relevance is this to schools? Well, apart from the obvious one of the home becoming a more 'IT-rich' environment than the school, it should mean that CD-ROM titles become available at lower cost – the home market is, after all, potentially ten to 100 times bigger than the schools market. Already we have seen the list price of *Encarta* drop from £250 to £99, with a 'street price' as low as £69. What we need to do is to develop exemplars and support materials for using these discs in schools and, where the home/commercial market does not see certain needs as a priority, to press for funding (government or otherwise) to enable specific 'educational' discs to be developed. Such an approach would give us the 'best of both worlds'.

Is all in the garden rosy?

Although there is much to celebrate in terms of the positive reaction of children and teachers to multimedia systems there are dangers and pitfalls to avoid. Management issues arise immediately.

Who gets the new multimedia machine? Our experience would indicate that you should avoid the tendency to place this system with the most technically capable teacher and/or assume that it is only suitable for use with older children. There is a good case for putting a multimedia system (properly set up) with the teachers who are most reluctant to use IT – even better if they teach infants.

The sound produced by some discs can be a problem – headphones are an answer but not for groupwork unless you attach some form of listening station. In one school the head told a child off for making a 'rude noise' when it was actually the sound of a hippo from the *Mammals* CD!

It is almost impossible to know about all of the information stored on a CD-ROM. Children exploring an encyclopaedia might come across information which raises awkward questions. Some teachers see this as a positive opportunity, others as a major drawback. Such issues need to be raised and approached realistically if the initial enthusiasm of some staff is not to be turned into trepidation.

Even more fundamental are issues about bias, validity and accuracy. When first using a CD-ROM encyclopaedia with children I was reminded of my early years of teaching in a junior/middle school in Norfolk. We were doing a historically-based project looking at the early 1900s and considering the effects of the depression – you can tell that this was well before the days of the National Curriculum! When two children asked 'What day did the General Strike actually begin?' I responded (truthfully) with 'I don't know – go to the library and find out.' They came back with three books, two of which gave one date and one a different date. After some discussion, a group of five was dispatched to find out more information and came back with 11 references – four gave one date, three another and the other four different again. What ensued was a marvellous discussion about the validity of information and historical evidence – all from the chance event (hands up those who remember Nuffield Junior Science).

I have often wondered what would have happened in that case had the classroom contained a MPC with a CD-ROM encyclopaedia. Would we have simply looked up the information and assumed it to be correct? Until we have sophisticated systems which look at a range of sources and draw our attention to conflicts, then it will be vital that children are taught to see IT systems as just one source of information and that, whenever possible, we encourage them to look at a range of sources themselves.

An encouraging conversation overheard recently in a Year 5 class was between three children looking for information related to their history work. They were debating which of three sources of

information would be the most useful – *Encarta*, *Grolier* or the school library. In the end they decided to investigate all three and compare notes. The school had made a point of teaching children ‘information skills’ following staff discussion of the outcomes of their first year of using CD-ROM information sources.

Why such a positive reaction?

Is it simply that multimedia is alluring because it has flashy pictures, sound, animation and video clips? Whilst all of this is true, there are also examples of discs which are less attractive but which teachers and children access regularly. What really matters is the access to useful information. In one of the network pilot schools the system has been extended beyond the initial four classrooms so that each classroom now has a 386 or 486 PC, linked together, with access to CD-ROMs shared permanently across the network. The reaction of staff when the system was extended was exemplified by the quote ‘We found using *File Manager* a bit fiddly but we didn’t mind because we wanted to get at the information on the CDs’, a good example of ‘Why?’ becoming ‘Why not?’

The future

Given the reaction in our schools in the last two years, I’ll be surprised if the wider introduction of multimedia systems through the DfE initiative doesn’t stimulate the growth of this medium nationally. The use of authoring – producing your own multimedia presentations – will also grow. Hampshire’s Horizon project is a good example of this. Our own work in this area using *MM-BOX* (much easier than other Windows packages) is receiving a positive reaction in schools.

Developments for the home market will continue to push down the cost of multimedia technology. Discs will continue to proliferate – there will be a need to share what works and what doesn’t in terms of educational and classroom use.

Networking on a wide scale – between schools, libraries and homes – may well happen sooner than we anticipated. In the US, ‘digital superhighways’ are being created with government support which will create vast networks of users using optical fibre cables. This will be fast enough to send, for example, the whole of the *Oxford English Dictionary* from one side of the world to another in about ten seconds. Live video transmission is equally possible.

As children start to explore such massive ‘information-rich’ environments the need to teach information skills will become even more obvious. A few years ago, I attended a conference where Marilyn Metz referred to Logo as ‘allowing young children to paddle around in big numbers’. Access to large sources of information, whether on a CD in the classroom or on a remote computer the other side of the world, is surely equivalent. As young children ‘paddle around in large amounts of information’, will we be giving them the skills to search, sort and assimilate the information they need?

There used to be arguments about project work in primary schools along the lines of ‘all they do is copy large chunks from books in the library’. Well, perhaps now we can reduce the copying to a few minutes work and then spend the rest of the time discussing, analysing and deciding how to use the information.

What will be the role of teachers in all of this? Will they be replaced by computers? The simple answer is that ‘if a teacher could be replaced by a computer then they should be’! What I really mean by this is that while the imparting of information could be replaced, the professional skills of analysing, questioning, planning, discussing, prompting, motivating and so on cannot.

What also will be the reaction to ‘older’ equipment? After using a multimedia CD-based adventure it may not be easy to go back to using *Granny’s Garden* on a BBC Model B. Do, however, remember Mike Matson’s comment at a MAPE conference some years ago that, in many ways, the most creative work seen in schools came from a ‘text only’ adventure, whereas the work arising from *Granny’s Garden* tended to be ‘cloned’ pictures of what was seen on screen – emphasising the need for multimedia to be just one of a range of stimuli in the classroom.

Finally, I wonder whether all of this would have happened without some form of local support? The combination of Welsh Office ‘pump priming’ together with LEA funding followed by ongoing support from the LEA IT centre enabled things to get off the ground and, just as importantly, information about successes and difficulties to be disseminated to others. This was accomplished as much by informal contact and discussion as it was by more ‘formalised’ presentations and documentation. Being able to see what ‘a school down the road’ is doing seems, in our experience, to be more powerful than any imperative that might come from national organisations – but then, I would say that, wouldn’t I?

The views expressed in this article are the author’s own.

CD-ROM and the teaching of reading

Professor Ted Wragg
Exeter University

I remember going to a small rural primary school in the mid 1980s. Kenneth Baker had just introduced the scheme which put a microcomputer into every school. I talked to the head about what an interesting development that was going to be, and how it would be necessary to develop much more high-quality software for primary schools than was available at that time. She nodded in agreement. Then there was an embarrassed pause. 'Er, we haven't actually unpacked ours yet,' she confessed. A spanking new BBC Model B micro lay, untouched by human hand, in a cupboard.

The spread of CD-ROM over the next few years might be inhibited by that same terror of new technology, but I doubt it. There are significant differences compared with the early to mid 1980s. First of all primary teachers are now used to having a micro in the classroom, even though some are still uneasy about using it fully. Secondly, the present generation of children is much more familiar with sitting at a screen, either at school, or on a games machine at home.

The most telling impact of CD-ROM, however, will be made in the field of reading. The teaching of reading lies right at the heart of what teachers do in the early years. Since the summer of 1993 I have been writing the new Nelson reading scheme *Flying Boot*. It is based on the adventures of Max, a furry extraterrestrial Beeble from the planet Beebledom. Max travels the universe in a Big Boot with five children and his two friends Magpie and Gobbler. We decided, from the beginning, to build in a series of CD-ROMs, and it has been the experience of integrating them into a reading scheme that has convinced me that CD-ROM will revolutionise the teaching of reading during the next few years.

There are two major demands in a reading scheme, and they are not always compatible. The first is for decent stories, the second is the need for some degree of structure, both in terms of gradual increase in complexity and control over vocabulary and phonics. The problem is that if you let your imagination rip on absolutely belting stories, they are bound to be too complex for absolute beginners. On the other hand, if you limit yourself to what is phonically true, then you might as well

write 'The cat sat on the mat' and 'The big pig hid in the rig' – not exactly Booker Prize stuff.

There are numerous advantages with CD-ROM. Some of the pressure to write artificial prose is taken off the author, as children can practise phonic sounds in a visual context. We use the character Magpie, who always steals things, to swoop in as the cursor and move letters around. Taking the rhyme stem '-at' and using Magpie's beak to drag and drop initial letters to make 'hat', 'rat', 'cat' or 'bat' is a pushover in CD-ROM.

Then there is the tricky issue of differentiation. Primary teachers are usually averse to public labelling of the 'bright' or the 'dull'. In the CD-ROM it is perfectly possible to have parallel tracks, with more practice for children who are having difficulties and extension work for those who are surging ahead. The children, however, are simply playing 'Gobbler's Game' or solving 'Magpie's Puzzle', without any stigma or public fuss.

One of the greatest boons to teachers will be the facilities for record keeping and assessment. Teachers regularly complain when assessment becomes an intolerable burden, rather than a natural part of teaching and learning. It is a big plus for CD-ROM that record keeping and assessment are built in, and seeing a profile of children's achievements and errors is straightforward.

Most engaging of all, however, is the interactive multimedia nature of CD-ROM. I remember the excitement in 1985, when I chaired the national committee that planned the BBC Domesday Project. Over a million children in 14,000 primary and secondary schools took part in a survey of the United Kingdom. The finished discs contained hundreds of maps, thousands of photographs, millions of words of text, and moving film of a royal wedding, Wimbledon and other noteworthy events, all available and accessible in seconds.

It was clear then that the interactive multimedia approach would eventually make a huge impact on education, but the hardware was much too expensive. Now that CD-ROMs are in a much lower price range, ordinary schools will have them, but increasingly families will afford them in their homes, so the potential for the teaching of reading is staggering. Children are surrounded by print in

their own environment: 'Exit', 'Look right', 'Tesco', 'Danger', 'Telephone', 'Sale', 'Post Office', 'Toilets', 'Cross here'. We have tried to make the involvement of parents a central part of the *Flying Boot* reading scheme. There are books which use photographs showing Magpie stealing the letter 'A' from a sign saying 'GARAGE' and other devices for drawing attention to environmental print. Again the use of photos and graphics is a gift in CD-ROM, but in the next few years it will increasingly become

possible to send home the discs for children to practise with their parents.

Perhaps the most engaging feature of all with CD-ROM and young children is the

possibility of the characters talking to them. In the conventional book there is a feeling that, however lively, the characters are dead on the page. Even pop-up books have limited capacity for interaction. The chance to talk to children, and indeed for them to talk back through the microphone, offers tremendous potential. 'I thought I told you to pick the letter M. You've picked the letter N', Max will shortly be saying to thousands of children.

And the next step? Well just wait and see what happens when Virtual Reality makes its appearance. Will children in the 21st century learn to read wearing a sort of bobble hat, with the central processor in the bobble and the sound and vision in the seam of the hat? I suspect they will. Max and I are discussing it at this very moment.

The first three stages of the reading scheme *Flying Boot* by Ted Wragg were published by Thomas Nelson in April 1994, and the first CD-ROM will be published in September 1994. The Virtual Reality kit is still a twinkle in Max's eye.

For further information on the reading scheme and CD-ROMs, please contact Thomas Nelson Ltd, Nelson House, Mayfield Road, Walton on Thames, Surrey KT12 5PL; Tel. 0932 252211.



The Horizon Project

Martyn Wilson

Inspector for IT, Hampshire LEA

Multimedia is sometimes described as a solution looking for a problem. Hampshire schools, with the help of Acorn Computers, have recently been examining the possibility that school classrooms may be one of multimedia's natural homes; the Horizon Project looked at the potential of multimedia authoring to support and enhance pupils' learning.

The school classroom is a place which is seldom observed dispassionately. Rather, it is seen through the eyes of personal memory or from a perspective of the nation's needs. Where information technology (IT) is concerned, the former predates computers although it still has an influence and the latter often has an outlook bounded by current commercial use. To understand the roots of the Horizon Project it is worth reflecting upon the nature of IT use in the classroom and upon its users.

Generally, the tasks for which IT are used are, by commercial and industrial standards, quite trivial. The document may be less than a page long, the controlled object may be the flashing bulb on a Lego lighthouse, the spreadsheet is probably a matrix of less than 50 cells, the measurements could be of the acceleration of a wooden trolley rolling down a 1 metre slope and a 500 record database would be a giant indeed. However, this list does contain a clue to the way in which the demands are sometimes greater than those found in industry and commerce. It is that the range of tasks for which any given computer is used is greater. Each computer is a multi-purpose gadget; the centre of a control system, a graphics workstation, a mathematical modelling tool, a program development machine, a data logging and analysis device, a multimedia workstation, a machine able to run a range of specialist programs and inevitably a word and text processor. Outside the school office, hardly any machine is dedicated to a single or even a limited range of tasks although, of course, these tasks are really subsets of the one main task; that of enabling and enhancing pupils' learning in any and every way that is effective.

The end users too are rather different. They are the pupils but they cannot be enabled without enthusiastic IT-literate teachers. The teachers are required to show competence in all the major software areas as well as an ability to troubleshoot problems in an environment which can sometimes make the North Sea look friendly. As if that isn't

enough, they are asked to support pupil users who are much more relaxed than their teachers about the whole situation, who have been pushing buttons and translating icons from the cradle, who expect the technology to work and who certainly aren't going to make the adult response of blaming themselves when it doesn't. Perhaps the most demanding challenge of all is to ensure pupils use IT not only as a training and productivity device but also as a tool to develop ideas. This will involve not only examining and searching data but selecting it, authoring it and bringing it together with a sense of purpose and audience to meet clearly-identified needs. It should be remembered that all this has to be done in a workplace where a £1000 computer is seen as expensive and where the machine-user ratio is unlikely to be better than about one to nine and is often closer to one to 30. All of this contributes to the fact that the average school IT co-ordinator may well have a wider range of IT experiences than their commercial counterparts even if their depth of knowledge in particular areas is less.

In April 1988 the Government began a new grant programme to support IT in schools. This programme was the biggest in a still-continuing line of government initiatives to support technology in education. It has been supported by politicians from all parties with Jim Callaghan and Kenneth Baker being two particularly influential figures. Along with all other local authorities Hampshire, one of the largest in England with well over 100 secondary and 500 primary schools, faced the challenge of how to use these grants to support schools effectively. There were several key decisions taken which are still influential today.

The first was to offer, as the key support element, extended training which offered a worthwhile formal qualification. This was allied to help for schools which made use of those teachers who attended this training by placing them at the centre of local support networks. The second was to use, as far as possible, a single machine base. The machines which were chosen were those produced by Acorn. It is a decision which is still closely questioned but it continues to be true that for multi-purpose use they offer a price-performance ratio which is unbeatable. For example, with regard to performance, 25 frames per second full screen video can be

processed and played without any hardware additions on a £1000 machine. They also offer a graphic user interface (GUI) which is more flexible than *Windows 3.1* on a PC and they have provided a backward compatibility sufficient to ensure that 1987 purchases are able to run the multimedia material we have developed. They use an ARM 32 bit RISC processor as their CPU and, for me at least, it is pleasing to see a British development, of which we should all be proud, in use in our classrooms. They are not 'industry standard' except that they offer 'fitness for purpose at lowest possible cost' but that is really the subject of a separate debate.

Multimedia is a generic term which covers everything from home games to professional training systems. At its heart is the combination of a wide variety of digitally stored sources such as sound, text, graphics, video and animations in a single resource which allows the user to control its use, exploration, presentation and even content. Typically a multimedia presentation might combine music, sound effects and the spoken word with still and moving images from film, video and photographs as well as conventional artwork, computer graphics and animation. Many involved with multimedia professionally believe that its future commercial use lies in consumer products.

Multimedia is sometimes seen as a new idea. In fact the principles which underpin its educational use are long standing. For example, the creation or collection of graphics and their combination with text is a traditional glue and scissors activity in schools. When IT came along the use of fancy fonts as part of a form of desktop publishing was attempted as soon as the capability was available. The creation of teletext pages with a range of crude graphics and text effects to produce such things as school bulletin boards was something happening five years ago in some schools. Often pupils each created their own page with their individual contributions being brought together in the finished scrolling or searchable 'database'. At that time I was involved in discussions with the local Borough Council regarding the possibility of the creation and production of a local Teletext newspaper by my pupils. This was to be available at points such as the library. The technology was not really sophisticated or mature enough then and I had left the school before we had started anything, but cable TV has come to several areas now and we have schools looking at the possibility of distributing information in this form through this burgeoning network.

A frequent IT skills progression for children coming into Hampshire's extensive nursery provision is the creation of a simple picture on the computer followed by the incorporation of that picture into their first document. This is essentially

a multimedia activity. That first picture is likely to be created using the computer graphics package *Easel* which was written by a Hampshire teacher. This is because all Hampshire primary schools purchased, with grant assistance, a toolbox of software supplied with a range of support materials which were created within the county by advisory teachers working alongside their colleagues in the classroom. The use and continued development of a common software base was the third key decision which smoothed the path of the Horizon Project. The multimedia software which was used was called *Genesis*. This had been provided to all primary schools within the toolkit of software and the majority of secondary schools had also purchased it, so expertise in its use existed in many schools. The project could build on existing good practice as well as existing hardware and software.

The project began from conversations in early 1992 between Sam Wauchope, the Managing Director of Acorn, my predecessor Graham Bevis and myself. We felt that multimedia had great unexplored potential in education. The ability to use the computer to develop ideas, perhaps to access information through it, and then to bring the ideas and information together in a multimedia essay seemed a powerful learning activity. An influential figure in my understanding of the development of multimedia in education has been Professor Stephen Heppell of Anglia University. He identifies three stages in the use of multimedia:

1. A narrative stage – where users can 'watch and note';
2. An interactive stage – where users can 'choose and do';
3. A participative stage – where users can 'contribute and create'.

We had supported the use of multimedia delivery platforms such as interactive video and compact disc (CD-ROM) in Hampshire since their introduction and felt that stages one and two activities were accessible to schools without problem. We felt that pupils and teachers were ready for stage three and we actually already had quite a collection of examples of such activities carried out in the classroom. Acorn felt that their computers and associated software were sophisticated and accessible enough for multimedia authoring to be a realistic activity for pupils.

I was and am also concerned that multimedia, like a whole host of other applications of IT, could become the source of yet more essentially passive activities for the Sega and Nintendo generation. There are parallels which can be drawn with previous technological 'toys'. I can remember as a (male!) child and young adult that my friends and I built models with meccano, balsa wood etc. Once

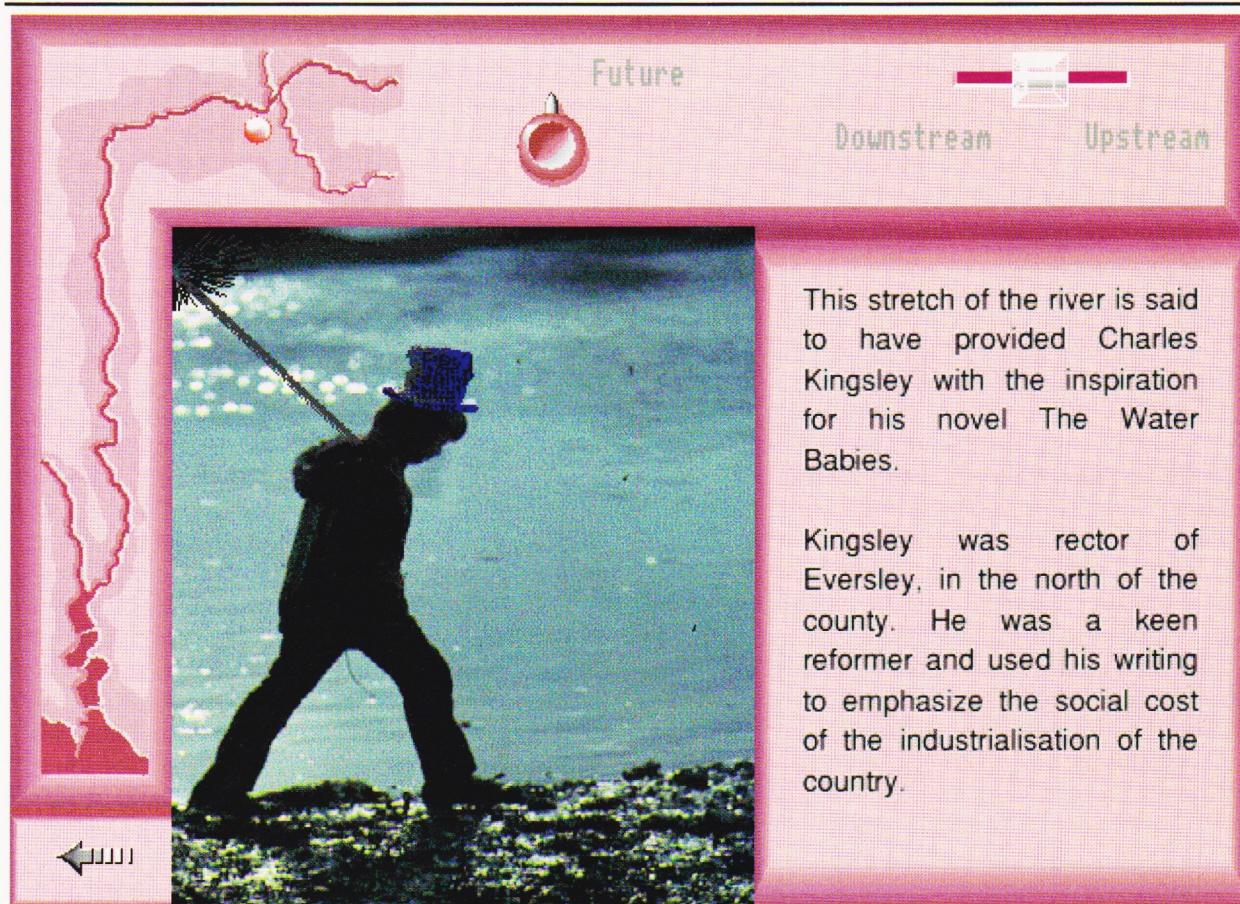


Figure 1 'Itchen' is a study of the River Itchen, by teachers Chas Duckhouse and Martyn Wilson. Sites of interest throughout the river's history are illustrated with photographs and text.

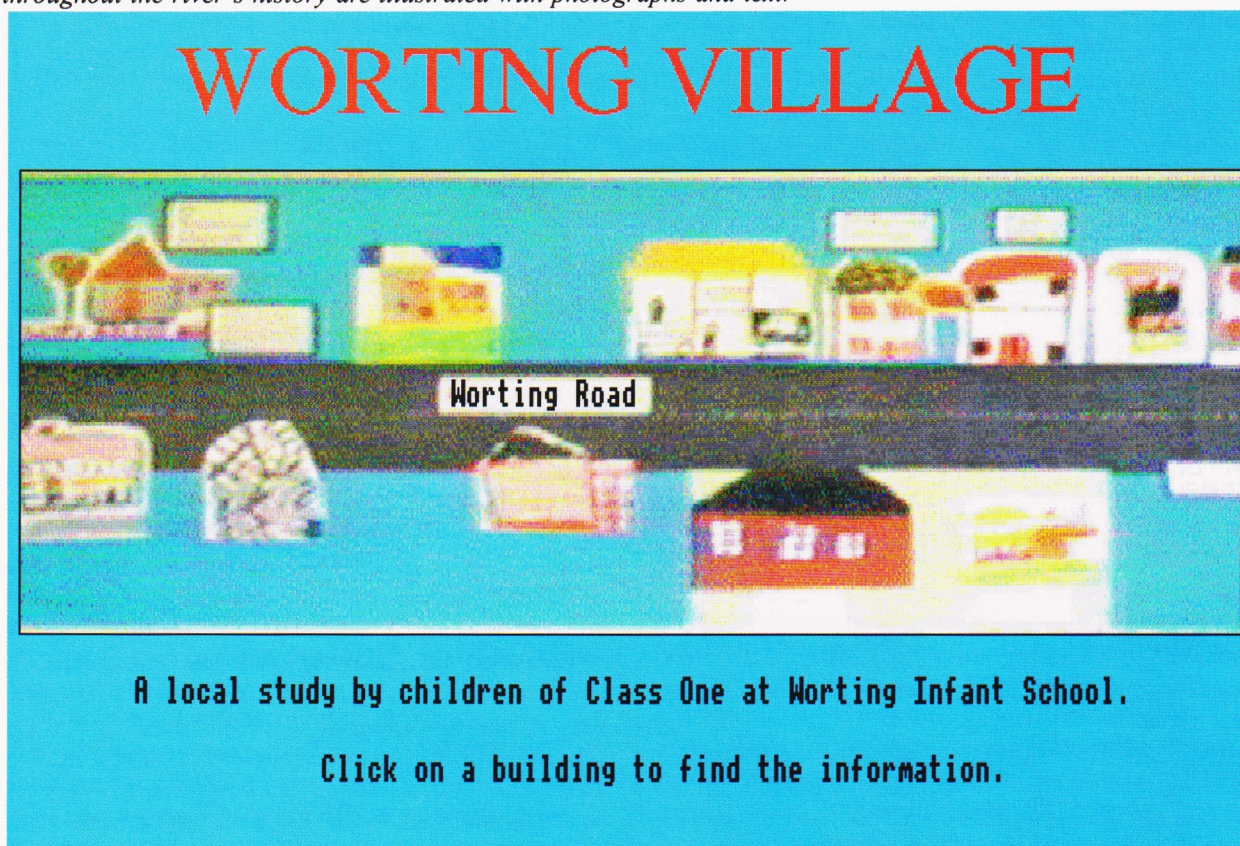


Figure 2 Several schools in the project studied the immediate area, past and present. 'Worting Village' was compiled by the children of Worting County Infant School.

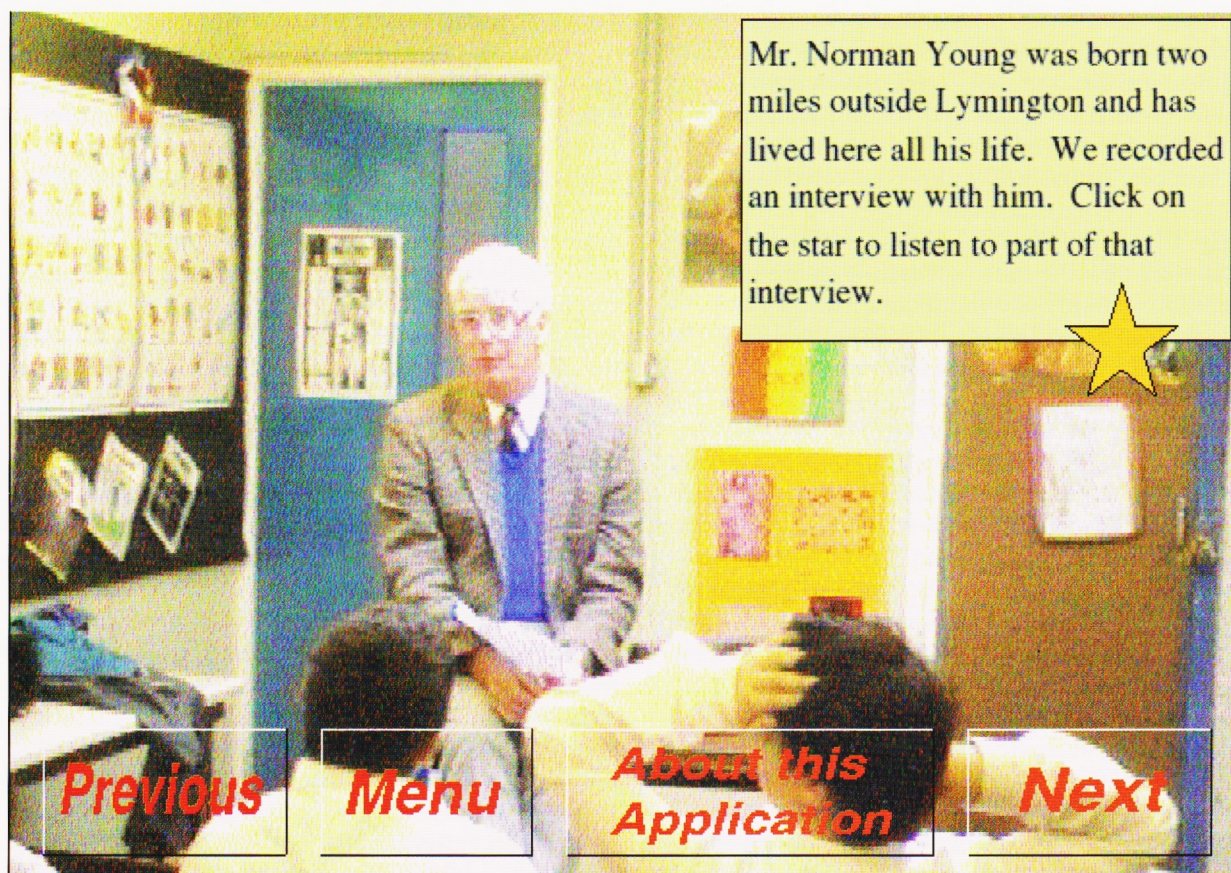


Figure 3 'Looking at Lymington' is an examination of the town by two boys from Buckland School.

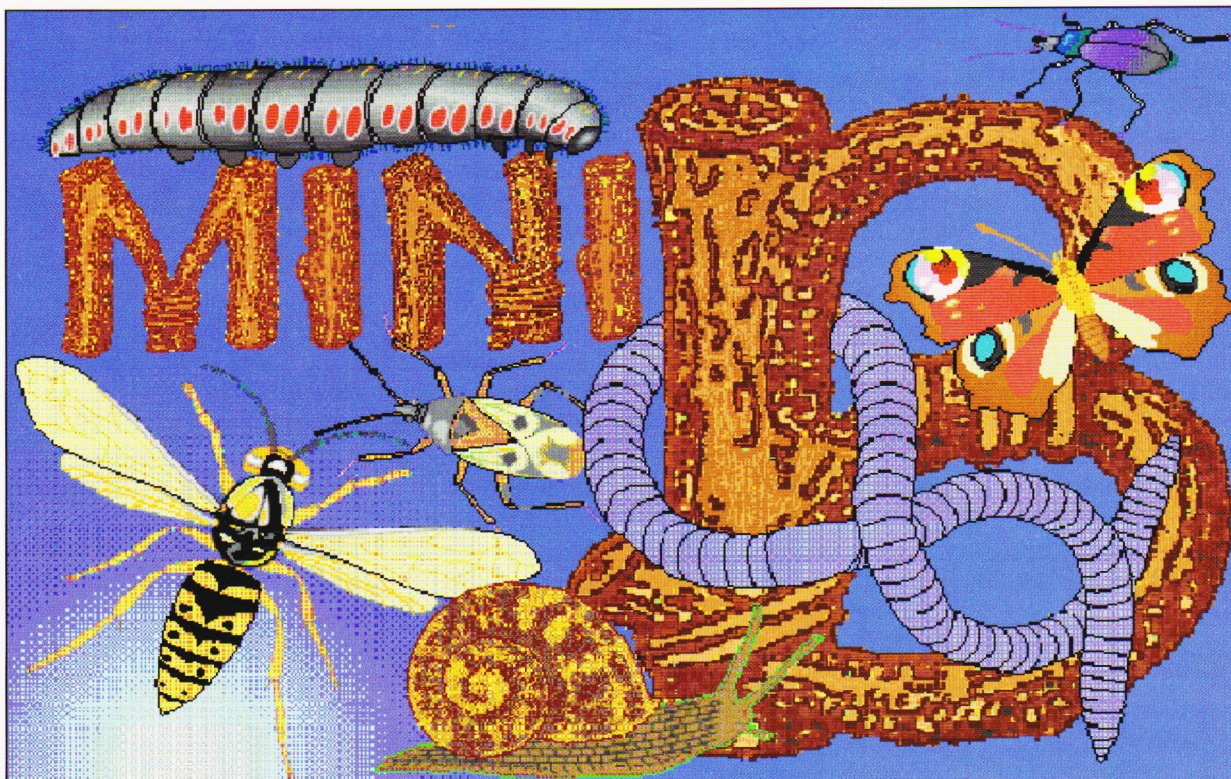


Figure 4 'Minibeasts' is an introduction to the taxonomy of creepy crawlies. It was inspired by Harcourt Brace's resource pack 'Investigating Minibeasts' and authored by Tony Stutters, a teacher at Isambard Brunel Middle School, Portsmouth.

built, our main desire was to make them move. Model aeroplanes had rubber-band and later fuel engines, meccano models were driven with electric motors or steam engines and so on. I wonder if we would have bothered if we could have purchased the reliable, ready-built radio-controlled models that today's youngsters can enjoy? More importantly, I wonder who missed or is missing most. As computers become more accessible, more productive, more reliable and more complex they also become less exciting, less interesting and less challenging for today's youngsters. Multimedia offers the opportunity to create, to edit and to rebuild using the basic resources which computer programs use. These creative activities can take place at levels ranging from simple screen presentations, which could be likened to desktop publishing on the screen, right through to the use of a programming language within the multimedia authoring package. It allows real control over the WIMP (Windows, Icons, Menus, Pointers) operating system such that the user can not only control but configure and own it. It offers a route into programming activities ranging from simple macros right through to assembler. More generally, whilst the majority of pupils will never be more than end users it is essential that all of them can see and understand all the levels and range of activity which are a part of an increasingly IT-based society. I was interested to see whether multimedia authoring, like meccano and balsa before it, offered the tools for a first-hand creative practical experience of value and significance.

We decided that we would structure a project such that pupils, sometimes working in groups, would use the range of media which they take more and more for granted and through which they often experience the world. They would not just encounter the information in these electronic forms; they would also communicate their ideas and knowledge in the same forms. They would select the relevant information, interpret and re-work it and present it, with a sense of audience, in an appropriate form for others to see and use. It was christened the Horizon Project. Acorn agreed to provide sufficient funds to pay for a project co-ordinator for a year, funds to release teachers from their classrooms on an *ad hoc* basis so they could work more intensely with pupils on project activities, and funds for additional equipment so that schools could have prompt access to more specialist items.

In July 1992 after a conventional interview process Tony Cox, a teacher at a secondary school for pupils with learning difficulties, was appointed as project co-ordinator. This appointment was full time for a year. He was joined by Maureen Gooding, an infant school teacher who was released from her teaching duties for one day a week.

Tony had some experience of developing multimedia applications. For example, he had developed such resources to support exhibits at INTECH, the industry-sponsored interactive technology exhibition in Winchester. Tony and Maureen began by contacting schools and selling the idea. They were looking for enthusiastic teachers willing to develop applications by themselves or with pupils. They rather anticipated a few enthusiastic experts but discovered these had been joined by many more enthusiastic novices. As the project was looking at the process of developing multimedia material they felt that everyone willing to be involved should be involved. By November 1992 the projects were taking shape. Most contributors understood the general requirements, had developed a set of ideas and were making a start.

Once a significant number of projects was underway the support requirements became clear. It was decided to run a series of weekend workshops at which people could receive answers to the more common problems and could share ideas and expertise. The funds stretched to providing fish and chip suppers during these working weekends together. In addition a series of 'surgeries' was run throughout the county, arranged so that teachers could attend after school. The rest of Tony's time was spent working with pupils and teachers in the classroom, purchasing equipment and ferrying it from school to school as need arose, and answering the million and one questions that flooded in at work and at home. Maureen was similarly occupied in her own area. She also decided to see what was possible within her own school and she soon had just about everyone from the youngest pupil to the Chairman of the Governors involved.

Among the main additional items that schools required were computers with sufficient hard disc space to bring together the work which had been done, often by smaller groups of pupils on their own class machines. When handling large graphics such as scanned or photographed images, additional memory was also useful. However, it was the Ion still camera and the Oak recorder which really caught the imagination. The Ion camera can be connected to a digitiser which sits in the computer. It allows the photographs which are taken with it to be used in the computer immediately. The Oak recorder, which is named after the company which produce it, costs less than £30 and offers a similar facility with sound. When the project started, digitising video film was in its infancy, but it was incorporated into the work of one sixth-form college. We also filmed some of the participants and include the film in the descriptive multimedia application which introduces the project CD. If we had started the project a few months later, film would have been as commonplace as still pictures


and sound. Text, animations and graphics were never any problem as, with a common machine base and a common WIMP environment, all the programs which might produce them use a similar file format.

The work in over 40 schools involving over 100 teachers and around 1000 pupils went forward throughout the spring and summer term of 1993. Towards the end of the summer Tony and Maureen faced their greatest challenge in persuading the, by then, totally involved teachers and their pupils that the work had to have an end point as the project required finished material to demonstrate and document the classroom practice which it had engendered. It was to be the subject of a professionally-authored 48 page glossy book describing it all, a compact disc with all the applications properly documented and linked to the relevant areas of the national curriculum and an official launch.

Finally, long after Tony and Maureen had returned to school and could only do project work in the evenings, it was all completed. It was launched on 15th November. The rest, as they say, is history. If you would like a copy of the 48 page colour booklet which describes and illustrates the project and shows the superb efforts of all the hundreds upon hundreds of teachers and pupils, it is available for £5.99 (inc. P&P). If you would like the

compact disc which contains all the computer applications ready to view and use this is available with the booklet and a guide to creating your own multimedia applications for £19.99. Both can be obtained from Lesley Blake at The Hampshire Microtechnology Centre, Connaught Lane, Portsmouth PO6 4SJ (Tel. 0705 378266).

Was it all worth it? The overwhelming answer has to be a resounding yes. It has demonstrated that IT helps learning and that multimedia is an important part of that. It shows that multimedia authoring can give pupils' learning a clearer focus on the key issues, help them develop greater accuracy and a more economical style and approach, and that it can improve their ability to 'tell the whole story'. It can also give them the confidence to tackle a wider range of information sources with greater criticality and to link the data they gather in less linear fashion. More generally, I believe that we have produced something which is a first. Certainly, I have seen nothing of equivalent quality and scale produced by a school community anywhere in the world. It has helped confirm my view that in its use of information technology British education using British computers leads the world. Most importantly, it has given teachers and pupils a sense of adventure, purpose and audience and provided the impetus to learn and work together in new ways.



You are a wealthy french merchant who has been on a pilgrimage (a religious jouney). You have followed the Pilgrim's Way from the religious shrine at Canterbury to Winchester. You are going home to France from the port of Southampton.

At Southampton you visit several different buildings, these are shown on the map on the next page.

You enter Southampton through the Bargate (building 1 on the map). As your day progresses you visit other buildings in the order shown.





Figure 5 An exploration based on a pilgrimage.



Centuries were grouped into units called cohorts. Ten cohorts made up a legion the largest fighting group. The exact size of each legion varied from time to time but the structure of a typical legion had around 5000 soldiers.

Legions made up the main part of the Roman army that invaded Britain. Each legion had 5,300 heavily armed and well trained foot soldiers who by law had to be citizens from Rome.

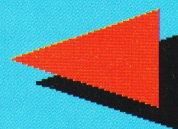


Figure 6 In 'The Roman Soldier' some children used the Canon Ion Camera to photograph members of Secunda Legion Augustus, a living history group who visited Peel Common Junior School, Gosport.

Back

Claire Broomfield

Next

Place of work.....St. James Children's Nursery, Shirley.

Type of work.....General nursery duties.

I worked at St. James Park Nursery. I worked with Margaret and Sue. I played games with the children and I read stories to the children. I liked going out at lunch time to Shirley for my lunch. I liked it when it was the afternoon because we did games with Steven, Thomas and Sarah. It was hard work and I felt tired.

Figure 7 In 'Work Experience', Year 11 students at Red Lodge School, Southampton, described their experience during short placements in real jobs.

The making of *Frontier 2000*

Brian Richardson

Cambridgeshire Software House

Editor's introduction

As microcomputers have become more powerful, so the costs of producing good educational software, in terms of both money and time, have soared dramatically. Early editions of MICRO-SCOPE were packed with ideas for ULPs (Useful Little Programs) which could be produced in a few evenings for minimal cost. It must be admitted however, that some of these were also of minimal educational worth! In MICRO-SCOPE 32, (Spring 1991) 4mation's Mike Matson traced the history of his 10-year involvement in educational software and his gradual move away from programming (when he came to terms with the fact that a 14-year-old New Zealander probably had more programming ability than he had ever had) towards coordinating projects. In this article, another of our leading software producers, Brian Richardson of Cambridgeshire Software House, tells the story of how Frontier 2000 was conceived, developed and published, and paints a vivid picture of the risks and costs involved in producing educational software in the 1990s. (Since this article first appeared in MICRO-SCOPE 40, Brian has had several phone calls from schools, asking 'Did it really cost £100,000, or was it a misprint for £10,000? It wasn't a misprint!')

'Do you know what Border Reivers are?' This was the question that started what were to become two of the most interesting and exciting years of my life. Little did I know it, but it also meant that the *Frontier 2000* project had started. In late August 1990 I had just returned from my summer holiday to find a message on my desk that read 'Please telephone Mike Taylor – Urgent – 0228 347811'. In the course of publishing the *Mary Rose* program in 1982 and its update, *The Anatomy of a Tudor Warship* in 1988, I had got to know Mike Taylor quite well. He was the Commercial Director at the *Mary Rose* Museum in Portsmouth and was our first line of contact when resource materials were needed. He was (and still is) one of the most enthusiastic people that I have ever met. From the telephone number I knew that it was not Portsmouth I

was telephoning but I really had no idea where it was. When a voice answered 'Tullie House', I gave my name and asked for Mike Taylor, but before any pleasantries could be exchanged he asked me 'Do you know what Border Reivers are?' When I told Mike that I had no idea what he was talking about, he suggested that I might like to go up to Carlisle, where he was, and find out. He explained that he was no longer with the *Mary Rose* Trust but was now the Commercial Manager in a new museum building project at Tullie House, Carlisle. 'It'll be just opposite the Castle main entrance when it's built' he said, guessing correctly that I had never been to Carlisle in my life. I asked Mike what he was talking about and his reply went something like 'I'm talking about the location of your next educational simulation program. When are you coming up to sort it out?' Never being one to argue, I presented myself in Mike's office one week later!

He showed me around the building site that was to become the Tullie House Museum and told me where every exhibit was going to be. For an outsider this was hard to imagine because there were only four walls and the roof to look at. He told me that there was such a wealth of historical information available in Carlisle and the surrounding area that he was sure that we could produce from it a 'unique educational software package'. Without dampening Mike's enthusiasm too much I remember telling him that 'unique educational software packages' didn't grow on trees and that the sort of ideas he was talking about would mean us taking a substantial financial risk. 'How much do you need?' came the reply.

On the drive back to Cambridgeshire I think the enormity of what was being suggested hit me for the first time. Here we were, just five people running a small software company and here was an opportunity to create something really special. At the same time, if we got it wrong it would put us out of business for ever! It was too great a risk for us to take ourselves. Or was it? I felt both excited and depressed but I remember thinking that at least I had met an old friend, had discovered that Border Reivers were the families that lived in an area



Figure 1 Outside Tullie House Museum – Official Opening Ceremony attended by HM The Queen.

between England and Scotland in the 16th Century, that they were totally lawless and that Tullie House was to have a light and sound experience all about them! Back in the office we sat down and discussed the project, and its financial implications, at great length. The idea of doing another big simulation certainly attracted us but there was always the risk element whichever way we looked at it. We came up with three alternative suggestions: Option A would cost around £20,000 and be a game about Carlisle; Option B would cost around £35,000 and would be Option A plus a few 'bells and whistles'; Option C would cost a massive £80–100,000 and was a full-blown simulation. Following discussions with our Bankers, it was decided that we could go 50:50 with Carlisle City Council on the development costs. I reported this fact back to Mike Taylor. Four months passed and I can only guess at the number of meetings that must have taken place in Carlisle from the number of telephone calls and visits that I had to make. Just before Christmas 1990 Mike telephoned to say that the part funding had finally been approved. It was to be Option C: the simulation was really on!

While these financial discussions were taking



Figure 2 Inside Tullie House Museum – replica of Bewcastle Cross.

place, I had approached Ian Whittington, who is Head at Great Gidding Primary School, near Huntingdon. Ian and I have worked very closely since CSH was formed. He has had a tremendous input on programs like *Saqqara*, *Mary Rose*, *Cars – Maths in Motion* and many more, but most importantly of all he knows how large simulation packages are developed and subsequently used in the classroom. Even before the financial side had been sorted out, Ian and I had two trips to Carlisle and started to gather some of the initial information that was needed. It was during the second of these trips that we visited Birdoswald, a large Roman Fort on Hadrian's Wall. As it was winter-time the Museum was closed and we were waiting for the Curator to arrive to talk to us. Those of you who know Birdoswald will also know that the car park is 400 metres away from the Museum. The wind was blowing a gale, the rain was driving horizontally and it was freezing cold. It's good being a software publisher, I thought! We were both soaked to the skin and had nowhere to shelter. We were on the point of giving the Warden up for



Figure 3 Screenshot: *On Hadrian's Wall – High House Mile Castle.*



Figure 4 Screenshot: *On Hadrian's Wall – Bird Oswald.*

lost when a Tornado jet fighter came screaming over our heads at around 300 feet. For those of you who do not know, Ian has a great love of aircraft and to the day I die I will never forget his words when this happened: ‘. . . ****! Did you see that? We’re going to war!’ I could only just see my feet in the puddles but he had spotted that the Tornado was in desert camouflage and was on its way back to its base in Spadeadam Forest. It was a very sobering silence that followed, broken only by the arrival of the Curator; the Gulf War was now only a matter of weeks away.

During one of these trips we visited virtually every Tourist Information Office within a 30-mile radius of Carlisle. We told the staff about the project and listened to many a favourite tale about their town or village. At this point, of course, we had open minds about what shape the software was to take but the one thing that was clear was that we were going to need as much factual information as we could get. We had many, many meetings with the staff at Tullie House including the historians and the archaeologists and soon began to get a good idea of what was and was not going to be available to us. I should perhaps say here that all the people we met in those early meetings were every bit as enthusiastic as us and had it not been for their tremendous cooperation the project would have fallen at the first hurdle. It was now January 1991, and we set ourselves the target of publishing the project in January 1992 at the BETT Exhibition in London. At this point we were still making ourselves known to many specialists from whom we were to need help.

During the February half-term Ian and I decided that we would spend most of the week either gathering documentary information or meeting people in order for us to get a better understanding of what appeared to be some of the more interesting facts that were coming towards the top of the pile. In six days we had over 70 meetings, drove nearly 2000 miles and came back to Cambridge with a car loaded to the roof with information. It was on that drive back that Ian and I hit on the idea of children following historical trails, whilst moving around the map, with much problem solving involved along the way. Back at the shop, our two programmers, Mark Watson and Kevin Sanders, had been busy laying down the skeleton of the program. Little did they realise that both of them would be doing nothing else for the next year, such was the enormity of what we were to do!

The map and coordinates were the first to be encoded and this took longer than anticipated which, of course, put us behind schedule. Eventually the map was finished which meant that we could flesh it out with one historical trail so that we could get the concept of the program into the

classroom as soon as possible. The first trail was to be about the Border Reivers. Ian had been reading about little else but the Reivers, such was the fascination of these families. The trail was put together and children were then asked to try and work through it as best they could. The work that came out of this one trail was incredible but, and perhaps more importantly, the children really enjoyed using the software. They even started to send requests in for more trails! Ian was now heavily into the research for the 11 trails we had chosen and was generating all kinds of questions which needed answers fast. We had gone for as wide a spectrum as we realistically could and had subjects ranging from Religious Beliefs to Hadrian’s Wall and from the Victorians to the Environment. By the time Railways, the Civil War and Mary Queen of Scots had been added to the list we were well on the way. At this time many faxes and telephone calls were made to make sure that what we were producing was as accurate as possible. One lesson I quickly learnt was never to rely on just one source of information. History in this part of the world is certainly coloured by which flag you carried at Bannockburn! This was evidenced when we started to produce the Time Line. The City Historian, Rosalind Gee, had given us a chronology of Carlisle’s history as part of the research documentation we had asked for. We decided that if this could be expanded to cover different towns and villages as well as including other significant historical facts, whether or not they related to Carlisle, then we would make this information available to children in the form of an easily searchable Time Line.

Have you ever considered producing a 25,000-word Time Line? Take my advice and don’t! Many of you will know Wendy, my co-partner in CSH (and wife!) from her MAPE secretariat days. Wendy took one look at the various pieces of paper on which this Time Line existed and disappeared for over a week while she typed it into the computer in a form that could then be searched and understood by children. I shall never forget watching her run her work through a spell checker, especially the parts of the Time Line that are in Latin, Old English and Lalland! This was a nightmare that nobody had anticipated, added to which two historians could not agree on some of the contents, and it took well over a month to get this sorted and checked.

In May 1991 I, together with 20 or so other software publishers, went on Acorn’s Software Roadshow to Scotland. At that time I had just six of the screens from *Frontier 2000* that had been saved as ‘stills’. However, I was determined to let some of the advisers in Scotland have a look at what we were doing and so it was that Dundee saw the first ‘showing’ outside our office. By the time

the Roadshow reached Glasgow two days later I knew we were on the right lines. The massive volume of information now being generated was becoming a problem. We had set ourselves a limit of two floppy discs and no more! Our problem for once was not what to put in but what to leave out! During the May half term, Ian and I had decided that another trip was called for so that we could put the finishing touches to some of the trails. I distinctly remember trying to find the Capon Tree Memorial near Brampton. We really wanted a photograph of this to illustrate part of the Bonnie Prince Charlie Trail. Ian and I, following a sign, walked miles across open countryside and at times were fairly deeply involved with copious quantities of cow dung and mud! We simply could not find this Memorial and as it was getting late we decided to turn back before it got dark. Two hours later we returned to my car determined to get back to Carlisle in record time to get out of our smelly clothes. After 10 minutes or so, Ian recognised an avenue of trees through which we had been walking so out of curiosity we turned up a side road to have a look. Yes, you've guessed! There was the Capon Tree Memorial no more than 40 metres from the place where we had turned to go back! We came back from this trip with very sore feet and another car boot full of information.

The summer of 1991 was pretty much spent getting the program ready for the entry of all the data we had collected. This data was not only text but also photographs that were being used to illustrate the trails. In August, Wendy and I decided to go to France for a short holiday and when we came back we discovered that our offices had been burgled and that the computers we program on had been stolen. Although we had copies of the programming we didn't have a computer on which to load it! Enter Sue Wall of Acorn Computers. Within three days Acorn had lent us sufficient kit to get us going again; something for which we will always be grateful. Pressure was now starting to mount. Not only was BETT 92 getting ever nearer, the Carlisle City Council and our friends at Tullie House decided that it would be a good idea if we held a 'behind closed doors' showing in December. We thought that this was a brilliant move. The program still had no title (*Luguvalium* and *Over the Wall* having been deemed totally unsuitable) and our finish date had just been brought forward by five weeks! However, the team spirit within CSH and Tullie House was now running so high that weekends and evenings became a thing of the past and on December 9th 1991 *Frontier 2000* (complete with a few bugs!) was given a pre-release showing in Tullie House for the City Council and invited guests. These guests included six children from Great Gidding Primary School who,

apart from showing the various local dignitaries how easy the program was to use, finished up the day by giving live interviews to Radio Cumbria.

The mechanics of actual publication were now uppermost in our minds. The boxes in which the pack was sold had been designed and ordered but Christmas was fast approaching and delivery could not be guaranteed. The manual had been written and would be printed during the first week of 1992. The resource materials, videos and audio cassettes to accompany the program were all received just before Christmas so we were looking good although the boxes were a slight worry. It was just three weeks to go to the BETT launch and selling *Frontier 2000* in a plastic bag did not seem at all attractive. The boxes arrived the week before BETT and we quickly made up our initial stock to take to the Show. Press releases were sent to every computer/educational magazine in the UK, and Border TV even carried an item on its local news. The program was even finished and had undergone final testing. On Wednesday 22nd January at 10 o'clock, our stand at BETT was full. There were the five of us, Ian Whittington, Mike Taylor, Nick Winterbotham (Director, Tullie House) and Grant Ogilvy (Education Officer, Tullie House). We were eagerly awaiting the arrival of Eric Martlew, the MP for Carlisle, who was coming to officially launch the program for us. Suddenly, there was an announcement to say that the doors, and thus the Exhibition, were open. Wendy leant across and whispered 'Does this mean that we can start getting our house back?', for that is what it had meant. Yes, we'd done it, but we had risked everything to create this one piece of educational software. It was only now that we would find out if anyone would actually buy it. The next four days were going to be very interesting indeed! I am very pleased to say that the teachers at the Show gave *Frontier 2000* the 'thumbs up' and sales were being made almost immediately. Then, on the Saturday, one LEA ordered 300 copies and *Frontier 2000* was really on its way. It had taken us over two years, around 1000 meetings, had meant over 100 nights away from home and had eventually cost over £100,000 to produce. Since launching the disc version, we have spent a further eight months expanding it onto CD-ROM. This version has meant researching more trails, digitising around 2000 full colour photographs and finding 20 or so relevant video clips to digitise. These came after extensive searches being made in the Border Television film archives. The Time Line has been increased to over 35,000 words and we have included some speech in the simulation. The CD-ROM has enough information on it to fill over 300 floppy discs. If, three years ago, when we started this project, someone had told me that I



Figure 5 *Capon Tree Memorial at Brampton*

would sit down with a group of nine-year-old children to watch a video clip of a barn owl in flight, would listen to a commentary about its conservation, would watch the Nigel Gresley steam across the Ribblehead Viaduct, and that this would all happen on the computer screen from within a program that we were going to design and write, I would have had a great deal of serious thought about their sanity. However, we did it and, if nothing else, many children may now know the answer to Mike Taylor's question. I certainly do!



Figure 6 *The environment of the Eden Valley.*

Software information

Acorn RISC OS disc: £49.95.

Acorn RISC OS CD-ROM (included in the Acorn bundle as part of the DfE Primary Pilot scheme): £79.95.

PC Compatible CD-ROM (*Windows 3.1*): £79.95.

Additional resource pack (including VHS video, *Border Ballad* cassette tape, full colour history books, a piece of Roman timber, colour postcards, posters, a pictorial history guide and tourist information): £30.00.

Prices include a site licence.

CASE STUDIES

Multimedia arrives at Albert Primary School

Anne Roberts

Albert Primary School, Penarth

1993 was the year that multimedia PCs arrived at Albert Primary School. CD-ROM and IV systems were both received by children and staff with great enthusiasm. There were some initial technical problems which irritated staff but since these have been solved multimedia has certainly taken off!

Initially Inset sessions were led by the IT co-ordinator so that staff could learn how to use the systems, but since then staff have used their own time to familiarise themselves with software in order to incorporate meaningful IT into their planning, teaching and assessment. (This is essential if the possibilities of multimedia are to be fully explored.)

Reception children were the first to encounter the CD-ROM and they took to it like ducks to water. They were absolutely enthralled with *Just Grandma and Me*. Every character and object on each page can 'come to life' at the click of a mouse button. They soon have no trouble in controlling the mouse! Unbelievably, starfish dance, dolphins dive, umbrellas fly and telephones ring.

Children are delighted and immediately stimulated to start discussing what they have heard and seen, thus developing their language, communication and prediction skills. Although *Just Grandma and Me* is intended for Key Stage 1 children, whenever there is a wet playtime, one of the Year 6 children is sure to ask permission to use the program!

At the upper end of the school, Year 5 children used an IV disc illustrating paintings and drawings from the Louvre and a CD-ROM of impressionist paintings as part of their half-termly project on Tudors and Stuarts. At first the class were shown how to operate the systems. Both boys and girls found this easy. As a class, led by their teacher, they looked at a variety of portraits and discussed the different styles, techniques and materials used in the paintings. They learnt how artists were influenced by culture and religion, and the role of symbolism in portraits in a variety of periods (Fig. 1).

Each child then chose a portrait and wrote a piece of descriptive writing about that person, incorporating accurate historical details and

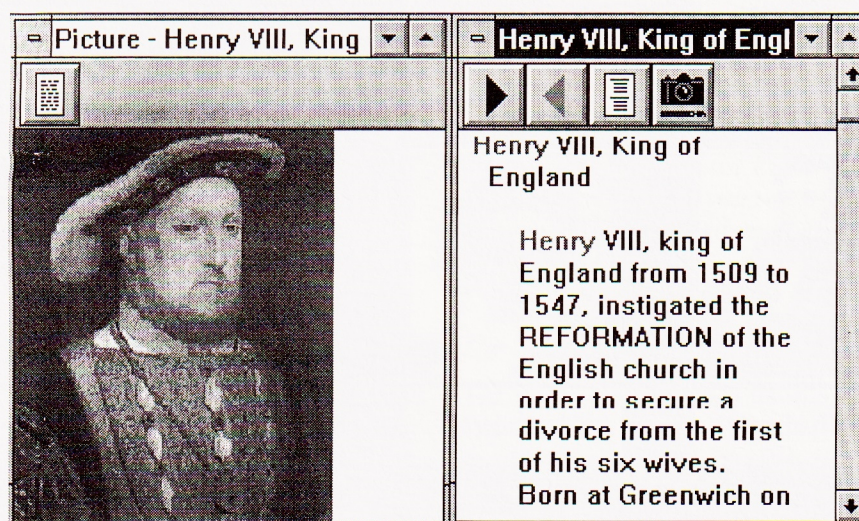


Figure 1 Using portraits to stimulate historical investigations.

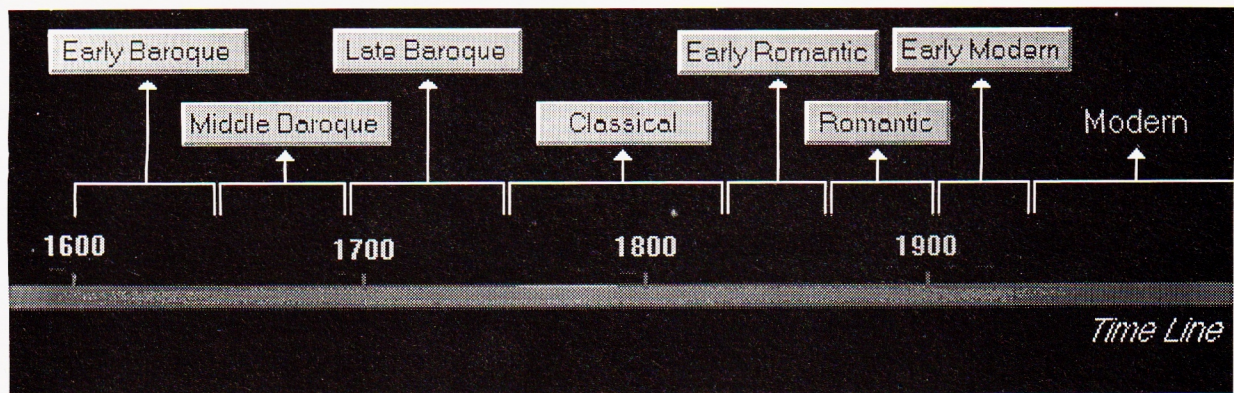


Figure 2 Timeline from *Encarta* (see p.25).

character studies. The resulting pieces of creative writing were most imaginative and thoughtful. In groups they used the visual stimulus of the disc to answer a series of questions from worksheets and each child produced a portrait of a friend, choosing the medium with which they felt the most comfortable. They were also fortunate enough to have access to an *Impressionists* CD-ROM disc which they then used quite freely to do some research on an artist or topic which interested them, and the children were taken to a local art gallery to study the portraits there.

Finally, these children were asked to evaluate multimedia systems as they had used them. Here are some of their comments:

'The disc has a very large selection of paintings and they are all famous.'

'It's best to visit the art gallery/museum first if you can, to see the size of the paintings.'

'The computer allows you to look more closely at details missed.'

'The disc has lots of paintings together so you don't have to go to lots of galleries to see them all.'

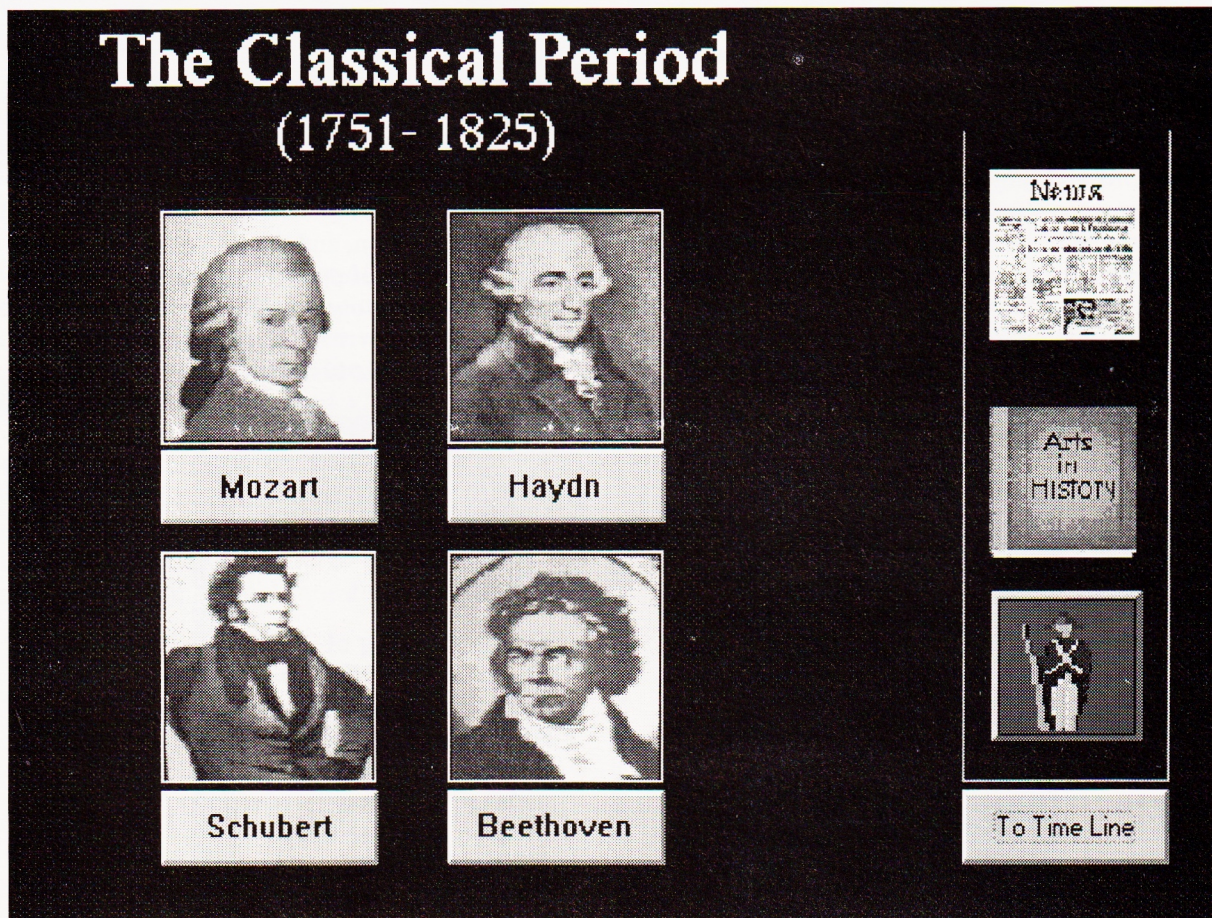


Figure 3 *Encarta* offers an opportunity to explore the Classical Period of music.

'The computer can tell you about the pictures but that doesn't happen in a gallery.'

'It will take you to the picture that you want very quickly.'

'There is no queue to see the pictures on the computer but in the gallery the colours are better.'

'You can use the computer at any time but you sometimes have to queue in an art gallery.'

'You can look more closely at a painting with the computer. In an art gallery the alarm would go off!'

'You can't say that you've really seen the picture' (snob value).

'With the computer you can look through the pictures and decide whether there are any you would like to see in real life.'

'You don't get to see the attractive building of an art gallery if you just use the computer.'

'You can't see the textures or how the paint has been put onto the canvas on a computer.'

These children were from a wide socio-

economic background; some were very bright, some were less able and some had special needs but all thoroughly enjoyed and benefited from this project.

From our experiences, multimedia certainly shows a great potential for stimulating children to learn at their own pace with considerable enthusiasm and pleasure. Children adapt quickly to new technology and are certainly motivated by sound, colour and moving images, but are also able to identify both advantages and disadvantages of multimedia technology as opposed to using books.

All children at Albert, from the nursery to Year 6, will tell you that multimedia systems are exciting and fun to use whether they are using *Impressionists* discs or *Just Grandma and Me*. Multimedia systems are undoubtedly here to stay, and will be an invaluable resource, but their success as an aid to teaching will depend on imaginative teachers who are willing to spend time familiarising themselves with the software and thinking of methods to use multimedia within their classrooms to its full potential.

CD-ROMs – the children's view

P. Hinton and the children of Colcot Primary School

My Year 3 class has been using CD-ROM applications since September, and the children have become increasingly aware of the exciting learning opportunities they offer. Much of our recent topic work has been researched through various software titles and we have also used several adventure games and story books. The true test of success in terms of classroom application lies of course with the children, so I have included their comments in this review of titles currently in use.

Mammals

Photographs, sound and some video clips enable the children to view mammals in their natural habitats. For this aspect alone it is a valuable resource to be used by younger children. Although informative, the text is not overwhelming and the option to research further any pertinent words is available. There are facilities to investigate facts and figures relating to each animal and to locate its geographical habitat via icons on screen. The simple format and indexing allows for easy access to the required information.

'You can see exactly how the animals move and you can see them really closely.' Emily

Microsoft Encarta

The quest for a photograph and details about Ayers Rock which the children had heard about in a class story prompted us to use this CD and we have since found it to be a valuable reference source. We investigated the various routes for obtaining information and the children now initiate their searches quite confidently. During a subsequent History topic the Timeline enabled the children to scan for specific events and to date them. Such a task would have been beyond many of them using reference books alone. We have also looked at other multimedia encyclopaedias but the children have expressed a preference for *Encarta*.

'The timeline lets you see when everything happened in order and you can look for things very quickly.' Michael

The Secret of Monkey Island

The sound and graphics on this pirate adventure, together with the ever-present theme tune can't fail to attract children of all ages. It is bright, noisy and funny and the children love it. The players are faced with multiple-choice options and challenges and are therefore responsible for the outcome. It

involves much reasoning and discussion of a 'What if . . . ?' nature. The reading level is quite high, so that needs to be allowed for in deciding the ability mix of pairs/groups using it. Position in game can be saved and retrieved later.

'I like the music and the way the people move around and talk to you.' Martin

Arthur's Teacher Troubles

This graphical storybook is lively and humorous and needs no reading skills as the text is narrated. The characters are appealing and the children identify with the situations presented to them even though it is very American in content. The entertainment level is high and from a language aspect less able children are only too eager to provide a running commentary

of what is occurring on the screen. There is so much activity on each page that every time they read the story they find something new.

'I like the story. It makes me laugh.' Rhys

Microsoft Dinosaurs

Everything you wanted to know about dinosaurs. Good quality sound effects (but how do they *know* what dinosaurs sounded like?). The children were particularly impressed with the dinosaur movies. It offers a wide range of options to classify, investigate and research. The printing capability is good and the graphics reproduce well.

'My favourite movie shows the hunt. I like the fighting and the noises. I printed some pictures to go in my book.' Stuart

Introducing multimedia authoring

Judith Gain
Surrey IT Adviser

In Surrey we are planning a multimedia initiative in our primary schools. A major emphasis will be on pupils creating their own multimedia presentations, so we recently took the opportunity to explore the possibilities with a group of Year 7 pupils. As we firmly believe in IT being used only when it enhances and extends pupils' learning and not just for IT's sake, we wanted to be sure that multimedia had something not only new, but valuable to offer pupils' learning experiences. It did not take us long to be convinced!

The main conclusion resulting from the project was that the key to creating a multimedia presentation is the planning which takes place well before the computer is used.

1. By the teacher and class to develop clear objectives as to the aim, purpose and audience for the presentation.
2. By groups of pupils who might be responsible for a particular section of the finished product and perhaps for passing on certain skills of using particular equipment only known to that group.

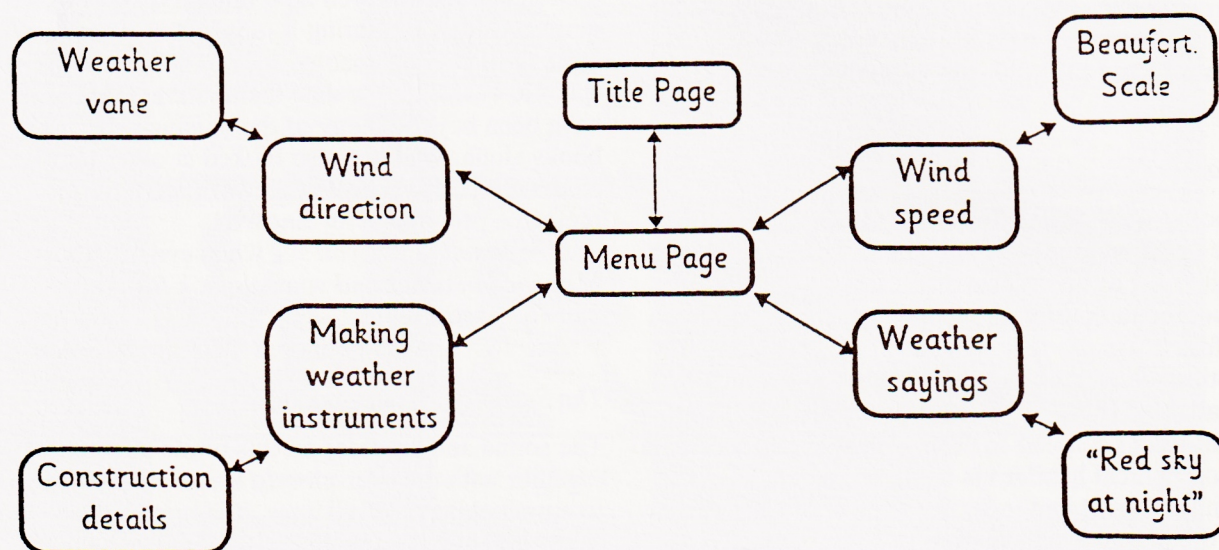


Figure 1 Flowchart showing how the presentation would develop.

3. By pairs or individuals to plan, research and design the content for their specific page.

Having been introduced to the concept of multimedia presentations, the pupils began creating their own presentation using MMBBox2 authoring program on a Nimbus 486 Multimedia PC. They were working on a weather project, creating their own weather recording instruments, collecting weather sayings, explaining technical terms, etc.

The first thing the group and their teachers did was to create a flow chart of how the presentation would develop.

Each group was responsible for two pages, and the next stage was to plan out on paper the content of their pages for the particular area they had chosen. With this done, they then went about researching their information, creating a picture, taking an Ion photograph, recording sound effects and spoken text. At various intervals they added their latest development to the overall presentation.

The ease with which the pupils coped with the new media applications was encouraging, though not unexpected. But the level of concentration, the

cooperation and the perseverance shown by the pupils to achieve the desired quality of finished product was particularly noteworthy.

A multimedia project can:

- provide a very real purpose for the pupils' work.
- provide an audience other than just the teacher.
- enable pupils to keep ownership of their pages.
- encourage pupils to produce work to the best of their ability.
- encourage pupils to take responsibility for correcting their own mistakes.
- provide opportunities for pupils to work collaboratively.
- provide opportunities for pupils to consider appropriate ways of presenting their ideas.
- be developed in any area of the curriculum, e.g. field trip reports, information guides, school prospectuses, interactive story books, etc.

Having been so encouraged by the success of the pupils' first experience of working with multimedia, we are now looking forward to extending the multimedia project throughout the county.

Using multimedia with young children

Dr Mike Wald

Senior Lecturer, LSU College of Higher Education, Southampton

Aims of study

The main aims of this study were to investigate classroom strategies for integrating the use of CD-ROM and to look at the benefits of learning with CD-ROM as compared to learning using traditional media. The study took place in a Year 2 class with no previous experience of CD-ROM technology and I worked with all the children in the class in groups varying from three to seven children, the composition of the groupings changing from session to session. The study was carried out in close consultation with the class teacher to ensure integration with existing schemes of work. A range of strategies and approaches was adopted involving both the use of CD-ROM as a multimedia database and as a stimulus and source for creative work.

Technology used

The project used a Cumana CD-ROM drive and an A3000 computer with 2Mb of memory. The only RISC OS CD-ROMs available that were felt to be appropriate were *Dictionary of the Living World*

and *Creepy Crawlies*, both published by Media Design Interactive (MDI). They generally performed satisfactorily although *Creepy Crawlies* crashed sporadically after the commentary had been spoken. This was reported to MDI who expressed their surprise as they had tested the CD-ROMs extensively without experiencing similar problems.

Range of activities experienced

Children investigated the CD-ROM system by searching for creatures and looking at all the forms of information provided. This unstructured 'play' activity was important but would clearly not have held the attention of all the children indefinitely. Some children would however have been happy to spend a great deal of time just 'playing' with the system.

Children used the CD-ROM to find out information for project work linked to maps and geography. The fact that they could return from their work on the computer with a colour map of the world showing where the appropriate animal lived added greatly to their motivation.

The BBC program *Sorting Game* (a hierarchical database involving classification skills that can be used as a simple introduction to rule-based expert systems and therefore to some extent 'modelling') was used in conjunction with the CD-ROMs to provide a context for researching about animals. Children taught the computer about animals using the CD-ROMs as an information source. The use of the CD-ROM for a real purpose added greatly to their motivation and enjoyment in the use of the system. Children compared the computer CD-ROM system with books in terms of time and ease to find information about the living world. The challenge and the focused task provided motivation and held interest. The lack of the children's ability to conduct a strategic search of the school library was clearly evident even though the children were aware of the numbered classification system; the most popular approach to finding information from books was browsing through book titles and cover pictures on shelves.

Some children were shown how to export pictures into the painting program *Easel*. They then modified the picture to create imaginary animals.

Children exported text and pictures to *PenDown* for writing and illustrating their work. Sprites were exported into *!Draw* and used to create *My World* screens. This approach showed much potential although the use of sprites meant the files used a great deal of memory.

Children made 'animated books' using paper and cardboard to try to compare and contrast with the video movies in the CD-ROM applications. This was greatly enjoyed and involved many design and technology skills as well as referring back to the CD-ROM screens for ideas.

They gave critical reviews of the strengths and weaknesses of the CD-ROM system and compared it with other ways of finding out about animals in order to provide 'expert consultancy advice' to the school as to whether to spend money on CD-ROMs or on books, videos, trips to zoos, etc.

Children's evaluations

The children evaluated the technology and whereas sometimes they were able to evaluate the actual medium, at other times they were evaluating the content of the CD-ROMs compared to their experience of books and other media. Some of the children's views are reproduced below arranged under various headings.

Real experience is best . . .

'C . . . likes finding out about animals in zoos because you can find real moving animals.'

'M . . . likes going to zoos because you can go around looking at the animals in your car and

have rides on the camels.'

Portability . . .

'Books are easier to carry around than computers are.'

'You can put a book on your lap or read it in bed. You would need a laptop computer to do this.'

'They [books] are handy to take around with you. If you are going to the zoo you can take a book with you to look things up. They are not very heavy and they are not very big.'

Multimedia

'Computers can have people's voices talking and videos playing.'

Range of information in books

'There are more interesting things in books.'

'There are more pictures of dinosaurs in books.'

'I liked using the computer CD but read books more often.'

Forgiving nature of IT

'It [computer] talks and makes noises and it has videos and moves. You can type on it and go back if you get it wrong.'

Ease of access

'To find something we just typed the name in and the computer found it for you. We didn't have to get up off our seats.' [comparing it to searching books in the library]

Difficulty in browsing for information on computer

'The book has a front. The book has pictures on the cover to show you what the book is about. You can turn the pages and look at the pictures instead of reading it to find something.'

'You can put your finger on the words instead of an arrow.'

'You don't have to wait a long time for them to load. You don't have to press lots of keys. It is easy to turn pages.'

When asked to make a choice of preferred information medium there was about a 50/50 split between books and CD-ROMs, with a few children choosing videos.

Hardware and software limitations

The display on an A3000 standard monitor was acceptable although the small text was sometimes

very difficult to read. The access times were too slow for the video and audio replay files (approximately 10 seconds) and the video clips were not up to 'BBC standards' and not always interesting. The animations were motivating although occasionally the animals didn't do very much. For example, although lions spend most of their time lazing about, it would have been exciting to have seen some more action. The sound effects were appreciated as much as or even more than the movies and it would have been better if there had been more of them. There was great disappointment when a creature had no sound or more surprisingly had no picture. The maps were interesting but sometimes confusing for the children as, for example, the map for the lion showed the locations of the whole of the cat family. The quality of the still video frames was poor compared to the photos and very disappointing when printed out. This disappointed the children as they wanted to 'personalise' the output by selecting their own 'still frame' rather than just use the photo provided.

Recommendations based on study

What are the training needs of children and teachers?

If the CD-ROM applications are well written and there is access to hardware with sufficient memory it is simple for both children and teachers to actually operate the system. However, efficient strategies for accessing large databases will need to be taught and experienced. Some time is required to 'play' with the system in order to gain the confidence and experience to appreciate it.

What is the level of supervision required?

Children need certain skills to operate the equipment; they may also need additional reading and conceptual skills, some of which may be above the children's level of development, for example to understand the classification system and Latin names on the CD-ROM. It would clearly be of value for the teacher to be available to discuss search strategies and issues concerning the content. To some extent this could occur away from the computer. Access to adult support will therefore be helpful. A hard disc system with more than 2Mb of computer memory would simplify the operation of the system, especially if information is to be exported to other applications.

Can the available CD-ROM resources help teachers deliver the National Curriculum when compared to traditional media?

Yes, if the resources available are appropriate. CD-ROMs with video, text photos and sound could

provide a rich up-to-date resource to support teachers in their teaching and children in their learning. Although CD-ROM systems could simply be used as 'cheap' ways of distributing up-to-date information and teaching aids to teachers, the technology nevertheless offers much more potential than this. It offers the chance for children to become aware of the nature of information, to access it at first hand, and to compare different forms. Children can also create their own information.

What are the organisational issues?

The siting of CD-ROM systems in a school is important. As with any medium that produces sound this could be distracting to other children. The roaring of the lion certainly makes an impact in class! The use of headphones might be one solution.

How do you choose CD-ROMs?

CD-ROMs need careful design if they are to be easily accessible to young children, and they benefit from graphics, animation and sound wherever possible. The videoclips need to be relevant and interesting. The CD-ROM needs to be easy to set up without having to configure the computer before running the application. A wide range of CD-ROMs is required to cover the curriculum and it would be valuable if teachers could customise CD-ROMs to use them in their own way, for example by supplying lots of photos, videos, sounds and text information to build into their own or a child's own database.

What are the technical requirements?

It is best to use hard discs and large computer memories if pictures and text are going to be exported to other applications. Disc swapping and quitting and loading works but is tedious.

And Finally!

The overall evaluation conclusions of the study were that with careful design CD-ROM can provide a motivating, powerful and accessible learning technology for young children. There are however at present very few CD resources authored for the Archimedes range of computers designed for use by young children.

It is important that CD-ROM does not just become another information handling technology solution looking for a problem to add to things in the 'Teach and Test' list for the IT Attainment Target. It is a powerful and flexible resource tool allowing young children the power to access and use vast amounts of information in a range of media.

Teaching and learning with a CD-ROM

Neil Aiken

Danesholme Junior School, Corby, Northants

When I was first approached and asked to write an article on the way we managed our CD-ROM system, I thought it would be an excellent way of conveying to the rest of the educational establishment the huge benefits these new modern machines could offer to school and classroom teaching with their multimedia capabilities. It would also be an opportunity to highlight some of the difficulties found in operating some of these 'high tech' machines! Although we were lucky to be one of the first Junior schools in Northamptonshire to obtain one of these machines, by now many schools within the county are beginning to order and receive them.

Danesholme Junior School is a Grant Maintained school in Corby. There are 15 classes in the school and each classroom contains a computer. The types of machine in the various classes range from the very basic RM Nimbus PC-186 processor to the impressive RM Nimbus 486/25sx processor. The latter machine suddenly brought a whole new meaning to the words 'speed', 'efficiency' and 'flexibility' in school computing. The introduction of Windows and the various applications on offer to schools using powerful PC machines has meant that at least one individual on the staff (usually the IT coordinator) has had to become familiar with the system in order to maintain and manage the hard disc and install new programs. This can be a very time-consuming job as well as teaching a class of Year 4 children!

I was pleased to learn that a new CD-ROM machine was being delivered and that it would be running through Windows on the RM Nimbus 486/25sx processor. The machine itself is the same as the other 486 machines except that it has an internal CD drive system built into the front of the computer, alongside the 'A' drive. This in itself makes it more compact than an external drive system. Compared to the PC-186 machines the PC-486 is extremely quick and has a huge memory capacity, of varying sizes, but this one is approximately 170 megabytes. Loading, saving and printing take place at a much higher speed and this saves time when operating these machines in the classroom. The high resolution (Super VGA) screens give excellent graphics and colour definition.

The new machine arrived in May 1993, and the first dilemma was the actual positioning of the computer within the school. The obvious place was the school library; this would enable the whole school to benefit from the new technology. The CD-ROM could then be used as a library resource

and the children could use the encyclopaedia program to search for any information related to their studies. The only real drawback with this machine was that we only had one of them! This meant that sharing could have been a problem. To encourage use of the machine, certain members of staff were briefed on the basic procedures to follow when using the CD-ROM and they were allotted times when they could take their whole class into the library and work through some of the programs to familiarise their children with them. Once the children were confident in their use of the machine, it would be easier for them to look up information more independently. Fortunately we have since been able to purchase a second machine which will be sited in a classroom, for a short period of time, before being rotated around the rest of the school. This will ensure that all children will be able to work on the machine on a regular basis.

The programs themselves are now very easy to install and fortunately the other members of the staff do not need an in-depth knowledge of the workings of the Windows system in order to run the programs. They are all icon driven and a simple 'double-click' on the correct icon will load and run the CD programs. Installation usually involves loading a floppy disc into the A drive and something as easy as typing 'setup' will begin the installation process. The machine will then take you through a question-and-answer, or yes-and-no procedure until the program is fully installed. The installation disc will often provide you with a custom-made icon to put into your program groups! This can all be performed fairly quickly by the IT coordinator, and then the other members of staff just have to load the CD into the cassette holder and 'click' on the correct icon when they want to load up a program.

When the children come to use the computer for themselves it is very important to tell them that if they get into any difficulty whatsoever to notify the teachers. I have found that it is very difficult indeed for the children to crash the programs that we have on compact disc and the majority of the software is very user friendly. Some of the early software was rather basic and temperamental (and expensive) but the later software publications are very good quality and easy to use. Many of the programs are 'mouse driven' and this enables the children to work through them swiftly and confidently. The main problem that I have encountered with the CD-ROM machine occurs when the children, for some reason or other, have come out of the CD application and

found themselves in the middle of the Windows application. This may be the result of the child accidentally exiting the CD application. The main problem starts here! If the child notifies the teacher immediately then it is relatively easy to restart the program. If, however, the children decide to try and restart the program on their own then they can start to do some damage to the hard disc. What does a Junior school child think, when faced with something as complex as the 3.1 Windows application? 'Lots of nice pictures that move about and do things when you click on them!' or 'Things that suddenly appear on the screen and make something else disappear when you press something!' Junior school children are encouraged continually to think for themselves and experiment, and that is exactly what they do! I find that having the Windows system in school provides excellent opportunities for the staff and children, and it is a very efficient way of managing computer programs, but great care must be taken to ensure that the children respect the complexity of the system as well.

The problems highlighted above can be solved with relative ease by installing a protection system. This can work in several ways. A system such as *Window Box* can be tape-streamed into the computer before it is delivered to the school. This system allows either the pupil (user) or the teacher entry into the Windows section. Entering as a pupil, the icon options put up on the VDU are limited only to those programs that the teacher wishes the child to see and operate. If entering as a teacher, a password has to be typed in correctly and verified by the machine before progressing through to the 'complete' program manager setup in Windows. The system we chose for our machines was very similar. Entitled *Alan's Front End Protection System*, it works in roughly the same way, either allowing pupil entry to a restricted program manager or, via a password, access into the teacher's section and once again a complete program manager. By installing a protection system it ensures that any programs that you wish to safeguard, or keep well away from the children, are out of harm's way, and if the children, for some reason, do come out of the CD application then only minimal disruption can occur.

Rather than being put off these machines by some of the problems that can arise, it is only fair now to highlight some of the huge benefits a CD-ROM machine can bring to the children within a Junior school. It is important that your machine is fitted with a sound blaster card to take full advantage of the audio capabilities of the disc programs. Sound is as much an integral part of these programs as is the viewing, and if the computer lacks the ability to reproduce the digital sound then many of the programs will only be half as attractive to the children. The children are absolutely fascinated by some of the programs which we have on disc. One program which we acquired when we first purchased the

machine was the *Mammals* program – a multimedia encyclopaedia from the National Geographic Society. This remarkable program has a dictionary of many animals. As well as pictures and technical information on all of the animals, because of the huge memory space on the disc, the program also contains moving video film and actual animal sounds both digitised and ready for playback at the touch of a button. In short it is only the real animals that are missing from the classroom! This is common to many of the disc programs on offer and gives the children a wealth of experiences and allows them to play a far more interactive role with each of the programs that they are working through.

The *Hutchinson Encyclopaedia* by Attica Cybernetics is one of many very detailed encyclopaedias which enable the children to look up events, places or people in history very quickly. The information is accurate and concise and it is possible to obtain links with other historical events and proceed through a historical trail. There are also programs to help the children with their reading. They are completely interactive and make the books the children are reading come alive.

As a teacher, I find one of the main benefits of these programs is that the majority of the information that the children look up is easily printed out directly onto paper through one of our standard Citizen printers. This means that children can look up the information they require, print it out, and then take it away to work on and let another set of children use the machine, rather than tie up the machine themselves.

The price of the CD programs may vary greatly, from thousands of pounds to somewhere around the £25 mark. On average a very good educational CD program may cost around £50 plus. As with all new ideas the initial cost is quite high but over the last year the programs have come down in price considerably. Let's hope things can only get cheaper! Certainly the quality of the later CD programs has improved tremendously as compared to the earlier ones. It is still important to have a chance to 'play' with a certain program, if possible, before purchasing a piece of software, in order to make sure that it is exactly what the school needs. With prices as they are it is wise to choose carefully and plan the choice of programs you need. Teachers themselves may use the machine to do research and with a whole set of encyclopaedias on one disc costing about £50 it can even be a saving of money and space!

I think that it is vitally important that teachers remain familiar with the leaps and bounds of technology, especially within the information technology field. Multimedia machines are here to stay and I wish any teacher who manages to obtain one of these machines many hours of fun and fascination.

A book has a front, a middle and an end — a CD-ROM goes round and round

Dr Jon Coupland

CITE (Centre for Information Technology in Education), College of St Mark & St John, Plymouth

During 1992 and 1993 tutors in Initial Teacher Education took part in a national scheme to explore the use of CD-ROM in education. All those taking part produced a report. These reports have been collated and are being published by NCET in a booklet called *CD-ROM in Education – The ITE Scheme*.¹

The reports indicate lots of exciting potential for CD-ROM to help pupils learn. They also identify areas that may be of concern when introducing this new technology in schools. As most people have found, once the equipment is up and running in schools, teachers and pupils have few difficulties in interrogating the discs. Primary pupils find it easy to press the buttons and click on the icons to get information from the disc. However it was frequently found that the pupils did not have the necessary information skills to make effective use of the technology. It raises one of the conundrums of information handling:

You have to know what you are looking for before
you can find it
or

Whatever you find is by definition what you were
looking for.

Columbus must have faced similar problems!

If pupils do not have the necessary information skills, how are they going to acquire them? Some will argue that they will naturally develop these skills as they have more and more access to information systems, others will argue that their use of systems such as CD-ROM needs to be carefully structured so that they develop and practise the skills, while others might argue that these are general learning skills that need to be planned into the curriculum. At the time there were few CD-ROMs specifically designed for schools, let alone primary schools. We can expect the CD-ROMs designed for primary schools to have navigation systems and language tuned to the needs and capabilities of primary pupils – and teachers.

Teachers were found to have high expectations of CD-ROM materials. They expect them to be colourful, have high quality sound, high definition still and moving images and interactive animation.

At times they were disappointed at finding CD-

ROMs containing factual errors, spelling mistakes, inconsistencies in the way information is presented and some discs that pupils found plain boring. The message must be, as with all teaching and learning materials, to try things out before buying them, to carefully read reviews in magazines and newspapers and to take every opportunity to talk to fellow teachers to find out what works.

An intriguing area considered by the ITE tutors was the subtle differences between what the disc is in terms of content and structure and what the user perceives the disc to be. Many discs around are based on book materials and try to copy the structure of the book – for example, encyclopaedias and dictionaries. However, a newspaper CD-ROM is very different from a real newspaper, being a collection of news articles without access to the pages as they are displayed with all their built-in information of headlines, advertisements and sports results. It is suggested that if the CD-ROM does not present a clear model of its organisation the user will invent one which may or may not be appropriate.

Quite often it was found that the pupils readily compensated for what some would see as inadequacies in the CD-ROM materials. Many pupils were not concerned at the Americanisms of some discs and even found it extended their knowledge, for example, that in America ladybirds are called ladybugs. Other pupils, finding that they could not cut and paste information from the CD-ROM, settled down to copy out what they considered to be the main points.

CD-ROMs are still scarce resources in schools and location is a key aspect of success. As an information source often a good location is in a library area, particularly if there is someone around to help if there are any difficulties. With the increasing number of titles becoming available it seems that primary teachers will soon need ready access to CD-ROMs both in the classroom and in library areas. Not surprisingly, a remarkably ineffective location for a CD-ROM is securely locked away with the computer in a cupboard.

CD-ROM, in common with general IT use in schools, raises key issues concerning gender and the role of the teacher. When using CD-ROMs

there seemed to be a tendency for the boys to direct the activity by being keen to make quick decisions like 'We want to go there!', with the girls preferring a more strategic approach. CD-ROM also furthers the shift in the role of the teacher from a provider of information to a facilitator of access to information.

For many people the scarcity of CD-ROM drives in primary schools will take them back to the days when primary schools had only one computer. Some argued that there was nothing useful that could be done with one computer, while others went ahead and did things. Outside schools, CD-ROMs are becoming a *de facto* standard for the economical delivery of large amounts of textual and visual information. In schools we will have the benefits of both being able to select carefully from the mass of CD-ROMs made for the business and leisure industries, as well as exploiting those CD-ROMs developed especially for schools.

The Initial Teacher Education tutors found uses for CD-ROM in many curriculum areas. Art CD-ROMs, although not an alternative to seeing original works of art, enable pupils to browse among pictures from galleries around the world. In Eng-

lish, CD-ROM provides lots of source materials and with the advent of systems such as talking books provides yet another method by which pupils can be encouraged and supported in their reading. There is a wealth of written, diagrammatic and pictorial information available on CD-ROM to help the teaching of geography. CD-ROM grew from the now familiar music CD and, with the added benefit of interaction, will offer many new possibilities for pupils learning and enjoying music. Since the reports were completed, many more CD-ROMs have been produced providing exciting resources for history, mathematics etc.

Although the use of CD-ROM in primary schools is not without its problems the future seems very rosy for CD-ROM in radically extending the range of learning opportunities that can be offered to primary pupils.

References

1. *CD-ROM in Education – The ITE Scheme* is published by NCET, Milburn Hill Road, Science Park, Coventry CV4 7JJ; Tel 0203 416994.

And Cinderella shall go to the ball . . .

André Wagstaff

NCET Primary CD-ROM Project Director

Like all good primary teachers I both used to look forward to Christmas – all those shining eyes and candlelight – and yet recognised it to be the great stress creator of the school's year (I still shudder when I think of that pantomime horse heading off in two directions across the stage). But that was some time ago. Today the anticipatory antennae begin to twitch around February. For this is the month when IT-related projects can get started at the wave of a fairy wand. In past years we have seen schemes which put interactive video equipment into schools, and portable computers into the hands of pupils. All too often the lions' share seemed to be devoted to the secondary phase. Like Cinderella we in primary sat amongst the ashes, hoping that one day our turn would come.

Well this year the fairy godmother has really delivered the goods. On 11th February 1994 Eric Forth announced that the DfE would be spending £4.5 million on an initiative which would provide a significant number of primary schools with CD-ROM based equipment and titles. Now whenever you hear such announcements you should

ask first of all 'Why is this happening?' Secondly, 'Is there any catch?'

This initiative was launched because it was judged that CD-ROM technology had reached a stage of development when primary schools could give serious consideration to the potential contribution it could make towards better learning.

Intrinsically, CD-ROM technology allows the storage of really large quantities of information; the potential it offers for information to be searched, accessed and retrieved poses an exciting challenge for classroom practice. Moreover, because the information is stored digitally, there is no practical limitation on the kind of information or its mix – words, still and moving images, sound – all are interchangeable. Finally, although gathering, assembling the material and designing a particular CD-ROM product is a serious exercise, the actual cost of reproduction and distribution are tiny compared with more conventional media such as paper.

We should look upon these silver discs as one of the keys for children's future learning, with the children of tomorrow carrying whole libraries in

their satchels. Right now, they offer the potential to augment significantly schools' ability to deliver a rich, high-quality set of educational experiences and materials.

Primary schools present a particular set of challenges. First, they are more numerous and more varied in their characteristics than secondary schools. Second, the range of ability within any one class is likely to be greater than at any other phase of education. Third, teaching is conducted on the whole by generalists rather than subject specialists. Fourth, ownership of equipment tends to be a whole-school rather than a departmental matter.

Preliminary work carried out by the NCET indicated that the most motivating CD-ROM materials were precisely those – high quality, extensive and appealing admixtures of text, pictures and sound – which are so challenging to develop in the first instance. We have evidence that where these are currently under development, they are intended for use in the home. Commercial publishers hesitate to produce school-curriculum-specific titles; schools hesitate to purchase the necessary equipment. NCET believed that an initiative was called for which would encourage publishers to embark on the development of a sensible body of CD-ROM titles. It would achieve this by equipping a significant number of primary schools with complete CD-ROM computer systems together with a representative sample of titles.

So much for the reasons why. But where was the catch? Quite simply, it lay in the fact that all the purchasing had to be done in time for schools to start receiving the equipment and titles from the start of the 1994 Summer term. In order to accomplish this we had to plan a project which would compress all necessary stages within an overall time constraint of 34 working days. How did we spend that time?

Well, first of all NCET asked all LEAs to state their preferences for types of computer system. Next, we evaluated more than 30 different computer systems and over 200 CD-ROM titles for suitability. This was a mammoth task that saw people working hours that would have pit ponies coming out on sympathetic strike, but it was worth it to ensure that schools got the kind of quality support they deserve.

Currently, schools are being selected by the LEAs, using criteria of their own devising. The list of schools is to be submitted to NCET by 30th March. GM schools were selected by their funding committee.

And what, you might ask, will they be getting? Each nominated school will receive:

- a complete CD-ROM computer system (Acorn 5000, Apple LC475 or RM486)
- a compendium of titles
- installation and set up

- two hours demonstration of titles
- hot line support from suppliers
- the usual warranties
- guidance documents
- general support

As this is a 100% funded initiative, no school is having to contribute any money towards either equipment or titles. These become the property of the school on delivery.

Naturally, schools will be anxious to know what further support is available. Well, there is a GEST funding of some £22 million available to LEAs next year. They have a great deal of choice in how best to deploy it. They might, for example, choose to purchase further titles, or to provide support for school INSET. The funds are there – LEAs are encouraged to use them to their best advantage.

There is bound to be a lot of interest in the kind of CD-ROM titles chosen to accompany the equipment. Titles were chosen using teams of evaluators recruited via NAACE, MAPE, OFSTED etc. These worked in pairs to common criteria issued as part of the technical specifications to potential suppliers.

These were the criteria:

- Adequacy of content and coverage
- Appropriateness to the National Curriculum
- Appropriateness of reading age
- Suitability of interface design, clarity of presentation, degree of interactivity, extent of additional facilities
- Appropriateness of support materials
- Overall quality of title

NCET considered over 200 titles. The majority of these reviews will form the heart of guidance documentation which will be supplied to all schools in the initiative to help them make future purchasing decisions.

By now you might be wondering whether your school will be part of this initiative, and if not, feeling that there's little here for you. Not so. Over the next 12 months NCET will:

- appoint a field officer
- collect evidence of successful use of titles
- monitor the development of support materials
- help in the process of refining classroom materials
- organise an evaluation of the use of CD-ROM in primary schools

So, in the end, all of our primary schools will feel some benefit from this project. Quite simply, it is the largest project of its size in the world. That's something to feel proud of. Best of all, it's an opportunity for primary schools to show that they can make use of the very latest in Information Technology. And that is no fairy story.

The TERU Project

Multimedia in the primary classroom

Jacquie Disney

Technology Education Research Unit, Goldsmith's College, London

The ability to integrate text, sound, pictures and film to create classroom resources was something I had long been waiting for as a teacher. The Macintosh computer has been offering such facilities for a long time but it is only recently that I have discovered the ease with which it is now possible to access and even create full-colour multimedia resources for the primary classroom.

Over the last five years I have found myself moving more and more towards the Mac, simply because it is so much more accessible than any other computer system I have ever used. Before I knew it I was integrating media by creating resources which incorporated text and graphics with remarkable ease. Within a very short period of time I realised that I could just as easily add sound by using the microphone which comes with all Macintosh computers. To my amazement sound files can be copied, cut and pasted in exactly the same way as pictures or text. This meant that there was nothing new to learn and unlike most other computers there was nothing new to buy or add. My only challenge was how I was going to make best use of this new-found resource within the classroom.

I was quite happy for a while, as I slowly developed my understanding of the techniques and issues involved. I had managed to create one or two very useful *HyperCard* stacks and, far more excitingly, the children were doing the same. One of the best examples was a database created in *HyperCard* during a topic which incorporated information about themselves and their families. Along with their personal data, the children were able to include photographs of themselves and their family, sound recordings which ranged from favourite music to clips of interviews, scanned samples of their best work and details relating to their interests. More recently, with a reception class, we documented their trip to the local city farm using *KidPix*. Their illustrated essay incorporated pictures about the day's visit with text and sound captions which we combined as a slide show using *KidPix Companion*. Within a very short period of time we had created their own personal talking story book of the visit. The book is now part of the class library resources and the children often refer to it.

Within the last two years my role has changed, as has the influence of Macintosh computers in education. I have started to work with other teachers who are just starting to use Macs. I hadn't really noticed the extent to which things had changed until I started this work. It has made me realise that new computer users are stepping straight into a world where multimedia is well established; where text, graphics, sound and video can be copied and pasted into almost any Macintosh application whether they be the main industry standard packages, specific 'authoring' software or solutions created specifically for the primary classroom.

Now I find myself introducing the Macintosh to teachers and children who have little or no computing experience and within no time at all they are consumed by an excitement which reflects my own. They soon discover how easy it is to create a full-colour reading story book or how easily resources on CD-ROM can present their selected information through text, sound files, video clips, graphics and animation. They do not have to suffer the slow and painful progression from the early low-specification computers that many of us have had to deal with. They are in an era when integrating media is almost the norm, simply because the technology makes it so easy.

The great stimulus for me is the steady introduction of good quality educational solutions for the Mac. Many have been specifically designed for the primary classroom and naturally take advantage of the ease with which different media can be integrated. Not only do we have access to information on CD-ROM but these can now act as a stimulus for creating our own resources through the use of excellent tools such as *HyperStudio*, *Storybook Theatre*, *Storybook Weaver*, *ClarisWorks*, *KidPix* and *KidPix Companion*, to name but a few.

Through the use of such software we can enhance children's learning by giving them the opportunity to access resources which are not only relevant but which make learning come to life. This can be in the form of 'resources files' which contain relevant references which the teacher has gathered for particular topics including clips of text, images, video and sound. Children can then

simply copy and paste these into their work to support or enhance their writing. Equally, these tools can provide children with the challenge of creating their own multimedia presentation as an alternative method of developing and presenting their learning.

It is evident that multimedia is here to stay and is

a vehicle which we must learn to use as a means of enriching the learning process. It enables children to produce high quality results, provides an environment which they find exciting and challenging and is in line with a style of presentation which is very much an established part of their culture.

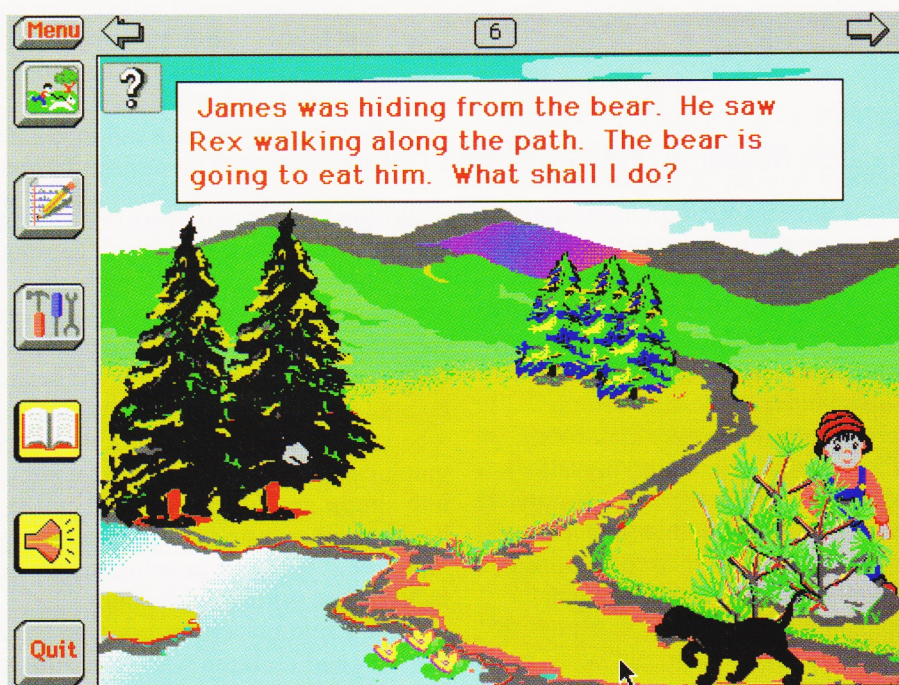


Figure 1 Storybook Theatre – Children can build their own interactive stories using a host of props, backdrops, animated characters and sound effects.

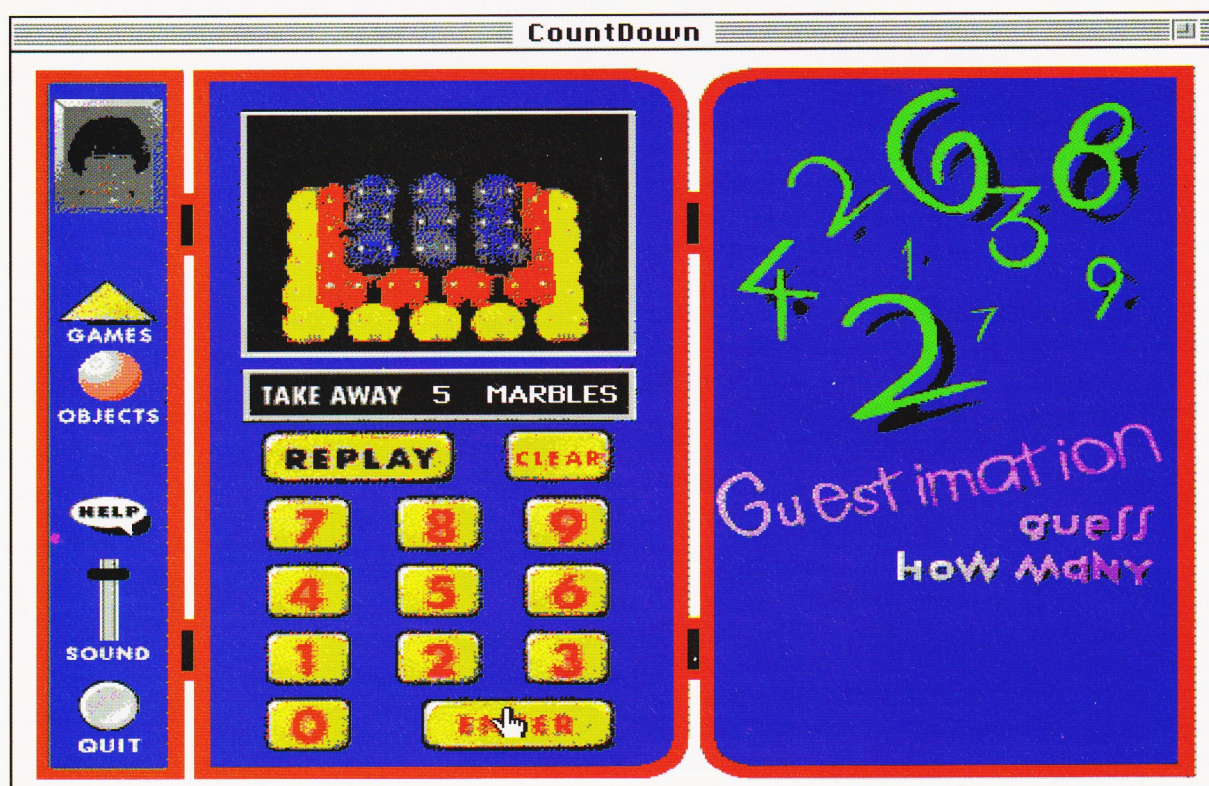


Figure 2 Countdown 2 – An exciting new maths CD which uses video and animated sequences to show children the effects of their estimates on screen.

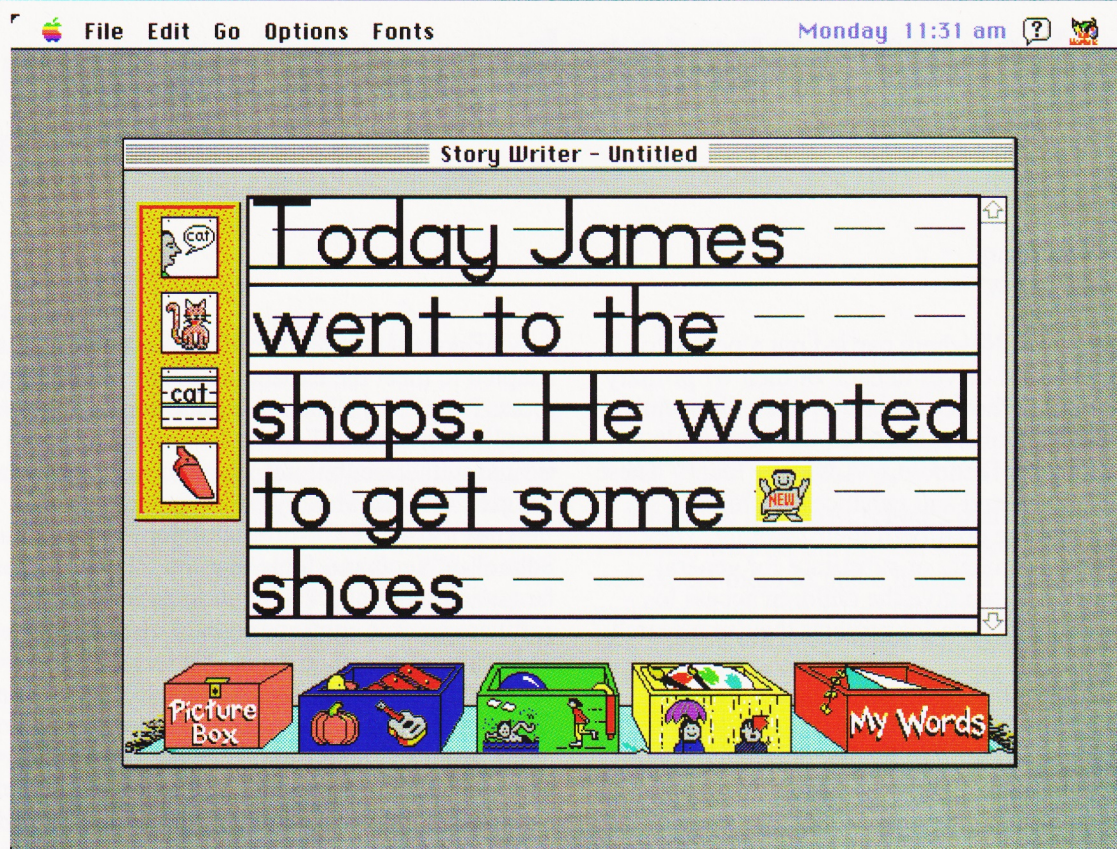


Figure 3 KidWorks 2 – Children can create and illustrate their own stories which can then be read back to them by the speaking word processor. A wonderfully motivating tool for early writing.



Figure 4 KidPix – Part of a series of paintings created by a reception class which made us their own reading story book of their visit to the local city farm.

The Newham approach

Martin Newman
Freelance writer

In January 1994 Newham carried out a policy to supply CD-ROM drives in each of their 67 primary schools. 'Our authority has always been innovative,' admits Viv McDonald, leader of the Borough's Information and Technology Advisory Team. 'These facilities will extend and enhance the children's education and the quality of their learning. They're not meant to dominate or substitute for general education. They can give the children access to larger amounts of data for projects they're researching.'

'Along with the CD-ROM drive we've given them an Acorn Directory, *Granny's Garden*, *Maths in Motion* and *Acorn Replay*. We hope each school will invest in more CD discs of their own.'

Viv is presently carrying out another stage of the borough's policy, running training sessions for the IT co-ordinators so they can learn to use the CD-ROM drives that have been installed. Next term she'll be offering open sessions for teachers in the evenings, and in-service training at various venues the following term.

Adam Williams, IT Co-ordinator at Ellen Wilkinson Primary School, is happy about this most recent move forward by the borough. 'CD-ROM looks to be the future, as we should be able to have the ability to write our own programs onto CD-ROM very shortly. It is already possible for us to load our own photos with the use of *Photo CD*. The *Magpie* software allows children to use multimedia to complete their topic work – forging together words, pictures, sound and recordings of the kids' voices and playing it all back again with moving images – and in the future CD-ROMs will make this even more adaptable and powerful.'

'The skills that the children learn in this process are astronomical – the manipulation of data, sorting, sizing, shaping, learning how different sounds work together, understanding how much memory is needed, learning to think carefully and exercise forward planning.'

Adam identifies a need to channel the enthusiasm that children have for computers into sound educational areas which they can benefit from in the future: 'Having a bank of multimedia programs shouldn't be the be-all and end-all. Technology is

only as good as the teacher using it and how it is adapted to meet the expanding needs of the classroom. People from the top authorities right on down should realise that IT is the future – it needs to be treated with care, but not suspicion, as a valuable addition to what already exists in education.'

Andy Bush, IT Co-ordinator for Portway Junior School in Newham, feels that the CD-ROM has fantastic potential for education as long as the software houses continue to back the schools with new programs.

'We need a primary encyclopaedia on CD with film and sound – an all-singing and dancing micropedia to make full use of the CD-ROM potential. Moving graphics and animated screens can make schoolwork more enticing and exciting.'

'It's not because books are going out of fashion; putting information on the screen can give the children a different approach to information, which starts to take on a different dimension. Often you can tell pupils about something and they forget it. Put them in front of a computer, let them see the information, and they're less likely to forget it.'

Andy plans to try a whole range of projects with CD-ROM, for example, putting the sounds and sights of Tudor England together for history lessons and working with clips of sound in the study of music.

'I want the pupils to realise that the computer is a machine that doesn't have a brain, but that it will do what they command it to do. They should learn to use a computer as easily as they use a pencil. For the most part that's happening, because children are flexible and seem to pick up the skills as they go along. The CD-ROM is very popular with kids and some have even been asking me if they could use it at home.'

The London Borough of Newham has no trouble justifying its investment in new technology for primary schools. Viv McDonald explains, 'The basic future needs of our pupils can be summed up in one word, and that's adaptability. To accomplish this they need the broadest spectrum of experience possible to prepare them for a society in which computers are more and more a natural and unassuming part of their environment.'

An Interim Report on The Berkshire Pilot Project

Chris Robson

Adviser/Inspector for IT, Berkshire LEA

In 1991–2, six Berkshire secondary schools took part in the national pilot project to evaluate CD-ROM. Many useful things were learned during the year and we continued to find new and exciting ways of developing its use in 92–93, when all our secondary schools were equipped with CD-ROM through the IT in Schools GEST scheme. At the same time, I began, together with colleagues from NAACE (National Association of Advisers for Computers in Education) and MAPE, to talk about the possibilities which this technology could open up in primary schools, if only there were CDs which ‘fitted’ into the primary school curriculum. At the RESOURCE Conference in November 1992, I at last found what I’d been looking for, when I saw a demonstration of *Frontier 2000* which runs on the Acorn Archimedes with which Berkshire primary schools are equipped.

With strong support from the members of the Berkshire IT Team, I decided to initiate a small pilot project which was planned to run from March–December 1993. After consultation with colleagues, five primary and one special school were invited to join the project. All accepted the invitation enthusiastically and received an A5000, CD-ROM drive, copies of *Frontier 2000* and *Creepy Crawlies* and a brief introduction to both the hardware and software. They were asked to spend the second half of the spring term familiarising themselves with the materials and to return at the end of March to plan the summer term’s work in more detail.

The aims of our project were:

- To evaluate the usefulness of CD-ROM in primary and special school environments;
- to evaluate the contribution of CD-ROM resources to the primary and special school curriculum, to support:
 - subject teaching;
 - topic work;
 - cross-curricular themes.
- to assess the implications for management, resourcing, organisation and technical support;
- to produce curriculum materials to complement the use of *Frontier 2000* and *Creepy Crawlies*;

- to produce broad guidance for primary and special school both locally and nationally about the issues surrounding CD-ROM.

Knowing that most schools plan several terms in advance, we told the project schools that we did not expect them to make dramatic changes to existing plans, but asked them to incorporate the two CDs in whatever ways they could, to fulfil our aims. We were prepared to see six very different projects and were not disappointed in any of them; all used both programs in some way and the following extracts are from three of the schools. The full evaluation report will be available in July.

1. Lowbrook Primary School

Lowbrook Primary School, on the outskirts of Maidenhead has approximately 180 pupils. The headteacher, Alan Harding, spent a year working as an advisory teacher for IT in 1988–89.

Creepy Crawlies: 1

Alan Harding, Headteacher

Introduction

The chance to use a CD-ROM at Lowbrook was a very welcome one. The children had a fair amount of experience in using the Archimedes through a variety of programs: *PenDown*, *First Paint*, *Grasshopper*, *Revelation*. They also have access to a scanner and midi-interface. Therefore, I was keen to extend their experience into an exciting new area. All teachers encourage the children to use the computers that we have, but themselves have varying degrees of confidence. They are all, however, keen to develop the use of computers in the school and their own skills in using them.

I installed *PenDown* and *Revelation* on the computer and it was placed in the library, in the middle of our open plan building. The children have easy access to the library and it is an area where they are encouraged to work independently. We felt that the CD ROM would fit in well with

our existing plans to develop the children's library and reference skills.

Our project work

The first group of children to use the system were Y3/Y4 children who were already working on mini-beasts, so this disc fitted well with our plans. After a short demonstration, the children were unleashed on the machine and could often be seen using the disc both before or after school; they had little difficulty in operating the disc and finding their way around. Initially, they were encouraged to use the system as a reference device. The children would go to the machine armed with a notebook and then look at a screen page and make notes or sketches to incorporate in work that they were doing away from the computer. Once they were shown how to operate the printer drivers and our Tesco Bubble-jet, they were able to print a picture or even some text to paste into a file or onto a display. I explained that they could save the files (text or pictures) and then take them to other computers and add to them and print them. However, this concept proved rather difficult for most of the children at their present stage of IT development, and is something that we have built into our revised IT policy; in this way, children will acquire the necessary skills early enough so that when they use the CD-ROM system, they will have the IT knowledge to best take advantage of its power. There is no doubt in my mind that the ability to take text/pictures from discs to use in work is a very useful facility, and will be an essential skill as the children have more and more access

to computers. It marks the boundary where IT and reference skills overlap, and we need to build in opportunities for the children to learn and develop these competences.

Conclusion

Creepy Crawlies demonstrated the possibilities for one particular use of CD-ROM – as a reference tool that supports the children's curriculum work. For this to be developed further in primary schools, teachers and children need access to suitable discs covering a wide variety of curriculum areas, and supporting a range of teaching strategies.

2. Holyport Manor School

Holyport Manor School is an all-age special school for pupils with a range of moderate and severe learning difficulties. Two teachers, Sue Segger and Marianne Jewell were involved in the project.

Creepy Crawlies: 2

Sue Segger, Holyport Manor School

Introduction

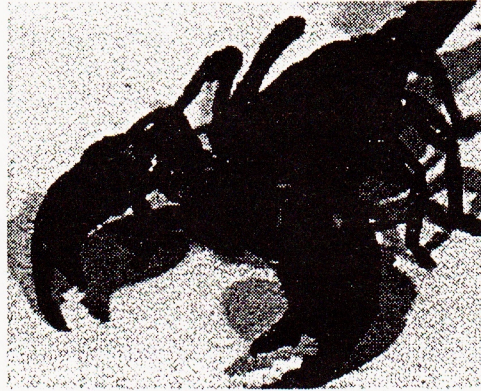
We decided initially to site the CD-ROM in our technology area where there are two other Archimedes. Our Middle School pupils pass through this area going to and from lessons and to the playground, and so the new system would be on display to a large number of pupils. This strategy paid off. When groups of pupils were working

Black Scorpion

**Black Scorpions live in hot places.
They eat insects and spiders at night.
They catch their food with long pincers.
Then they sting it with their
tail to keep it still.
You can see Black
Scorpions moving
in the film.**



Figure 1 *Word processing including a CD-ROM image.*



Black Scorpion

Vejovis Spinigerus

Scorpions are less common than spiders. They live mainly in hot tropical countries, and feed at night on insects and spiders. Scorpions catch their prey with their strong pincers - they sting their victim to immobilize it, and can move very rapidly as you can see in the video sequence.

Although scorpions can kill, most do not have a sting that is dangerous to man, but they have a habit of living in houses and crawling into beds, shoes and under carpets.

Figure 2 Word processing including a CD-ROM image.

with the CD, there was usually a crowd of interested onlookers who picked up a lot of hints just by looking. Consequently, when pupils began to use the programs as part of lessons, some of them had a certain amount of skill already. We agreed, as a staff, that it could be moved, by mutual agreement, to other classrooms or areas as teachers wanted to use it. We also decided that when any member of staff wanted to use either *Creepy Crawlies* or *Frontier 2000* as part of a module of work, the system should be moved to their room for an agreed period of time. This was done very successfully by Marianne Jewell as part of work on the Romans. (Editor's note: Marianne's work on *Frontier 2000* will appear in a future issue of *MICRO-SCOPE*.)

Our project work

As I teach science, I decided to target Year 10, using *Creepy Crawlies*. The topic being taught was Animal Categories and Habitats (AT2) for which there is already a module of work. Because of the reading and writing difficulties experienced by many of our pupils, all the work has

differentiated outcomes and so differentiated tasks and worksheets are produced as a matter of course. *Creepy Crawlies*, with the additional worksheets I produced, proved to be a valuable resource in this module and one which provided extra motivation for the pupils.

The lessons were planned over six weeks, of which pupils would spend about three using the CD-ROM. There were various activities which included:

- finding out in depth about one creature – food, habitat, description etc.;
- learning about groups of creatures with a common theme and carrying out information searches – eg comparing snakes/butterflies/desert creatures;
- pond dipping our school pond, bringing back specimens, looking for them on video or still pictures, and then finding out about them and recording the information;
- saving information on disc; groups of pupils were given their own discs on which to save their pictures and written information. This was printed out and pupils were able to use it as part of their recorded work.

Name _____ Class _____
Date _____

SEARCHING CREEPY CRAWLIES

You are going to be finding out about

_____.

Look for 3 different ones.

The ones I am going to look at are:

How are they all the SAME?

How are they DIFFERENT?

Write about ONE of them.

Save pictures of all of them.

Save the writing about all of them.

Move these pictures and writing onto PHASES. Take care that you organise them neatly onto the pages. Print them.

Figure 3 Proforma to aid recording.

The ease with which they became familiar with both the hardware and software was absolutely brilliant. I was careful about the grouping of pupils and usually put together a reader, a pupil with IT confidence and one other. Because many of our pupils have reading difficulties which have caused them to 'fail' in the past, many of them are not interested in finding information. *Creepy Crawlies* allows you to select either KS1 or KS2 text on screen and also contains spoken information; these two facilities really inspired some poor readers. By reading, listening and watching, the pupils were able to get much more information independently than they normally do. They also remembered how to use the system from week to week, and were able to show other pupils how to use it too.

Helping pupils to access the CD-ROM

As well as direct pupil demonstrations (formal, in class) the cascade method of teaching by motivated pupils was useful. They picked up how to use the hardware, the skills needed and became familiar with the programs quite quickly; I was able to use these pupils as 'teachers' quite successfully.

I made simple proformas to aid recording – nothing fancy – just a straightforward, logical way of recording simple information that would enable pupils to access the programs (Figure 3).

I also produced my own step-by-step instructions for both programs, colour coded them and put them on a notice board above the workstation. When Marianne prepared her module of work, her step-by-step instructions were much better than mine, and so have superseded them.

Additional benefits

Other software, including *Phases*, *PenDown*, *First Paint* and *Data Sweet* was installed on the hard disc, and this, used in conjunction with the CD, has proved to be most valuable. Pupils from Year 7 onwards were able to save an image from the CD-ROM and include it in a piece of word-processed work (Figures 1 and 2). We also had access to a variety of fonts, and some of the work they produced was excellent. A major benefit therefore of using the CD and hard disc is that IT skills and confidence have improved enormously for both pupils and staff. We are learning about the power of IT first hand.

Conclusion

My own class group now use both *Creepy Crawlies* and *Frontier 2000* whenever they can – breaks, lunchtimes and tutorials if I can be

persuaded to let them! They have realised the need for some recorded work as they go along, and have generally made use of pens and paper that I have put around the workstation. Their discussions have been interesting to hear – comments like 'Yuk - look at that', 'Do you get them creatures over here?' and 'We've got one of those in our garden' – 'Don't be stupid – it's a scorpion!' Their self-confidence and pride in their achievements has been an unexpected but thrilling by-product of the project.

In conclusion, I feel that, given carefully selected discs, with simple language, differentiated text and the listening facility, CD-ROM will be a most valuable tool in the teaching of special needs pupils.

3. Cranbourne Primary School

Cranbourne Primary School, housed in a Victorian building, is near Windsor and has 112 children on roll. Beth Lofting and Colin Rouse used Frontier 2000 with their Y4, 5 & 6 children.

Frontier 2000

Colin Rouse, Deputy Headteacher

Introduction

We were delighted at having been chosen to participate in the project but somewhat horrified at the prospect of what we had to do! We decided on the following course of action.

First, we decided that, to use the system to its full potential, we needed to 'play' with it ourselves and familiarise ourselves with hardware and software before introducing them to the children. We were already familiar with the Archimedes computer; the software was user-friendly, and apart from having some minor problems with installing printer drivers, we were soon able to find our way around.

Secondly, we had to think about the ways in which we could use it with our children. We were lucky enough to have a planning day, paid for through GEST, and devoted this to planning a project built around *Frontier 2000*.

Thirdly, we needed to think about ways in which we could evaluate the software and the children's effectiveness in using the computer. We decided to produce an evaluation sheet for the children to complete each time they used the computer, a teachers' evaluation sheet and a certificate of competence, (supplied with the software), detailing the computer skills mastered by the children whilst using the software.

Finally, we decided to produce curriculum support materials for our children to use and

children's computer guides to the hardware and software to enable them to become as independent as possible when using the computer. We also produced worksheets and resource pages to help the children when pursuing a line of enquiry and supplementary materials, where appropriate. We also linked the project to National Curriculum statements of attainment for assessment purposes wherever appropriate.

Our project work

The children were first introduced to the hardware all together to give them a taste of its capabilities and then in small groups for 'hands-on' experience. I produced some 'child-friendly' user-guides to help the children to become independent users of the *Frontier 2000* CD-ROM, which were simple and easy step-by-step guides. The children found them useful. There are three guides: *Getting Started*; *Saving and Printing* and *Other Frontier 2000 Options* (see p.48 for details).

Siting the machine was another issue that had to be addressed. Initially, we were going to put it in the library but decided against this for several reasons:

- we wanted an overview of its use and the way in which it was used;
- we wanted some means of assessing its value in the classroom;
- we wanted to be in control of the children working through the trails, offering help and advice where needed.

We decided therefore to site it in an open space within the classroom but used display boards to make it slightly more private for the less confident user.

Preparation

Frontier 2000 comes in an attractive case containing: tapes, postcards, guide books, information books, a video welcoming you to Carlisle and even a piece of Roman timber! We supplemented this basic starter pack with information from a variety of sources.

We produced a nine-week thematic topic pack based around the program which includes: background to the primary pilot; questions to consider; long term planning; nine-week planner; flower chart; an overview – gaining skills and knowledge; short term weekly plans detailing activities and outcomes; student schemes of work for using historical sources; timetables for thematic and computer work; National Curriculum correlations; resources to include sources of information and places to visit; outline map showing Carlisle's

position etc; group work skills sheets; research skills worksheets; presentation skills worksheet; other sources of help sheets; evaluation sheet; a booklist; the three computer guides mentioned earlier; eight children's help packs containing work pages and resource pages with pictures and text. (See examples in Figures 4–6.)

Each group was also given a portfolio box to keep their work in and a floppy disc to save any work they had done. In addition we produced a large scale map of the area, taken from the program and plans of various places such as Carlisle castle and cathedral. We also produced a town plan of Carlisle and pictures of interest taken from the local area.

We wrote to several places for information, including Tullie House in Carlisle, the English Tourist Board and the Border History Museum in Hexham who were particularly helpful in supplying us with information on the 'Reivers', a difficult trail to resource. We also visited the County Library Service at Shire Hall who provided us with some 30-plus books on the trails we had chosen. Although much hard work was undertaken, we felt that with these resources, our thorough forward planning and our confidence in the software package, we were well prepared for this thematic work.

Potential benefits to the children

In our planning, we gave much thought to the factors necessary for the children to have real quality in their learning. We tried to ensure that this quality learning would take place by ensuring that the pupils would:

- respond readily to the challenge of the tasks set;
- understand the purpose of the task;
- concentrate to produce sustained work;
- make progress;
- work in different contexts, using different strategies and tools;
- organise the resources they need, including managing the hardware and software they need through the use of child-friendly user-guides;
- select appropriate ways of working;
- gain a sense of commitment and enjoyment about the tasks and a positive attitude towards them;
- gain a willingness to ask questions where appropriate, but persevere when answers are not readily available;
- readily help each other, if appropriate to solve problems;
- make judgments about their own work;
- learn from their work, both successes and mistakes.

It became apparent while working through the project that most of the children were able to

RECORD OF SHORT TERM INTENT

WEEK; THREE TO EIGHT DATE; 7th JUNE - 16th JULY YRS; 3/4/5/6.

ACTIVITIES:	S.O.A.'s	OUTCOMES:
BONNIE PRINCE CHARLIE.	See National Curriculum Correlations for Attainment covered in the group work sessions.	Investigate the life of Bonnie Prince Charlie, who we was, where he came from, who is parents were etc.
A profile of Bonnie Prince Charlie.		To Investigate his claim to the throne and its effects.
His claim to the throne.		Understanding who the Jacobites were and the reasons for the rebellion.
The Jacobite rebellion.		Looking at the family tree of the House of Stuart and the part individual members had to play.
The Stuart dynasty.		Understand the causes and effects of the Battle of Culloden.
The Battle of Culloden.		To use mapping skills to produce a map of Scotland showing places of historical significance during the time of Bonnie Prince Charlie.
A map of Scotland.		To Investigate the design of tartans and to develop their own design, to include artwork.
Design your own tartan.		To Investigate the life of George 1st and his claim to the throne.
George 1st.		To show pictorially, the escape to Skye and the reasons for this. Investigate Flora MacDonald's li-
The escape to Skye.		

FOR RESOURCES SEE RESOURCE BOOKLET. FOR NATIONAL CURRICULUM CORRELATIONS SEE PLANNING.

PLANNING



CRANBOURNE SCHOOL and

Figures 4 and 5 Teacher's planning sheet and children's information sheet.

BONNIE PRINCE CHARLIE Information sheet

In your pack you will find:

RESOURCES:

Professor Hardwick's famous history trail. Picture of Capon Tree Memorial. Picture of Prince Charlie's House. Picture showing the names of Jacobite prisoners carved on choir stalls. Picture of the plaque above Marks and Spencer, Carlisle town centre.



HELPFUL INFORMATION:

Complete an evaluation sheet each time you use a computer.

Think very carefully about the way in which you are going to present this work to the other groups. Write down your planning of the presentation.

BE IMAGINATIVE!

WHAT YOU NEED TO DO!

Plan a presentation in which you will need to include evidence of study in each of these areas:

Bonnie Prince Charlie - who was he, when was he born, where was he born, who was his father and what was his claim to the throne? (I)

Jacobite News - A newspaper front page about the Jacobite rebellion. (G)

A Family tree of the Stuart dynasty. (G)

An account of the Battle of Culloden. (I)

Produce a map of Scotland showing Culloden, Skye and other places of interest. (G)

Who was George I? What was his claim to the throne? (G)

Draw a picture of Bonnie Prince Charlie and Flora MacDonald escaping to Skye. (G)

(I) means each person has to produce the work and (G) means one item per group.

The work above is only a minimum amount to encourage you in the right direction - Can you find out more?

See if you can become good HISTORY DETECTIVES!



CRANBOURNE SCHOOL and

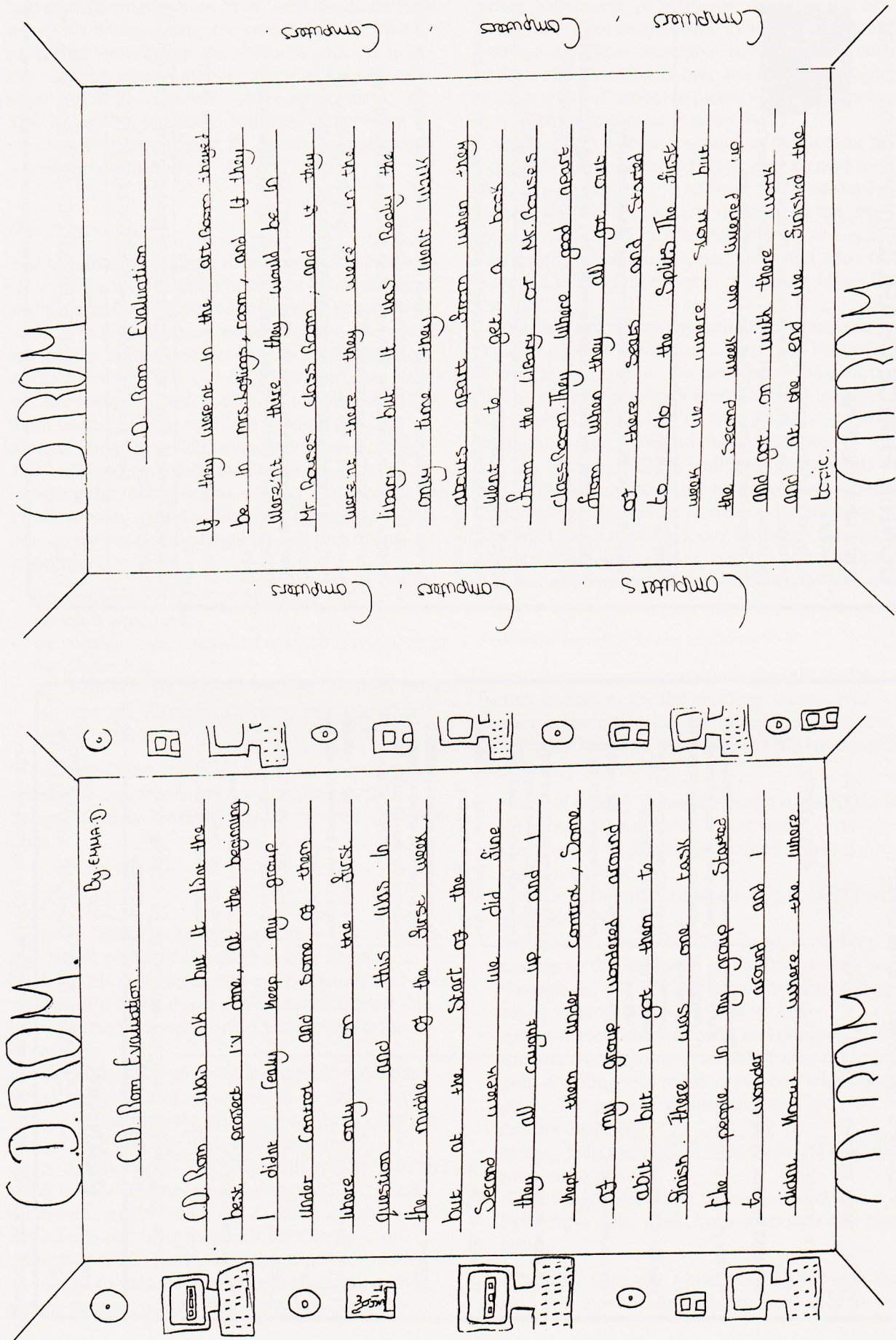


Figure 6

achieve most of the criteria above. CD-ROM provided the stimulus for a lot of work away from the computer which, in turn, allowed the children to see the computer as another resource within the classroom, as an aid to their work. CD-ROM is a very powerful aid indeed, becoming an enabling tool for the development of a wide range of learning and other skills and the multimedia approach provided a additional stimulus to quality learning (see Figure 6).

Considering the children had not worked in this way before, they really developed in this area, producing some excellent work and developing skills and knowledge in a short space of time. I would argue that the presence of the CD-ROM acted as a stimulus for this development because it provided children with the latest available technology which was both exciting and challenging.

Potential benefits to the teacher

CD-ROM provided us with the opportunity to use the latest technology, which was both exciting and challenging. We wanted our children to receive the very best from this equipment and also wanted to convey our enthusiasm to them. Having thought carefully about the best ways in which we could provide motivation and develop quality teaching, we decided that the following factors were (and still are) necessary for our teaching to be most effective:

- careful planning, with clear objectives, direction and progression, intentions and outcomes;
- lesson content which is well structured, well introduced, with good subject knowledge to engage and maintain pupils' interest, and which used various teaching strategies;
- teaching that meets the needs of differing abilities and pupils;
- lessons managed so that teaching style is matched to purpose;
- resources that are appropriate and well organised;
- sensible classroom routines which are understood by everyone;
- a good personal understanding of the subject;
- opportunities for high quality discussion and questioning;
- good ongoing assessments to move pupils on to new work;
- good working relationships between teacher and pupil, and good pupil interaction;
- consideration of our role in facilitating pupils' application to work;
- consideration of our role in facilitating pupils' self-assessment;

- sensitivity to individual needs;
- teacher assessment, both spoken and written, to aid further development;
- the deployment of non-teaching staff within the classroom.

In planning the CD-ROM work within our topic, we hoped to create the right conditions for quality teaching and learning to take place. Other factors that needed to be taken into account, specifically IT-related were:

- the siting of the computer systems;
- the group mix – boys and girls – and the related gender issues of who actually did what;
- timetabling and allowing sufficient time;
- issues of allowing equal access.

Gender Issues

There is some evidence to suggest that girls tend to work collaboratively while boys work competitively. The evaluations, completed during the course of the CD-ROM project uphold this theory. When working individually, the boys generally wanted to finish their work quickly and receive praise for it, while the girls generally wanted to take more time but present a more accurate piece of work. Our evaluations also show that mixed groups were the least effective way of using the computer. It is clear, through careful observation and evaluation that the boys dominated the computer. While they were prepared to listen to the girls' point of view it was the boys who wanted to 'press the buttons' and be in control! When boys worked with boys there was a certain amount of co-operation but, as previously mentioned the element of competition was stronger, which prevented real co-operation between them, but when girls worked together, there was real co-operation and both parties shared the outcome with minimal competition.

When looking towards using CD-ROM in the classroom I would suggest that the following issues need to be thought about, and decisions taken, to use the equipment most effectively:

- look at the way children are grouped, and let them, at times, select their own groups for working on the computer;
- allow single sex, mixed sex and individual access to the computer;
- look at the positioning of the computer. (Is it positioned so that some children can work in privacy and share their work when ready to do so?);
- let less confident children of both sexes have time to experiment and explore ideas without fear of 'making mistakes';
- look at software for 'bias';

- try to continue these attitudes into other activities;
- raise expectations, when using the computer, of both sexes.

There are no easy answers! We decided to allow the children, with some teacher intervention, to choose their own working groups; this was mainly successful!

The Way Forward

With the development of CD-ROM we are on the verge of another technological breakthrough in the primary classroom. This needs to be managed carefully if we are to see the benefits in the classroom. Issues to consider are:

- The training of teachers – we need to train our teachers in the uses of the new technology thoroughly and ensure they have the necessary skills needed to use this development fully within the classroom.
- The provision of exciting and relevant software, such as simulations, rather than using CD-ROM merely as a database, although there is, of course, a place for both, given the huge capacity for storage on CD-ROM. As previously mentioned, the need for teachers to be involved in the development of new software to ensure its relevance and application in the classroom, needs to be ensured.
- The need for a standardisation of software or the development of dual-purpose machines, able to run CD-ROM discs in a variety of formats, both IBM standard and RISC-OS.
- Adequate financing for CD-ROM. Many schools may feel that the expense of purchasing CD-ROM systems isn't justified for a variety of reasons. Cheaper CD-ROM drives are probably on the way but the whole issue of finance is one that needs to be addressed.
- The ability to 'write' to CD-ROM. This capability, I feel, is almost with us. The ability to store children's own work and chosen information will make floppy discs a thing of the past. It will make disc storage problems almost disappear.
- The use made of photo CD and the costs involved. This could be another opportunity not to be missed for the primary school with the capacity to store vast quantities of photographic images on disc and the ability to manipulate them at will.

The potential value of using CD-ROM materials in the primary classroom cannot be emphasised too greatly. It is a very powerful tool that can aid work in all curriculum areas. CD-ROM has shown great potential in helping children to learn. CD-ROM is here to stay and we, as teachers, owe it to our pupils to make use of this technology in the best possible ways.

Postscript: A Personal View

Beth Lofting

As the new technology arrived in the classroom I, like many other teachers, aimed to treat it as a useful tool, like another book in the library or a new piece of maths equipment. Exciting as a computer in the classroom can be, I have always felt it rather limiting in as much as only two or three children can use it at one time. To try to use CD-ROM as the centre of a class topic was, therefore, quite a challenge!

The children were divided into groups and timetabled to use the computer twice a week for one-hour sessions. The multi-media aspects of CD-ROM kept the children's interest up to a point, though with large groups it was not always possible to give all the children a chance to operate the program.

The scheme of work, necessitating group work as it did, had unforeseen benefits. The groups developed and co-operated in different ways; some worked well from the start, with the older children organising and apportioning work and ensuring the smooth running of the group; some found their leaders ineffectual and took on the running of the group themselves. There were, unfortunately, a couple of groups that began and remained dysfunctional and required a lot of guidance and teacher input and support. The social benefits to the successful groups were, however, valuable and constructive.

The materials that my colleague produced to support the project were vital to its smooth running. The work books and expanded maps and pictures all gave the project 'substance'. It is difficult to see how a project of this size could be run without such excellent educational materials to support it.

These guides are now available as *Junior Impression* and *!Edit* files from Cambridgeshire Software House, price £19.91, inc p&p and VAT.

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