MICROSCOPE

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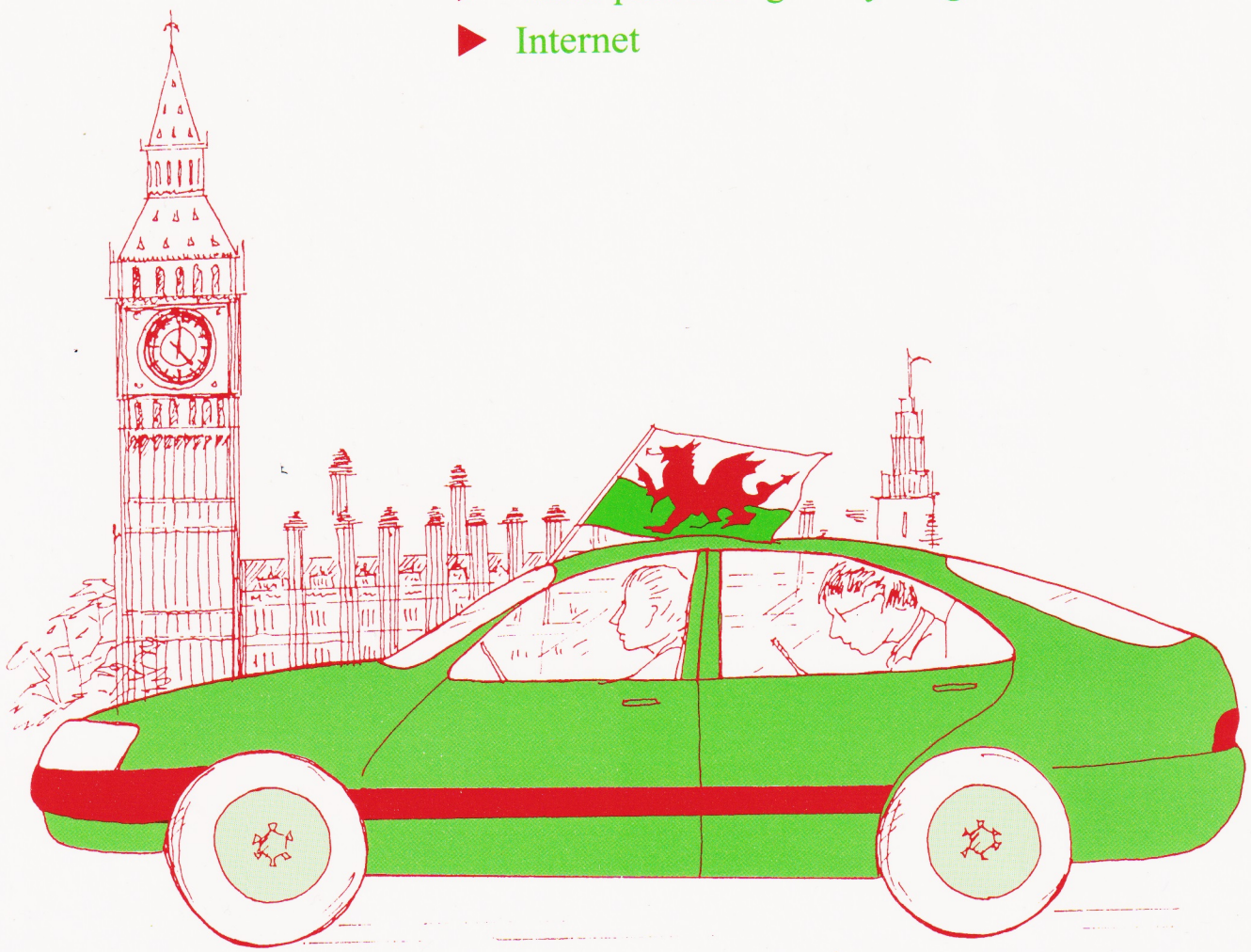
- Minister of Education for Wales speaks to us
- IT in Romanian primary schools
- Science and data handling
- Word processing and young children
- Internet



NEWMAN COLLEGE with MAPE

Contents

Editors: Chris Robson
Illustrations: Jenny Russell

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Correspondence to the Editor: *MICRO-SCOPE,* 99 Foxcote, Wokingham, Berkshire RG11 3PG.

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MICRO-SCOPE 44

MICRO-SCOPE matters

Chris Robson
Editor

Have you started Surfin' ?

A couple of years ago the latest 'buzz-words' being used at BETT were CD ROM, multimedia, interactive video etc; it was apparent that multi-media was here to stay; so the idea for our very successful *Multimedia Special* was born, and we have since had an injection of £9.5m from the DfE to equip primary schools with CD ROM. During my first quick tour of BETT 95, it seemed as though everyone was talking about Internet, the World Wide Web and 'Surfin' the Information Superhighway'. Hmmm . . . I thought – this is not quite what the Beach Boys had in mind – more call for mental than physical agility – but definitely something else that looks as if it's here to stay.

This initial impression was confirmed later in the morning when the BETT 95 Exhibition was opened by Gillian Shephard, Secretary of State for Education, who said: 'We now have a New Dawn of communication – the Information Age'. Moving and still pictures, sound, speech, words, figures, diagrams, charts – all available at the touch of a keyboard or mouse. These are the everyday tools of modern society. Mastering these tools and accessing them through information technology are as crucial to cultural development as to future economic success. That mastery requires knowledge, skills and understanding – in a word, education. It won't be long now before we think of that mastery in a new context – the information superhighway. You could describe it as the "education superhighway" because it will involve education in its widest sense.'*

Mrs Shephard went on to announce a consultation on Superhighways for Education, seeking ideas and advice from all sectors of the education service. She concluded that 'the "education superhighway" will not be a quick fix. But it will come – and probably sooner than we expect. It is vital that potential users and suppliers come together now to help put a coherent strategy in place.' That consultation is beginning this spring and will help government, all sectors of education and the communications industry develop a service that is of genuine benefit to pupils and teachers. But what does it all mean? Most of the teachers I've talked to this year have, like me, only a vague idea of what it's about and what it can do. Those who know a little more tell me that the development of Internet as a tool to support schools is at a very embryonic stage. However, the education or information superhighway, like CD ROM, is here to stay and so MAPE is beginning to plan ways of helping teachers understand more about it. At the moment, we have two plans: the first is to produce a Communications Special and discussions with a probable sponsor for this have already begun. The second is to have a regular section devoted to electronic communications in *MICRO-SCOPE*. I'm sure you can guess the next bit. . . . Yes, you're right! If you have any experience of using Internet, Campus or any form of electronic communication with primary aged children, please get in touch. My Campus number is 01: YNE009; I hope to be able to give you an Internet address in the next issue.

**Editor's note:* Taken from: 'Laying the Foundations of the Education Superhighway', speech by Mrs Gillian Shephard, Secretary of State for Education, 11 January 1995.

'Let's ask Chris!'

Don't just sit there alone, gazing blankly at your keyboard – if you've got a problem and feel you need some help, write to Chris Robinson

Christopher Robinson
Education Consultant

Two very similar requests this time and some help for those not wedded to Archimedes computers!

■ OLD BUT NOT REDUNDANT

Looking through computer magazines, there are often advertisements for low cost computers that have been superseded by the latest models. Is it worth considering purchasing these or is there a risk with 'redundant technology'?

There are some very good deals around at the moment but before you rush out with your purchase order, think very carefully what you are wanting. Most of the cheap bargains around at present are likely to be '286' or '386' PC machines which use DOS (Disc Operating System) rather than the Archimedes' RISC OS or WINDOWS or RM's WINDOW BOX. What this means is that your existing software probably won't run on the machine. This needn't be a problem if you wish to use it principally as a draft text processor as there are some adequately serviceable public domain or shareware programs available (see later question). Work can usually be saved as plain (ASCII) text onto a floppy disc and transferred to nearly any other machine you will have in your school – and your favourite word processor! (Children at my school regularly draft text on old '286' PC laptop machines, save on their own floppy discs and load into *PenDown* on the Archimedes for a pretty final draft.) In addition, spreadsheet and Logo programs are available to run on these systems making them valuable extra work horses.

If deciding to invest in a cheap bargain, buy from a reputable source. Ensure the machine will accept 3.5" DOS format floppy discs and is equipped with a hard disc containing the DOS system files and on which suitable software may be installed. If you are deciding to make such an investment as a second classroom computer, also consider the implications of any extra power sockets that may be needed and the physical desk space (footprint) required.

■ ARE WE COMPATIBLE?

A well-meaning parent has donated an old computer being thrown out by the company he works for. It is a DOS-based 286 PC machine whereas our school uses Archimedes. Is it useless?

See the previous answer. The machine may well be useful. Assuming you have RISC OS 3 or above, you will be able to use MS DOS discs (used by your 286) to transfer files from one to the other. Your main problem, however, is one of ease of use. Whereas you will have been used to using an Archimedes, clicking and dragging on files with a mouse, you're now probably faced with a blank screen requiring some obscure codes to be typed to start the program you require. If you are prepared to experiment a little you could make your life bit simpler, however, by typing some 'batch' files. (You may be lucky enough to engage the services of a willing clued up parent or you could do the job yourself.) If you are able to run any text or word processor on the machine, load (or import) the ***autoexec.bat*** file.

This is the file that loads automatically when the machine is switched on that tells the machine what to do. There will be all sorts of codes that you won't understand but you can add the following lines to the end of it:

```
ECHO OFF
ECHO Type W to load the Word Processor
```

and resave as plain text again under the same name.

Next time the machine is switched on, it will invite you to type W to load your word processor. You are now going to have to write a 'batch file' to do that job for you. A batch file is simply a list of commands telling the operating system what you want it to do. (Autoexec.bat is itself a batch file.) Assuming your Word Processor is on the hard disc in a directory called 'WP' and is started by typing in 'WORD', your batch file should look like the example shown below. Type it in carefully with your word processor and save it as plain text under the name *W.BAT*

CD\WP	Change Directory to that containing your word processor
WORD	Start up the Word Processor program
CD\	Go back to the 'root' directory when you leave the program
AUTOEXEC	Rerun the autoexec batch file

When you have other programs on your disc, they may be called in a similar way. If you want more help in writing batch files or understanding DOS, please write and ask.

■ WHAT IS SHAREWARE?

There is a wealth of shareware available. Usually these are programs written by amateurs or cut-down versions of professionally produced programs which you can use free of charge. Looking through any PC magazine will reveal many adverts for these programs. Typically it will only cost you £2 (i.e. the price of the disc and postage and packing) to receive a program. Much of the available software originates in the USA and most of it is written for the PC computer. There are some good programs available and some absolute rubbish. Amongst the better ones I have used, worth looking out for, are: *EnVision Publisher* (a desktop publishing program) and *AsEasyAs* (a spreadsheet program). Since these are shareware, if you want to send me a disc and return postage, I could let you have a copy. (But be patient with me if I receive a hundred requests!) One of the most atrocious ones I have seen is *JEM LOGO*, proving whatever we can do badly, our colonial cousins across the pond can do considerably worse. It can best be described as a 'turtle graphics like' program with the most appalling syntax so if you've found Logo difficult to get to grips with this is a hundred times worse and guaranteed to put you off for life.

WHERE HAS MY PROGRAM MANAGER WINDOW GONE?

On a PC or RM Window Box Computer

If all your Windows have disappeared and all you can see is the background then probably someone has turned your PROGRAM MANAGER into an icon.

The PROGRAM MANAGER icon should be down at the bottom of the screen. Double click on it with the left hand mouse button and it should return to its normal size.

I CAN ONLY SEE ONE WINDOW, WHERE ARE ALL THE OTHERS?

On a PC or RM Window Box Computer

Somebody has 'maximised' one window so it now covers the whole screen.

1. Look in the top right hand corner of the window and you should see a diamond shape made up of two triangles.
2. Double click on it with the left hand mouse button and it should go back to the size it was originally. (See also re-sizing windows card.)

HOW DO I CLOSE DOWN WINDOWS WHEN THE DOOR ICON HAS DISAPPEARED?

On a RM Window Box

1. Don't panic, you can still close down the Program Manager window properly!
2. Move the mouse pointer to the top left hand corner of the Program Manager window. You will see what appears to be a minus sign. Double click on this and the normal requester will appear.
3. Click on the OK button and you will get back to the LOGON screen as normal.

HOW TO FORMAT A DATA DISC ON A RM PC186

Using a RM PC186 either double or single drive

1. Switch on your computer and put your system disc in the drive, the left hand one if there are two.
2. The computer should be showing the A: prompt. Press RETURN if asked for time or date to get to the A: prompt.
3. Type in FORMAT /S and press RETURN.

Make sure the disc you are formatting has the 'write protect' window closed.

4. Now follow the instructions on the screen.

HOW DO I MOVE A WINDOW?

On a PC or RM Window Box Computer

1. You need to be able to **CLICK & DRAG**.
2. **CLICK** with the left hand button on the title bar of the window and *hold it down* while moving the mouse i.e. **DRAGGING** the window.
3. The window appears as an outline box until you let go of the button.

HOW CAN I RE-SIZE A WINDOW?

On a PC or RM Window Box Computer

1. You need to be able to **CLICK & DRAG**.
2. Move the mouse pointer over any side or corner of the window. The cursor will change to either an up & down arrow or a left & right arrow or a diagonal arrow. When the cursor changes **CLICK** and hold down the left mouse button.
3. Move the mouse pointer. The window will resize either vertically or horizontally or both if you put it on the corner. Let go when the window is the correct size.

Using computers in Romanian Primary Schools

Roger Keeling and Senga Whiteman
Newman College

'Wanted – 480Zs or Nimbus machines for Romania' – so the advert read. A chance phone call – here was an opportunity to pass on some redundant 480Zs in a constructive manner. The voice on the other end of the phone was quick to point out that there was a desperate need for in-service training for Romanian teachers as well as the provision of equipment.

And so it came to pass that Senga and I spent a week in Romania at the beginning of September showing a group of primary teachers how to integrate micros into their classroom practice. The course focused on the ways in which micros can be used in primary schools to support teaching both across the curriculum and in specific curricular areas. Over 30 teachers attended the five-day course in addition to some trainee teachers.

The initiative was organised by Lesley Andrews of the Romanian Trust. On the flight out *I* was hoping that we could get the equipment up and working while *Senga* was more preoccupied worrying whether the plane would land in one piece! After all, *who are* Tarom Airlines?! Some UK schools had donated redundant equipment and this had been shipped out to Romania prior to our arrival – although we didn't know the finer details of what had been sent out! Micros and monitors were in abundance; t-pieces and terminators were like gold! The first Sunday was spent in temperatures of 30°C trying to set up networks and to ensure that we had something to work with by the time the teachers arrived the following day. After having blown the fuses half a dozen times, we began to solve the different problems and by the time Monday arrived we had two networks up and working. Although we solved the electrical problems (a 4" nail acting as a fuse) we never quite solved the sanitation problems (inconsistent supply of running water!).

Fig. 1. *Hands-on experience.*

Fig. 2. *Roger inspires his enthusiastic audience.*

Our abiding memory is that of a very warm welcome. The teachers were dedicated, enthusiastic and very appreciative of our efforts. They tried a variety of programs, from *Frogs* and *Picture Builder* to *Grass*, *PaintSpa* and Logo. However, trying to discuss curriculum issues through the medium of an interpreter is a skill we hadn't been prepared for – but the determination of the teachers overcame any language problems.

We have now promised to try and provide on-going support, both technical and software. We also need to send more equipment out there so that they have the facilities to build on this initial project. So far I have run the Stroud half marathon in October and Senga organised a charity auction at college, raising in total over £600. We have also had the offer of several other sets of machines which we are currently in the process of collecting from destinations all over the country. The money we raised will help fund sending the computers out there and will help to cover the costs of in-service training.

However, we still need your help. The Romanian teachers we worked with are desperately keen to adopt new technologies in their methods of teaching and we have promised that we will do our best to provide on-going support. I hope that MAPE members will pledge their support.

a) If you have redundant 480Z micros or Nimbus machines, the Romania Trust will be delighted to receive them. We can arrange collection. Just phone me at Newman College with the details (or Lesley Andrews) and we will arrange the rest.
b) If your school would like to write to a primary school in Bucharest, please let me know and we will try to set it up for you.
c) If you wish to make a donation to the trust to support this work, please send it to Lesley, making a cheque payable to the Romania Trust!

Roger Keeling can be contacted at Newman College on 021 476 1181 extension 270. Lesley Andrews' address is The Romania Trust, Brook Cottage, Sydenham, Chinnor, Oxford OX9 4LY; Tel: 01844 351153; Fax: 01844 260334.

looking forward looking forward looking forward looking forward looking forward looking forward looking forward looking forward looking forward looking

10 years on . . .

Most classroom teachers would agree that microprocessors are useful in direct proportion to their reliability of function and the quality of programs available.

***MICRO-SCOPE 14*, Spring 1985**

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FOCUS ON MULTIMEDIA

Educational multimedia and its potential as an educational medium

Steve Bruntlett
Senior Lecturer, Centre for Postgraduate Teacher Education, De Montfort University, Leicester

Introduction to multimedia

There is currently much debate in the press regarding the development and use of multimedia in the home as an item of consumer electronics, even as a means of helping pupils do their homework. Multimedia means different things to different people. For some, multimedia is purely technological but for educationalists such use of interactive technology is helping develop radical new teaching and learning concepts which harness the power of the moving image with text, graphics and sound to produce an accessible and stimulating learning environment.

The use of multimedia in primary and secondary schools as a means of delivering and extending the curriculum means that there is a need for the development of new educational philosophies which make the most of this new medium. Schools need to begin to get to grips with producing and publishing their own multimedia resources rather than persistently, and perhaps mistakenly, using only commercial applications. Perhaps the view of some teachers is that if it takes so long to produce a commercial product using complicated and expensive equipment then it's not a feasible exercise for schools. Far from it! Using inexpensive equipment and good quality software and a very clear idea of the purpose of the application, teachers and/or pupils can produce multimedia applications which suit particular curriculum purposes and gain a much greater understanding of the way they learn having had experience of researching, designing and constructing applications.

Exemplars of such work include the 1994 NEMA awards and the Horizon project run jointly by Hampshire Microtechnology Centre and Acorn Computers.

The mechanics of multimedia production

Educational multimedia production focuses on the production of computer-based applications using a range of software tools to combine text; visual images including paintings, drawings, graphics, illustrations; scanned and digitised images; Photo-CD images; sound and animation in way that enhances, and potentially revolutionises, learning. Hardware needed for the production of school-based multimedia applications comprises a basic computer system with good quality monitor on which to produce the application; a video camera or still-video camera and digitiser (using an existing school video camera and a sub £100 colour digitiser to produce the most cost effective images from video); a scanner to work with existing resources and conventional visual materials; a CD-Rom player and Photo-CDs (approx £20 for 36 pictures using an existing 35mm camera); sound sampler and microphone to produce speech and sound effects. Software packages for the production of multimedia start at approx £50.

The role of multimedia in the development of new teaching and learning strategies

Given that the introduction of multimedia as a teaching and leaming tool may radically change existing teaching and learning strategies and philosophies, we need to ensure that such changes progress teaching and learning for all pupils. Teachers need to begin to examine the ways in which the curriculum needs to be adapted/changed/developed to take account of the teaching and learning potential of educational multimedia. Schools need to explore the impact of multimedia production on the school curriculum, comparing it

to the impact that desktop publishing has had on English and other NC subjects. (Given that some schools have 'newspaper days' or some coherent block of time for using desktop publishing in a 'realistic' way, would it not be reasonable to expect the same importance to be given to multimedia production?) It could be argued that multimedia production is an extension of desktop publishing, and to some extent it is, but there are new opportunities for the presentation and investigation of visual and textual material in the use of multimedia systems and tools, even on a limited budget.

The future of multimedia

Technologies will change dramatically over the next few years as far as schools are concerned. A philosophy for the use of educational multimedia needs to be established that will develop irrespective of the technology being produced and handed to schools by industry almost as an afterthought. Schools need to be pro-active in this respect, almost demanding the tools from industry that they need to produce the kind of teaching and leaming materials required by schools and colleges as society changes along with, or despite, the development of new information and communications technologies.If children, pupils and students don't have access to strategies for Using interactive technologies while they are at school or college then they will be disadvantaged along with many other sections of the general population in understanding and controlling the presentation and use of information. The general problem needs to be addressed by education.

The use of multimedia in developing the teaching of critical studies and cultural inheritance

While the uses of multimedia in the general school curriculum have been many and varied with perhaps a bias towards the sciences or encyclopedia-type material, the main uses of multimedia in art and design education have so far been related to critical studies or developing applications on cultural inheritance or industrial archaeology. Disc-based applications which are achievable by all primary and secondary schools could be produced in collaboration with other agencies such as LEAs, Museums, Libraries, computer companies or NCET and published so that a wider audience in having access to the applications could make use of a vast range of local resources on a national scale.

Multimedia in museum-based art and design education

Steve Bruntlett
Senior Lecturer, Centre for Postgraduate Teacher Education, De Montfort University, Leicester

In this article I would like to discuss the possibilities and production of art and design images for inclusion in multimedia applications, and to look at the use of paint systems, scanning and digitising systems to produce material for a multimedia application.

A multimedia application is the controlled display of text and images produced using a multimedia program. Sound and animation can be added if you have access to the equipment. When referring to a multimedia application I'm talking about the final disc-based product though it equally applies to a CD-ROM based product. I won't be tackling the use of multimedia programs themselves as I'd need more space than is available here. I will be looking at the potential of paint systems in the production of material which could be used with any of the multimedia programs currently available.

Let's get the credits out of the way first. The particular multimedia application on which this article is based was produced by two PGCE (Art & Design Education) student teachers at De Montfort University while on Summer CAAD placement at Oakham School. The multimedia application was produced using *Magpie* and is a guide to the Rutland County Museum. If you're now wondering what this has to do with art and design then let me assure you that the multimedia application was produced from an art and design point of view and

is intended not only to guide the user round the museum in question but also how museums can be used as a resource for art and design teaching and what projects can be designed to make use of such resources. For example, projects which were developed from the research work for the multimedia application included object drawing (on site, from on-site sketches back at school and directly onto computer from initial sketches), paintings (using sketches from the museum visits or from school-based resource material), textile design (from scanned on-site drawings) and DTP work combining painted drawings and historical information.

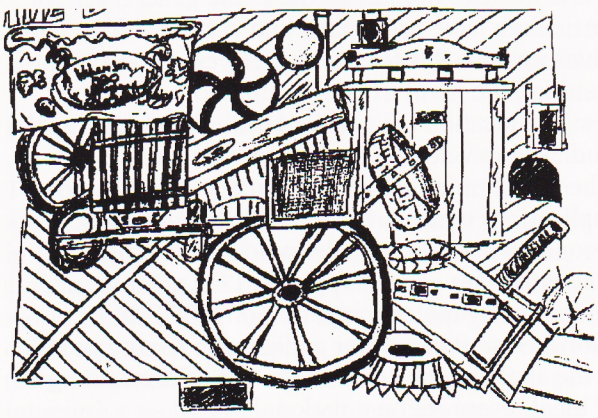

Fig. 1. *Drawing on location in museum.*

If you know anything about multimedia then you'll realise that there needs to be some initial planning of how the various components of the application are put together, how they are accessed and in what sequence. This can be changed as the application is developed but one overriding factor needs to be taken into account at the very start of such work and that is the matter of disc space. If a multimedia application is to run from a single 800K disc then graphics are going to make heavy use of disc space compared with text, even making use of the inbuilt compression techniques available in most multimedia programs. There are various ways to alleviate this problem. One is to avoid the use of full screen images unless you want a really dramatic screen. Smaller screens combined with text often make a particular point perfectly adequately.

The other way to reduce the memory required is to use lower resolution modes or two or four colour modes where an image is only black and white or simply coloured. For example, on the Oakham multimedia application, Amanda and Julia could have used mode 28 all the time for really good quality resolution of photographs, drawings and paintings but this would have been wasted as the

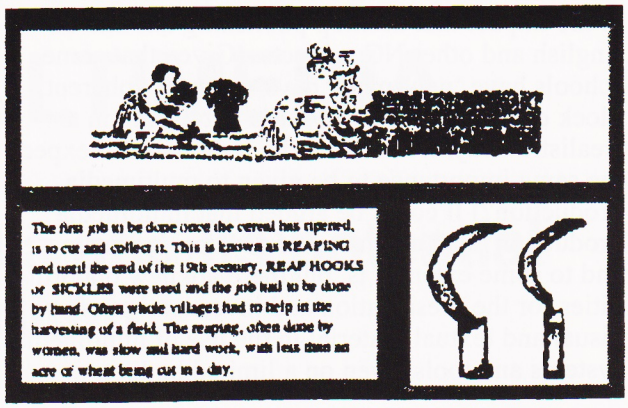

Fig. 2. *Application page layout showing economic use of text, scanned and painted images.*

disc was to be used in Primary schools which predominantly use A3000s and thus can only display such applications in mode 15.

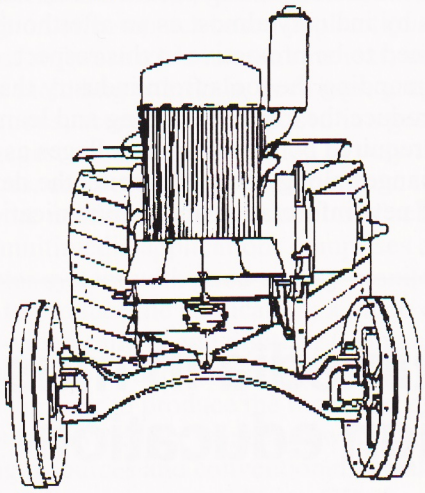

Fig. 3. *Scanned line drawing of tractor.*

Another way to reduce disc space is when scanning images. If you are working with any kind of resource material then scanning can give you really accurate representation of the original resource. Such scans can be dropped into a multimedia package but would gobble up the space rapidly. A couple of A4 256 grey scale scans of photographs would just about fill a disc but saving them as sprites in the final viewing mode would dramatically reduce the amount of disc space needed. You could scan them in monochrome to really reduce the amount of disc space needed.

You need to cram as many images into the application as possible if it's to be primarily a visual experience but don't save so much disc space that you have to reduce all your images to monochrome. Try and keep a balance and decide what is appropriate for each kind of image. You

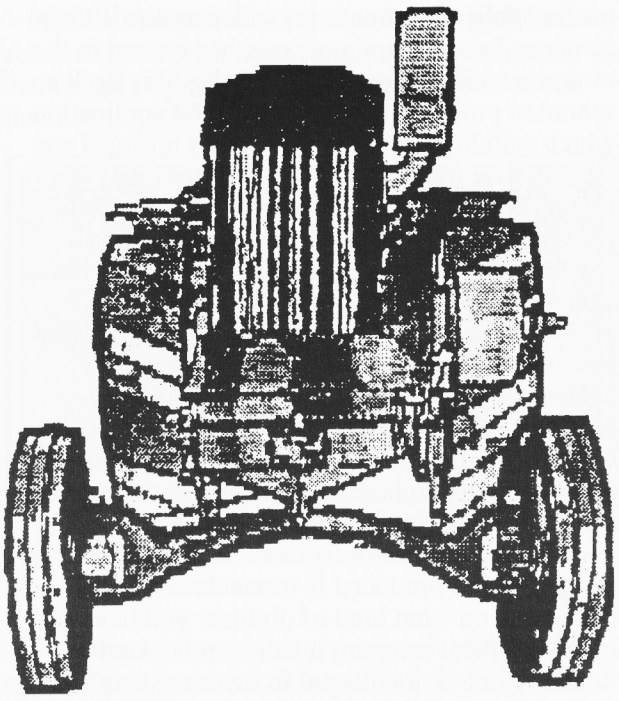

Fig. 4. *Coloured version of line drawing.*

might decide that it's better to have a quarter screen colour image than a full screen monochrome image for example.

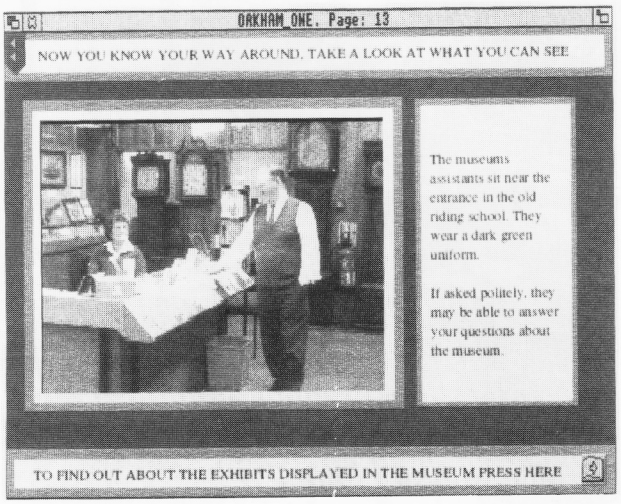

Fig. 5. *Sample screen from prototype application showing use of digitised image.*

So what kinds of images can you produce and how might they be used in such an application? Well, you need to experiment with a variety of techniques before you settle on any one particular way of working. The first time Amanda and Julia took groups of Oakham pupils down to the Museum for a typical drawing session they were working on vertical A4 paper with pencils as many art teachers might. That might seem reasonable enough, but if you're trying to scan an A4 portrait format pencil drawing then two problems immediately occur. One is that the pencil doesn't show up very well and if it does it's generally patchy. The second is that when only the clearest and darkest of drawings is scanned you either have to use the top or bottom half of the image or reduce it to half size and lose a lot of detail and use it in the middle of the screen. There are a couple of routes you can then take. One is to retouch the drawings in a paint system which means virtually redrawing the tractor or sickle, and this can have benefits, but more preferable is to change the original drawing technique.

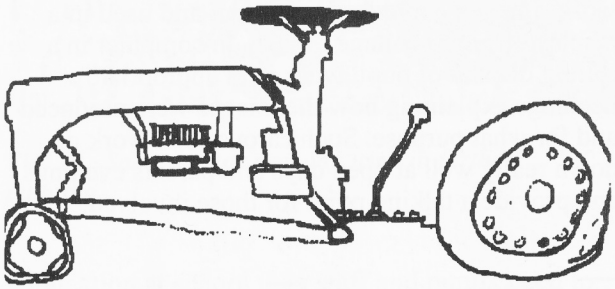

Fig. 6. *Drawing from Museum Visit.*

On subsequent trips to the museum, pupils worked on A5 or A4 paper in horizontal format with fine line pens. This results not only in a more confident drawing in many instances but in drawings that are in the right format for the final medium of delivery, a horizontal 4 : 5 ratio computer screen. When these drawings were scanned, they needed a minimum of redrawing or cropping and could be painted straight away rather than after a lot of tedious work. So two things are important here: one is that you need to organise drawing sessions bearing in mind the method of transference to computer and the final means of display; the second is that pupils need to need to find the work as interesting as possible with a minimum of drudgery caused by inappropriate production techniques.

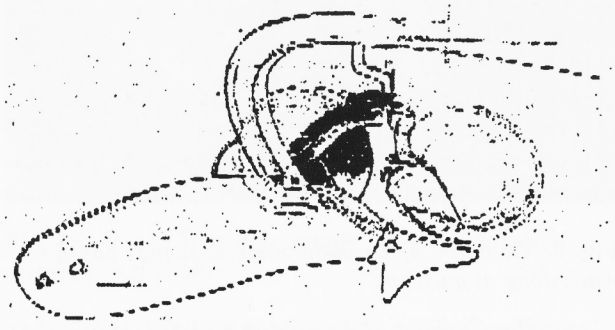

Fig. 7. *Unclear scanned line drawing.*

Once the drawings are scanned they can be saved as sprites and dropped into a paint system (in this case *Pro Artisan*) for tidying up. They may need some processing first, however, to increase contrast, thicken the line, change orientation or crop the image. It's worthwhile pupils understanding the scanning process and being able to operate scanner toolboxes so that they have an understanding and some control over the whole process. Once pupils are happy with the line drawing on computer then there are possibilities for producing a painting based on the drawing or rough sketches or resource material, for using the painted machine or artefact in a larger painting or a piece of textile design or for its use in a poster or piece of DTP work. Images could be printed out and used in a display or group collage or kept on computer in a rolling display of pupil work with appropriate headings explaining how the images were produced and for what purpose. Such carousels of work go down really well at open days and parents evenings and provide a talking point for those involved.

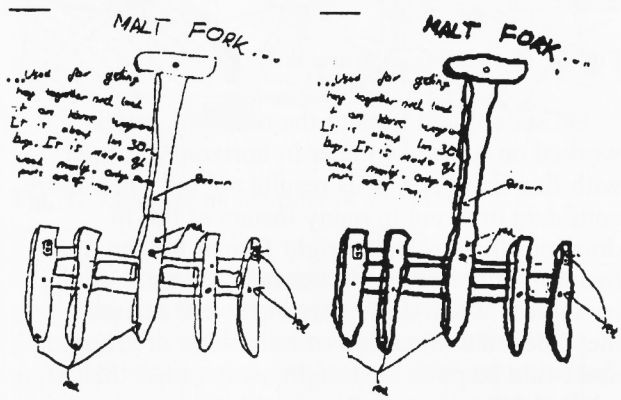

Fig. 8. *Original and enhanced drawings using scanner toolbox options.*

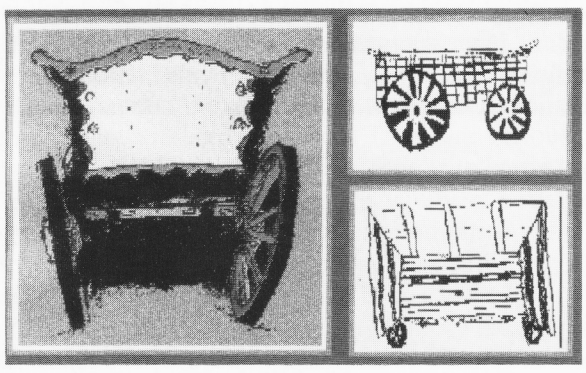

Fig. 9. *Coloured and monochrome drawings based on work done at museum.*

However, that's only one way of producing images for a multimedia application. The second way of producing images for the museum multimedia application was using video and still-video cameras. Images captured on either system in the museum were processed using a digitiser back at school to produce illustrations for the application which couldn't be obtained by other means. I say this because from what I've seen, and I may be wrong, better images can be produced by scanning photographs than by using digitisers with a video camera and certainly better than with a still-video camera. Best results are obtained by taking photographs and scaning those but this takes time and costs money. Reasonable results can be achieved using a video camera and digitiser, especially if you reduce a full screen image to quarter screen size, greatly sharpening the image and saving disc space at the same time. A quarter screen digitised image combined with text looks good and is perfectly adequate. Such digitised images can be produced in monochrome or colour depending on what kind of digitiser you have but once on a paint program it can be processed further, painted or collaged in the same way as any painted image so it doesn't have to stay the same as when it was saved as a sprite.

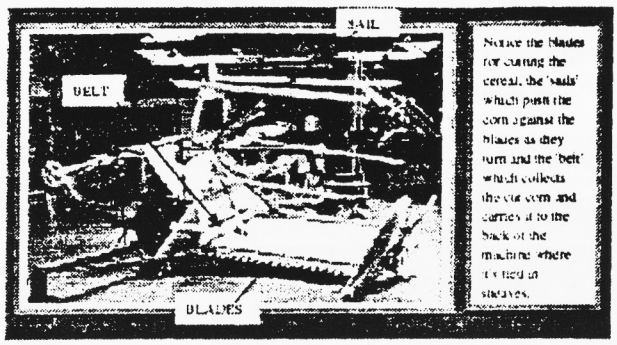

Fig. 10. *Use of digitised image to present information.*

Fig. 11. *Enhanced digitised image to clarify pertinent detail.*

Another way of making digitised images is to enhance them with false colour or supplement them with a line drawing to make it easier to see fine detail.

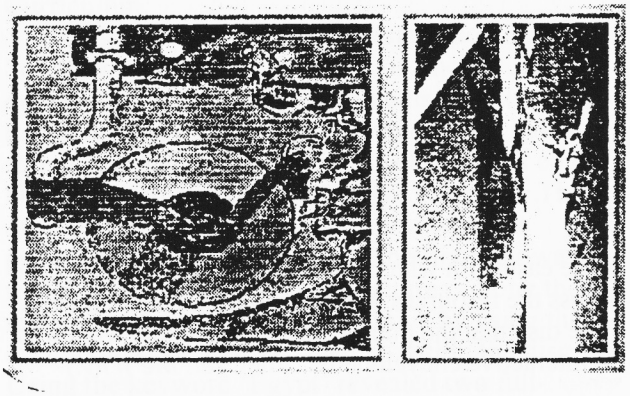

Fig. 12. *Painting or drawing of plough detail alongside digitised image.*

In terms of the production of such multimedia applications, you need to systematically store and catalogue all the images, preferably in successive stage of completion, with meaningful names, perhaps in different categories. You don't really need to save the original scanned images files, just the resultant sprite files, as you'll obviously keep the original art work and can re-scan it at any time.

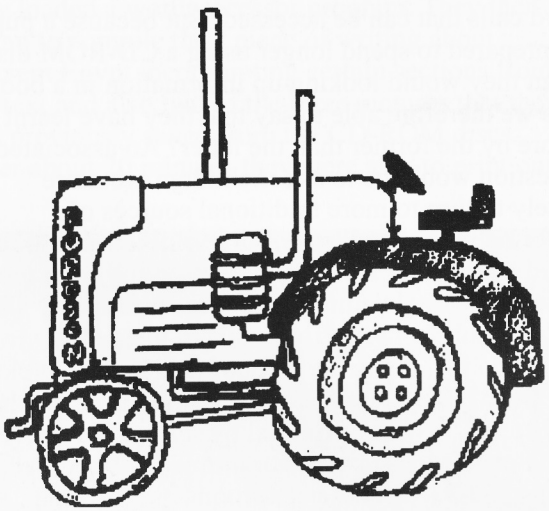

Fig. 13. *Tractor drawn by pupil.*

Hopefully this article will give you some ideas about how CAAD can be used in multimedia applications. To tackle such a project at the same time as learning how to use a multimedia program from scratch is a gargantuan task. It can be done to very good effect as Amanda and Julia showed but is better to stage such work over a longer period.

If you're doing such work at home then you need to know how to use a paint system, a scanning or digitising system and finally the multimedia program. If you're producing such an

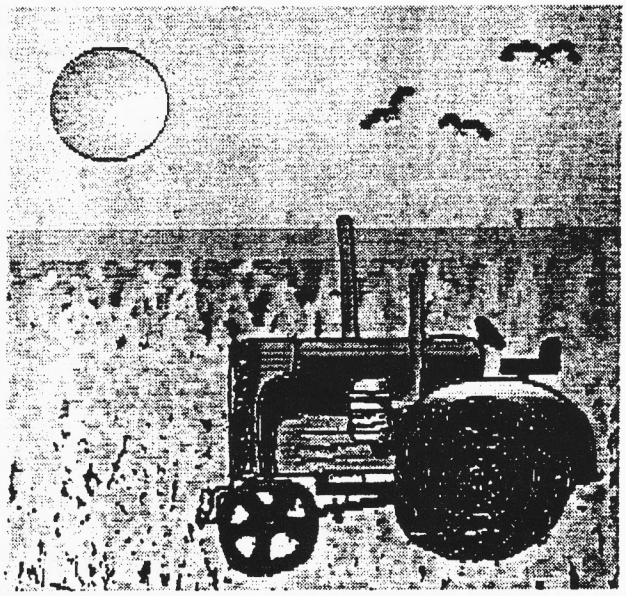

Fig. 14. *Same tractor drawing used in further painting.*

application at school then staff and pupils need to be fluent in the use of paint, scanning or digitising systems, maybe leaving the assembly of resources into a multimedia application to the staff, though I would have thought with a small group of pupils it would be worth while getting them involved in the production of the application or teaching them the basics of the multimedia program and letting them produce their own version. However you tackle it though, it needs to be done systematically and not all at once, otherwise you'll have to learn too much all at the same time, making what should be an enjoyable experience a possible nightmare. Having said that, you'll find it's an exciting way to work.

Fig. 15. *Use of repeating image based on painted drawing in title sheet.*

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CD-ROM evaluation project in Norfolk primary schools

Peter Noon
Norfolk Information Technology Team

The recently announced DFE 'CD-ROM scheme for primary schools' may have been inevitable but back in the spring of 1993 there was no apparent sign of any such initiative. The Norfolk IT Team therefore took the decision to set up a local research project which would explore the potential of CD-ROM technology with children in Key Stages 1 and 2. The project, which commenced in September 1993, involves a total of 22 Norfolk schools (4 First, 9 Middle, 8 Primary and 1 Special school) and is supported by three advisory teachers. Each school was provided with appropriate computer hardware for the project. For most of the schools this is an Acorn A5000 computer with Cumana 600 series CD-ROM drive and a range of CD-ROM discs for the Acorn machine. Some of the schools were also given additional resources to support their particular evaluation (ie *Black Box* sound samplers, *Key Author* and *Revelation* software packages). Six schools chose to look specifically at ways in which CD-I resources could support learning, particularly with younger children, and were therefore provided with a Philips CD-I system, a Roller Controller and various discs. The schools were asked at the outset to specify a particular focus for their evaluation. These can be grouped into four broad categories: CD-I, Multimedia, Information Handling and Authoring.

CD-I

Weasenham County Primary has just 26 pupils on role, which makes it one of the smallest schools in Norfolk. Sandy Francis is the headteacher there and she was particularly interested to see if a CD-I system could be used by the whole range of children (5 to 11) at the school. I had the opportunity to visit the school just a few weeks after they received the equipment and as I stood talking to Mrs Francis a young girl of about 6 years old came into the room and turned on the CD-I system. She then selected a disc, loaded it into the machine and began to explore the information presented on the screen. As I observed this situation it made me very aware of one of the major advantages of this system, and that is the ease with which even very young children can access the resources without the need for adult help. (The disc that the pupil had chosen, by the way, was an interactive encyclopedia called *Tell Me Why*.)

Multimedia

The multimedia features of audio and moving video make many of the new CD-ROM discs very appealing. It is therefore not too surprising that children are able to concentrate for long periods of time in front of something like the *British Birds* CD-ROM. They are presumably fascinated by the high quality photographs and video sequences displayed on the screen, as well as the authentic bird calls that can be accessed. But because a pupil is prepared to spend longer using a CD-ROM disc than they would looking up information in a book, are we therefore able to say that they have learnt more by the former than the latter? An associated question would be to ask if children are more likely to turn to more traditional sources of information in the library, for example, having first used an exciting multimedia disc on the computer? The very visual nature of these resources may also be particularly useful for pupils in their early years of schooling, but is the level of language suitable for them? These are just three of the questions that are currently being explored by schools that have decided to focus upon the multimedia aspects of using CD-ROM in the classroom.

Information handling

One of the notable features of this new technology is the huge volume of data that can be stored on a CD-ROM disc. Each can hold the equivalent of around 250,000 typed A4 pages or a complete 21-volume encyclopedia like *Grolier*. On the surface this would appear to be very good news to all computer users in education. The potential for learning here must be great but how do children manage this vast amount of information? And are they able to capture specific items and incorporate

these into their own work? These are precisely the issues that underlie the 'Communicating and handling information' theme in the draft proposals for Information Technology in the National Curriculum.

Pupils in Years 5 and 6 at West Walton Primary School were studying the topic of Ancient Egypt during last term. Some of the pupils recalled that they had seen some clip-art images on the modestly named *Really Useful* CD-ROM, which could be used to illustrate their work on this topic. This disc is a general purpose CD-ROM which is packed with text and pictures. The first task was therefore to find the required pictures among the mass of other images. They did this by using the excellent 'Super Search' facility within the disc. Using the keyword 'Egypt' revealed two full-colour images, which were both transferred onto a floppy disc for use later. The group then decided that they needed more detailed written information to support their project and so they loaded the *Hutchinson Multimedia Encyclopedia* onto the computer and carried out a database search for any references to 'Egypt'. This produced a section of text and also a photograph. They agreed that they could use both of these and so they saved them onto their own floppy disc. At this point they moved over to a different computer onto which they loaded a wordprocessor program. They then began to compile their piece of writing about Ancient Egypt incorporating certain sections from the text and also two of the three pictures that they had previously saved from the CD-ROM discs. After about 20 minutes they were able to print out the finished article. A good example of information handling if ever there was one.

Authoring

The authoring group are using the *Key Author* program from Anglia Television to produce on-screen presentations which incorporate sound from a standard audio CD disc. This area of the project is probably the most technically challenging. Because of the nature of the work many of the projects in this area are still in their early stages. There are, however, a number of very interesting tasters of things to come. Blakeney Primary School have, for example, produced a computer picture book. Each pupil in Year 6 was asked to create an original picture using the *Revelation* art program. Each picture was saved and then loaded back onto an individual page within *Key Author* along with the name of the pupil who designed it. These pages were linked together so that the user is able to move between them by moving the mouse pointer over an arrow on the screen, and pressing the button. These pupils also used the *Black Box* sound sampler to record speech about their pictures, which was then saved on the *Key Author* page and would be played back when the page was selected. Pete Everall is also involved in some extremely innovative work at Roydon Primary School. He has adopted the traditional adventure game format and produced a series of *Key Author* pages which are linked together in a fairly sophisticated way. So, for example, the user can click on the picture of a house and the screen changes to display the interior of one of the rooms. Then by clicking on the door of a cupboard you will be presented with certain items which may prove useful later on. As with most adventure programs this one features an evil witch and a princess to be rescued. There is also a series of problems to solve before the final goal can be reached.

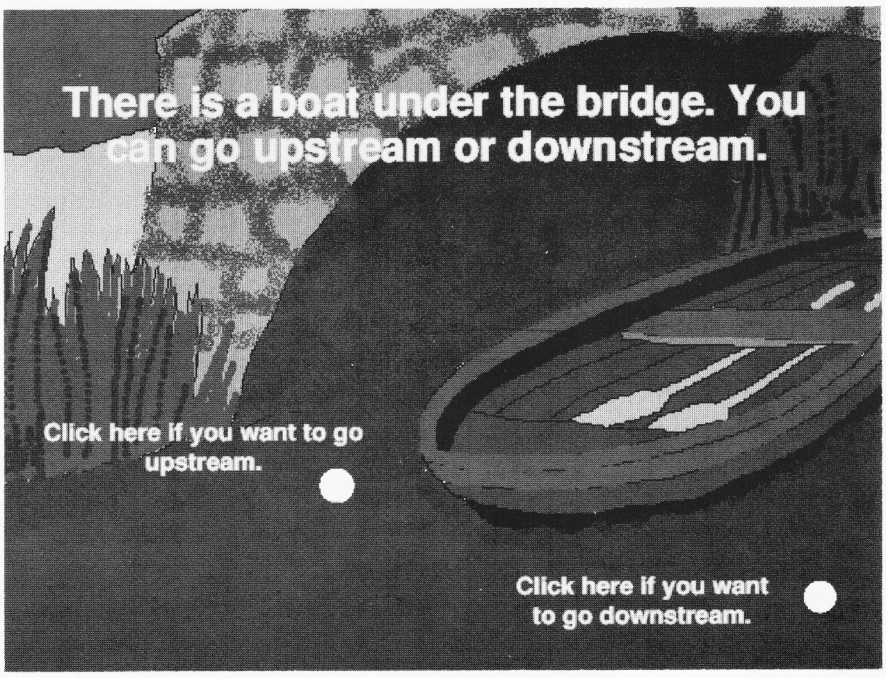

Fig. 1. *Which way would you turn in Roydon's adventure?*

This article first appeared in *KeyPress*, Summer 1994. It is reprinted here with permission from the Norfolk Information Technology Team.

If you are interested in the full evaluation report of this project, contact the Norfolk IT Team at County INSET Centre, Witard Road, Norwich NR7 9XD; Tel. 01603 33276; Fax 01603 700236.

IT AT WORK

The Minister for Education

Rod Richards
Minister for Education in Wales

As a journalist I went from typing my copy with two fingers and Tipp-Ex to producing polished prose as if by sleight of hand. Almost overnight, it seemed, the word processor had transformed my life – and that of hundreds of thousands of others.

It is now impossible to imagine life without one. When preparing a speech or an article all you need to do is to throw the ideas into it as they occur. Once you find a few moments to sit down and shape the final piece, it's all too easy – read on.

I seldom travel anywhere without a lap-top. A tedious journey in the Ministerial car is now an opportunity to have a few letters typed – providing my Private Secretary hasn't already thrust an official red box full of files under my nose.

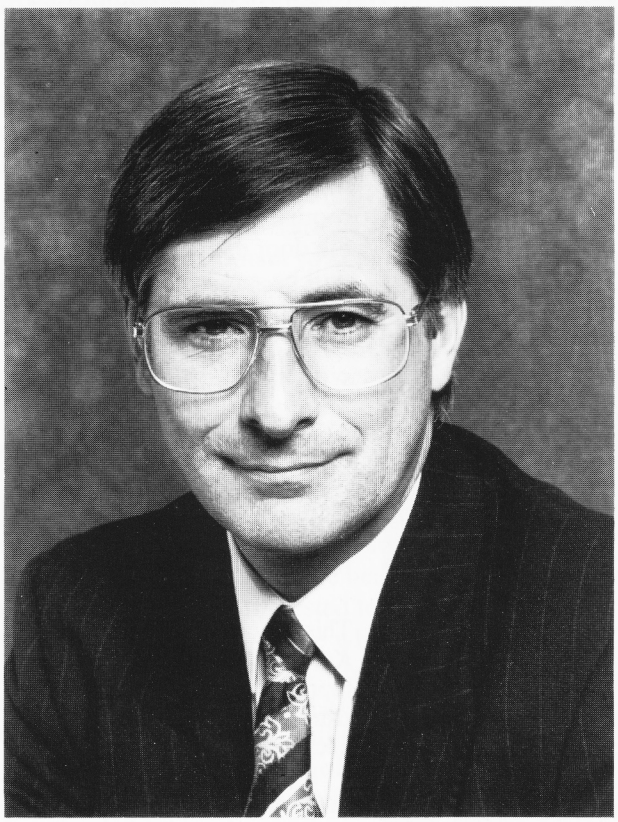

Fig. 1. *Rod Richards MP, Parliamentary Under Secretary of State for Wales, November 1994 – an official photograph issued by the Welsh Office.*

Like many businessmen, I seldom leave my office without a mobile phone – I have to be available to my Ministerial colleagues, to officials and to the media who need reactions to news stories almost as soon as they crop up. Fibre optics and satellites have added new dimensions to mass media and personal communications. I regularly hold video conferences with officials in Cardiff when I am tied in London by Parliamentary business and am often called to a London studio for a live television interview with a broadcaster in Cardiff. Twenty years ago such commonplaces were almost unheard of – and those of us who use them have negotiated a steep learning curve.

For future generations the expansion of technology is likely to be much more rapid and the tools it will place in the hands of modern man even more sophisticated than those of today. We are therefore training our children to use these tools effectively by bringing them into the classroom not only as a subject of study but also as incredibly versatile aids to learning.

In Wales we have made a sound start in introducing microcomputers into our primary schools and spreading their use throughout the curriculum. Two years ago we carried out a survey of microcomputers in schools which found that there were 34 pupils per microcomputer compared with 68 in 1988. Over half the primary schools of Wales had at least two microcomputers and some as many as five. A further 40 per cent had six or more machines. Only five per cent of schools had one or no microcomputers. And what was most heartening about that survey was the fact that information technology was being used extensively across most areas of the curriculum.

This growth in the use of microcomputers can be attributed in large measure to the Welsh Office's substantial programme of investment in IT under the Grants for Education Support and Training (GEST) programme. [There is a similar programme for

schools in England.] We are continuing to channel money into IT through these grants – so much so that in the two financial years 1992–93 and 1993–94 we invested £4.6m and some £1.9m is expected to be spent in the current year with a similar amount earmarked for next.

Future support will largely be dedicated to replacing systems over five years old and the introduction of new hardware and software to support the National Curriculum. The use of information technology is being encouraged right across the curriculum and the support I have just outlined covers both primary and secondary schools.

The Office of Her Majesty's Chief Inspector of Schools for Wales has reported that a widely diverse range of IT equipment is now available to pupils in Wales and continues to extend rapidly, including, for example, multimedia developments/ CD-ROM etc. Information Technology is increasingly becoming a natural and routine part of classroom and teaching practice.

This picture is precisely what we have been working to achieve – as under the National Curriculum all primary school pupils are required to study information technology. At Key Stage 1, pupils should be taught to use IT equipment confidently and purposefully to communicate and handle information, and to support their problem solving, recording and expressive work. At Key Stage 2, pupils should be taught to extend the range of IT tools that they use for communication, investigation and control. They should also be shown how to become even more discerning in their use of IT, in their selection of information, sources and media for specific purposes, and in their assessment of the value of IT in their working practices. It is also a common requirement in the National Curriculum programmes of study for pupils to be given opportunities, where appropriate, to develop and apply their IT capability.

Already, thanks to satellite technology, geography pupils can track developing weather patterns in any zone of the globe and language students can perfect their accents down to the slightest inflection by watching and listening to native speakers on local programmes. The coming of the multimedia 'super highway' is going to revolutionise leisure and workplace practices – and that includes those of the classroom. Apart from the fundamental changes in accessing, storing and retrieving information, the scope for variety in teaching method and experiential learning by students – offered by Broadband links – will be breathtaking. But with these options will come new responsibilities that the educationist can only discharge with full understanding of the media and an ability to select the appropriate medium for each particular message.

When I visit primary schools I am staggered at the confidence and dexterity that young children show at the computer keyboard. They are obviously comfortable with the medium and it is becoming commonplace in their lives. We shall do our best to ensure that schools renew and update their equipment to keep pace with the advances in technology. Then, our children should never have to embark on such a demanding ascent of a learning curve as the one I undertook in the move from my trusty Imperial to the word processor.

GRASS for Windows

Yes, it's here at last. In answer to the requests for a powerful but cheap Windows database, Newman Software, in conjunction with Flo Computers, will be releasing this program in February. If you want further details please phone Yvonne Peers on 0121 476 1181 extension 271.

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10 years on . . .

Children cannot be introduced to programming simply by leaving them alone with the computer. That is to repeat the error of Charles II, who imagined that if children were brought up in a state of nature, without any contact with any speaking human being, they would naturally speak Hebrew, Latin or Greek.

. . . there is a consensus of opinion that whilst the micro is a powerful and versatile tool, its true potential is as a resource which can be called on to extend and develop good primary school practice.

***MICRO-SCOPE 14*, Spring 1985**

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Science and data handling – a Key Stage 2 activity

Book covers – how resilient to wear and tear are different covers?

Roger Keeling and Senga Whiteman
Newman College

This activity is about the different materials that can be used to cover text books. It integrates areas of the science curriculum with the development of information handling skills. Investigations can be chosen which examine such features as:

- Is the texture of the material rough or smooth?
- Is it of natural origin or man-made?
- How strong is the material? How resistant is it to wear?
- Does it stretch when put under tension?
- How do different materials compare with respect to weight?
- To what everyday uses is it applied?

What are we going to do?

Examine the abrasive property of different materials that could be used to cover school books.

What do we need to have done before we start this activity?

Pupils will need to know how to conduct a fair test and how to create a database for the purpose of recording results. They will also need to be able to categorise subjective judgements, either by using pre-defined descriptors or by converting them to a numerical score.

What will the children learn?

How to conduct a scientific experiment, altering one variable at a time.

What resources are needed?

A small block of wood covered with sandpaper (or a rough stone). Some old books which can be covered in a range of materials. These may include the materials listed in the table below:

Paper	*Fabric*	*Plastic*	*Other*
wallpaper	hessian	plastic covers	polystyrene
crepe paper	nylon	clingfilm	leather
wrapping paper	canvas	transpaseal	aluminium foil
brown paper	felt	polythene	tin foil
sugar paper	cotton		
tracing paper	linen		
greaseproof paper			
cellophane paper			
newspaper			
tissue paper			

How to do it

The pupils work in pairs, each pair testing two materials. Each material should be tested by two different pupils to illustrate how subjective judgements will vary from pupil to pupils. Hence for a class of 24 pupils, 12 different materials will be needed.

What to do

Two tests are applied.

Test 1 – resistance to wear

The cover is rubbed with a sheet of sandpaper (wrapped round a block of wood to improve grip) a pre-determined number of times. Two problems arise:

i) how to apply even and consistent pressure
ii) how to describe the resulting effects – a vocabulary of terms will need to be agreed upon (eg no significant impact, roughed up, worn thin, minor hole or destroyed). Alternatively, the degree of abrasion could be graded on a scale of 1 to 5.

(This test could be repeated using a rough stone from the garden.)

Test 2 – resistance to wear

A tablespoonful of water is poured on the material and left for 30 seconds. Pupils will then have to judge how porous the cover is. As in the example above, it will be necessary to determine an agreed vocabulary to describe the results.

The database of the results could take the form shown in the box below. In the case of the last three fields the pupils could invent numerical scales to measure smoothness, abrasiveness or porosity. This would have the advantage of allowing them to draw scatter graphs in order to look for relationships.

Investigations

A number of hypotheses and investigations are suggested below. A hypothesis is a statement that can be justified, or otherwise, in the light of the evidence collected. The answer may not be definitive. For example, you may find that woven covers are not waterproof, but this hypothesis cannot necessarily be extended to all woven covers, only the ones in the sample.

a) Woven covers are not waterproof
(Search for woven covers and then draw a count graph on the 'soaking' field – this will show, for example, how many woven covers are not waterproof.)
b) The smooth covers are the most easily damaged by rubbing
(Search for 'texture' is the same as 'smooth' and then draw a graph on the 'rubbing' field.)
c) Plastic covers offer most resistance to rubbing
d) Materials that do not change when stretched are most resistant to water
(Search on 'stretching' is the same as 'no change'. Do the materials that satisfy these criteria have any common features?)
e) The heavier covers are most resistant to wear by rubbing
f) All plastic covers are waterproof

Q. If you are covering a book with paper, which is the best type of paper to use to avoid damage by spilling a drink on it?
Q. If you can choose any type of cover for a book for all round protection, what would you choose?
Q. To what extent is it true to say that materials that respond badly to rubbing are not resistant to water?

Field name	*Possible descriptions*
Name	crepe paper, cotton, etc.
Type of material	paper, fabric, plastic or others
Weight	in grams
(If you have accurate electronic scales, weigh the book before and after it has been covered.)	
Stretching	stretch, tear, no change
(Does the material stretch when put under slight tension?)	
Texture	smooth, rought, woven
Rubbing (appearance after)	no impact, roughed up, worn thin, minor hole, destroyed
Soaking (appearance after)	waterproof, partly soaked in, fully absorbed

Extensions

An alternative activity, for example, is to explore the porosity of different materials by another method – one which gives a more quantifiable answer and is less subjective. In this case a 'lid' of the material is secured over the top of a jam jar by a rubber band. Water is then poured onto the material and a note is made of how much water (in millilitres) passes through the lid in a 5-minute period.

This topic should promote classroom discussion about classifications, fair tests and the accuracy of subjective judgements. Pupils should appreciate the need to alter one variable at a time and to be consistent in their approach. They will learn how to construct a database and then how to use it to test their hypotheses. If you try this in the classroom, why not get your pupils to write a 'Which Cover?' report for the next *MICRO-SCOPE*.

Word processing and young children

(something we've looked at before, I know, but please don't turn the page over just yet, skim a little first)

Moira Monteith
School of Education, Sheffield Hallam University

I wish to encourage everyone to notice what happens in early education because it is there we find work and study patterns to build on subsequently. I know we are all overwhelmed with papers and books to read (let alone coming to grips with new software) and what a relief it is to decide you don't have to read something because it's not about your subject or age phase or whatever. I believe the kind and quality of IT experiences children receive early on *do* matter in their education. So I hope that teachers and lecturers concerned with older children and students will read this as well as those of us who work with younger ones.

One more introductory point: straight word processing may seem rather unexciting now, when we have talking books, CD-I and some very appealing software but it still seems amazingly attractive to young children. The glamour of learning to write is still compelling and I suggest that we should help them gain all they can from this initial enthusiasm.

The TOTAL Project (Time on Technology and Literacy), number 357 of the NCET Portables Projects, was based on three observations and two hypotheses:

1. Young children can make meaningful and quite sophisticated statements but find difficulty in writing them down.
2. Word processing is an ideal way to help them record their comments.
3. Adult help is needed to put 1 and 2 together. This third point was based on a finding from the United States CIEL (Computers in Early Literacy) Project[1] and confirmed by our own observations.

First hypothesis: that regular word processing would help their literacy skills, particularly as regards reading.

Second hypothesis: that the same procedures might help older children who were clearly falling behind in literacy skills.

It then became a process of working out how we might practically implement such a project.

TOTAL shared 12 Tandy word processors between six schools, four classes or Year 1 children, one reception class and one group of children in a junior school. The schools represent a range of local Sheffield environments: two schools are in the centre of large and fairly old council housing estates, two from a mixed area of housing with a number of privately rented and owned houses, one with a preponderance of children from a variety of ethnic backgrounds, one from a residential area near to Derbyshire. All the schools agreed to ensure that the participating children had 10–15 minutes' individual word processing a week with an adult nearby, and that the machines would be available sometimes for free class use. The schools managed the project in their own way and assessed the children's development as they saw fit. For

example, Southey Green N/I School bought an extra Tandy word processor so that their third Year 1 class could participate as well, and dovetailed the project with their reading recovery scheme, using their comfortable 'reading room' for word processing, Walkley Primary School gave the project over to a very enterprising parent, and in Meynell Primary School the teaching assistants took charge with the help of the Deputy Headteacher. All schools developed their own monitoring procedures.

What did we find?

1. It is perfectly possible to organise time for children to have regular one-to-one help with word processing in a variety of ways.

2. Young children enjoy using portable word processors, and find them comfortable and congenial to use.

They do not seem to mind the small screen and after a very short time become accustomed to the upper case letters on the keyboard. The notion that 'small fingers need large keys' does not seem true for Year 1 children. In terms of concentration, we found that 10–15 minutes work was about right for most children. Some could spend longer focusing on this activity.

3. Keeping print-outs is an excellent way of recording pupils' progress, but printing work from portables is often a chore.

Some of the project schools made books for each child, including pictures they had drawn. Other schools printed out each session's work and literally cut and pasted each child's individual piece onto sheets in their folder. This way all the children could read back what they had written so far. Children definitely enjoy seeing how much they have written as the weeks progress and selecting one or two statements to 'read'. The record also gives them a sense of their own time. For instance, Ben wrote 'I have two rabbits and three guinea pigs.' On re-reading this some time later, he commented that this was no longer true since one of the guinea pigs had died.

4. Monitoring children's progress is comparatively straight forward.

It becomes quite clear what stage individual children have reached, for instance, the ability to predict the first letter of most words they wish to write, to predict the first and last letter, to use vowels and so on. There is a continuum of progress and although children differ considerably as to the stage they have reached they have no sense of failure at all.

5. Extra help in the classroom needs to be well managed and integrated usefully within the learning environment there.

It may well be that parents are often not given the opportunities they deserve to help in the work of the school. One of the comments that seems to have struck teachers who have seen our video came from Mavis Coy, a parent at Walkley Primary School. When asked what she thought of the project, the first point she made was: 'It was clean'. She was very willing to supervise painting sessions and clear up afterwards, but the TOTAL project also gave her the opportunity to develop her considerable potential in terms of teaching support. She relished the chance to become more familiar with using computers as did many of the other parents who joined in the project. Some mothers, of course, already have excellent computer skills which they are only too ready to help pass on.

6. Pupil motivation improved.

Karen McSweeney, Deputy Head at Meynell Primary School, felt this was a significant factor in attitudinal change in a number of pupils, notably several boys. Regular word processing also appeared to improve concentration. Eileen Suter, reception class teacher at Sir Harold Jackson School, noted that several children benefited from the concentration necessary to get their words keyed in. Jean Gibson and Kathleen Parker, Head and class teacher, at Southey Green N/I School, evidenced the considerable gains in confidence made by some children during their individual word processing sessions. This confidence helped children overcome their initial timidity in whole class situations and helped them gain a 'voice'. The teachers felt that the 'instant success' children felt when word processing contributed to their gain in confidence.

7. Older children with language difficulties improved their verbal skills and were able to work more independently.

Sheila Hall, a colleague at Sheffield Hallam University, found that her older children at Firs Hill Junior School benefited from similar word processing sessions. At first they were entirely unable to work by themselves and often took so long over their composing that they couldn't remember entirely what they had meant to say. She asked them to tape record what they wanted to say and after that they transferred their sentences to the word processor. She designed some very simple cards explaining step by step how the children should use the Tandy word processor, right from turning it on. These cards enabled them to use the word processor in the classroom alongside other pupils without having to ask for extra help from their normal class teacher. This clearly

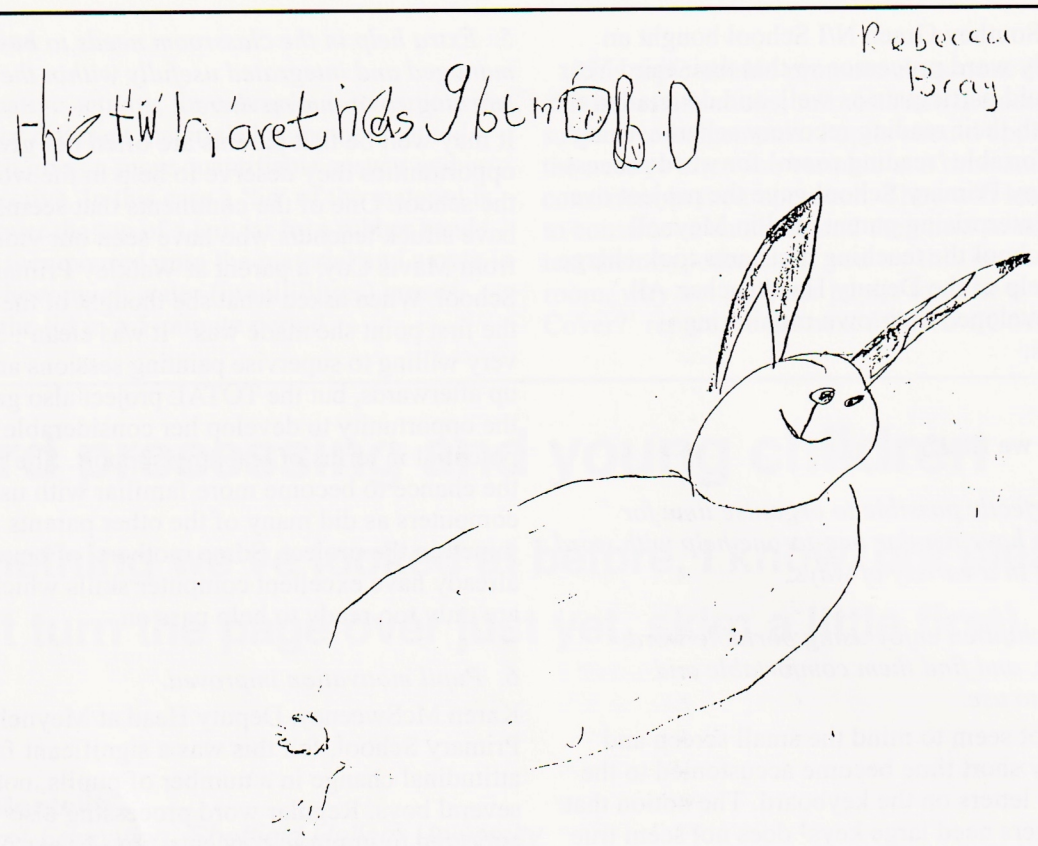
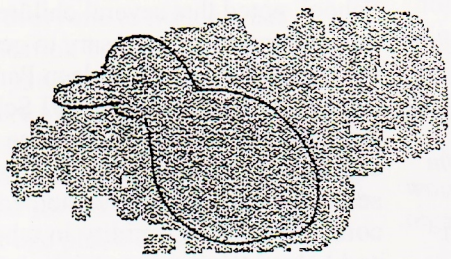


Fig. 1.



T duk is in is pod hy is swimig.

Rebecca

The duck is in pond he is swimming

Rebecca Bray

Fig. 2. *These two examples come from the book of Rebecca Bray, a Year 1 pupil at Southey Green School. They were done within a few days of each other and show that however good Rebecca is at writing at the moment she has great difficulty in reading it back!*

was of immense benefit to them and to the teacher. It was only a pity that not every child in the group could have access to a word processor when he or she needed to.

7. Children want to play with word processors.
This is a desirable activity which promotes greater familiarisation with word processing and computer use. For example, as in the CIEL project, we found that children liked to make long letter strings by keeping their fingers on one key. They also liked the power of deleting, and of changing from lower case to upper case and vice versa.

8. Young children are quite capable of editing their work in a simple manner.
All the children were capable of deleting and adding letters. Some pupils, notably at Walkley and Sir Harold Jackson Schools, were able to go back over their text for editing purposes.

9. Literacy skills do seem to have improved but this may well be because we have merely given children the opportunity to reveal *their improvement.*
The reading readiness test we gave to pupils at Malin Bridge Primary School, both before and after the project, indicates small gains for the pilot group (the 22 children who word processed regularly) but it was not statistically significant. On the other hand, the pilot group children are all younger than virtually all the rest of the class, with birthdays from May to August. So their attainment, given their age, seems indicative of current progress. In addition, they did improve in particular ways: they could pick out capitals easily, were good at including spaces between words, and were rather better than the majority of their classmates at noting a discrepancy in line and word order. The project will continue in the same manner at Malin Bridge for the next year so we may have further evidence during the year.

Fig. 3. *Debra and Mark at Malin Bridge Primary School.*

10. We noticed no gender differences in terms of eagerness to use the word processors.
Some boys because more motivated as regards writing.

Projects using word processing in primary schools have been many and various. I remember excellent work at Humberside, eg by Sylvia Emerson in the National Writing Project, as far back as 1985. However, we still have not grasped conceptually the potential of word processing for our children so that the implications are obvious in classroom management and curricular change. We need to ask questions such as: how can classrooms be best organised to suit these strategies? Is it a sensible idea to suggest that many children who have considerable problems coordinating their motor control when using a pen or pencil at 4–6 years old should focus on word processing and leave handwriting to a later stage? When every child who is four years old has access to a word processor as if it were a pencil, what does this mean for the rest of their school career? How useful is the majority of software actually used in classrooms? How can parents help in the school and at home with word processing and with computers?

The TOTAL Project was such a positive project that I can happily recommend other schools to try their own versions of it. We have a 20 minute video of the children involved in all six schools, with the parents and teachers also giving their account of the work accomplished. It costs £10.00 + p&p and is available from Moira Monteith, School of Education, Sheffield Hallam University, Collegiate Crescent, Sheffield S10 2BP.

Note

[1] *CIEL: The Use of the Computer as a Writing Tool in a Kindergarten and First Grade Classroom*, K. Olson and J. Johnston, Ann Arbor Institute for Social Research, Michigan University, 1989.

Infants and laptops!

Jane Chappell
IT Coordinator and Year 1 Teacher, Milborne Port CP School

After reading Paul Shefford's article concerning 'Notebook computers in the primary classroom' I felt inspired to relate my own experiences.

A year ago I was asked to take responsibility for coordinating Information Technology for both KS1 and KS2. My main priority was to build on the previous good work and to extend the use of IT in the classroom. The school utilized a mixture of Archimedes and BBC computers which are mainly used for word processing activities. We already had a couple of Tandy laptops which were confined to KS2. The KS1 department only had the use of a BBC computer in each classroom.

Introducing more hardware

Out of a limited IT budget I purchased a Brother Portable Word Processor for just under £300. The machine allows the children to word process their work and print it immediately using a daisy wheel printer. Alternatively it can be used as an electric typewriter for immediate results. The inconvenience of connecting the laptop up to an available printer – which is usually a dot matrix with poor printing quality – is thus avoided. For non-IT specialists it is a must!

To extend IT into KS1 I purchased two Amstrad NC100 portable computers for Years 1 and 2. They cost £100 each and can be mains or battery operated. I have found these to be the ideal solution. The class use these for word processing activities which frees the class computer for other work. However, it is worth shopping around as prices vary considerably.

Uses of laptops

With my Year 1 class I have started work at a very basic level. The children started by typing their initials once they had read to me, and progressed to typing out their first names once they had finished their work. It has served as a useful tool for the children who need extension activities, such as writing short stories.

Easy to use

The keyboard is just as easy to use as the NC200 which was recommended in the *MICRO-SCOPE 43*. I actually use one of these at home, which helps to inform my work at school as the keyboard and functions are almost identical. Unfortunately the NC100 does not have a disc drive, but for KS1 children the memory is large enough for all of the children to complete a piece of work. After all, you could purchase three NC100s for the price of one NC200!

Fig. 1. *Display work about word processors in the main school.*

The colour-coded keys help the children to find their document quickly. I access the program for my class and alter the settings to suit their needs. For example, I altered the settings to ensure:

- the machine switches itself off after two minutes;
- the context is preserved so that they can return to wherever they have left off, which leads to less teacher intervention;
- the keys are set to sticky shift so that they only have to press one button at a time.

Teachers can alter the settings to suit the needs of their class.

A rather thick manual accompanies the NC100s but, to be honest, once you have figured out how to turn it on you will be able to follow the ongoing prompts. Personally I think anyone who has never used a word processor before will find it easy to use. For example:

PRESS YELLOW AND RED you are now ready for WP.
PRESS EITHER:
RED for a new document
GREEN for an old document
BLUE to print a document

Work completed

In order to familiarise my class with the keyboard, we made a model of the computer. We made clay buttons and painted them and stuck them on a cardboard skin. We later displayed it in the main school with some printing that the children had completed. The younger children in the school could pretend to press the buttons and were becoming familiar with an appropriate keyboard.

Finally

In an ideal world we would have a Canon BJ10SX printer at school in a central area. Each class would have a NC100 which they could take to a central printing area. If children are to become familiar with computers they need to realise how easy they can be to use and need lots of access. The printing quality also needs to be better than dot matrix in order to give them some satisfaction.

I have become resigned to the thought that the school will never have enough money to purchase an Arc for every classroom. Even if we could afford it, it would not be long before they needed upgrading or we need hard discs. I would argue that laptops are the alternative as we are able to give the children more hands-on experience with similar machines. In this way we are teaching children to be flexible. To use an analogy, when teaching children to read we ask them to read a variety of texts to prove their competence. In the same way we would not wish to create a learning behaviour where the children only felt that they could use only one kind of computer.

We are now in a technological age. In our children's lifetimes they are likely to come across a number of different computer networks. We need to teach them to become flexible and selective in their use.

Fig. 2. *A model of the NC100 completed by the class with help from G.A.*

MAPE matters

Publications Group update: a chance to contribute your ideas

Chris Robson
Editor

In *MICROSCOPE 42*, you read details of the activities of the Regional Development and Profile Groups. It's now time to tell you something about the plans which the Publications Group have for the next 18 months so that you know what goodies to expect, and to invite you to help us plan our future publications programme.

MICRO-SCOPE

In our termly *MICRO-SCOPE* we aim to support the interests and needs of *all* members, ranging from new users with little experience to those who are beginning to explore the newer technologies. I am, however, reliant on voluntary contributions and in recent issues, it is people in the latter category who have been more keen to contribute. So, please help me to get the balance right. I know there are still a lot of teachers making excellent use of BBCs and 186s and I would love to hear from them. I would also be pleased to hear from children, with examples of their work, their opinions, their likes and dislikes. Your contributions are welcome any time, though the next copy deadlines are:

MICRO-SCOPE 45 – 1st May 1995;
MICRO-SCOPE 46 – 7th August 1995;
MICRO-SCOPE 47 – 1st December 1995.

Specials

You should have received *The Concept Keyboard Special 1995* with this issue of *MICRO-SCOPE*. We would like to thank Jennifer Taylor for all her hard work and expertise in producing this and The Concept Keyboard Company for their sponsorship. Further copies are available from MAPE software at Newman College.

The next Special you receive will be the *Early Years Special*, due to go out with *MICRO-SCOPE 45* in the Autumn term. There's still room in this for reviews or short accounts of IT activities with early years children, so contact me if you would like to contribute.

Contributions are also welcome for our next two Specials, due out in 1996. One of these is the *Environmental Education Special*, being edited by Chris Parker and produced in collaboration with WWF. We would be particularly interested in hearing from members in Scotland, Wales, Ireland or any other part of the world. Environmental education is a global issue, so please, let's hear from the rest of the globe about the aspects which affect you in particular.

Another worldwide issue is electronic communications and you should already have read about our proposed *Communications Special* in MICRO-COPE matters on page 1. I'd love to hear from anyone who has practical experience of using electronic communications with primary aged children, in both the UK and overseas.

And finally, what else can you expect? Another idea we've had is for an *Information Handling Special*; CD-ROM, multimedia and information superhighways will only be useful if the children – and adults – using them have developed sound information handling skills to help them sift through the vast quantities of information made so accessible by these new media. There are many schools in England who have benefited from this year's GEST IT in Schools programme, which has focused on information handling skills. If you're one of those schools, or even if you're not, but have done some interesting work with information handling, do please get in touch. Incidentally, there will be details in the next issue about *Making Sense of Information*, a set of materials being developed by NCET as part of this year's GEST programme, and designed to help teachers with the development of higher order information handling skills in the classroom.

. . . or how about *Add IT on*? – a special looking at all the things you can add on to your micro – control boxes, sensors, data loggers, printers, scanners, digitisers etc. Would that be useful?

. . . or perhaps you're an IT coordinator and need advice to help you and your colleagues with using IT across the curriculum. . . . How can MAPE help you with this?

If you would like to contribute to any of these publications or to suggest future ones, please write to me: Chris Robson, *MICRO-SCOPE*, 99 Foxcote, Wokingham, Berkshire RG11 3PG, England; Tel/Fax. 01734 733718

Dates for your diary

7–9 April 1995: **MAPE Annual Conference**, at Bath College of Higher Education, Newton Park, Bath. You should have received details and an application form with your last issue of *MICRO-SCOPE*. If you didn't, it's not too late to apply, so contact the Editor on 01734 733718 and ask for a Conference leaflet.

23–28 July 1995: **WCCE 95 World Conference Computers in Education**, at the International Convention Centre, Birmingham. It is expected that over 3000 delegates from all over the world will attend this 6th World Computer Conference. Full details are available from the Conference Secretariat, at WCCE 95, Margaret Street, Birmingham B3 3BW; tel. 0121 428 1258. In addition to the full Conference programme, we are in the early stages of planning a MAPE event on the afternoon of Wednesday 26 July. MAPE members will be able to attend this and also visit the Conference exhibition (including the MAPE stand) during the Wednesday morning. Special MAPE tickets – only £2.00 for the whole day (lunch not included) – must be bought in advance and are only available through MAPE. You will find further details of how to apply on the information sheet enclosed with this issue.

24 November 1995: **Ninth RESOURCE Exhibition**, at Doncaster Racecourse. Further details will be included in the next issue of *MICRO-SCOPE*.

1995 MAPE AGM

The MAPE AGM will take place at 4.00 pm on Saturday 8 April 1995, during the Conference at Bath College.

MAPE Software update

Add these to your current software list:

MAPE 7 – *Graph-IT*
Micro: BBC (B and Master), Archimedes, RM Nimbus
Cost: £9.49 new members; £15 non-members

MAPE 7 includes *Graph-IT* which is a simple graphical display package (similar to the original *DataShow* program). *Wordplay* is an amended version of the program which first appeared in the MEP Language Pack.

MAPE 8 – *Into Europe*
Micro: BBC (B and Master), Archimedes, RM Nimbus
Cost: £9.49 new members, £15 non-members

MAPE 8 'Into Europe' consists of a teacher's resource book, a book of photocopy masters (for overlay keyboards) and software, relating to aspects of European life and culture.

MAPE 9 – *Picture Builder* or *News Bulletin*
Micro: BBC, Archimedes, RM Nimbus
Cost: £11.75 new members; £15 non-members

Picture Builder is a shape manipulation program aimed at young children. It enables them to develop concepts of two-dimensional shapes (enlarge, rotate, stretch etc) and ideas which enable them to produce a variety of pictures. *News Bulletin* is a local viewdata package, including a number of graphical icons to illustrate different topics (news, jokes, sport etc).

Concept Keyboard Special
A booklet about using the concept keyboard with Acorn, Apple, RM and PC micros. Cost: £2.50.

IT Starts Here
For students and teachers who are just beginning to integrate IT into their teaching. Cost: £2.50 (box of 94 – £175 including p&p).

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10 years on . . .

. . . there are those schools that still struggle on with a cassette recorder; if we had wanted to make the adoption of micros difficult for teachers then this primitive device would have taken the Oscar. It is a great credit to many teachers that they have persevered, but they should never have been asked to.

***MICRO-SCOPE 14*, Spring 1985**

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Reviews

***ClarisWorks* Templates for Primary Years**
Publisher: (1993) Claris Corporation and TAG Developments
Micros: Apple Macintosh or Windows running *ClarisWorks* v2
Key Stage: 1, 2 and 3
Price: £25.73

There is a wealth of material in this package which covers maths, English, history, geography, science and religious education. Many of the worksheets are of good quality as they stand but what I like about this software is that it is very easy to create your own worksheets using the material provided. A brief summary of the contents is as follows:

In the maths section there is an excellent exercise which is very easy to use by even the youngest children which shows a fraction as a decimal and visual representations as a pie chart and a block graph. The graph and pie chart both change as you enter the numbers and would be very helpful to children when the concept of decimals or graphs is first being introduced. There is a similar program for percentages.

The history section is my favourite containing an excellent worksheet showing scenes from the Bayeux Tapestry and a worksheet showing hieroglyphics. There is also material on the Greeks, Tudors and Stuarts, Victorians, Vikings and Romans all of which can be used to devise interesting worksheets for children of all ages. I particularly liked the graphics for the Tudor and Stuart Kings and Queens which could be used to show a family tree.

The English section has a selection of 'Story Starters' which consist of a picture and a list of words which can be used as a stimulus for children to write their own stories. The subjects are Flying Machines, Ducks, Forest Creatures, Castles and Space. There is also a data collection worksheet about the family and methods of travelling to school.

The religious studies section has a large database about religious clothing used in many religions and explanations about how they are used and the material they are made from. There is also a figure of a boy which can be dressed in the clothing by using the mouse to dress the figure in the clothes.

The science section has a useful database of equipment which again can be used as it is or to devise new worksheets. There are also worksheets for the life-cycle of a butterfly, a frog and a chicken.

The geography section contains a weather chart which the children complete on the computer; there are spaces for the temperature and amount of rainfall and pictures showing different types of weather which can be copied and pasted into the spaces provided. There is also a worksheet showing the water cycle but I found the graphics on this were not very clear. There is a program to plan a town in which squares are coloured in to represent industry, housing, shopping areas and leisure facilities. This would be useful for linking with work on local geography. Of all the activities in this software, I found this one the least convenient to use but my daughter who is at secondary school assured me that most children would enjoy it.

The package is easy to use. I am not a computer expert and yet found this package fairly self explanatory and only had to refer to the handbook for one or two of the programs. I think children would also find most of it easy to use. It is assumed that you already know how to open a file, use a mouse to select items, save a file and print a file.

On the whole I thought this was an interesting and useful resource to have in schools as it contains material suitable for children of all ages and abilities and covers subjects across the curriculum. To get the full value from this software, however, it would need to be used as IT activities for the children as well as a teacher resource. The IT activities are cross curricular, suitable for all ages, and provide an interesting and exciting learning opportunity for everyone. The material can be customised to complement any other scheme of work being used.

Hilary Alcock
First Year Student, Primary BEd
Liverpool John Moores University

Editor's note: Three sets of templates are available or under preparation – Primary, Secondary and Special Needs.

This review has also appeared in *Computer Education*, The magazine of the Computer Education Group.

The Kingfisher *Children's Micropedia*
Publisher: (1994) ESM
Micros: Archimedes or PC with CD-ROM
Key Stage: 1, 2 and 3
Price: CD-ROM + guide: £95 Archimedes; £80 PC

This resource was used with a class of 22 Year 3 pupils of mixed ability. They had no experience of using an Archimedes, and so support had to be given on some simple, basic aspects of using a graphical interface. The class was covering three topics of interest, The Romans, Buildings, and Kenya. In turn, groups of four children used the single CD-ROM-equipped computer to find out some relevant information for one of the three topics mentioned above, whilst the rest of the class were getting on with their normal work.

The CD-ROM was easily loaded, with simple instructions, and the CD *Children's Micropedia* proved very easy to use.

The teacher has to make three decisions:

- Is the material relevant?
- Is the material at the right level?
- Is the material adequate?

Initially the child is presented with over 1300 items or batches of information, each in text and pictures, with some also having sound, where relevant. This information is too overwhelming for lower primary children, but the software allows the teacher (or a pupil) to set up a collection of restricted items of information. The pupil can then choose from these restricted subsets, making things a lot easier.

Instructions for the pupil are easily learned – they consist of largely self-explanatory icons, such as the printer. A printer is somewhat essential for this piece of software – pupils can print out all of the details they want and can digest or summarise the information they require. The pictures provide a bank of high quality, usually relevant, pictures which the pupils can use to illustrate their work.

Many key words on each page contain hot links – these allow pupils to access different parts of the information by clicking on a highlighted word. The children enjoyed using these. The links established are largely adequate and sufficient given the level of material.

The documentation suggests that new material can be added, but this was not attempted – in any case this could cause problems due to the storage requirements. It may be better to provide additional material in other formats, such as print.

The main restriction is that placed upon the teacher by any support material – work is needed to evaluate the material and to direct the pupils down the right path.

To summarise: The program provides an easily accessible bank of information in which access is available to almost any subject which the children may meet in their daily work. The information can be channelled into different subdivisions which may provide more specific information on a particular subject. The children who have used the computer each day for a week, have had a very useful experience, and have enjoyed what the *Micropedia* program has to offer.

Chris Hannell
Halsnead County Primary School, Knowsley

Sherlock Holmes Consulting Detective Vol. 3
Publisher: Mindscape International
Micros: CD-ROM for PC and Apple
Key Stage: 2/3
Price: approx £49

My feelings when I was first shown *Sherlock Holmes III* were that it would be a challenge for even the most able pupils in my Year 4 class. There was an opportunity to use it, however, with this particular group of pupils comprising two girls and three boys, within sessions related to reading activities. During these hourly sessions, the whole class was grouped by ability to work on various activities.

The immediate attraction of the pupils to this program was obvious. The group decided to work on 'The Banker's Final Draft'. During the first session, I supervised the group while they became familiar with the practical skills required to work through the program. They began to discern relevant information from the various sources. After this session, they were able to work independently.

Throughout the time spent on the mystery, the group worked collaboratively, in the school library, where the CD-ROM was installed. The situation was quite convenient, since the Year 4 classroom leads directly into the library. The pupils shared the tasks in rotation. The scribe always had the hardest task, noting everything that the others were desperate to record, before the next piece of information was divulged. The various sources of information were used by the group, but the extracts from *The Times* were not exploited nearly as much as they should have been.

I hoped that the investigative nature of the program would encourage research skills and group discussions. I also wanted to see whether the pupils would work on a process of elimination. I mentioned that it was not important that they succeed in solving the crime, but they were adamant that they would. The group solved the mystery after five sessions. At first, the pupils found it difficult to work by a process of elimination, but became more practised at this as their knowledge of the system increased. The group became frustrated at times, when they felt that they knew who had committed the crime, but did not have sufficient evidence to put it to the court. The pupils were able to make valid comments in their discussions, particularly at these times. They also realised that they were required to research further, and were able to do so.

Sherlock Holmes III is certainly appealing in its design and presentation. It succeeds in motivating pupils, and is addictive in the desire that it creates to solve the crimes. Having the opportunity to use this program in school was a useful exercise. Although it was a challenge for the pupils who tried it, their interest was held throughout. It is seen as a game by children (see appendix) which has the advantage that it teaches researching and other skills in a new and exciting way. I feel that it would be more suited to children in Year 5 and above, due the level of skills required. This, however, should not draw away from the satisfaction that the Year 4 pupils had in successfully solving 'The Banker's Final Draft'.

Joanne Griffiths
Newman College

Appendix: The children's own evaluation

Sherlock Holmes is a very hard and exciting game. To complete this game you have to think very hard and you have to be quite clever. It takes a long time to complete each game. To make it easier, they could write down somewhere what we had found out.

It is very clever the way they make the films appear. It takes a lot of concentration. We all think it is very good. It is the best game on the CD-ROM. It took four or five days to solve the mystery. We think that we should be able to go to the court at any time with any person we suspect and if you don't get this correct, points should be added to your score.

We like the way you can jump from one thing to another. The Times is not very useful because it tells you things you do not need to know. We think it is for age 9 upwards.

The graphics are excellent.

Short Walks with the Turtles

Publisher: NORICC and Northern Micromedia, Northern Region Consortium for Information Technology in Education, University of Northumbria, Coach Lane Campus, Newcastle upon Tyne NE7 7XA

Micros: KS2 pack for Acorn RISC-OS computer and Longman Logotron Logo. Version also available for RM Nimbus.

Key stage: 2–4

Price: £12.50 + £1.50 p&p

Full implementations of Logo have been available on school computers now for at least 10 years and its use has been written into the National Curriculum for half that, and yet there are still very many primary teachers who have not been able to get started with it. For them, any helpful support materials are welcome.

Upon cursory inspection, on an exhibition stand for example, the materials would look quite interesting to non-Logo experts as being a possible 'easy' route into using this valuable computer resource.

With *Short Walks*, NORICC has adopted an interesting approach of a directed path through the most common turtle drawing progression, gaining points *en route* to provide a 'passport' permitting pupils to explore further. This is in direct conflict with the true spirit of Logo as envisaged by its founders, Seymour Papert *et al.*, in which children are encouraged to freely explore from the outset.

The pack comes in an A4-size folder comprising 'Commands and Challenges' – 24-page A4 booklet; 'Teachers' Guide' – 12-page A5 booklet; and 'Pupils' Print-out booklet' of 20 A5 pages. In addition there is a master copy of an 'Official Passport of Turtlevania' and an A5 sheet detailing the National Curriculum coverage of the set tasks.

'Short Walks' provides progressive teaching of these turtle drawing and other graphics commands: st, cs, fd, bk, rt, lt, ht, pu, pd, pe, setpc, home, seth, title, repeat, edit, to, and end. In most cases, the abbreviated commands are taught without

providing any indication what they are abbreviations of.

Every two or three pages there is a Challenge page:

Challenge 1 progresses from rectangles to drawings containing rectangles.
Challenge 2 develops rectangles further.
Challenge 3 adds inclined lines.
Challenge 4 adds text labelling.

To achieve these examples, children are only required to use direct commands, programming not being met until Challenge 5.

Challenge 5 expects the use of REPEAT as well as programming.
Challenge 6, to produce regular polygons, is actually easier than many of the preceding challenges especially as the required code is provided within the text.
Challenge 7 produces those patterns of repeated rotated polygons that are so familiar to anyone who has ever viewed turtle drawings.

The authors have made a brave attempt to produce a simple guide which teachers can pass to children to get on with knowing exactly what they are learning. When they have completed the booklet they are rewarded with a 'passport' permitting them to experiment freely or pass on to the KS3 materials – 'Day Trips with the Turtles' – promising 'Turtle Construction Site', 'Great Turtle Circus', 'Calculating Turtles', 'Grand Firework Spectacular' and 'many more adventures'.

The teachers' book suggests the work is aimed at Y5 children whom it would expect would take a term, working in groups of three for an hour a week, to complete though I, personally, would feel disappointed with this goal.

It is intended that children each have a copy of the 'Pupils' Print-out booklet' in which to paste their listings of their solutions to the challenges, which are work various points towards the award of the 'passport'.

Summary

The pack provides a simple 'get on with it' kit. However, I found a number of errors when I first reviewed it, but these have now been corrected. Since publication, several other changes have been made and bugs ironed out. However, for the amount it contains, I consider it rather overpriced. Since it concentrates solely on turtle graphics, it wouldn't be necessary to use a full Logo implementation for this at all and *Screen Turtle* from Topologika may be friendlier if this is what a teacher wants. This pack could make any teacher produce the impressive looking patterns one associates with Logo, but they would totally miss the point of what Logo is about.

Christopher Robinson
Education Consultant

A 'Hands On' Guide to Modelling in IT

Publisher: (1993) WEST IT Centre, Unit 10, Hambledon Place, Devizes SN10 2RT
Micros: BBC
Key Stage: 2–3
Price: £5

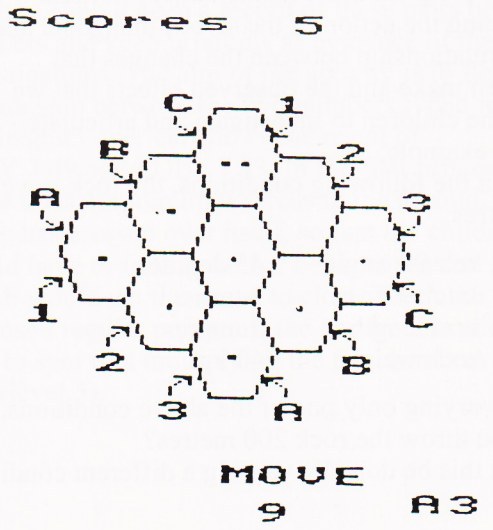
The aim of this document is to give the teacher a set of programs and notes to cover the modelling strand of IT.

The accompanying disc contains the software mentioned and separate program notes are available.

Locks is a program which simulates the raising or lowering of a boat through a lock. If the children use the program in an unstructured manner, they are working at level 1. If they can explain why they use the sequence they have chosen and why other actions are inappropriate, then they are working at level 3. Please note that there are no formal statements of attainment until level 4.

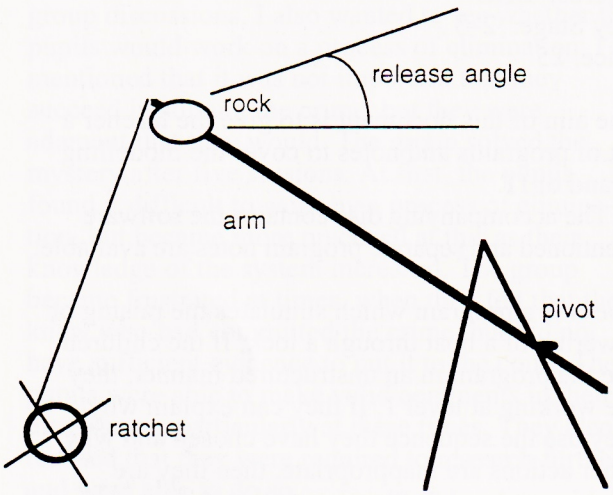
Colony is an example of a Gaming Simulation where the children have to work out the rules involved in playing this game.

It is suggested that the children select option 3 for a 3×3 game against the computer. The teacher should **not** tell the children the rules of the game so that the children can find them out for themselves through playing the game (a level 1



activity). If they can articulate the rules they think are being used they would be operating at level 4 and could select option 4 for a 5×5 game against the computer. If they can now predict the consequences of various moves that they or the computer can make they will be at level 5. If two children have reached this stage they could play each other on a 3×3 or 5×5 game and start to think about developing winning strategies.

Mangon simulates the action of a medieval seige machine called a mangonel which was used to throw rocks at an enemy.



Sketch diagram of a mangonel

Children involved in a topic which includes these weapons should be encouraged to research, design and make their own (NC Technology), and perform experiments to see if they can find the best conditions for firing further, higher or more accurately for different weights (NC Science). The presentation of their results would they be part of NC Mathematics and IT.

This program has a mathematical formula governing the action of the screen mangonel and it is the relationship between the changes that children make and the observed effects that we want the children to investigate and articulate.

For example:

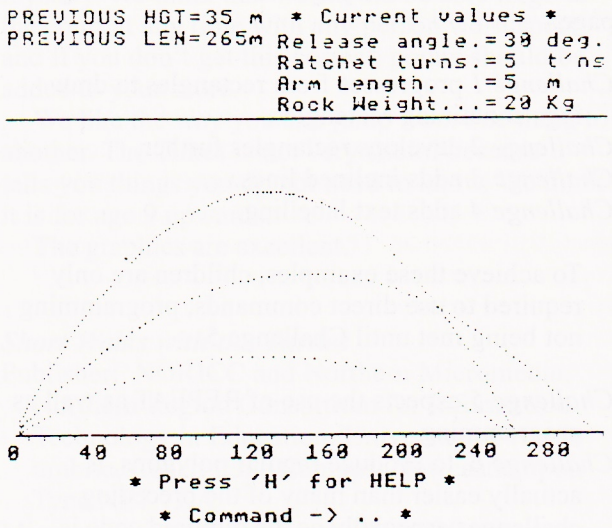
With the following conditions, the rock travels 72 metres:

release angle	45 degrees
ratchet turns	3 turns
arm length	3 metres
rock weight	40 kg

By varying only one of the above conditions, can you throw the rock 200 metres?

Can this be done by varying a different condition?

Can you find other conditions that will throw the rock 200 metres?



Note that systematic experiments can be carried out by recording the effects on distance thrown while only varying one condition, i.e. increasing the rock weight in steps of 3 kg and noting the distance thrown each time. This data can then be put into a graph and a statement written about the effect of rock weight on distance thrown (level 5).

Candyfloss. This program simulates the selling of candyfloss on the seafront of Blackpool. The program is on the menu and called CSYFLS. There is a random element in the program which can unsettle the children's calculations and be upsetting. It is important to stress that, as in real life, the unexpected an happen and some planning for such events may be a good idea.

The program is best used as an electronic blackboard where the screen brightness is turned up when the whole class needs to see information, and turned right down for the children to type in information away from the gaze of others in the class. The children need to be organised into small groups before starting the program. All the information they need about costs of materials is given and they have to decide how to allocate their money. The program will check their calculations and give a readout at the end of each day.

Note that the children will be using a simulation and making decisions which is a level 3 activity. If they can explain the reasons for their choices and explain the consequences, they will be working at level 4.

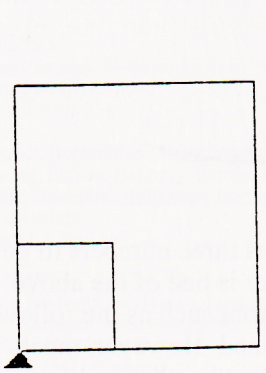
Dart is a turtle graphics program which can be used for the control and measurement strand of IT as well as the modelling strand. In general, we would encourage teachers to adopt an open-ended approach in using this software but realise that

some help and direction is needed in the context of modelling. The following files are on the disc together with a version of *Dart* called *DARTD0* which allows the screen to be printed.

The program *DARTD0* must be loaded first by selecting the appropriate letter from the menu after shift/break has been used. Pressing the return key once the introduction page is shown will put you in the work area. Each of the following procedures can be loaded into *Dart* by typing LOAD GSQ or whatever the name of the procedure required is.

A suggested route into modelling using *Dart* might be as follows:

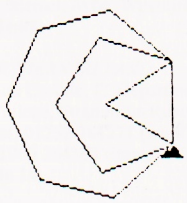
- Load *DARTD0*
- Type LOAD GSQ
- Let the children type in GSQ followed by a number, eg GSQ 40
- They can print this by typing PRINT
- Invite the children to say what they think is the effect of the numbers they are typing in. If they can tell you that the number is size of square then they are at level 4.
- The diagram shows the effect of typing GSQ 100 and GSQ 40



```
GSQ WITH SIDE

REPEAT 4
  FORWARD SIDE
  RIGHT 90
END
```

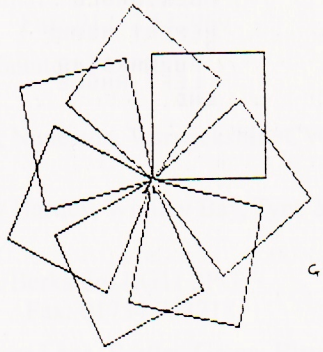
```
GSQ 100
GSQ 40
```

The next two procedures are alternatives to the one described above or they can be used to further establish the level they are working at. Repeat the above but type in LOAD GUESS or LOAD GSQR instead of LOAD GSQ. In each case the children should be able to explain the effect of the numbers they type in (see the following examples).



```
GUESS
→REPEAT NUMBER
→ FORWARD 40
→ MAKE ANGLE
  360 / NUMBER
→ LEFT ANGLE
→ END
→
```

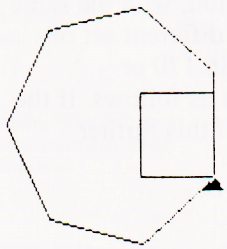
```
GUESS 3
GUESS 5
GUESS 7
```



```
GSQR WITH NUMBER

REPEAT NUMBER
  REPEAT 4
    FORWARD 60
    RIGHT 90
  END
  MAKE ANGLE
  360 / NUMBER
  LEFT ANGLE
END
```

```
GSQR 7
```

The next step could be to LOAD POL which takes two numbers to run, eg POL 40 4 or POL 50 7 as shown in the following diagram. If the children can explain that the first number determines the size of the drawing while the second number determines the number of sides to the shape, then they would be working towards level 5.



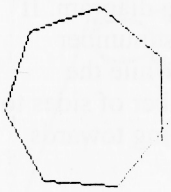
```
POL WITH SIDE,NUMBER

REPEAT NUMBER
  FORWARD SIDE
  MAKE ANGLE
  360 / NUMBER
  LEFT ANGLE
END
```

```
POL 40 4
POL 50 7
```

The next three procedures require a more investigative approach to determine what is going on and will take them from level 5 onward. These procedures fit in with NC Mathematics AT1, investigations.

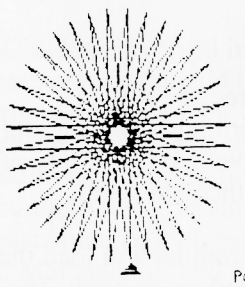
LOAD POLY in the above routine will load the procedure which takes two numbers to work. The children should keep a record of these pairs of numbers and keep printouts as evidence of their investigations. The aim of the activity is to find a relationship between the two numbers typed in, eg the diagram overleaf shows the result of POLY 7 49 and POLY 7 53. In the first printout the shape does not join up whereas in the second, the shape has crossed over itself, so that the children would have to find a number between 49 and 53 which would get the shape to close. From the table of closed regular polygons, the children should be able to spot that multiplying the two numbers gives 360 (level 5).

```
POLY WITH NU
MBER,ANGLE
REPEAT NUMBE
R
 FORWARD 40
 LEFT ANGLE
END
```



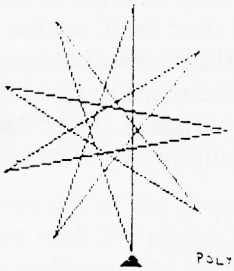
```
POLY WITH NU
MBER,ANGLE
REPEAT NUMBE
R
 FORWARD 40
 LEFT ANGLE
END
```

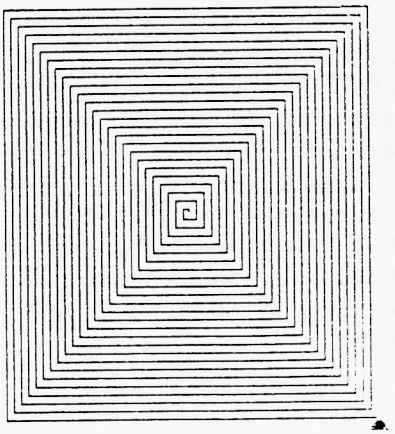
A more challenging investigation, with the same procedure, occurs when a totally different set of numbers is used, such as POLY 36 170 or POLY 9 160, giving the printouts as follows. If the children can explain the results of this further investigation they are at level 6.



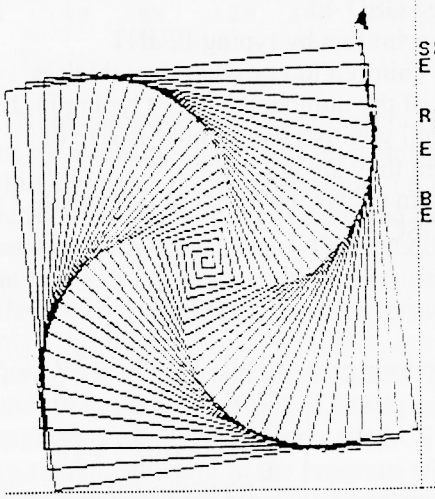
```
POLY WITH NU
MBER,ANGLE
REPEAT NUMBE
R
 FORWARD 40
 FORWARD 80
 LEFT ANGLE
END
```

With the first of these investigations using POLY the children will have discovered a set of numbers which I choose to call 'nice' numbers and these numbers are very useful to know in the next investigation.





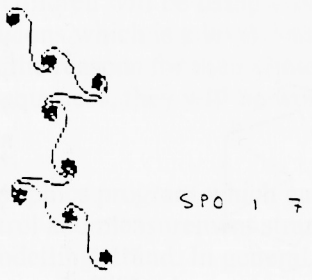
```
SPY WITH SID
E,ANGLE,ABIT
REPEAT 100
 FORWARD SID
E
 LEFT ANGLE
 MAKE SIDE A
BIT MORE
END
```



```
SPY WITH SI
E,ANGLE,AB
REPEAT 100
 FORWARD SI
E
 LEFT ANGLE
 MAKE SIDE
BIT MORE
END
```

The procedure SPY takes three numbers to get it going. If the middle number is one of the above 'nice' numbers then a printout such as the following for SPY 1 90 2 is obtained. However, much more interesting printouts can be obtained for numbers that are one or two either side of a 'nice' number. See diagram for SPY 1 91 2. This work can be used for getting lots of 'pretty' pictures but the investigative results and explanations of the printouts is still level 5.

A further investigation which may be beyond most children uses the procedure SPO which needs two numbers to make it work, such as SPO 1 7 shown on the following printout.



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Tel/Fax: 01329 661565

Roger Keeling, Newman College, Genners Lane, Bartley Green, Birmingham B32 3NT
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