MICRO-SCOPE

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MICRO-SCOPE 49

MICRO-SCOPE matters

Rhona Dick
Editor

This issue of *MICRO-SCOPE* contains the usual eclectic mix of features, and I hope there will be something to interest and stimulate everyone.

Harriet Martin introduces our 'Ancient Greeks' centre pull-out section this term by describing her approach to teaching this topic. It will come as no surprise to those of you who know of Harriet's work that once again she has brought history to life. Her classroom archaeology method has been widely reported elsewhere, and this short article, reprinted here by kind permission of the *Historical Association*, tells us how she integrates the ancient and the modern, archaeology and IT.

Heather Govier has provided another thought-provoking article; this one is designed to be photocopied for each governor, and could form the basis of valuable discussion. For those of you who were unable to hear Ron Allen, at either the Design and Technology Exhibition or at BETT, he has provided a synopsis of his seminar in which he demonstrates the use of a new control technology programme, *CoCo*. Dorothy Luff provides us with a tongue-in-cheek (and largely fictional) look at IT in her classroom in 'The truth is out there – look in the file marked X!!' I suspect, Dorothy, 'you are not alone.' Take heart, Margaret Still explains how your pupils can be developing the skills and concepts needed for better IT capability without even switching on a computer.

As more and more people are acquiring the necessary hardware to surf the Internet, guidance written in language that we can all understand is very welcome. Richard Selwyn provides this in his 'Introduction to the Internet'. Just as I was pondering all the possible Internet Service Providers, and which would be best for me to choose, Betty Lumley sent me an article detailing her attempts to get 'on-line'. For some months I had been happily using my husband's office e-mail address, but his increasingly frequent absences on business made this inconvenient. The time had come to bite the bullet. Perhaps I was fortunate, but my introduction to e-mail has proved almost pain-free. So far, the major benefit has been at Christmas time, as I tried to collate all the articles for this issue. When the postal system was overwhelmed, I could still communicate at great speed. It would be wrong to say that there have been no hiccups – attachments sometimes arrive as nothing more than gobbledegook, and occasionally messages have disappeared without trace; I picture them languishing in some ethereal black hole. Worst of all, I am now getting junk e-mail! As I do not know of any technology that is foolproof, and taking everything into consideration, I am, nevertheless, a convert.

E-mail is fairly new to me, but not so to education. Browsing through some back issues of *MICRO-SCOPE,* I came across an article entitled 'Electronic Mail and Local Databases . . .' by Pamela Winn, Graham Atkinson and Ian Webster in *MICRO-SCOPE 21*, Summer 1987. So, electronic mail was recognised as being of educational value almost ten years ago, not only in the specific area of data exchange, but also

> 'Using the system would certainly encourage children to see computers as everyday devices and develop an awareness of what the technology of today can do both inside and outside the classroom.'

The authors went on to say

> 'What the future holds for the use of Electronic Communication we cannot say but in Derbyshire we are sure of the educational value and the, as yet unexploited, potential of the medium.'

How many schools have access to e-mail for pupils to use? How is it used? Is the potential of this medium still unexploited, or is it underexploited? Do let me know your views. If you have used e-mail with your pupils please consider sharing your experiences with other *MICRO-SCOPE* readers. My address is inside the front cover, or you can contact me by e-mail – rhona@dial.pipex.com.

Finally just a reminder that there will be no *MICRO-SCOPE* next term, instead there will be a *MICRO-SCOPE* newsletter. *MICRO-SCOPE 50*, which will be published in the Autumn term of 1997, promises to be very special. Make sure you don't miss it.

IT in the primary school: what Governors need to know

Heather Govier

The history

The (short) history of the use of information technology (IT) in the primary school has left a number of legacies which lie at the heart of all issues that governors must face today. Before the early 80s there were virtually no computers in the primary sector. A very few forward thinking Head Teachers (almost all male) had purchased a Commodore Pet machine which was used, mainly with older pupils, either for the practice of skills in spelling and arithmetic or for learning to program in the computer language BASIC.

Everything changed in 1982 when the Department of Trade and Industry (DTI) offered all primary schools a half-price computer. It is important to note that it was the DTI and not the Department of Education and Science (DES) which was funding this scheme and the main objective was to boost the young British computer industry rather than to stimulate the effective use of IT in schools. Thus only three British-made machines were on offer. These were, in ascending order of price, the Sinclair Spectrum, the BBC B and the Research Machines 480Z. The middle priced machine, which was also the one with 'Aunty's' name attached, was far and away the most popular choice, although a not insignificant number of Local Education Authorities (LEAs) chose the 480Z which was the baby brother of the 380Z, then common in their secondary schools.

And, of course, it was the LEAs, not the individual schools, which made the choice. Firstly they were picking up the other half of the tab in those pre-LMS days and secondly they were responsible for providing the training and software support and most felt that this would be far more straightforward if they standardised on a single machine. The Sinclair Spectrum proved one of Clive's early flops (remember the C5?) and died a quick death as most software producers decided against writing for such a small market. It had been a relatively cheap machine and the joke at the time was that it was great for teaching arithmetic – you could buy five machines and children could solve problems such as:

'If I had 2 Sinclair Spectrums and then got 3 more, how many would I have altogether?'

One interesting early debate was to have significant long term consequences. The DTI claimed that it could not afford to offer both disc drives and colour monitors and there was discussion about which was most important to the primary schools. It was felt that young children must have colour, so the DTI machines were supplied with cassette loading. This caused major difficulties and alienated many teachers. Loading was unreliable, took several minutes (even when it worked) and had to be done all over again if someone inadvertently switched off the machine or tripped over a lead. Tripping over leads was a real hazard. To be fair, most teachers took great care to organise a safe working environment – but it was very difficult, as virtually all classrooms had a single power point at the front, near the blackboard. This is a very unsuitable position for a computer and so it was necessary to run a long lead around the walls to a preferable site.

For the first couple of years most schools had just one or two computers and these were kept on trolleys which could be moved from classroom to classroom to give everyone a turn. The 'nickable' nature of the IT equipment presented further problems and so the trolleys were usually rolled away into a lockable cupboard at night. All of this took teacher time and energy and schools with steps (know any that haven't?) had particular difficulties. Little wonder then that in many schools teachers were not exactly fighting for their turn to:

- reorganise the classroom to accommodate the computer
- collect the trolley before the lesson
- set up and plug in
- load BASIC from cassette
- load the program from cassette
- reload BASIC and program after an accidental switch off
- put the computer away at the end of the lesson.

And what could you do with those early machines anyway? There was precious little good software at first and the larger, more meaningful programs took longer to load. One Head Teacher boasted that he had calculated that the pupil/computer ratio in his school gave each child seven minutes per day. Careful timetabling ensured that each child got his or her seven minutes on the same little program which had been loaded up first thing in the

morning. Only software which could be 'done' in seven minutes was used and, of course, there could be no integration with the rest of the curriculum. That Head might now cringe to remember his strategy but he was only trying to do his best with the resources available to him.

Things did get rapidly better. Disc drives were purchased, software quality improved, teachers went on training courses and schools bought more machines. The years from 1984 to 1988 were the halcyon days for the use of IT in the primary school when the excitement about the growth of this new area of education was almost palpable. It was fun to be in the field at that time. New software ideas were coming in thick and fast and schools were rapidly moving towards the 'ideal' ratio of one machine per classroom. Children and teachers (some teachers) were stimulated by the new technology and our understanding grew of the myriad ways in which computers could help children learn.

But the early days left a five-part legacy which was thrown into relief when, in 1988, the National Curriculum gave teachers a lot more to think about and the development of IT use was put on the back burner.

The legacy

1. Management

It became clear that IT use in primary schools only really took off when the Head Teacher (or possibly the Deputy Head Teacher) was an enthusiast. This was for two reasons. Firstly the general management of computer hardware and software was such a burden that it took someone without a specific class responsibility to handle it comfortably. Those enthusiastic Heads personally took charge of getting the machine out, setting it up and moving it from room to room and many also spent hours working at the computer with small groups of children. Secondly it needed a good curriculum leader to inspire the staff and to persuade them that the learning benefits justified the use of what was really quite 'unfriendly' equipment. Schools which made best progress were often those in which the Head chose to specialise in some particular growing area such as data handling or the use of simulations and much innovative work was driven by the energy of Head Teachers. The result was a growing gulf between leading edge schools and the rest – a gulf which is still apparent today.

Another management issue has been the role of the IT Coordinator. Even before IT became a National Curriculum subject in its own right (after the Dearing Review) the majority of schools had nominated someone to act as IT coordinator. In most cases the job was concerned almost

Management	Importance of Head Teacher Role of Coordinator Gender imbalance
Organisation	Pupil:computer ratio Turn taking Computer labs?
Hardware	Old stock Upgrade budget inadequate Classroom wiring
Software	Management Unrealistic price expectations Software tools v. ULPs
Staff Training	Long courses needed Ongoing demand

Fig. 1. *The legacy.*

exclusively with providing technical support – an almost impossible task for a teacher with full class responsibility and little (if any) release time. However, the very existence of the coordinator encouraged other teachers in the school to feel that technical issues were not their domain. Even the simplest of technical problems led to the coordinator being called in to help and, where such problems were frequent, class teachers felt de-skilled and incompetent. Today the IT Coordinator's job should be very different. As in the case of the coordinators of all National Curriculum subjects, the work should be mainly curriculum planning and leadership – developing policies and schemes of work to ensure that pupils' IT education is progressive and continuous. But the legacy of IT coordinator as technician, and the problems associated with this, remain.

The gender imbalance in IT enthusiasm is a third cause for concern at management level. A disproportionate number of those enthusiastic Head Teachers and IT coordinators are male. This sends undesirable messages to children and must exacerbate the gender differences in attitudes to IT widely found amongst pupils at secondary level. Primary schools have always denied any gender bias in their teaching and certainly girls under the age of 12 seem to enjoy computer work just as much as their male peers, but attitude development and change is a very complex process, subject to subtle influences. Role models observed in the primary school could well influence life choices made much later. And children are not the only ones subject to such influences. Only a female teacher could have readily confessed, as recently as last term,

'I have never really been able to get on top of computers. I must get round to it one day.'

2. Organisation

Although the days of the seven minutes per machine have now gone, computers are still not fully integrated with the rest of the curriculum in many schools and the use of the machine as a reward for finishing early is still not unknown. Aspirations have changed. The ideal ratio of one per classroom has shifted and many would even like to see one per child! Certainly this would mean that everyone could have access to wordprocessing facilities at the same time, which could revolutionise the teaching of written composition. There are already some primary schools in Britain which have a laptop for each pupil and the enthusiastic Heads (!) of these schools rave over the changes that this level of resourcing has brought about.

But children in most schools must still share the equipment and how this is done is in the hands both of the class teachers and the senior managers. Where there are a couple of machines in each classroom teachers may organise a rota of use to ensure that all get a fair turn with each piece of software. In other classrooms, use is more spontaneous, with children electing to work at the computer when they feel that it is appropriate. This may lead to better integration of IT into the curriculum but carries the danger of uneven use across the class with those who are most competent and enthusiastic getting the most time on the machines.

The piecemeal acquisition of computers has dictated their distribution around the school. The model in secondary schools has been very different. In that sector there are IT labs full of computers which may be used by a whole class at a time. This was not possible in the primary schools at first because there were too few machines but many schools now have a dozen or so computers which would be quite adequate to allow a whole class to work together in groups of two or three. Few schools have really considered the pros and cons of reorganising their equipment in this way but, with teachers being urged to do more whole-class teaching, the possibilities need to be explored. Finding the extra classroom is a whole different problem!

3. Hardware

Nearly all primary schools have a lot of old stock which is unreliable and outdated. This is frustrating to teachers and severely restricts the ability of the school to meet the demands of the National Curriculum. The intellectual stimulation of trying to do all your writing without the use of the letter K (because the 'K' on the keyboard no longer works) is no compensation! Few schools have adequate upgrade budgets and this is partly because computers have always been thought of as capital assets rather than consumables. But IT does have a limited life and it is essential that schools come to terms with this fact and with the need to replace stock rather than just add to it. A number of schools are now considering leasing as an alternative to purchase of equipment and, although this appears to be considerably more expensive in the long term, the differences are less marked when the cost of service agreements is included. The great advantage of leasing is that it forces schools to set aside an earmarked sum of money for IT and that after the term is up (and possibly even during the term – depending on the lease arrangements) all the equipment can be upgraded for just a little extra charge.

The second hardware legacy is the school's wiring. Few schools have been built since 1980 and many have buildings which date from Victorian times. The single power point by the blackboard has now been supplemented in most classrooms but what about the installation of telecom connections or cabling to allow computers throughout the school to communicate with one another? Networking of various kinds, especially the use of the Internet, is the growth area of the nineties in society at large and, although its use in primary schools is still limited, it is bound to develop. Various political parties have made promises about getting all schools 'on-line'. Even if these promises are kept you can bet that they will not include wiring up every classroom!

4. Software

Mention software to teachers and most will immediately think of floppy discs – probably the really floppy, five-inch discs used by the BBC computer. The management of software in this form has been a major difficulty for schools since they acquired disc drives. In a well organised school, each class would have its own set of discs of programs suitable for the age of the children and these would be clearly labelled and appropriately housed. Blank, formatted discs would be available to store children's files and these too would be well labelled so that all pupils could find their own work quickly and easily. But we are not all the best of organisers and it is easy to see how a more casual approach to labelling and storage might lead to the frustrations of faulty discs and lost work. Fortunately modern machines have hard discs which make software management a much simpler task and this is yet another reason why schools really need up-to-date kit. All that is required now is an annual spring clean to throw out old files. The backing up of important work files

and the secure storage of programs on master discs is also to be recommended, although hard discs are generally very reliable and those insurances are seldom called upon.

The second software legacy bedevilling schools is a set of unrealistic expectations about prices. Early educational computer programs were cheap – they were often even free! Soon after the DTI hardware offer, the Department of Education and Science set up the Microelectronics Education Programme (MEP) to support the use of IT in schools. The MEP provided training on a 'cascade' model by running courses for LEA advisory teachers and the Primary Project of the MEP also provided software, supplied free to LEAs who were then able to copy it for all their schools. Many of the MEP programmes were 'garden shed' products, written at home by enthusiastic amateurs who worked long into the night, more for the intellectual challenge of programming than for the profit motive. Much commercial software was also produced in this way and was sold at give-away prices – a typical primary school program might cost £15. This software mainly consisted of useful little programs (ULPs) aimed at developing particular skills in particular subjects – the use of grid references for mapwork or an understanding of basic English grammar, for example. But such programs are now used less and less and the emphasis is on software tools such as a wordprocessor, a paint program or a database, which may be used in many different ways across the whole curriculum. Sophisticated software of this type cannot be developed in a garden shed! It usually takes a huge commercial team many thousands of hours to produce. You can't buy it for £15 – £150 is more realistic. Here is another major demand upon the tightly stretched finances of the primary school.

5. Staff training

When the half-price machines went into schools, the contract involved a commitment by the school to send two persons on a training course. The idea was that this pair would then return to their own school and pass on what they had learned to the rest of the staff. This 'cascade' model never worked, largely because the two-day training course provided for the two teachers was inadequate to equip them with the necessary competence, and more importantly, confidence, to undertake the training of their colleagues. The courses did not even really prepare the teachers to use IT effectively in their own classrooms as most concentrated almost entirely on technicalities with very little time left to consider educational issues. It became clear that only long courses (20 days or so) could really begin to increase teachers' confidence as well as their understanding of the role of IT in teaching and learning and thus have any significant impact on classroom practice. Such courses are expensive and only a small minority of teachers have had the opportunity to attend them. The situation is unlikely to change as many LEAs, strapped for cash as increasing proportions of their budgets have been delegated to schools under LMS, have cut the numbers of IT advisory teachers, which means that they are unable to run long courses even when schools are willing to pay for them. And not many schools are willing – what with so many other pressing INSET needs. But an extensive, deep, thought-provoking course can make an enormous difference to the way a teacher uses IT and the benefit her pupils derive from it. What greater dividend might a good, long course for Head Teachers pay?

Furthermore, IT INSET demands are never ending. Even in that hypothetical school where every member of staff has attended a 20 day course, developments in technology will require teachers to learn new skills. Industry recognises, and budgets for, regular updating of staff expertise in IT. Schools must begin to do likewise.

The governors' role

So what can governors do to address the many issues arising from this legacy?

Well, of course, not all schools are troubled by all of the problems described above and the first step is to ensure that review of IT is a regular feature of the Whole School Development Plan. Such a review should look carefully at each of the issues; management, organisation, hardware, software and teacher skills and decide which need addressing and in what order of priority. An OFSTED inspection might help in identifying shortcomings in, say, curriculum coverage or teacher expertise or it might be helpful to instigate an IT audit along the lines suggested in a document produced by the National Council for Educational Technology entitled *Reviewing IT* (see below for the full reference).

The next step is to make sure that you have a clear, up-to-date IT Policy which is practical enough to inform your decisions about development (see *MICRO-SCOPE 46* for a sample Policy). If the principal aim is to integrate IT fully throughout the curriculum, then machines in classrooms (perhaps augmented by some laptops) will be the way forward. If, however, it is felt more important to ensure that the skills of the IT National Curriculum are fully developed for all pupils, then you may wish to consider putting all the machines in one room with timetabled access

for every class. These are important decisions and it goes without saying that the Head Teacher and staff will have a major say in them. But governors too have a contribution to make in this area where teachers do not share a uniform view and may have limited knowledge of the alternatives.

The Whole School Development Plan and the Policy are jobs for the whole governing board but there is plenty of work too for committees.

The Curriculum Committee should be familiar with the National Curriculum for IT which is now quite clear and specific about the skills pupils need to develop in communicating and handling information, controlling and (at Key Stage 2) modelling and monitoring. What the National Curriculum does not do, is specify how these skills should be developed and the school will need a scheme of work to describe what is to be covered in each year and how this is to be assessed. This is work for the professionals but governors have a monitoring role and should satisfy themselves that schemes of work are in place and do ensure continuous and progressive learning in IT throughout the primary years. But IT is not just a curriculum area in its own right. It is also a tool, for use in all other subjects of the National Curriculum. Thus the policies and schemes of work for all other subjects will need to refer to opportunities for IT use, and this too should be monitored by the Curriculum Committee.

The Staffing Committee will need to consider the IT training and development needs of staff, the role of the IT coordinator and the importance of IT skills when seeking to make new appointments. Much has been said above about the ongoing training requirements of teachers but the committee should also look at the needs of support staff such as classroom assistants and even voluntary helpers in the school. Inviting these groups to IT training days could be very fruitful, improving both the quality of their work with children and their self-esteem as valued members of the school community.

Another issue to consider is whether or not the IT coordinator has more to do than coordinators of other subjects and whether an appropriate amount of release time is given for this workload. Perhaps it is time for a reshuffle of responsibilities anyway, especially if your coordinator is the only male teacher in the school. If there is a staff vacancy, the governing body may wish to seek actively for someone who can increase the general IT expertise on the staff. This is a particularly pertinent issue if you are looking for a new Head Teacher or Deputy Head Teacher.

The Special Educational Needs Committee should be aware of the major impact that IT can have in addressing many areas of special need. This vast subject is outside the scope of this article but NCET have produced a number of publications which can help with this (see below).

This committee may also be the place to consider wider differentiation issues. How is IT being used to stretch the brightest children? Has the school looked into the possibilities of Integrated Learning Systems (ILS) to develop pupils' mathematical or English language skills through individualised learning programmes? Integrated Learning Systems are currently very expensive and are unlikely to be of immediate relevance to most primary schools but they are likely to be a growth area and you should be aware of the possibilities. Again the NCET can help, with a booklet which describes the evaluation of ILS in British schools.

The Buildings Committee will have a major task on its hands if your school wishes to set up a computer lab. Can space be found for this, perhaps by moving the library or by finding some new area suitable for small group work? For small schools, shoe-horned into tiny buildings, even the question might be risible!

Even if the computers are staying in the classrooms you might wish to look at cabling needs. Are there sufficient power points and are these appropriately sited? Do classrooms need cabling for telecommunications to allow children to use electronic mail or the Internet and if so where should the connections be placed?

The Finance Committee admittedly has the biggest headache. Where can the money be found to do all of this?

Here, I can provide no help!

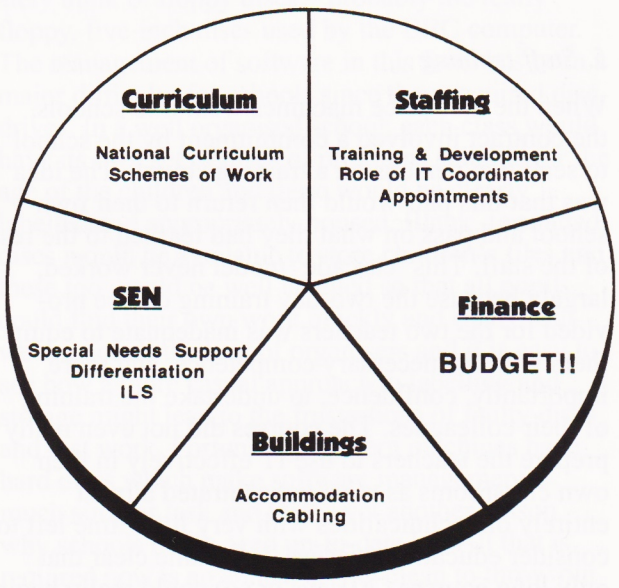


Fig. 2. *Issues for consideration by committees.*

References and further information

NCET (The National Council for Educational Technology) is the quango set up to promote the effective use of IT in education. The address is:

NCET, Milburn Hill Road
Science Park,
COVENTRY CV4 7JJ
Tel: 01203 416994
Fax: 01203 411418

NCET produces publications on a wide range of subjects many of which are likely to be of interest to governors. A catalogue is available. Publications referred to in the text were:

- *Reviewing IT* (ISBN 1 85379 262 4)
- *Access Technology* – making the right choice: Using information technology to support the learning of students with special needs (ISBN 1 85379 326 4)
- *ILS (Integrated Learning Systems)* – a report of the pilot evaluation of ILS in the UK (ISBN 1 85379 310 8)

Influences of home and school on pupils' use of computers

Geoff Strack
Adviser for Science and Technology, Hackney, London

Introduction

During the first half of 1996 a survey of 780 pupils between nine and 17 years of age was carried out to investigate the influences of home and school on their use of computers.

Information was collected and analysed on:

- home and school uses,
- individuals who influenced pupils' use,
- attitudes towards computers,
- the range of peripherals available at home,
- where they were located.

A targeted survey was also carried out of 44 adults. The results, which were compared with findings in Australia and the US, highlighted the varying experiences of boys and girls, of the differing provision and influences of individual schools, and the availability of home computers. Significant differences were also shown between pupils' and parents' perceptions of how home computers were used.

Home ownership

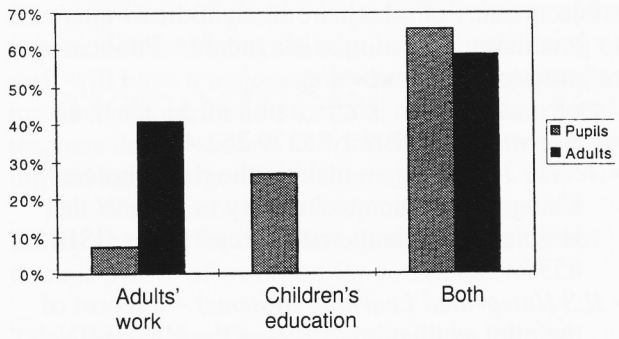
The level of ownership of home computers for the groups of pupils surveyed was 52%, which was higher than had been anticipated from discussions and reading. This figure was almost double that for computer ownership in all UK homes. That levels of home ownership are increasing was supported by evidence from a range of sources and a similar pattern seemed to be occurring in other countries including New Zealand and the US.

What happens at home

The responses showed that parents had considerable interest in their children's work where there were home computers, and numerous surveys have revealed that parents believe that computers assist in children's education. It was also claimed that the time that young people now spend at their computers was time they would previously have spent watching TV.

While many of the responses of parents and pupils in the survey were similar, there were some areas in which they did not agree. No parents responded that they had bought computers just for their children to use, whereas 109 pupils thought that they had. In contrast most parents and pupils felt that the computers were bought for joint use.

That the use of computers at home can be something for the whole family to share was confirmed by almost all respondents. However, a finding which did not support family involvement was that 58% of pupils responded that computers were in their bedrooms. In contrast the majority of adults responded that the home computers, which their children used, were almost equally found in the children's bedrooms, living rooms or studies. An American study carried out by the computer company Packard Bell in 1995, indicated a different pattern of distribution of computers in US households surveyed.

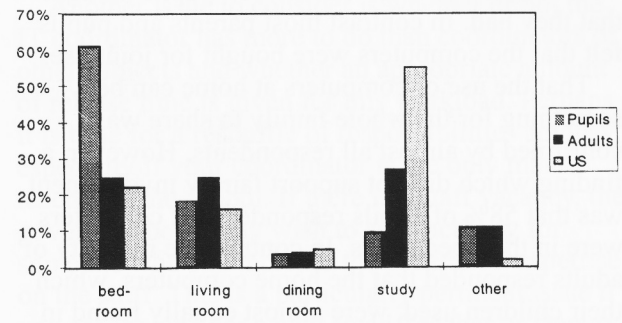


Reasons given for the purchase of home computers by pupils and adults.

Determining how much time a person spends working on a computer at home is not an easy task. Consequently, both parents and pupils see themselves as the major users of computers in their homes. These perceptions could have arisen from the fact that most home computers are located in children's bedrooms and it may not be apparent when children are or are not using computers.

For almost half the pupils, there are now two or more computers at home and the indications are that these numbers are increasing. As would be expected, this provides some pupils with more hands-on opportunities. The responses indicate that those pupils with four or more computers at home are getting an average of almost ten hours a week access, double the time for pupils who have only one computer at home.

Further disagreement centred around the issue of who helps pupils most at home when they use a computer. More than half of parents believe that it is fathers, whereas just over a quarter of pupils said it is someone else. Just under a quarter said that it is almost equally father or brother. In their responses the proportion of pupils who indicated that they spend most of their computer time at home playing games, was five times higher than the corresponding responses given by the adults. The conclusion that could be reached from this is that



Location of home computers which were mostly used by pupils as indicated by pupils and adults and the distribution of home computers within homes in the US survey.

Table 1. *Computers at home, how much time per week pupils used them and a US survey showing the percentage of homes having different numbers of computers*

Computers at home	1	2	3	4 or more
% of all home computers	55%	28%	16%	1%
hours used per week	4.9	5.4	6.5	9.7
US figures for home computers	39%	34%	13%	6%

parents are not fully aware of what their children are doing on the computer. However, there was a high correlation between the school subjects which pupils said that they did at home on computers and what parents said they did. This would lead to a modification of the previous conclusion to say that parents were aware of what children were doing for some, but not all of the time.

That parents have only a limited knowledge of their children's use of computers at home has important implications when considering the use of the Internet. In the survey only 16% of pupils responded that they had a modem and 11% said that they use the Internet, but with greater access to modems more and more pupils would be able to make use of this facility.

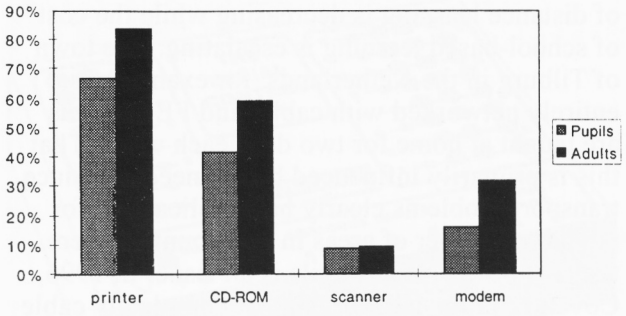
In the US a recent survey showed that 70% of home computer owners had a modem. As the percentages in this country also increase, a number of important developments might occur, and there are issues which schools will have had to come to terms with. As Professor Heppell pointed out;

> 'Home learning could easily become a rival to schools unless we carry out research and learn from existing computer projects in Australia, the US and Belfast.'

Home learning is well established in many parts of Australia and the use of computers is a fundamental aspect of this. What we should learn from these people is the discoveries they have made about what works and what does not. The question could arise that if pupils are going to be expected to complete school work on a computer, does it matter whether they are working at home or in a school?

About half the respondents with home computers said that they have CD-Rom drives, and in 1996 it is practically impossible to buy a new computer without an integral CD-Rom drive. As educational tools they have become at least as important as the wordprocessor in providing children with home learning opportunities.

Pupils' use of home computers to play games is likely to continue and probably increase. As Professor Heppell pointed out, in the right circumstances computer games did have real merit and



Percentages of pupils and adults responding that they had the computer peripherals indicated.

were an activity to which parents could contribute. In the same way as some parents indicate their approval or disapproval of their children's reading tastes, they might need to endorse the games which are played on the computer.

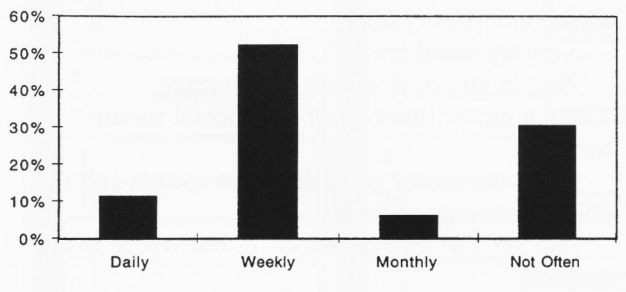
Gender differences

The number of girls entered for computer studies examinations has remained at about two-thirds of the levels of boys' entries for the last five years. The impression however, is that the use of computers is no longer a male preserve. Certainly more boys than girls have access to home computers, but in the survey the involvement of girls and women was greater than the researcher expected and was certainly higher than might have been recorded just a few years ago. The pupils responded that in 20% of homes, females use the computer the most and in 27% of homes they help the most. Adults responded that in nearly half of homes, females use the computer the most. These developments could well be as a result of changing work patterns and the increase in the numbers of women using computers at work.

Pupils without access to their own home computers

Almost half of the pupils who responded do not have home computers. Of these, about a half were able to use a friend's computer at some time but the others had no access to computers outside school. Even where pupils use a friend's computer, almost 70% of them replied that this was for two hours a week or less, and 70% of that time was spent playing games. In this situation some skills were being developed but this was not as beneficial as if pupils use them for educational purposes. Surprisingly though, almost 20% of pupils using a friend's computer responded that they did use it for educational purposes. One reason for this could have been, that since this was defined as school work there was strong parental interest and school influence in using the home computer for this activity.

There was some concern about pupils who had no computer access at all outside school, with just over half the adults saying that this matters. For those pupils, schools clearly have an important role and this is reflected in the responses to the question 'Who provides the most help in learning about computers?' The vast majority of these pupils indicated that it is their teachers, the contributions of parents, friends and other people being relatively small. For pupils who use a friend's computer, teachers do play an equally important role. This finding has a number of implications which include the importance of on-going training for teachers in the use of computers and the new developments which accompany them. There is also the need to improve pupils' access to computers in school.

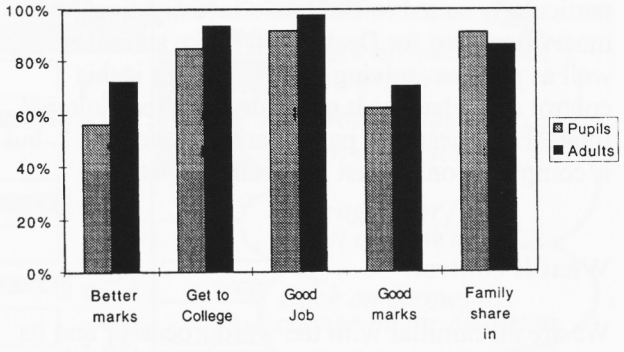


Responses of all pupils on how often they used computers in school.

Attitudes

A very high percentage of pupils and parents responded positively with regard to the questions on their attitudes to computers. As was expected the vast majority of pupils and parents indicated that they believe that computers are important for getting into college, and for getting a good job.

A significant, but unexpected finding, was that a clear majority of pupils and parents not only



Percentage responses by pupils and adults on the importance of computers in achieving the outcomes indicated.

believe that pupils who use computers get better marks, but also that computer skills are an important step towards getting good marks. There was, however, no evidence as to whether or not this is so, but the fact that pupils and parents believe it is something for schools to recognise and provide for.

Future implications

After social security and health, education is the largest item of expenditure for our Government and for many others. In 1996 we are taking part in an economic transformation that is being driven by an implacable technological revolution. This revolution has contributed to the fact that the cost of distance learning is decreasing while the cost of school-based learning is escalating. The town of Tilburg in the Netherlands, for example, is entirely networked with cable, and FE students are taught at home for two days each week. That this is primarily influenced by the need to reduce transport problems clearly has implications for the large number of areas in this country where the cost of 'bussing' pupils is an issue. In 1996, Coventry in the UK was almost completely cable networked and Gloucestershire plans to do this for all schools, colleges and hospitals for the millennium. All these developments are seen as being influential in determining not just how pupils use computers, but also the future of schools themselves.

Computer control – a cross-curricular approach to teaching

Ron Allen
Senior Lecturer in IT, Chichester Institute of Higher Education

Ron Allen demonstrated the use of *CoCo* at both the D & T Exhibition at the NEC in November 1996, and at BETT in January 1997.

Who is in control?

The introduction of micros into schools has provided the opportunity for the enrichment and extension of the curriculum. Such benefits can usually be attributed to the enterprising use of open-ended software which allows children to explore, investigate and try out their ideas.

Control technology is one aspect of IT which is particularly suited to children's investigations; it is most often used for Design and Make activities as well as problem solving. Well . . . What is this control and what has it got to do with Technology? Interesting questions, particularly the second . . . but is computer control just for Technologists?

What is control?

We are all familiar with the wordprocessor and its ability to print out text. What we may not be aware of is that the printer is being switched on and off, that is, controlled, by the computer. Instead of fitting a printer to the computer you can attach an interface box into which can be plugged electrical devices such as, light bulbs, buzzers, small motors etc.

Now replace your wordprocessing software with 'Control' software and you are in control!

Pressing buttons?

Using the *CoCo* software begin by just pressing buttons on the screen's control panel and see what happens. Build your models, plug them into the control box and make them go! Plug a light bulb into socket 1.

Point the mouse to button number 1 on the screen and press [Select].

Now try numbers 2, 3, 4 etc.

Plug in any device such as a buzzer.

Put a motor into one of the special motor sockets.

Make the motor go at different speeds and in both directions.

Fun isn't it? and easy too . . . but where is the learning?

Well I suppose it's in the making and testing of the models that you might connect to your device

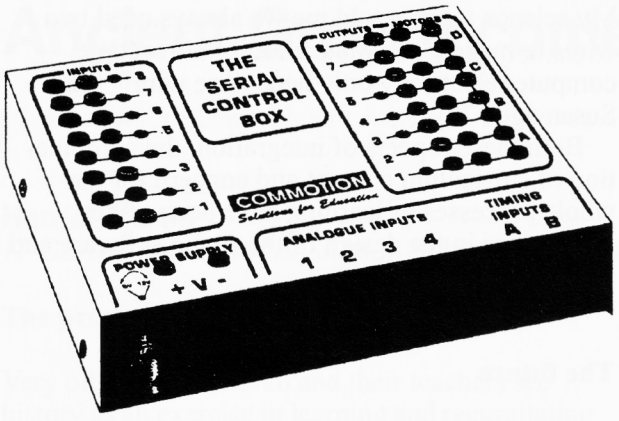


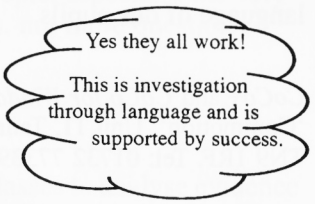
Fig. 1. *The commotion control box – jack sockets or banana plugs – what's the difference? – read on!*

and that's it. All we have achieved is the computer being used as a switch (and an expensive switch at that) to turn things on and off. This is not justified!

To move on, call up the dialogue window and talk to the computer by typing in words. Remember that bulb plugged into socket number 1? Can you get it to come on by typing words for the computer to understand?

Try some of these:

switch on 1
turn on 1
switch on 1 please
on 1



How many times do you think children would have to try their language skills before meeting success with software that only offers:

switchon1 ?

(making certain you **do not** put a space between words).

Do you want them to succeed with that anyway?

What about turning on three light bulbs plugged into sockets 1, 2 and 3.

How about:

switch on 1, 2 and 3
turn on 1 to 3
switch on all

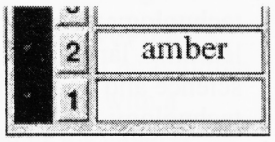
and there are many more that will work.

It is the language, more akin to English, that makes the software not only friendly and easy to use but powerful in helping children explore their ideas through words. They are able to investigate their abstract ideas through language and, with a high degree of success, turn them into concrete actions. It is this success that makes for powerful cross-curricular learning.

Where to next?

What about sets of instructions – procedures to solve problems? One of the most common ones is a set of traffic lights. Here is part of a procedure:

switch on red
wait 5 seconds
switch on amber
wait 2 seconds
switch off red and amber
switch on green etc. . . .



Of course you need to tell the computer which one is red, amber and green and you can leave off the seconds.

But wait, traffic lights go on and on and on forever. Many will say . . . 'Oh that's easy, simply use a RECURSIVE PROCEDURE.' Easy to use perhaps, not so easy to understand.

How about:

Repeat forever
switch on red
wait 2
switch on amber etc. . . .

That is much more conducive to children's thinking and relates to their everyday experiences.

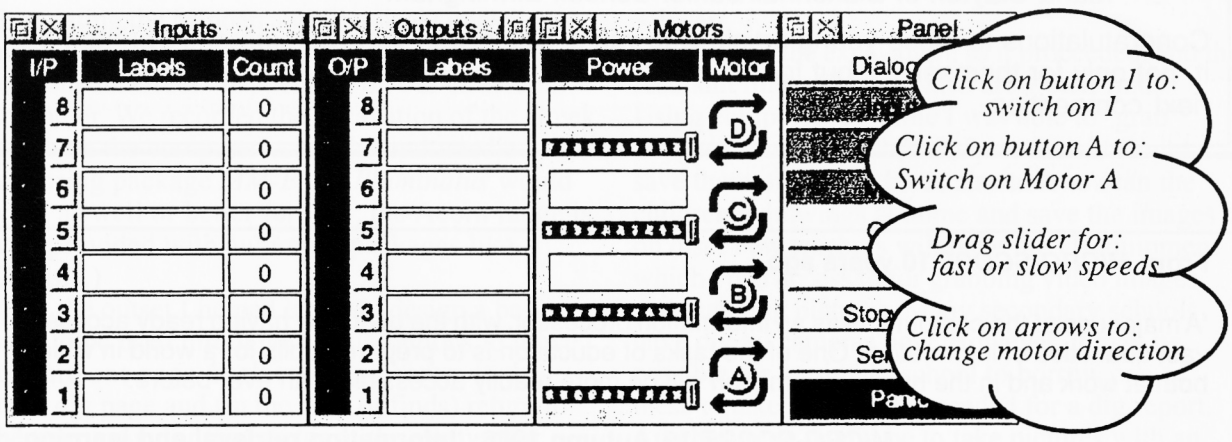


Fig. 2.

Incidentally recursive procedures also work – so, whatever turns you on.

Set your pupils problems, let them explore, investigate and solve these problems. Now you have children involved in higher order thinking without the constraints of a new clumsy language which they will have to learn from scratch.

So what do you think of these?

at 17:30 switch on all or
if input 3 is on then motor A forwards or
whenever sensor 3 > 50 switch on fan

An integrated curriculum

What is an integrated curriculum? To some teachers it just means integrating lots of different subjects through a single topic. What about this definition?:

> An integrated curriculum should mean that technology teaching supports good language learning, language learning supports good science and good science needs to support good technology.

We should not allow the computer to define poor language structure just because we are studying technology, or permit the technology of a control box to deliver electricity (via a jack socket) using what appears to children to be a single wire circuit. My science teacher told me we always need two wires to make a complete circuit. 'How come computer electricity only needs one wire?' asks Susan aged 7.

Both these aspects of integration, the combination of curriculum content and concern for the whole processes of learning have been of key importance in the design of the *CoCo* software and its associated hardware.

The future

As with most learning, teachers have found that any opportunity for first hand observation, in the context of their work, can only improve children's understanding. Observing working traffic lights and looking closely at real washing machines are just two examples of first hand experiences. It is increasingly clear that 'control' activities can provide a rich environment for the development of these and other skills, attitudes and concepts.

Our children therefore should not be re-educated to speak the language of our computers; our software should be re-designed to speak the language of our pupils.

CoCo+ and *CoCo for Windows* is obtainable from: 'Commotion', Unit 11, Tannery Road, Tonbridge, Kent TN9 1RF. Tel: 01732 773399; Fax: 01732 773390.

MAPE Art Competition

Judging the MAPE Art Competition proved to be very difficult this year. The winners are:

Samantha Summers of Hazelwood School, Totton
Lucy Penny of Milldown First School, Blandford Forum
Steven Leggat of Forgue School, Huntly
Ryan Shortt of St. Kieran's Primary School, Belfast
Maria Clayton of Blakenhall Junior School, Birmingham

Congratulations to these young artists who win a T-shirt with their winning entry printed on it, not only for themselves, but for every member of their class. Look out for news of the next competition.

From *MICRO-SCOPE* 10 years ago

'A major use of the computer is as an information processor, with the user now having ready access to vast quantities of information. One of the tasks of education is to prepare pupils for a world in which, both at work and in the home, information will be more readily accessible than ever before.'

***MICRO-SCOPE 19*, Autumn 1986: 'Information retrieval and learning' by Mike Schilling and Barrie Galpin.**

Ancient Greece comes alive

Harriet Martin
IT Co-ordinator, Cofton Junior School, Birmingham

The process vs. the product in history

Very often both children and their teachers see history as an exercise in learning and regurgitating facts. Most children's history books present facts for the children to learn or carefully copy down as 'research'.

For real historians, history is a process. They learn what evidence there is at present for reconstructing the past. They look again at the existing evidence to see if it has been interpreted correctly. Learning and teaching 'facts' is not the focus of a historian's professional life.

Problem-orientated history is real history. The difficulty with this type of history is that it can be amorphous and vague. People, especially the very young, want firm answers, not more questions.

Our Greek dig

In order to stimulate my classes to analyse evidence and draw their own conclusions from it, I have, on several occasions, had simulated archaeological excavations in the classroom. (See *Junior Focus*, April 1993 for details of my Mesopotamian dig.) In the Spring term 1996 I taught about the Ancient Greeks for the first time and resolved to try the dig approach once more.

From Ancient Greece to the modern world: the role of the multimedia computer

Excavating the Minoan and Classical Greek house in the classroom was the first step towards a multimedia Greek 'happening' on our classroom computer. We recorded the excavation of the Greek house on the computer using the multimedia authoring package *MM-Box*. (*Illuminatus* would work as well or better for PCs; the Acorn range is well provided with authoring packages like *Genesis*.)

At the outset I helped children design a basic page to be used throughout, with buttons to move forward one page, back one page, return to the main dig page and (in the case of finds) return to the main page for that sector of the excavation. One boy drew a picture of a running child in *Paintbrush* and then shrunk it (highlight picture, then choose *Pick*, then *Shrink and Grow*). This picture was imported into *MM-Box* and then treated like a button to move the user through the pages. He made a sound icon (a head with earphones) in a similar manner.

I designed the overall plan of work as follows:

- Title page;
- Map (traced by children from a map copied onto acetate and fastened to the computer screen;
- Pictures of the dig at the start and the end;
- Plan of the dig;
- List of squares dug with the names of the excavators, voice comments added by children;
- Each square on the dig had a page with a photograph and drawn plan of the square;
- Numbers on the plan which referred to finds took the user to the appropriate page;
- There were usually six finds per excavation sector.

Children made copies of our basic page and then used these to describe their excavation.

The children typed their written work out in either *Write* or *Word*. Work done in *Write* was then loaded into *Word* so that the spell-checker could run through it. This allowed us to make full use of the three computers which were sometimes available. Two of these only had *Write*; the third was our more powerful multimedia computer which also has *Word* and *MM-Box* installed.

Although there is no 'edit, paste' facility in *MM-Box*, work copied onto the clipboard memory with 'edit, copy' in *Word* or *Write* can be dropped into an opened text box in *MM-Box* by using Shift + Insert.

I videoed the excavation, as it proceeded, and the resultant finds. Children also drew their finds. Using equipment at home I was able to 'grab' images of the dig and finds from the video and save them onto disc. I was also able to scan the children's drawings at home and save the images on disc. Few teachers will have the IT equipment which I had access to for grabbing video images and scanning pictures. Many secondary schools have digital cameras now. However, it may be possible for a primary school to borrow one of these to take the pictures needed for a dig report. Another route would be to take pictures with an ordinary camera and to have them installed on a

CD-Rom at the time of developing, Boots do this. (See also *'Making Good Use of the School Camera'* in *MICRO-SCOPE 48*.)

Once they had text and pictures, the children were able to design their pages. They opened a text box and dropped in their text from *Word*. They could select the images they needed from those saved by me on floppy discs and add them to the page. Two parents came in on a number of occasions and helped to keep this activity 'on line' although a number of the children did become quite skilled in the processes needed by the end of the project.

Computer clubs ran two evenings a week after school. At these children drew scenes from the 'Twelve Labours of Herakles' in *Paintbrush*. One girl's picture of Herakles was copied and inserted at various sizes into other children's illustrations of the Labours. The best bit came at the end, the adding of a sound effect or two to each page. Children chose or made sounds to enliven each episode, adding them to the sound icon designed by one of the children. This story sequence formed a postscript to our multimedia work.

This was a very ambitious project, and we had more than our fair share of access to the three computers which are shared between three classes. Despite that, only twelve children actually had recorded their digs at the end of six weeks' hard work. The remainder of the class had much less time for their work, and it spilled over into the next term. Interestingly, it is as much the concentrated computer work that excites children as the actual excavation.

Although the project has been very successful, I feel it would have been more manageable either if children had had fewer finds per square or had been asked to select only one find for the multimedia report (at least to start with). Never mind, the children thought it was wonderful. Certainly there was very little on either the history or the IT National Curriculum for England and Wales which was not covered by some aspect of the topic.

Excerpts from the children's assessment of the Greek project

Jamie: I liked our excavation because you could dig and figure out things.

Gemma: The thing I liked doing best was the Lysistrata play and going to the Ashmolean Museum.

Joseph: I like the computer the most. We had a dig and wrote up it onto the computer.

Emma: I like making the Greek pots. We made them with Greek patterns. The most interesting thing was when our class did a Greek assembly. We all dressed in Greek clothes and had Greek masks. It was about some women who were fed up with their husbands who kept going to war. In the end the women go to the hill (the acropolis) and leave their babies. The men beg the women to come down because they can't look after the babies and they stopped the war. The women come down from the hill and they have a party.

Matthew: I liked it when I was on the computer because you can draw pictures like lions and snakes and you can add noises and other funny sounds.

Vikki: I liked the food tasting. I like the grapes and pomegranates best but I disliked the olives and the pastes on the bread (yuk!). I like the bread, but not the pastes, if you know what I mean. We did pots in the clear glaze and black paint which was clever.

Amy: I liked doing the excavation best. I dug square C2 with Claire. We had really nice finds. We had pots with boys picking olives from an olive tree and a little boy kneeling down, trying to catch them all. We went on the computer and we wrote up about all our finds. We made buttons and we put writing on the computer.

This article first appeared in *Primary History*. MAPE is grateful to *The Historical Association* for permission to reproduce this article.

From *MICRO-SCOPE* – 5 years ago

'Technology has now reached a stage where it is not just wheels for the mind but wings for the mind. It is not merely enabling us to do things more quickly and efficiently but it is enabling us to do things that previously were not possible at all. To be able to search at will and in seconds the contents of a newspaper for a whole year, or a 21-volume encyclopaedia is breathtaking. In the future we will take this for granted. . . .'

***MICRO-SCOPE 35*, Spring 1992: 'CD ROM – wings for the mind' by Jack Kenny.**

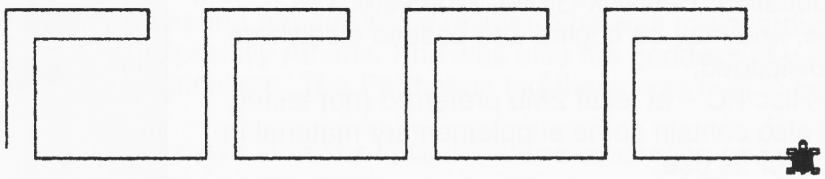
ART & IT

Title: **GREEK KEY**

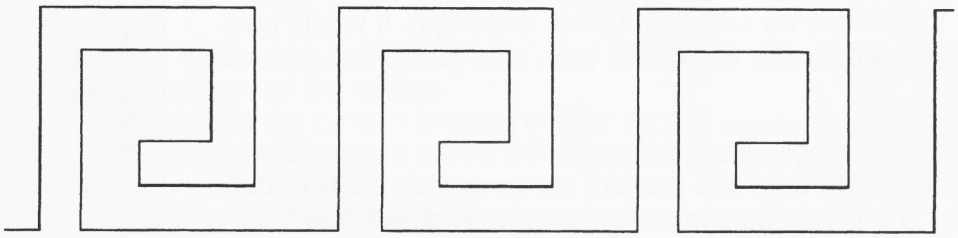
Activity: Design a Greek Key pattern to border your writing.

Resources: Examples of Greek Key or other typical designs. Logo or a suitable drawing package.

What to do: Look at examples of Greek Key designs. Identify the features of the design and replicate one section of it:



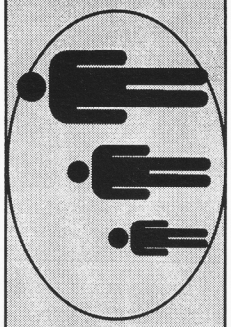
Possible extension activities: Try more complex designs:



If using Logo, write a series of nested procedures
Make your pattern border a page.
Use shading to give a 3-D effect.

IT capability: Communicating information (a);
Controlling monitoring and modelling (a).

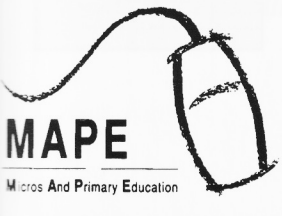
Experience level
Beginner ✓
Intermediate ✓
Experienced ✓



Communicating and handling info. ✓

Controlling, monitoring and modelling ✓

IT Activity Sheet 1



MAPE
Micros And Primary Education

If you want further information about MAPE, please contact Yvonne Peers at Newman College Technology Centre, Genners Lane, Bartley Green, Birmingham B32 3NT.

HISTORY & IT (1)

***Title*: BUILD A GREEK TEMPLE**

Activity: Two *My World* screens are available (see below) which enable children to assemble or take apart a Greek temple (loosely based on the Parthenon). The first screen is simply a shell with a base, doric columns and roof sections; the second contains some interior architectural features.

Resources: *My World 2*; Greek temple screens disc – at present only available in Archimedes format. Send *either* one HD (1600K) disc *or* two DD (800K) discs and a stamped addressed envelope to Bob Fox, School of Eduction, Worcester College of Higher Education, Henwick Grove, Worcester WR2 6AJ. The files are free of charge, and may be copied and passed elsewhere as long as their source is acknowledged.
Hardware – any Archimedes or Risc PC – at least 2Mb preferred (not tested on 1Mb machine). The disc will also contain some supplementary material in drawfile format, and suggestions for its use.

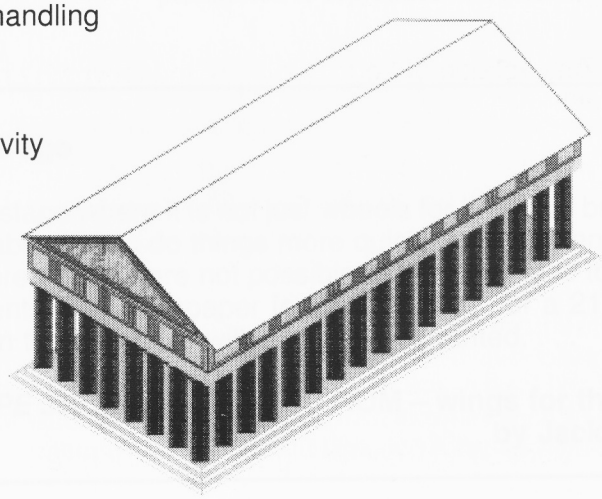
Previous experience required: the screens are intended to build on prior learning about ancient Greek civilization, Greek gods, and perhaps some notion of Greek architecture (eg. there were no arches in Greek buildings). It would help if children had some familiarity with using *My World*.

What to do: On the first screen, simply place doric columns in the appropriate places (hint: start at the back!), then add the roof sections. Use the text tool to label different parts. The proportions are approximate. Find out how tall the columns of the Parthenon were. How tall would you be, if you were on your screen?
On the second screen, start with the complete temple. Remove the roof (you can drop it in the bin) and look inside. What might the different parts have been used for? Gradually remove other parts of the temple. At different stages, label the features you can see.

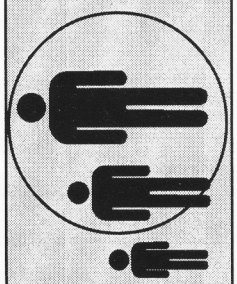
Possible extension activities: See the files accompanying the disc.

IT capability: Communicating and handling information.

Experience level: Intermediate. Activity can be adapted to suit any KS2 level, or even possibly upper KS1.



Experience level
Beginner
Intermediate ✓
Experienced



Communicating and handling info. ✓

Controlling, monitoring and modelling

IT Activity Sheet 2

HISTORY & IT (2)

***Title*: GREEK MYTHS & LEGENDS** (from an idea by Harriet Martin)

Activity: Write the story of a Greek hero and print out using Greek characters.

Resources: A wordprocessing program with a Greek character font, for example *Write-It* (or *MS Works*) using the font SYMBOL.

What to do: Choose an area of research, perhaps a Greek hero or a god. Using the wordprocessing program, write a biography of the chosen person. Highlight the writing, select the appropriate font, save and print.

'Athena was the Greek Goddess of wisdom and fair warfare. The Greek people thought she was the daughter of Zeus. She was often pictured wearing armour and a helmet. She was the guardian of many cities, especially Athens. She was also the goddess of weaving, spinning and agriculture. The Parthenon in Athens was built in her honour.'

'Αθηενα ωασ τηε Γρεεκ Γοδδεσσ οφ ωισδομ ανδ φαιρ ωαρφαρε. Τηε Γρεεκ πεοπλε τηουγητ σηε ωασ τηε δαυγητερ οφ Ζευσ. Σηε ωασ οφτεν πιχτυρεδ ωεαρινγ αρμουρ ανδ α ηελμετ. Σηε ωασ τηε γυαρδιαν οφ μανψ χιτιεσ, εσπεχιαλλψ Αθηενσ. Σηε ωασ αλσο τηε γοδδεσσ οφ ωεαωινγ, σπιννινγ ανδ αγριχυλτυρε. Τηε Παρτηενον ιν Αθηενσ ωασ βυιλτ ιν ηερ ηονουρ.'

Possible extension activities: Use copy and paste facilities to produce a 'translation' of the writing.
Use the border pattern created in ART & IT to surround the writing.
Drop pictures or maps from a CD-Rom into the writing.

IT capability: Communicating and handling information at various levels.

MATHS & IT (1)

***Title*: THESEUS AND THE MINOTAUR**

Activity: Guide Theseus out of the labyrinth.

Resources: Any version of Logo, a plan of the labyrinth drawn or printed onto an OHT sheet.

What to do: Tell the story of Theseus defeating the minotaur.
Stick the OHT sheet onto the monitor so that the centre of the labyrinth is at the point 0,0.
Children work in pairs to guide Theseus out.

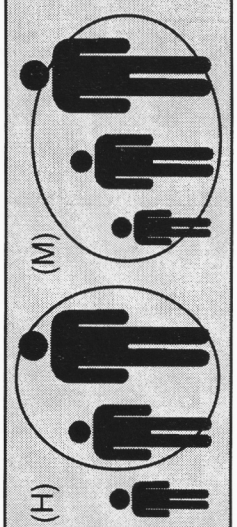
Possible extension activities: Write a procedure or series of procedures to free Theseus.
This activity is very versatile as labyrinths can be drawn to cater for all needs.

IT capability: Controlling, monitoring and modelling (a).

IT Activity Sheet 3

Communicating and handling info. (H)

Controlling, monitoring and modelling (M)



Experience level
Beginner (M)
Intermediate (H,M)
Experienced (H,M)

MATHS & IT (2)

***Title*: THE SIEVE OF ERATOSTHENES**

Activity: Setting up a spreadsheet to generate the prime numbers to 100.

Resources: Any spreadsheet.

What to do: Set up the labels as below:

number	divide by 2	divide by 3	divide by 4	divide by 5	divide by 6	divide by 7

Set up formulae to generate the counting numbers.
Set up formulae to generate the quotient.
Print out the resultant table.

number	divide by 2	divide by 3	divide by 4	divide by 5	divide by 6	divide by 7
1	0.5	0.3333333	0.25	0.2	0.1666667	0.1428571
2	1	0.6666667	0.5	0.4	0.3333333	0.2857143
3	1.5	1	0.75	0.6	0.5	0.4285714
4	2	1.3333333	1	0.8	0.6666667	0.5714286
5	2.5	1.6666667	1.25	1	0.8333333	0.7142857
6	3	2	1.5	1.2	1	0.8571429
7	3.5	2.3333333	1.75	1.4	1.1666667	1
8	4	2.6666667	2	1.6	1.3333333	1.1428571
9	4.5	3	2.25	1.8	1.5	1.2857143
10	5	3.3333333	2.5	2	1.6666667	1.4285714
11	5.5	3.6666667	2.75	2.2	1.8333333	1.5714286
12	6	4	3	2.4	2	1.7142857

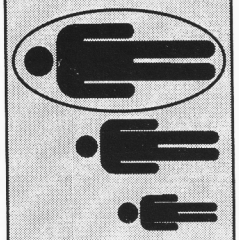
The prime numbers are found by looking along the rows. Any row which contains a whole number **apart from 1** cannot be prime.
Prime numbers are usually found by eliminating multiples on a 100 square. This activity approaches the idea of prime numbers from the point of view of division. The various definitions of prime numbers all refer to factors, and by using a spreadsheet children can see which numbers have no whole number factors apart from themselves and one.

Possible extension activities:

1. Why do we only need divide by numbers up to 7 to generate primes under 100? What happens if we extend the counting numbers?
2. Do we need to divide by any even number bigger than 2?
3. Do we need to divide by multiples of odd numbers?
4. Do any number patterns emerge?

IT capability: Controlling, monitoring and modelling.

Experience level
Beginner
Intermediate
Experienced ✓



Communicating and handling info.

Controlling, monitoring and modelling ✓

IT Activity Sheet 4

My children didn't use the computer today – but have they been doing IT?

Margaret Still
Educational Consultant – Still Educating

Children may well have been using many of the programmable devices that would come under the heading of IT – cameras, videos, cassette recorders, programmable toys etc, but are there any other ways in which classroom activities without the use of the computer can actually work towards developing IT capability?

Throughout their school life, when developing IT capability children will, through a range of experiences, develop confidence in the use of IT. They will learn to identify when the use of IT is appropriate and be able to select an IT application for a particular task. They will be learning to reflect and comment on their use of IT and recognise that IT affects the way in which people live and work. Thus they will develop their IT capability; a combination of knowledge, skills and understanding.

The National Curriculum outlines the opportunities and IT experiences children must acquire, as well as the skills and understanding they should develop in the areas of:

- communicating and handling information;
- controlling, monitoring and modelling.

Teachers will need to plan IT into their curricula by recognising where opportunities exist for children to use IT in their work. They will need to provide a range of resources to enable them to make choices when practising their IT skills and developing their IT capability.

The recent Ofsted report[1] emphasises the need to spend more time on enabling pupils to gain a better knowledge and understanding of the underlying principles of IT. In many schools children are learning IT skills but are not developing their knowledge and understanding. Planning IT in the curriculum is particularly weak at Key Stage 2.

How can we ensure that understanding takes place and that the children gain the necessary knowledge? Obviously we need to make time to discuss their IT experiences with them, but there are also many activities appropriate to developing IT capability that can take place away from a computer. Some of these activities will be a necessary prerequisite to the computer activity, some may take place following a computer activity, and some activities may be complete in themselves but will help children in their understanding. A number of these activities are familiar to teachers and have been taking place in primary classes for many years although teachers may not be aware of their connections with IT.

When **Communicating information**, the use of IT enables children to develop, refine and communicate their ideas more effectively. It allows them to reflect, experiment, revise and redraft. They can address a variety of audiences using and combining different types of information.

Away from the computer, children need to reflect on their work. They need to talk about and make choices for presentation – the choice of fonts, colour, order on the page, and illustrations. This attention to presentation can begin at a young age in the Nursery and Reception Classes. Give children a share in decisions about how their work should be displayed:

- What colour paper would they choose to mount their painting?
- Would they like a border round the picture?
- Should their name go above or below or to the side?
- What colour should the writing be?
- Should the writing be large or small, upright or slanting?

All these decisions are an important preparation for making presentations through IT. As they get older and use IT, they need to develop a knowledge of the extent and limitations of the software they are using eg.:

- What fonts/sizes of text will it allow?
- Does it give a choice of colour?
- Can you combine illustrations with the text on the screen?
- Are you able to create borders?

Time needs to be given to allow the children to talk about these aspects of their applications.

Before embarking on computer generated 'cut and paste', ordering text and graphics in frames, and manipulating them around the screen, children need to experience physically 'cutting and pasting' their work, either handwritten or computer generated, to produce news-sheets. Doing this enables them to have an appreciation of what is actually happening in desktop publishing, gaining an understanding of organisation and display. When using a desktop

publishing program an emphasis on planning ahead will allow the process to be less troublesome.

When communicating with graphics is it important that children know how the pictures are generated on the screen? Would this enable them to make better use of graphics programs? To understand how computer pictures are generated (colouring of individual squares – pixels – on the computer screen) children can create their own pictures and patterns by colouring individual squares on paper. They can use centicubes and peg boards to create letters and numbers. They can investigate symmetry and the composition of pictures. At Key Stage 2 they need to discuss and plan ideas for designs before going to the computer; this could include square paper design for tiling patterns.

Information Handling concerns the capture, storage, manipulation, interrogation and use of information using IT. Teachers of young children have been doing classroom activities associated with this area for many years, long before computers arrived in the classroom. From a very early age children are information gatherers. They find information from a variety of sources, gathering it through their senses. In order that children may make sense of this information they must be encouraged to talk about and describe their experiences and feelings, the objects they use and that are around them, looking for and thinking about similarities and differences and sorting the objects into groups. It is this describing and sorting of objects that is vitally important in the initial stages if these children are to become effective information handlers using IT. Young children will need the objects to be available to them whereas older children will be able to work with increasingly abstract sets of data.

Such describing, sorting and classifying activities should be included when planning IT in the curriculum. In order to gain IT capability in Information Handling children need to participate in many activities away from the computer.

A variety of **describing and guessing games** can be played:

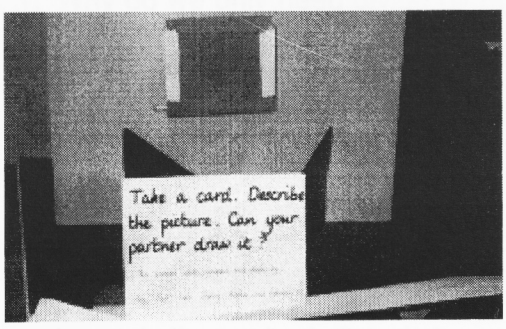


Fig. 1. *Older children can design and make boards for guessing games.*

Children carefully describe certain objects in different ways; other children guess the object being described. The describing can be done using single key words, a note being made of the words used. Alternatively, appropriate keywords could be written onto cards then matched to the objects.

The objects could be **sorted** and resorted into groups using different criteria. The results can be displayed as Venn Diagrams and Carroll Diagrams either in 3D or on paper. Counting the objects in each group can lead to the production of graphs to show the results of the sorting process. Graphs can be built in a 3D form using centicubes or building blocks, coloured pegs on a pegboard, completing a paper graph with sticky paper squares, or coloured in blocks.

ROUND	apple peach grapes	orange
NOT ROUND	pear	banana lemon
	EAT SKIN	DON'T EAT SKIN

Fig. 2. *A Carroll diagram classifying some fruits.*

These are important activities prior to using computer graph drawing programs.

Interpreting graphs by talking about them with teachers and friends using appropriate vocabulary – bigger, smaller, more than/less than, half, quarter, is a vital part in the information handling process that could take place away from the computer and one that is too often neglected!

A more sophisticated **classifying** process involves directing questions to a group of objects in order to divide them into two groups, forming a **binary tree.** Such an activity allows for the development of language and differentiation skills. Producing a binary tree on paper is a complete activity in itself and forms part of the development of IT capability. It should not be thought that such activities must *always* be followed by the use of a computer program.

To use a computer database successfully means children must have an understanding of the information collected and the variety of ways it can be sorted and classified in order to gain the maximum benefit from the database and to allow effective predicting and hypothesising to take place. In order to get a thorough understanding of the process of Information Handling it is essential that pupils are given ample time away from the computer at all stages of the information handling

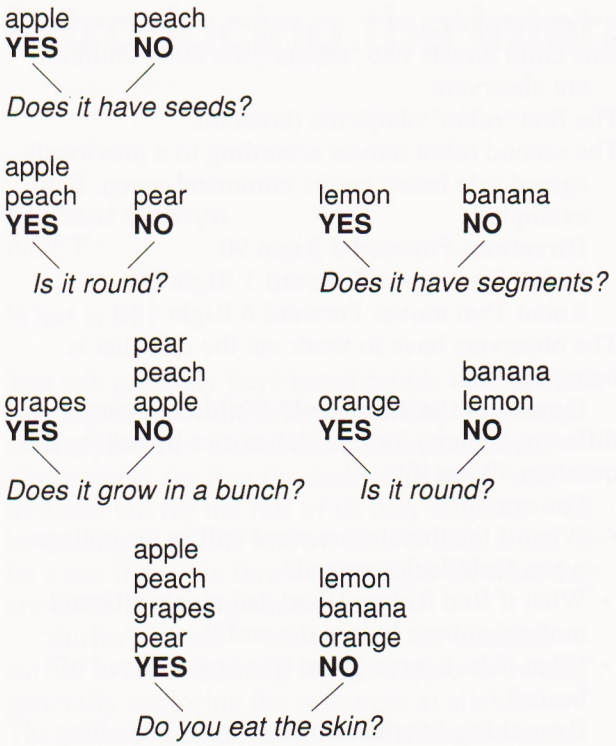


Fig. 3. *A branching diagram for classifying some fruits.*

process, before setting up the database, whilst interrogating it and when making connections with the information to predict and hypothesise in order to develop higher order skills.

Computer Control may well be the area of IT that most affects our everyday lives and those of our children. As more and more technological devices appear, controlled systems are very much a part of our children's world before they enter school. With young children we could begin by talking about controlled devices in the home and elsewhere. Pupils can collect pictures, draw the objects, sort and re-sort them into groups. As they get older they can be encouraged to distinguish between those objects that work from the single touch of a button that sets off a series of pre-programmed instructions and those that need a set of instructions entered before they work. The home corner can become a class shop/bank/library/office. Through role-play children can gain an understanding of the use of bar-code readers, cash dispensers, programming cycles on washing machines or dishwashers etc.

By seeing how devices respond in a controlled and orderly way children will begin to develop their own understanding of what a set of instructions might be. One way to experience the process of using sets of instructions is by playing robots or 'People Logo'. Begin with the teacher being the operator and the children the robots, then develop this into paired or group work with the children in charge. The robots only respond to words they understand. Initially this can be just two words 'go' and 'stop'. Immediately children will see the need to introduce extra commands, for example 'turn'. The commands are further refined until the robots are responding to basic Logo commands. Activities using programmable toys and devices such as Roamer, Pip, Pixie or the Lego Control Centre could follow and/or happen alongside these activities.

Practice in using precise language is essential in developing Logo and control work.

The following are some examples.

- Drawing shapes: Children sit one behind the other, or on opposite sides of a screen. One child holds a piece of paper with a shape drawn on it which the other child cannot see. She explains in her own words, step by step, how to recreate the shape. The second child obeys the instructions and draws the shape. The papers are compared and the instructions refined to make them more precise. (More like Logo)
- One child calls instructions to others who respond by drawing lines on squared paper, for example fd 2 lt 90 fd 5 rt 45. . . . At the end the children will have produced a picture or shape if the instructions were followed correctly.
- Young children, using their fingers or pebbles to create routes in sand trays for small world characters or cars to find their way home are developing their understanding of direction, essential pre-Logo work. Stories can be told around the routes.
- Choose a well known story with a route, for example Rosie's Walk, or the Very Hungry Caterpillar. Children draw the route and illustrate the events that happen on the way.
- Children write their own 'procedures' for everyday tasks for example making a sandwich, a cup of tea or cleaning teeth etc.

Modelling is an area of IT that many teachers have difficulty with. Governed by rules and managed by the computer, a computer model represents real or imaginary situations and allows us to ask 'what if . . . ?' questions to see what happens when changes are made. It has to be more than using adventure games and simulations. Older pupils are required to create their own computer models to solve problems. In order to be able to do this it is necessary to have lots of experience of using computer models, to be able to identify underlying rules and change variables in response to the question 'what would happen if . . . ?' A simple spreadsheet could be set up and children could explore the effects of changing a variable.

There are many activities away from the computer, particularly in the early years, where the children can be working towards IT capability in

```
  :     A          B    C   D
--:----------------------
00: What's My Rule?
01:
02: number     ?       ?   ?
03:  1          2       3   3
04:  2          4       6  12
05:  3          6       9  27
06:  4          8      12  48
```

Fig. 4. *'What are the effects of changing the numbers in Col. A?'*

modelling. Modelling activities require children to take on roles, working within a set of rules, making and acting upon decisions that will change the outcomes of the game or activity. Young children are natural modellers of situations as, through their play, they begin to make sense of their world. A computer can be used to broaden this experience. Modelling helps children to learn the relationship between cause and effect and encourages logical, sequential and creative thought. The collaborative nature of modelling activities encourages children to think logically and sequentially and to explain their thoughts to others in order to make joint decisions. At the early stages without the use of the computer, opportunities can be taken within role play situations to encourage children to analyse what they are doing and pose the question 'what if . . . ?' thus changing the outcome of their game.

These pre-modelling activities allow children to visualise a situation, identify the rules, change variables to help identify patterns and relationships in order to predict different outcomes

Play the What if . . . ? game. Children talk about a walk to the park and what they expect to see on the way. Ask what if they went a different way, where would they end up, what would they see then. This activity can be adapted to many different situations in the children's experiences.

Board games where situations are governed by rules and decisions have to be made, provide children of all ages with experiences that will enable them later to visualise situations when solving abstract problems, eg. Monopoly, Go for Broke, Nine Men's Morris, Scotland Yard, Talisman.

People Logo features as much in the developing of modelling as in control. Children direct each other as previously described

The **disobedient robot** is an activity that gives children experience in identifying rules. Two children follow instructions as robots, one obeying the commands, the other consistently changing the rule. (They might double or halve each command) The observers have to work out the rule.

For example:
One child directs two 'robots'; the other children are observers.
The first 'robot' obeys the direction.
The second robot moves according to a previously agreed rule based on the command given. For example :
Direction: Forward 3 Right 90
Robot One moves Forward 3 Right 90
Robot Two moves Forward 6 Right 180
The observers have to work out the rule that is being applied.

How does the story end? Children create different endings for familiar stories by asking the question 'What if. . . ?'

For example:

- What if the three bears were still in the cottage when Goldilocks arrived?
- What if Red Riding Hood had reached Grandmother's house before the wolf?
- What if Jack were given five eggs instead of beans?

Branching Stories. Children read branching stories and discover different narratives. They can create their own stories with alternative routes to give different endings.

To understand the use of IT in the outside world and the value of IT in their own lives children can collect, discuss and perhaps keep scrap books showing:

- itemised bills and till receipts
- computer printouts
- standard letters/junk mail
- evidence of computer errors
- the use of bar codes
- references to new developments in the use of IT as reported in the media and in the world of entertainment.

The above show a few examples of ideas for classroom activities taking place away from the computer that help to develop the children's understanding of IT. These activities may or may not lead to the use of the computer but all help to develop more than just the skills of using IT equipment. You may well have been doing some of these activities, and others, with your children. You may not have realised the links with IT. With careful planning alongside IT activities we can help to give the children the knowledge and understanding that is required.

So, even if the computer was not used in school one day it may well be that the children have been involved in activities that help to develop their IT capability.

[1]Issues for School Development arising from OFSTED inspection findings 1994–95 Key Stages 1 & 2.

Introducing the Internet

Richard Selwyn
NCET

What is it?

You will probably have heard people talking about 'surfing the net', the Information Superhighway, and maybe even broadband communications. These terms are fine for those who have been initiated but for the rest of us they might as well be talking in a little known dialect of Martian. So, let's see if we can throw some light on what they are actually talking about.

'Surfin' the net' – net is short for Internet; surfin' is modern slang for 'grazing', 'browsing', generally exploring the resources available. The Internet is a global communications system developed over the last 25 years which relies on connecting computers via current telephone technology. It allows the transfer of a range of media: text, graphics (including video), sound – albeit very slowly for the majority of us mortals. The latest software gives 'point and click' availability to information from all over the globe. No hieroglyphics (except Egyptian . . .), very little jargon (unless you really want it) or if someone feeds you their favourite resource location (URL, Uniform Resource Locator).

The Information Superhighway is the 'holy grail' for communications. It is intended to provide instantaneous access to 'life, the universe and everything'. In practice we're still limited by the number of other users trying to access the same resources, the number of transatlantic connections available at any one time, the age of our telephone exchanges and the cables connected to/through them – so DON'T PANIC if you can't get off the sliproad, or you're stuck trying to get on the Highway.

Broadband communications is just another term to describe the Information Superhighway, its major feature being the speed at which you can access and retrieve enormous amounts of information including video-on-demand (VOD). Unlike the Internet, broadband does not rely on basic telephone connections. It generally uses optical fibre cabling capable of carrying 'infinite' x current telephone line information – it is currently on trial in the US, Japan and the UK, but it is likely to be quite some time before all primary schools are fitted out.

What can I do with it?

Linking with another school – locally and internationally – to compare and contrast your locale with another – pupils from different cultures and regions – to share the simplest or the most complex of concepts and activities. Keep in touch with friends who've moved to Europe, follow expeditions as they explore the far reaches of the world, have the opportunity to question experts. All these and more are available through e-mail (electronic mail).

Access to an enormous range of materials from across the globe (but mainly US, Canada and Australia at this point in time), catering for every conceivable interest – and here we must give a warning – you will need to watch out for pornography, racist material, paedophile activity, anti-social and political propaganda. All this and more is available through the WWW (World Wide Web or W3). On the more positive side, you have the ability to visit and move through virtual museums and libraries, shop for wine at Sainsbury's, plan an exotic holiday, visit a shopping mall, read the Electronic Telegraph, The Guardian 'On-Line' or a communications magazine. Software allows the user to access this vast information bank of different media from within a single environment and at the click of a mouse button. The latest versions incorporate more and more of the other internet facilities within the one package – eg. electronic mail and access to discussion groups.

Newsgroups, discussion groups, open and closed conferences, interest groups . . . all these and more (over 15,000 apparently are available) offer the opportunity to post messages and share ideas across the world. Talking to a potential audience of thirty million can be attractive, but being talked *to* by thirty million can be rather a daunting not to say a mind-blowing proposition. These groups need to be set up, nurtured and maintained – they do not, usually, evolve naturally. One further word of warning – not all data that is sent through the system is secure; you should be very wary of giving home telephone numbers, credit card details or any other 'private' information, just in case there are unscrupulous people (hackers) lurking!

So, why not advertise your school, yourself, your school curriculum, school projects on the Internet? – free software is readily available

(downloadable from the Internet or on CD-Rom) to allow you to compose information, and most of the service providers offer free space on their servers for any of their Internet subscribers to use.

How do I get onto it?

You need an Internet Service Provider (often called an ISP) – first point of call might be Research Machine's RMIFL service, British Telecom's CampusWorld, Educational Exchange (EDEX) or Enterprise. There are over 170 UK ISPs currently available, but the majority do not give any specific support or discounts to primary education.

Look out for special offers from firms such as Microsoft – currently offering free access to all schools – Enterprise and the various cable companies who are offering a fixed Internet fee which generally is determined by the size of the school.

Alternatives available to you will include: cable companies – if there is one cabling your community they should link your school free of charge; university connections – most universities are members of JANET and can offer links to other educational institutions; LEA service provision (point of provision most commonly at this time with Research Machines or Educational Exchange (EDEX); and other internet firms.

All offer a range of services that you will need to cost out carefully – decide whether you need on-line support, restricted time access, filtered information sources, on-site maintenance etc, and whether there are additional time charges included. Don't be seduced by the glossy adverts – check out the small print – costs are being reduced all the time, so it is best not to sign a long-term contract.

The minimum kit you will need is a modem: BT approved and **preferably at least 28,800** rather than 14,400; a modern computer – preferably RISCOS or 486 equivalent with 'high' graphic capability, a sound card, a large hard disc, large internal memory (you may well get away with a little of all these but not very efficiently – for example it might take twenty minutes to receive a picture of an Hawaiian volcano eruption) and a telephone line, preferably one that is dedicated to Internet use only.

What is it going to cost?

The basic costs (assuming that you already have a suitable system) involve a modem that will cost around £85 for the 14,400 modem, with 28,800 costing nearer £180, together with a dedicated telephone connection which costs about £110 to install, plus the usual quarterly rental. You can use an existing line but that may lead to problems both of access to the ordinary telephone and accessibility of the Internet service for different staff.

Your internet provider will charge you a registration fee – usually £25 plus a monthly charge – £6.50 to £18 – depending on who it is and what services you require. A fixed fee charge is currently available from BT and Enterprise and may be on offer from your local cable company. If your school is going to make a lot of use of the Internet one of these may be an ideal choice. Some providers also charge per hour over a basic number – eg. 20 hours per month free + £3.50 per hour thereafter. You will need to plan ahead. Some providers give you software which they have already registered for you – if they have not there will be additional fees to pay to software vendors (usually around £10 per package). Other providers will only supply 'basic' software that works adequately but is not necessarily intuitive and easy to use. That type of software package will cost more – eg. £35. There are also the time costs associated with being on the telephone – a local call might cost as little as 69p per hour or as much as £6 per hour depending on how local is local!

Some sites to visit to get you started:

Loughborough Infants School
http://www.rmplc.co.uk/eduweb/sites/loughinf/index.html
This school is based in Brixton, London and is always looking for contacts with schools in other areas (please e-mail them on loughinf@rmplc.co.uk)

Other school pages:

All Souls County Primary School:
http://www.rmplc.co.uk/eduweb/sites/allsouls/index.html
Brixton Connections Project:
http://www.brixton-connections.org.uk/
Wickham School:
http://www.rmplc.co.uk/eduweb/sites/wickham/index.html

Some home pages:

MAPE – http://www.chelt.ac.uk/guests/mape
BBCWeb – http://www.bbcnc.org.uk/
NCET – http://www.ncet.org.uk
RM IFL – http://sunsite.doc.ic.ac.uk/wm/

Museums

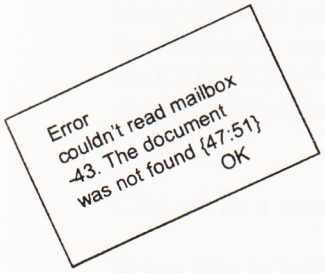
Science Museum – http://www.nmsi.ac.uk/
Louvre – http://sunsite.doc.ic.ac.uk/wm/
The Viking Network Web – http://odin.nls.no/viking/ewww.htm

Others

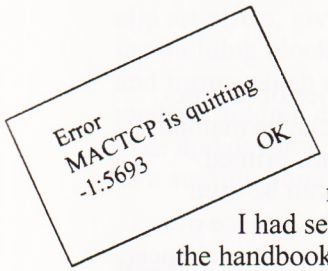
K-12 Education sites in the States – http://www.sendit.nodak.edu
Newsgroups – http://www.mailbase.ac.uk/

Happy Surfin'!

Email and the Web – connect or bust by a Technonerd

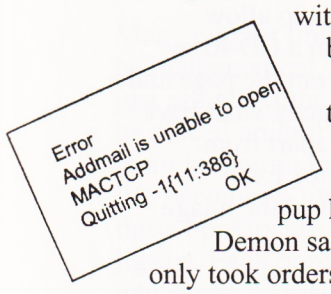


Betty Lumley is Vice-Chair of MAPE

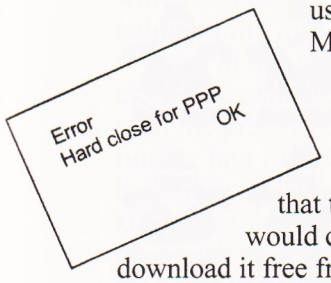


The whole activity took ten days' worth of free time, mostly in the early hours with regular calls to Dave Siviter, my mentor.

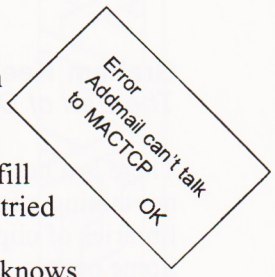
I had secured a modem and set it up using the handbook (not too much jargon). I thought all I needed to do now was phone Demon with a credit card number and I'd be there. Wrong!



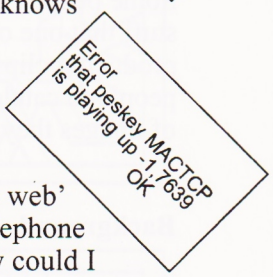
Demon would give me no details until I had TCP for my Apple Mac. (I only knew TCP as something I used when my pup had an accident.) The guy at Demon said he didn't know what it was, he only took orders and was told to make sure Mac users had it. A phone call to the Mac help line revealed it was a piece of software needed to interpret the code from the ISP (in my case Demon) and make it accessible to me. They said that to get it and my machine ready would cost around £70. You can download it free from the 'net', but without it you can't reach the 'net'. Having obtained TCP free I recalled Demon to pay up and become a user. I was forewarned and had my node name ready (that's the bit after the @ sign). They checked that it was unique, but then asked for a password of up to eight letters or digits. This I was not expecting, and so my word is quite ridiculous. Demon confirmed these details in a letter now lost under a mountain of paperwork and included my IP address 192.222.76.197 – I've no idea what this means, but you need it later, and often when all else fails this number will make things work.



At this point I thought I was nearly there – what a fool! I needed software to send and receive e-mail, in my case *Eudora* and *Addmail* (again they are free on the 'net' if you can get there). These programs work with TCP to decipher incoming e-mail. Loading Eudora and Addmail was simple, but configuring and getting them to work was a nightmare. Some parts had to be expanded by dropping into *Stuffit* which itself had to be expanded – the directions when printed filled five A4 sheets. I never got more than half way through a page without help from my mentor.

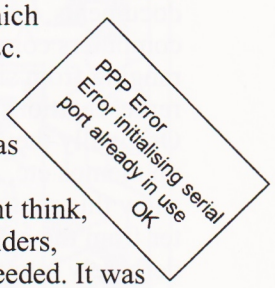


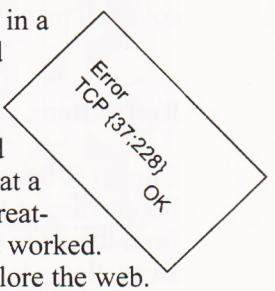
Eventually one Sunday afternoon I needed a combination of numbers to fill 'gateway address' and another box. I tried many permutations, but eventually 192.222.76.197 did the trick, heaven knows how! *At last I could send and receive e-mails.*



Now for the Web

All the software you need to 'surf the web' is up there for free, (except for the telephone line charge of 1p per minute) but how could I get it? More jargon. You need a piece of software to be able to download. I had *Fetch*, which came on the *Addmail* and *Eudora* disc. *Fetch* had to be configured – more phone calls to Dave. I needed a 'browser', it seemed *Netscape 2.2* was the best and this can be found at sunsite.doc.ic.ac.uk. Simple you might think, but it was hidden in folders, inside folders, inside packages – more phone calls needed. It was rather like looking for a specific book in a very large library when you can't read the labels on the shelves. Eventually the *Netscape* folder became visible. I pressed 'get file' to download it, and one hour later it was on my hard disc at a cost of 60p as opposed to £60. After treatment with *Stuffit* to expand the files it worked.





Search machines will help you explore the web. They work on key words but because the information pool is so very vast (there are over six million sites!) they often come up with 40 or more sites which mention the keyword/s. As not all private sites are registered with search machines you will need to know specific addresses. I started my surfin by going to the MAPE page and clicking on the search machine, *Lycos*, at the bottom of the page.

With subscription to Demon comes your own free web page, but to get anything 'up there' it seems you need to master the appropriate language in which to send your text/graphics – *HTML* or *JAVA*. Another minefield of jargon, a project for the Christmas Holidays perhaps?

Displayed are some of the inexplicable error messages I encountered.

You can contact me by e-mail at betty@westb.demon.co.uk

Clip art

Graham Keeling
The Earl of Dysart County Primary School, Grantham, Lincs

There is a huge amount of clip art around. We are not talking a few high density discs here, but large libraries of clip art on both floppy disc and CD. Some people, and institutions, have so much of the stuff that one of the big growth areas in IT is not producing clip art itself, but applications that help people to catalogue and keep track of the hundreds of images they have stored away.

Background

Clip art, that is images produced for use in documents, has been around for ages. Many computers come ready packaged with images ranging from simple black arrows to full colour representations of tropical paradise sunsets. Originally they were intended to be used to liven up memos etc, and many clip art libraries still show this root. With the movement of the computer from the office into schools and now most definitely into the home, clip art has developed to cover all manner of subjects.

Restrictions

Clip art is bought as a series of images on either floppy disc or CD. It varies tremendously in price from the quite expensive to the virtually give-away. Some is distributed as public domain software or shareware. Whatever your source, all these images are sold, or given away, on the understanding that the user agrees to follow the rules laid down by the provider.

In most cases once you have bought the images you can do what you like with them once they are inside your computer, but all collections will contain a text or read-me file. This should be studied carefully as it will explain exactly what you can, or more importantly what you cannot do with the images, the most worrying being, '*No image in this collection should be altered in any way without the author's written permission.*' Such collections may be spectacular in content but of no use whatsoever if you wish to use clip art to its full potential.

Some dos and don'ts

The very nature of clip art as a series of instructions for a computer means that it can be manipulated. It does not exist on paper until printed. Historical and ethnic clip art files can be used simply to illustrate children's work. A piece of wordprocessing on Greek triremes can be enhanced by a clip art image dropped onto the page. What should be avoided is the temptation to allow children to clip an area of text from a CD-Rom together with a picture, then print out the page and stick it into their topic folders. Exactly what have they gained from this experience, apart from practising the skills of cut and paste? Even resizing, flipping or using just part of the image may be a valuable exercise.

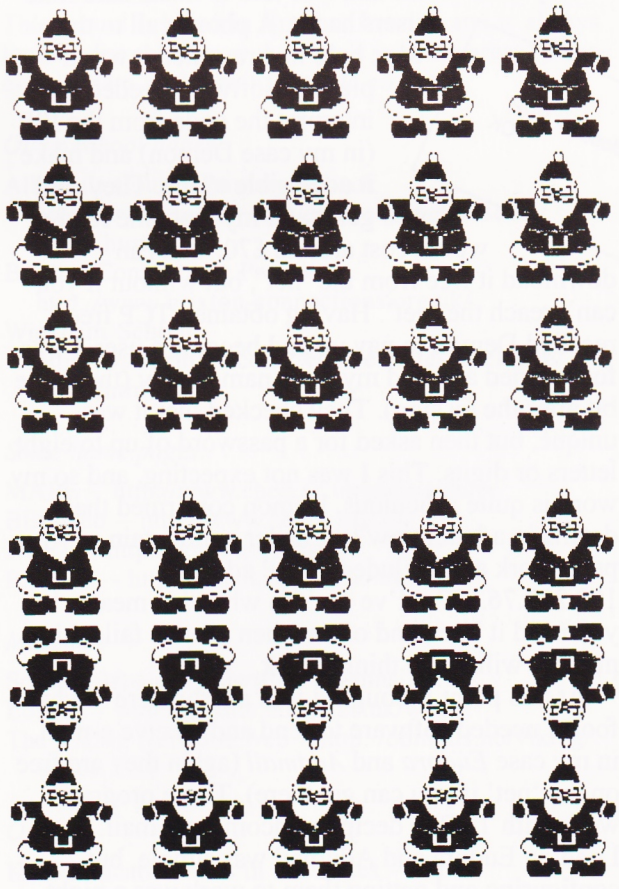


Fig. 1. *Santa meets his match!*

Many software packages come with files of clip art for children to use. Two titles which spring to mind are CSH's *Cars – Maths in Motion* and 4Mation's *Granny's Garden*.

Clip art as a source of investigation

Being able to look at an image in the detail that clip art offers, gives children the opportunity to see the building blocks of images, to look for patterns and forms which may well be invisible in other media. Children can study technique at their own pace and develop ideas using the original clip art as a starting point.

Borders

Many clip art libraries contain borders. These can be mathematical, ethnic, historical in origin or just pretty. At the simplest level these borders can be placed around an A4 poster to add decoration to an invitation to a concert or other event. Where life becomes a little more interesting is when these borders are used as pieces of a bigger jigsaw. Each border is, in fact, a piece of art work which can be resized, flipped, rotated, or simply coloured in.

Used in this way they become part of an electronic collage, but the final result is not fixed until the printer begins to whirr, clatter or slowly rumble into life. Studying exactly how these borders are designed, by using them in this way, allows the child to see far more than simply placing the border around a poem or picture. With multimedia being used more and more in our schools, clip art can be used to enhance the appearance of pages where a quick, well-presented result is required. It's all very well to say that children should provide their own art work but once children begin to extend their multimedia presentations beyond more than a few pages, the sheer amount of art work needed becomes unmanageable.

Topic-specific clip art

Many software houses provide topic-specific files which might deserve closer scrutiny, but please choose carefully. Some clip art is just not worth the disc space, while other examples are superb. Some has huge artistic potential while other examples have little merit. Some leave one wondering how a topic on flight could be taught without clip art; other examples leave one struggling to think of a valid reason for using it. Just remember that when all is said and done clip art is only a collection of images. It's what you and your children do with them that counts.

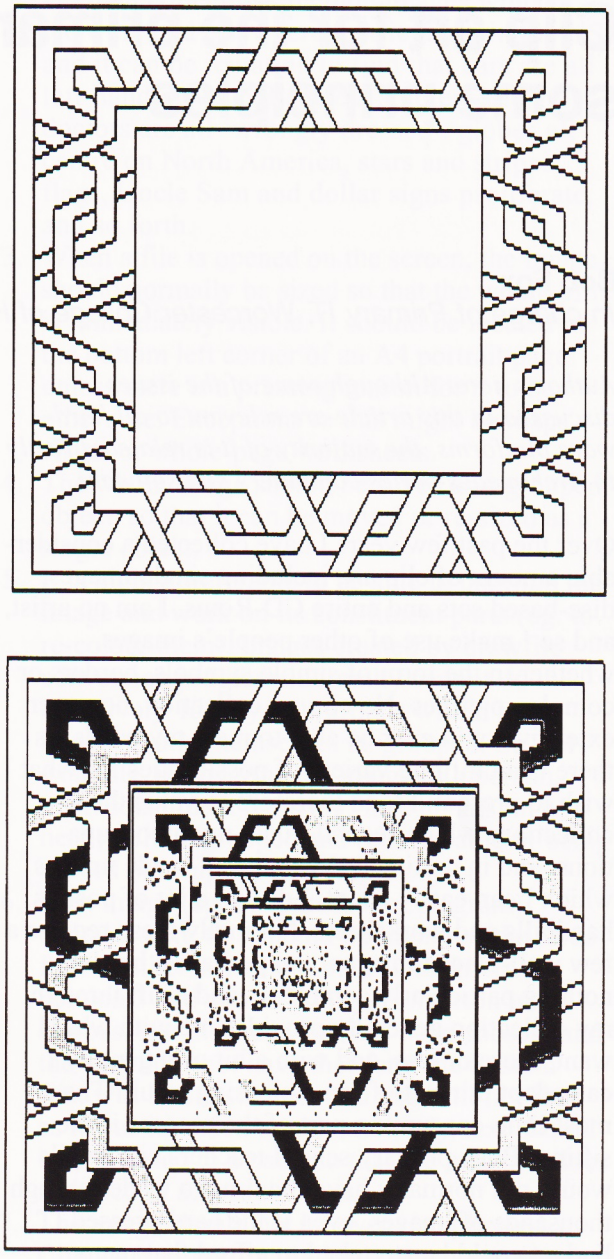


Fig. 2. *The Koran – bordering on the beautiful.*

Resources

Cars – Maths in Motion, Cambridge Software House.
Granny's Garden, 4Mation.

Clip art for the primary classroom – some principles

Bob Fox
In charge of Primary IT, Worcester College of Higher Education

Author's note: Although some of the issues discussed in this article are relevant to all hardware platforms, the majority of it is related directly to Archimedes-series computers and software.

Over the past few years I have collected a considerable amount of clip art, including single images, disc-based sets and entire CD-Roms. I am no artist, and so I make use of other people's images, whether in the form of simple symbols, borders or complex pictures. No clip art collection, however extensive, will ever be able to meet my needs, as there is an infinite variety of possibilities for what I wish to present. I tend therefore to value those collections which second-guess my preoccupations, and in particular I value well-made images which I can easily adapt. I design a lot of posters, handbills and worksheets. Normally these require a few well-placed images, and perhaps a border – nothing particularly complex – and a sift through my collection generally provides me with what I want, more or less, and with a bit of ingenuity I can adapt things to form a pleasing result. The most time-consuming part of the process is the sifting. Busy primary school teachers and pupils would not normally have the time to wade through thousands of images, even if the hard-pressed IT budget could be stretched to afford that many.

This article sets out to describe what I think are the basic principles for the design of clip art images to be used in primary classrooms. The extent to which the principles apply will depend on the uses to which images are to be put. In most classes at the moment the vast majority of uses will be to enhance wordprocessed text, though increasingly, pupils are likely to use clip art in multimedia presentations.

Bitmaps and vectors

There are two basic ways in which a computer can store information about a graphic image. A *bitmap* is a matrix of numbers representing the colours of each dot in a rectangular area. A black-and-white image can be stored as a single bit per screen dot, or pixel (0 = black, 1 = white); whereas a 24-bit-per-pixel image can in theory discriminate among 16 million colours. Bitmapped images (called *sprites* on Acorn machines) are very fast to re-draw, but they suffer if they are re-sized. The only way to make a sprite larger is to make its coloured dots larger, so enlarged pictures may become chunky; making a sprite smaller inevitably means the loss of fine detail. Sprites always occupy a rectangle, though it is possible to mask out unwanted areas of background, so that overlapping pictures do not obscure each other unnecessarily. All scanned images and screenshots, and the products of most painting programs, are sprites; most images on CD-Roms, particularly photographic shots, are sprites (though compressed bitmap formats like JPEGs are also becoming common). Though all such images can be dropped onto a page of a wordprocessor or a multimedia package, they do not form the main focus of this article.

Vector graphics start from a different premise. Images are made up of sequences of lines and fills. The computer records co-ordinates for the start and finish of a line, its colour, thickness, pattern etc, and the colour of any enclosed area. Acorn computers have a vector graphics system built in, in the form of drawfiles (based on *!Draw*, which is free with the machine, and indeed built into the ROM chip on most recent machines). Vector graphics are relatively slow to re-draw, as the computer needs to calculate all the co-ordinates etc, but they can be re-sized without any change in the quality of the image – the computer just does a multiplying sum for each co-ordinate. Fairly simple images do not take long, and do not occupy much memory, but elaborate pictures with lots of twiddly bits can seem to take forever on an A3000, and can use up a sizeable chunk of a floppy disc. Nobody would want an arcade game based on drawfiles, but they have become the preferred format for clip art collections, because they can be re-sized, taken apart, re-coloured or transformed with relative ease. If you are an Acorn user and you are not fluent in *!Draw*, try and find some time to learn (it's all in the *Applications Guide*), as it opens up a world of possibilities.

There are art programs which use vector graphics in a more sophisticated way (notably *Artworks* on Acorn machines, or *Corel Draw* on PCs), in which objects are multi-layered, with fine gradations of shading. These can look very realistic, but they can also take a long time to re-draw, and if your purpose does not primarily lie in the creation of the image as an artefact in its own right, but more in the use of the image as a component of something else, then you might well consider this sort of graphic to be not strictly clip art, and therefore outside the scope of the present discussion.

It is relatively easy to convert a drawfile into a sprite, using the snapshot facility in *!Paint* (again, it's all in the *Applications Guide . . .*). It is rather more difficult to convert a sprite into a drawfile, though there are applications which do this. The results are rarely entirely satisfactory, in my view, and images do not normally behave as drawfiles should.

Clip art collections vary considerably in the quality and style of images they present. Some are specifically geared to primary school needs; others have a more general focus. There is a very large quantity of material available from Public Domain libraries. This material is inexpensive (typically between £1 and £2 per disc), but extremely variable in quality. There is a lot of pointless rubbish, which is a total waste of time and disc-space, but there are also some surprisingly good, professional-standard images. At its worst, some Public Domain material is no more than scanned line drawings saved as sprites into drawfile format (I seem to have acquired a lot of dungeons-and-dragons type images like this, and pictures of sports cars). Then there are a lot of poor-quality images converted from other formats; slightly better than this are home-grown, but generally amateurish renditions of familiar household objects (I cannot imagine ever finding a use for these images). There seem also to be a number of images circulating in Public Domain libraries which clearly have their origins in commercial collections. Lastly there are some truly excellent images, created with great care by talented computer artists.

I want to propose seven principles by which I think clip art should be judged:

1. Every image should be immediately recognisable for what it is. Some Public Domain cartoon figures and caricatures are so badly drawn they would be unrecognisable were it not for the filename.
2. The image should be appropriate for the audience for which it is intended. Many Public Domain collections include images which were created elsewhere, particularly in the US, and it can be irritating to find that cars are all left-hand drive, policemen, soldiers and doctors are all 'wrongly dressed', globes all centre on North America, stars and stripes flags, Uncle Sam and dollar signs proliferate, and so forth.
3. When a file is opened on the screen, the image should normally be sized so that the whole of it is immediately visible. It should be located in the bottom left corner of an A4 portrait page unless there is a pressing reason for it to be otherwise. Exceptions to this might be maps, charts or whole-page worksheets.
4. The whole image should be saved as a grouped object, so that it can be moved or re-sized as a single object.
5. It is highly preferable to be able to ungroup the image and work on its constituent parts (eg. to re-colour them). Images created by drawfile conversion programs normally cannot do this effectively. Ideally, sub-groups within the image should themselves be grouped. So, for example, if I ungroup an image of a person, main constituent parts (eg. face details on a head) will be grouped and thus capable of being moved or swapped as a single object.
6. If an image (eg. a worksheet or diagram) contains text, this should be in one of the three font families which are built in to *Risc OS* version 3 and above-Trinity, Homerton or Corpus. If a different font has been chosen, and the user does not have that font, the System font will be substituted, and text will not look as it was intended to. Alternatively, text should be converted to a path, so that the machine does not need to access the font.
7. The image should not be over-complicated. Clip art is normally used in a representational context. For many purposes monochrome line drawings are perfectly adequate, and may often be preferable for non-colour printing.

In the next edition of *MICRO-SCOPE* I will evaluate a number of commercially-produced and Public Domain collections in the light of these principles. If any reader wishes to extend or amend the principles, or indeed take issue with any of them, please write.

If you have any copyright-free clip art images of your own (created by you, your pupils or someone else) which you think might be of general use to other primary teachers, and which comply more or less with the above principles, please let us know.

NCET news

Progress of the multimedia portables for teachers project

Just over 87% of teachers who applied to join this pilot project were successful in their applications. They were asked to give a first and second preference of the computer and associated set of software. In the event 92% of teachers received equipment which matched these preferences.

The statistical profile of the teachers participating in the pilot should give the evaluation team a rich seam of research to work from. For example, there is an approximately equal gender balance, nearly half of those participating are aged 40 or older, and most have been in post for 5 years and are more confident than competent in using IT.

Most of the computers were delivered and demonstrated to teachers by the end of the summer term (July 1996). Although the majority of teachers had expressed an initial wish for delivery and demonstration to be at their school, many attended local support centres. There they frequently had whole-day familiarity sessions.

NCET wrote to all schools early in the Autumn term to let teachers know of the appointment of a Field Officer. The same letter signalled the start of the evaluation period and requested teachers to begin keeping a brief diary. Teachers have been sending in their first written reports. They were asked to give comments on the delivery and demonstration phase, to identify useful software, to give first reactions to using the Internet, and to forecast their plans for using the equipment this term. Once these reports have been processed, they will be summarised and a distillation of them will be published on the Internet.

The project pages on the NCET web site include details of Curriculum and Internet support as well as comments from teachers involved in the project. The URL to access the project pages is:

http://www.ncet.org.uk/projects/mmportables/index.html

The Quality IT Training Register

The British Educational Suppliers Association (BESA), the National Association of Advisory Teachers for Computers in Education (NAACE) and the National Council for Educational Technology (NCET) have established the Quality IT Training (QITT) Register. The QITT register lists training providers who are currently members of the above organisations and are committed to a Code of Practice which aims to promote quality, effectiveness and value for money in the provision of IT Training.

As Information Technology exerts an ever increasing influence on our lives and the variety and scope of technology is growing, the impact of this on education is such that teachers need regularly to update their IT skills and knowledge, and maximise its impact on their pedagogy. There is a need for all teachers to keep up to date with new applications of IT so that they know what is available, understand what it can do and are able to evaluate its contribution to their students' learning. They also need to consider how it can be applied successfully across the curriculum and what effect this will have on the way they work as teachers, both in and out of the classroom.

For these reasons professional development will be high on the agenda for the foreseeable future.

In the current marketplace, independent consultants and commercial suppliers of IT resources have become providers of in-service training alongside the existing network of accredited training providers. The aim of the register is to assist teachers in obtaining what they need and offer them confidence in the IT training provider they have chosen.

The Register was launched during BETT '96, and over the past year schools have received a poster and information leaflet giving full details of the Register. The QITT Register is currently sponsored solely by Microsoft Limited, a member of the British Educational Suppliers Association.

The Register is available as an on-line service and can be accessed at this address:

http://www.ncet.org.uk/projects/qitt/index/html

or you can contact NCET for details of trainers in your area.

Our work with the Teacher Training Agency

The Teacher Training Agency has a remit for pre-service training and the continuing professional development of serving teachers. NCET has been involved in presentations to TTA staff and an on-going dialogue has been established to ensure that the importance of training teachers to be IT competent is not overlooked.

IT Survey

Working with NCET, the TTA has recently commissioned a survey to establish a picture of current IT provision and the full range of Initial Teacher Training models. The survey aims to provide data on the current contribution and use of IT in all aspects of teaching and learning in Initial Teacher Training as well as providing information about current and future needs. The report is scheduled to be completed in two stages, the first stage, not dependent on student teachers having finished their course, aims to be completed by January 1997 with the second stage, investigating student experience and competence targeted for June 1997.

National Curriculum for ITT

NCET, the TTA and other organisations interested in IT, will be working together to ensure that the role of Information Technology is fully considered in the development of the National Curriculum for ITT and also in the proposed framework for the professional development for serving teachers, including Head-teachers. Preliminary meetings have taken place in order to explore how IT might be represented in these standards.

Early Years and IT

If you are working with young children and IT you may be interested in the Early Years Information Sheet which NCET has published. It discusses why IT is important for young children, offers advice on choosing and evaluating IT hardware and software and presents case studies of how IT has been used to support learning. In addition, this information sheet will give you pointers to other sources of support.

We have also pulled together a selective list of available software to support the development of basic skills, literacy and numeracy in the early years of education. We have listed software for a range of platforms, ages and interest levels but inclusion in the list does not imply that the software is recommended by NCET.

If you would like copies of either or both these sheets, please contact Margot Martin at NCET on 01203 416994.

Oz TeacherNet and SchoolsNet

Representatives from NCET recently attended a two-day conference which explored the possibility of establishing a UK TeacherNet and SchoolsNet along the lines of the networks already in existence in Australia. The British Council is keen to establish closer links between teachers and schools in the UK and those in Australia in preparation for the celebration in 1997 of the 50th anniversary of the British Council in Australia. As part of the celebrations, a conference is being held in Australia during August and the hope is that some UK teachers will attend the conference and present papers on their project links with Australian schools.

The programme of activities relating to the 50th anniversary of the British Council in Australia is called New Images and more details can be found at the following URL:

http//www.membrane.unsw.edu.au/~bc/ni

Details of the curriculum projects which are currently looking for partner schools in the UK can be found at:

http//curriculum.qed.qld.gov.au/elt/newimages/

and further information about the OzTeacherNet can be found at:

http://owl.qut.edu.au/oz-teachernet

Janice Staines, NCET, Milburn Hill Road, Science Park, Coventry CV4 7JJ. Tel: 01203 416994.
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Internet: http://www.ncet.org.uk

Regional news

West Midlands

Two events were held in the Autumn term. The first, 'Preparing for Ofsted', will surely prove very helpful to the members who came. The second gave participants the opportunity to evaluate a variety of CD-Roms on both PC and Acorn machines.

South Eastern

If any members in Barking and Dagenham and East London would be interested in an East London group, possibly meeting at the Westbury Centre, could they please contact Ruth Allanach.

Chiltern

If you came to the session run by Trevor Millum of Resource on 5th Oct. you will know how useful it was. If not, this is what you missed.

Trevor gave us innovative ideas on using 'Talking Word Processors' as well as many tips on how to encourage children's creative writing. The resulting discussions led the group to suggest that our Summer term meeting should be devoted to pooling our ideas on creative writing. If you have an idea that works well in your class or would like some new ideas then **Hatfield** is the place for you on 14th June, 9.30–12.00.

Chiltern's next session at The Advisory Unit for Computers in Education, 126 Great North Road, Hatfield on 8th February will be led by John Kenny. He will introduce 'Alban Wood Logo'. It is cheap, easy to handle and his guide to its use is child's play. Do come along and allay your fears of Logo and how much it will cost to equip all the computers in your school.

We charge £4 per participant or bring a friend and get in for £2.50 each (this goes towards the cost of hiring the venue). Attendance certificates are available.

For further details/comments/suggestions about the Chiltern region please phone or e-mail me, Betty Lumley on 01923 823411 or betty@westb.demon.co.uk

The truth is out there – look in the file marked X!

Dorothy Luff
Dubmire Junior School, Tyne & Wear

Do you think that computers can sense fear? I know mine can. . . . IT watches me from across the classroom, sending out an endless tide of energy waves which never allow me to get beyond the PLUG IN and SWITCH ON stage!

I *have* tried, honestly I have. I've been on training courses, compulsory ones, where I've listened intently, grappled with the mouse, and made copious notes which may as well have been written in Chinese for all the good they did me back in school. The problem is that the course leaders always assume that their captive audience actually likes computers, never mind knowing what F7 means! I try to look interested and competent but I can't help feeling a bit like non-swimmers do when they first realise that their feet don't touch the bottom any more – completely out of my depth! I don't need to tell you I never mastered swimming either!

I go back to school armed with pages of helpful tips, determined that I am going to use a keyboard overlay and produce class books just dripping in Gothic script, but then I walk through the classroom door, take one look at IT and realise I can't even remember which way round the disc goes in!

I have had patient colleagues sit next to me for hours talking me through 'THE DATABASE' but as soon as they leave I can't get that little arrow thing to move and then everything disappears from the screen. . . . IT knows it's me!

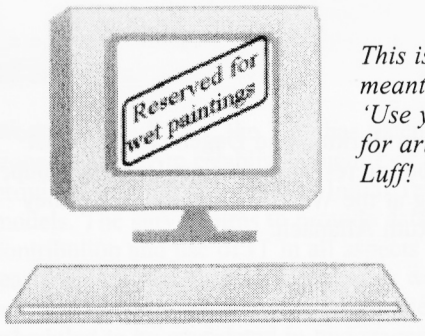
Does anyone remember that old film where a huge computer, covered in enormous tape spools, absorbed all the world's knowledge and threatened to take over the earth? IT was stopped by one innocent who asked the question 'WHY . . . ?' causing ITs brain to explode. Well that's me, the innocent one. I'm constantly asking myself 'why?' . . . Why are my children spending hours producing a database to discover who has the biggest feet when they only have to look beneath the desks? Why do my children have to use an art package when there are pots of paint in the corner? Why does my printer refuse to produce what has been laboriously typed onto the screen, and instead spits out some alien message and then chews up the paper anyway, steadfastly refusing to part with one meaningful syllable?

Up to this point I have managed to avoid contact with the beast by appointing Craig as its keeper. When a child begs to be allowed to 'go on the computer', Craig, with just a glance from me, leaps into action and has the thing under control in seconds – music plays, pictures flash, and everyone is delirious.

This state of affairs cannot continue indefinitely, alas, the spectre of OFSTED looms large! I have several ploys up my sleeve:

1. Hope for a four day power cut.
2. Bump into child carrying bucket of water perilously close to the keyboard.
3. Gift wrap computer and leave classroom window open overnight.
4. Inject mouse with a deadly virus
5. Pray for an Act of God

Failing these I have a new project in mind – I'm planning a new handy teachers' guide – '101 things to do with a computer without actually switching it on.' So far I've got to 'A for ART – use the computer as a handy place to drape wet paintings.' All suggestions gratefully received.



This is not what I meant when I said 'Use your computer for art work', Mrs Luff!

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MICROSCOPE

Micros And Primary Education

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MAPE publishes a wide range of materials which it sends out free to members. These include a termly magazine (MicroScope), an annual thematic resource pack (MicroScope Special) and (educational software) targetted at the primary age range.

Other Links

A link to potentially useful pages for everyone interested in primary education.

Forthcoming Events

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People in MAPE

A list of the E-mail addresses of some of the MAPE members .

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