MICRO-SCOPE

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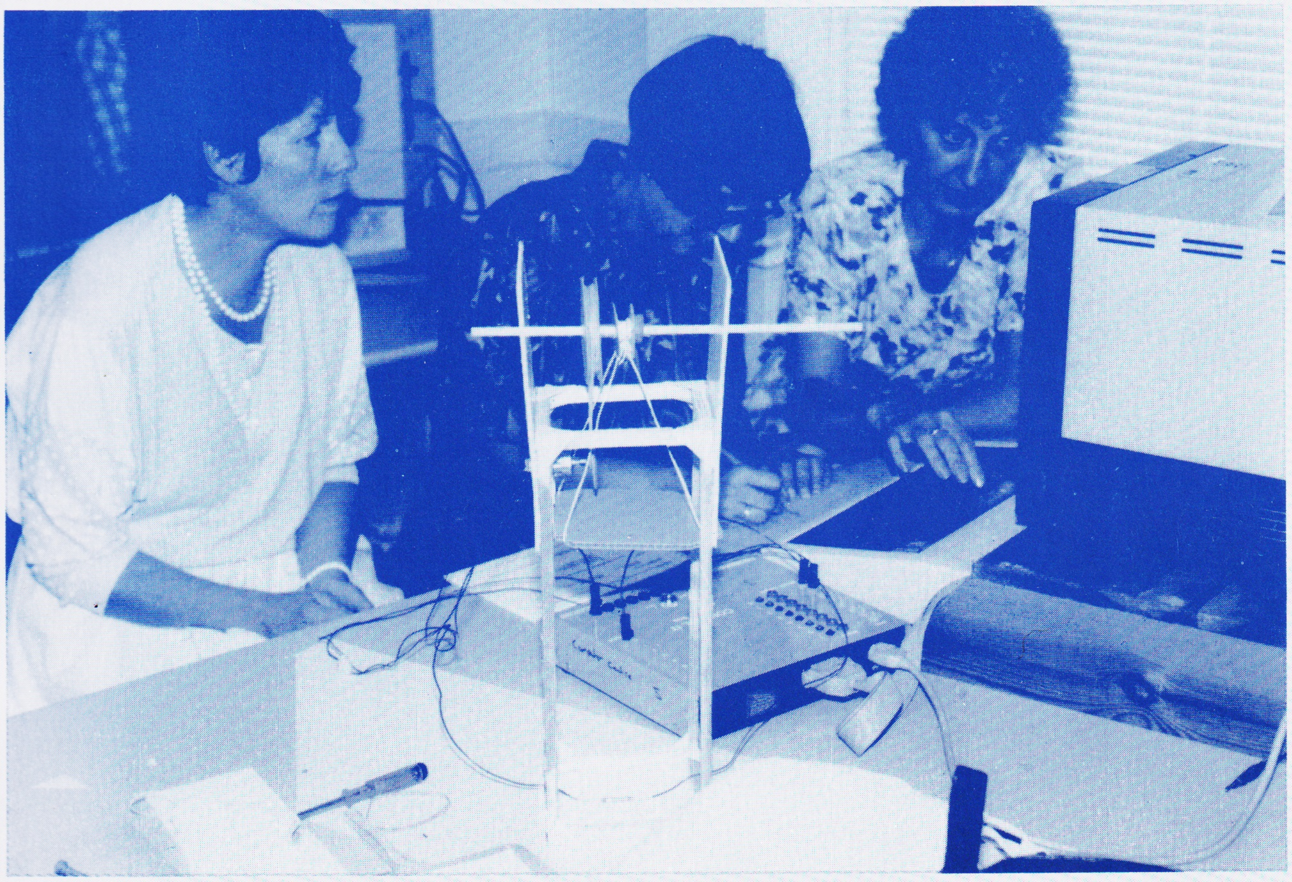
Tenth Anniversary



Making the most of a MAPE INSET activity

- ‘Thought Experiments’ in Mathematics’
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MICRO-SCOPE 32
10th Anniversary Edition

'Thought experiments' in mathematics and the impact of IT

Anita Straker
Senior Inspector, Berkshire LEA

September 1989 heralded a new era in education in England and Wales. For the first time in British history a national curriculum was introduced. Following some frenetic planning by hastily convened national working groups, and one of the briefest consultation periods on record, statutory orders have been drawn up and distributed to all teachers. The orders set out attainment targets (objectives for what children should know, understand and be able to do) and programmes of study (what children need to be taught in order to reach the attainment targets).

The attainment targets are described at ten levels, covering in a continuous ten point scale the progress which pupils are expected to make between the ages of 5 and 16. A range of attainment is expected for each age group. For example, it is expected that in a class of 11 year old pupils the range of attainment in mathematics will be from Levels 2 to 6 and that an average pupil will be achieving at Level 4. National assessment of seven year olds will take place for the first time in the summer of 1991 – and at the time of writing, no one knows very much about what this will involve.

A framework for the use of IT across the curriculum is of course included in the National Curriculum for Technology. Nevertheless, the first working groups to be established were asked to identify attainment targets and programmes of study for their respective subjects before the framework was published! In Northern Ireland, which normally follows the patterns of education in England and Wales, they are doing things in a rather more logical manner, and their IT framework has been produced first so that it can act as a guide to each of their subject working parties.

The proposals for the national curriculum came at a time when teachers were beginning to exploit information technology as a medium for furthering problem solving and investigative activities in mathematics. It was becoming clear, too, that particular pieces of software could allow different approaches to be made to standard but quite difficult topics in the mathematics curriculum. For example, the use of Logo has given young children an understanding of angle as a measure of turn which was previously hard to achieve (Figs 1, 2 and 3). For older pupils, instead of applying algebraic techniques to solve equations, a graph plotter can be used to home in with increasing accuracy to the visual point where two lines cross each other – a method which has become known as trial and improvement.

So new technologies had started to have an impact on classroom methodology in various important ways, but to what extent was mathematical content affected? There was, and still is, increasing public concern about 'standards' and considerable debate about the performances of British pupils in comparison to those in other countries.

> **3.27 . . . Are we at risk of producing a generation of school leavers entirely dependent on their calculators with no knowledge of the number functions which calculators are programmed to perform?**
>
> **8.27 . . . No amount of calculator or computer wizardry can come near the wonder of what can be achieved by the human mind.**[1]

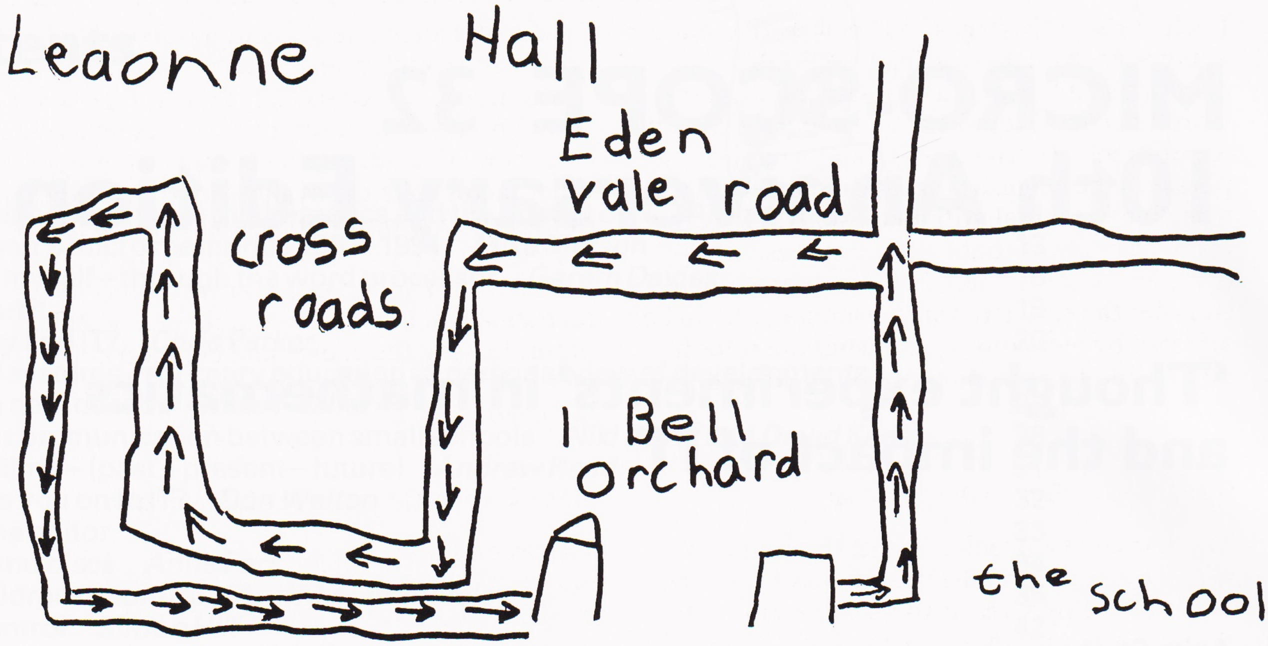


Figure 1 Logo related activity involving angles.

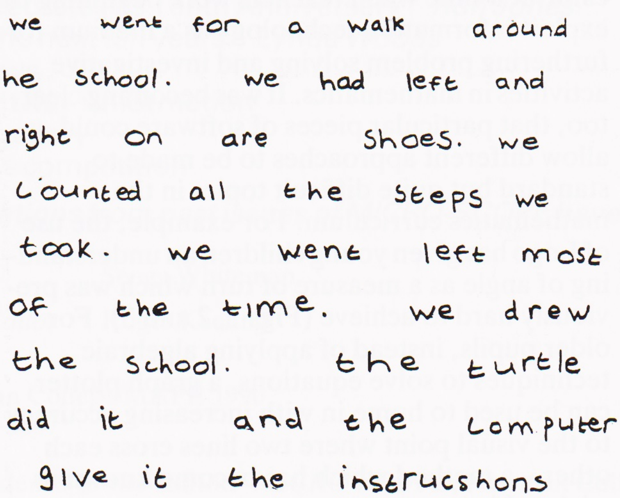
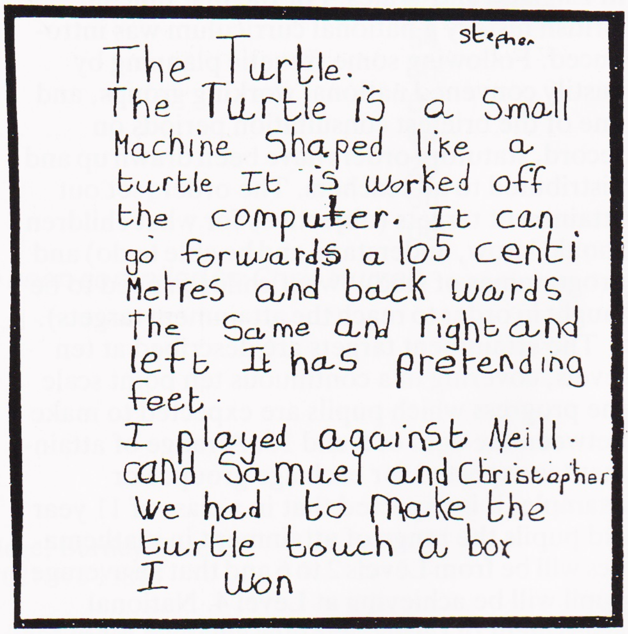

we went for a walk around the school. we had left and right on are shoes. we counted all the steps we took. we went left most of the time. we drew the school. the turtle did it and the computer give it the instrucshons

Figure 2 A written record of a Logo activity.


Stephen

The Turtle.

The Turtle is a Small Machine Shaped like a turtle It is worked off the computer. It can go forwards a 105 centi Metres and back wards the Same and right and left It has pretending feet.

I played against Neill. and Samuel and Christopher We had to make the turtle touch a box I won

Figure 3 A record of a Logo game which involves directing the turtle to a box.

If we are both to improve standards as perceived by politicians and parents, and prepare children for a technological future, there is a need to clarify the role for people and the role for machines in the process of 'doing maths'. Mathematics could be the area of the curriculum most affected by IT, but its role may be more controversial, or even less well defined, in some aspects of mathematical activity than in others.

The process of doing mathematics can be described in six stages (there could be several passes through stages two to five):

Stage 1: deciding what the question/problem/investigation/hypothesis is;
Stage 2: gathering and selecting information which is relevant;
Stage 3: creating a mathematical model;
Stage 4: manipulating the model using a selected technique;
Stage 5: gathering, interpreting and explaining results;
Stage 6: communicating outcomes.

Each of these six stages has been carried out for many years by people using traditional apparatus and techniques, including what the Germans call 'Gedankenexperimente' – thought experiments. (Perhaps a lack of an equivalent phrase in the English language is connected with a decline in mental arithmetic skills?) In some instances we will continue to use these traditional ways of working, but it is interesting to consider the extent to which each stage could be affected by technology, and what the roles for people and for machines are likely to be in the future.

Stage 1: deciding on the question

The source of a problem, or of the stimulus which causes the mathematical question to be asked or the hypothesis to be conjectured, has traditionally sprung from situations, people, objects, images, and so on. The mathematician who is deciding what the question or hypothesis is will continue to do so for herself – no machine can do it for her. But the possible sources of the stimulus that cause the question to be asked in the first place have been extended by, say, the existence of programming languages and also by films of dynamic images, and by adventure games and simulations (figs. 4, 5 and 6).

The impact of technology at this stage is not contentious – few would raise objections to the extension of a range of resources – although other factors like the availability of machines or of in-service opportunities might inhibit its use at present. But eventually it will be possible for both the old and the new starting points for mathematical activity to complement each other, leaving the choice and decision about the particular problem to pursue to the people involved.

Stage 2: collecting relevant information

The second stage of gathering and selecting information is affected differently. When the mathematician is researching and collecting data, she might be questioning, listening, observing, reading, touching, visualising, counting, measuring, sounding opinion, sampling, and so on. She will make decisions about the relevance of the data, how accurate it needs to be or can be, whether there is sufficient information or whether more is needed. Technology can only play a limited part here,

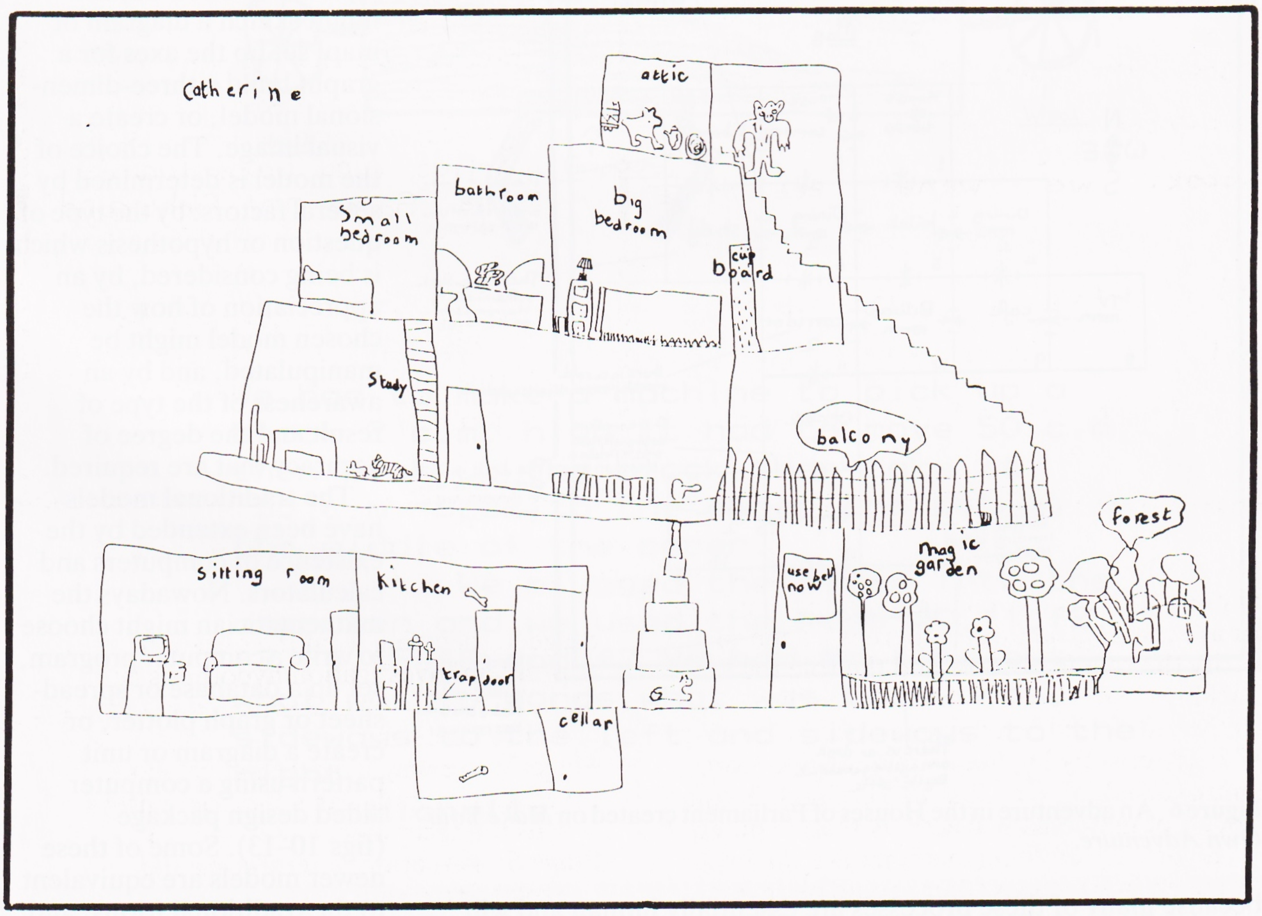


Figure 4 A plan of the rooms, and hazards, to be found in the adventure game *Lost Frog*. A stimulus for mathematical investigations.

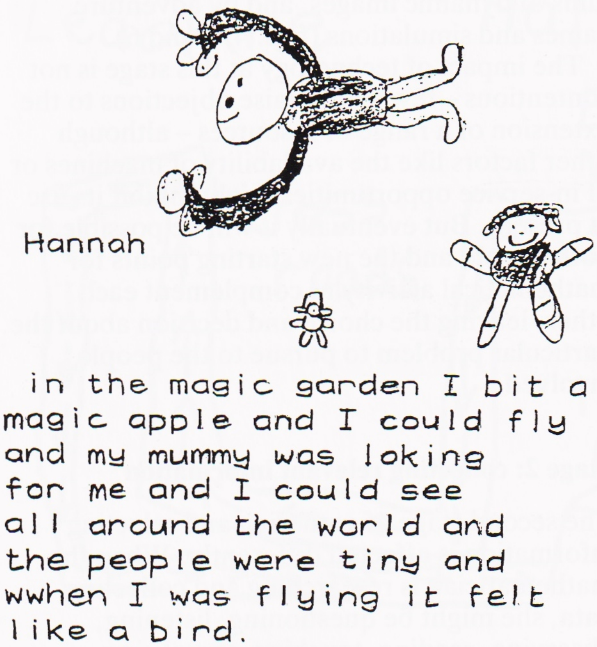


Figure 5 A response to playing an adventure game.

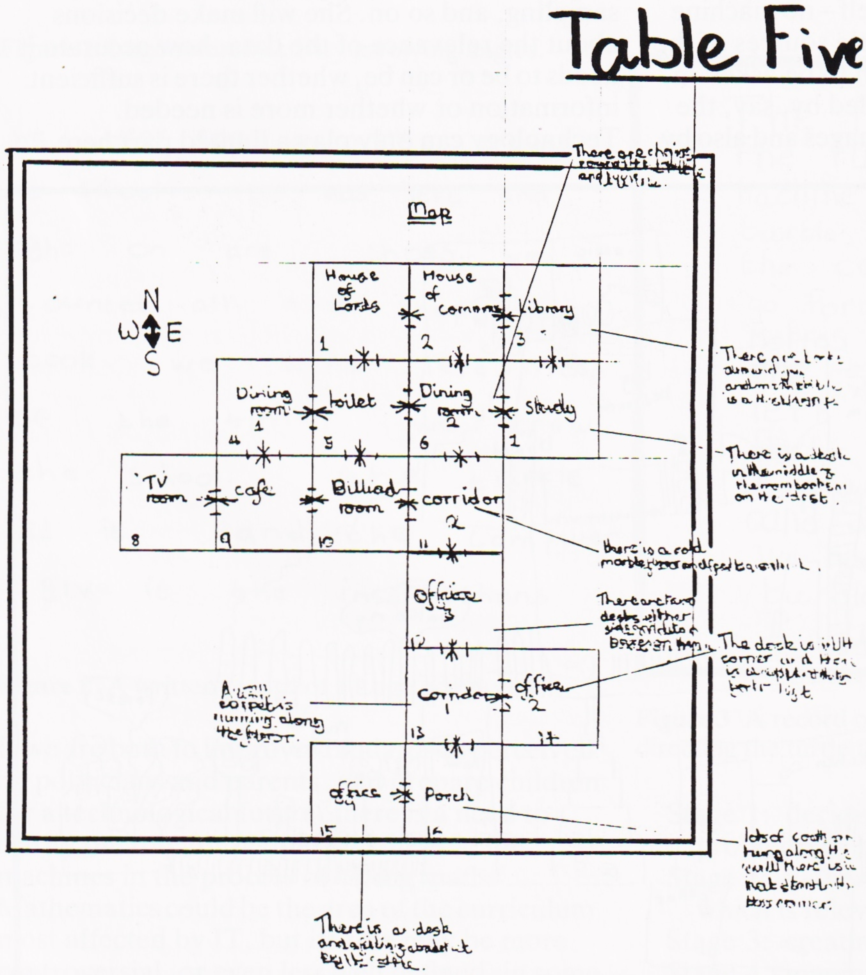


Figure 6 An adventure in the Houses of Parliament created on *Make Your Own Adventure.*

because many of these processes are essentially human and will continue to be so. People will continue to make a major contribution in the gathering of information, using high level skills and strategies.

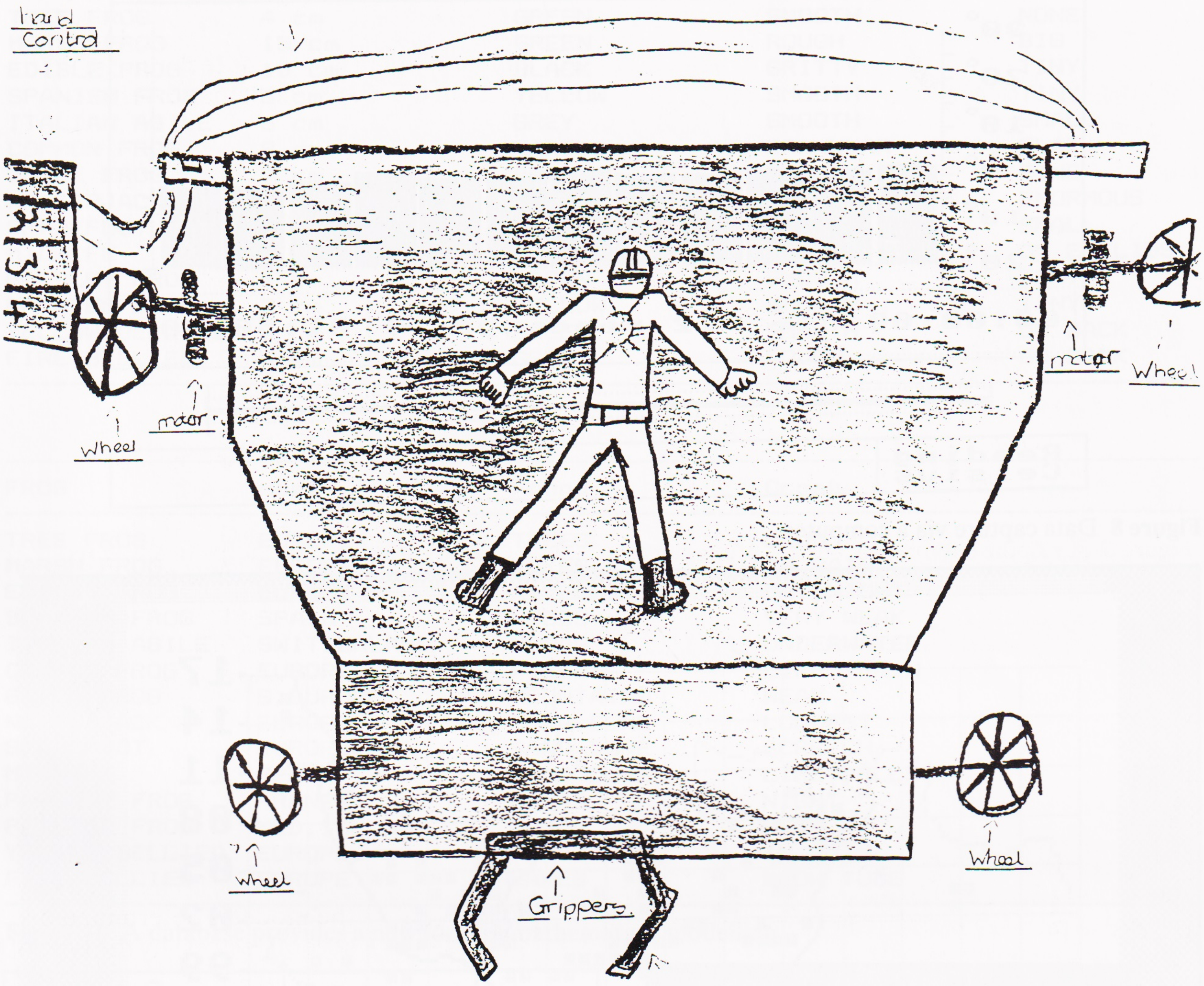
A computer can, of course, be used as an aid in the selection of samples. It can also be used to count or capture data for scientific purposes (fig. 8). At present though, pupils are more likely to make use of microelectronic measuring equipment in their science or technological activities than in their mathematics lessons (fig. 7).

New technology also affects the stage of gathering information in the sense that the source or means of storage of the information might be a computer database (fig. 9). Pupils now need opportunities to acquire the new skills and understanding required for the interrogation of databases as well as opportunities to acquire the more traditional research skills.

Stage 3: creating a mathematical model

A mathematical model is a representation of a piece of mathematics that helps to show its structure. Traditionally the mathematician would form a number sentence, set out a calculation, create a set, form an expression or an equation, and so on; she might sketch a diagram or map, set up the axes for a graph, build a three-dimensional model, or create a visual image. The choice of the model is determined by several factors: by the type of question or hypothesis which is being considered, by an appreciation of how the chosen model might be manipulated, and by an awareness of the type of result and the degree of accuracy that are required.

The traditional models have been extended by the existence of computers and calculators. Nowadays the mathematician might choose to write a computer program, set up a database or spreadsheet or graph plotter, or create a diagram or unit pattern using a computer aided design package (figs 10–13). Some of these newer models are equivalent to the traditional forms, and the choice of one or the other may depend at present on



We had to make a machine to pick up a block 2 c.m. high.It had to move 50 c.m. then pick up the block,then take it 50 c.m. back to the paper and put it in the middle of the paper.

We plugged the wires into the computer and we used the keys f0,f1,f2, f3,f4,f5,f6 and f7.We had to find out what was forwards,what was backwards, sideways to the left and sideways to the right.

Michelle

Figure 7 A record of the creation of a computer controlled machine.

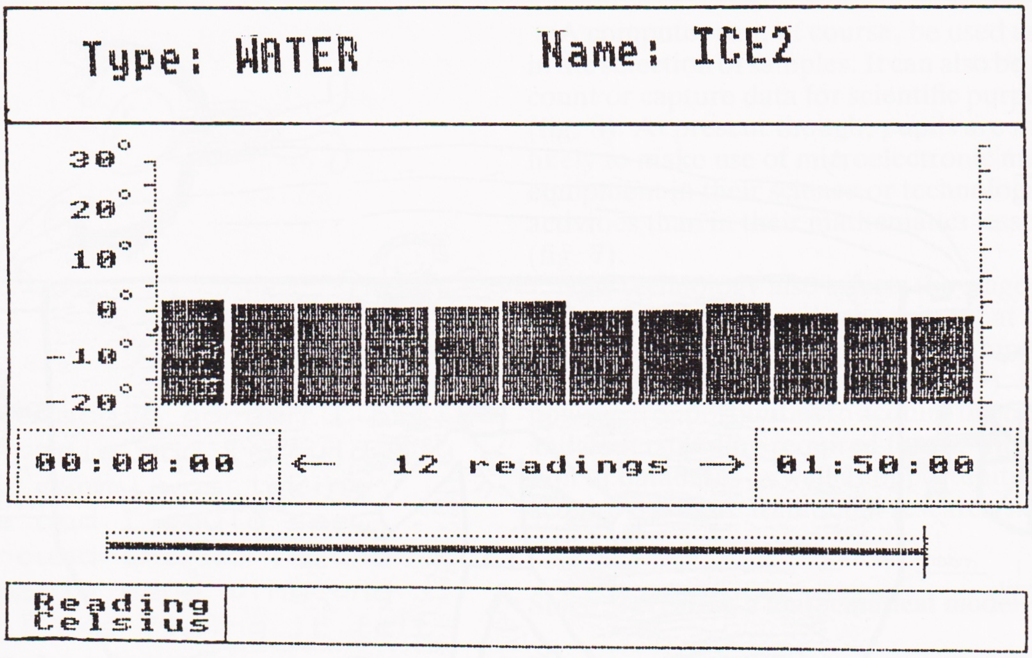


Figure 8 Data capture via a computer.

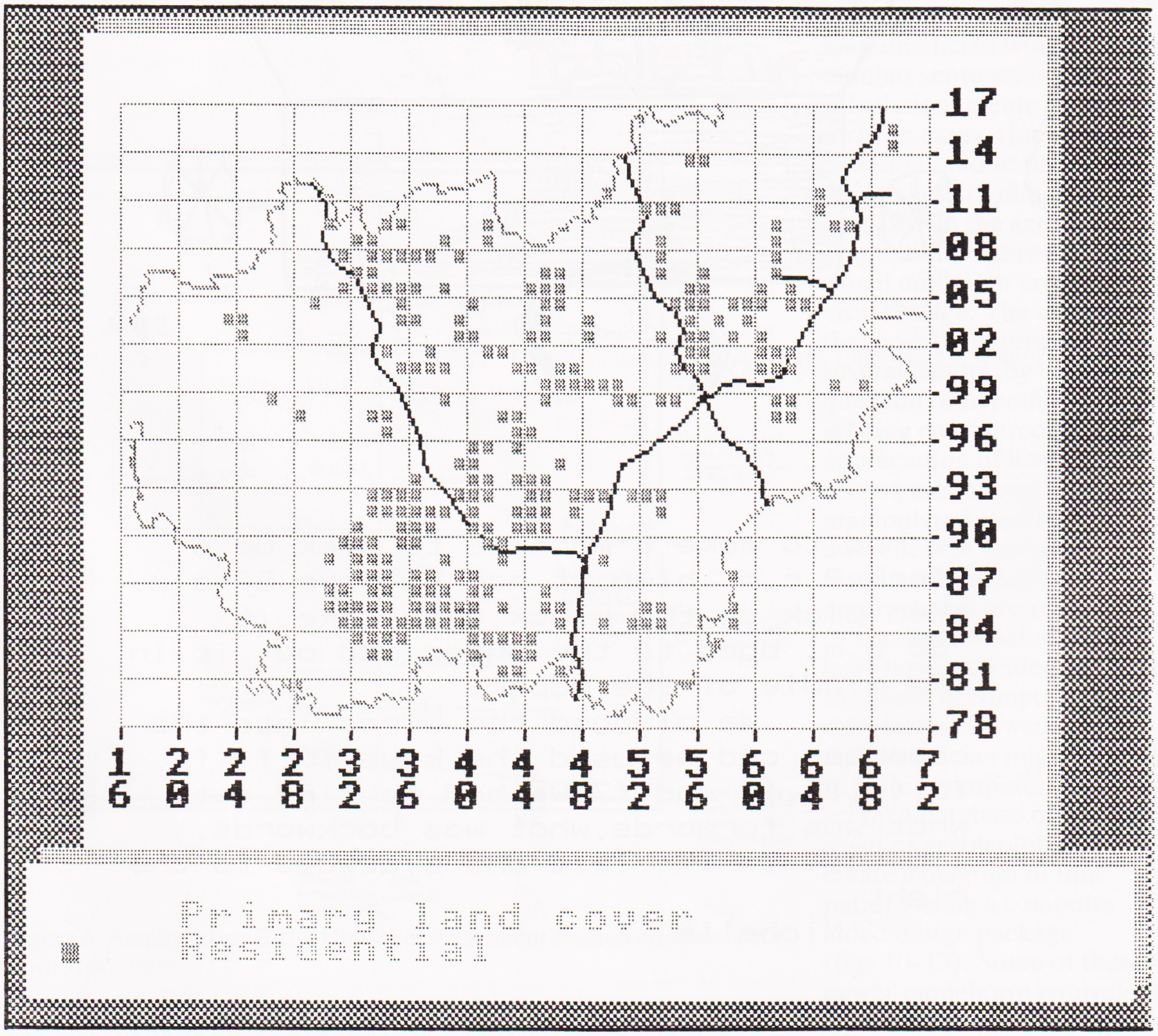


Figure 9 A computer database can provide a new source of information.

File: FROGS

FROG	Size	Colour	Skin	Warts
TREE FROG	4 cm	GREEN	SMOOTH	NONE
MARSH FROG	15 cm	GREEN	ROUGH	BIG
EDIBLE FROG	10 cm	BLACK	GRITTY	TINY
SPANISH FROG	6 cm	YELLOW	SMOOTH	TINY
ITALIAN AGILE	6 cm	GREY	SMOOTH	SMALL
COMMON FROG	9 cm	VARIED	GRANULAR	FLAT
GREEK FROG	7 cm	BROWN	SMOOTH	FINE
NATTERJACK	8 cm	GREEN	ROUGH	ENORMOUS
SPADEFOOT	8 cm	BROWN	SMOOTH	SMALL
MIDWIFE	4 cm	GREY	ROUGH	ON EYELIDS
PARSLEY FROG	4 cm	BROWN	SMOOTH	TINY
PAINTED FROG	7 cm	YELLOW	SMOOTH	TINY
YELLOW BELLIED	5 cm	GREEN	SMOOTH	ON BACK
FIRE BELLIED	5 cm	GREY	ROUGH	ON BACK

FROG	Home	Found	Croak
TREE FROG	EUROPE	TREES	LOUD
MARSH FROG	EUROPE	LAKES	IN RAIN
EDIBLE FROG	EUROPE	RIVERS	DAY,NIGHT
SPANISH FROG	SPAIN	WOODS	VERY WEAK
ITALIAN AGILE	SWITZERLAND	WOODS	UNDERWATER
COMMON FROG	EUROPE	FIELDS	LIKE TRAIN
GREEK FROG	S.EUROPE	MOUNTAINS	WEAK
NATTERJACK	EUROPE	SAND DUNE	LOUDEST
SPADEFOOT	EUROPE,ASIA	SAND DUNE	SCREECH
MIDWIFE	SPAIN	SAND DUNE	LIKE BELLS
PARSLEY FROG	FRANCE	PONDS	NIGHT
PAINTED FROG	MED.ISLANDS	PONDS	WEAK
YELLOW BELLIED	EUROPE	PONDS	IN RAIN
FIRE BELLIED	EUROPE	LAKES	BLOW TUBE

Figure 10 A database provides a new form of mathematical modelling.

1. get ○	17. colour
2. make bigger	18. get —
3. move ↓	19 Move ↓
4. colour	20 turn
5 get △	21 Make bigger
6. Make bigger	22 Colour
7. turn	23 repeat last 4
8. Move ↓ ←	24 get △
9. Colour	25 Move ↓ ←
10. get △	26 Colour
11. Move ↓ ←	27 repeat last 3
12. colour	28 label
13. get □	29
14. move → ↑	30
15 get ○	31
16 Move ↑ ←	32

Figure 11 A record which identifies the stages involved in creating a shape pattern on the computer.

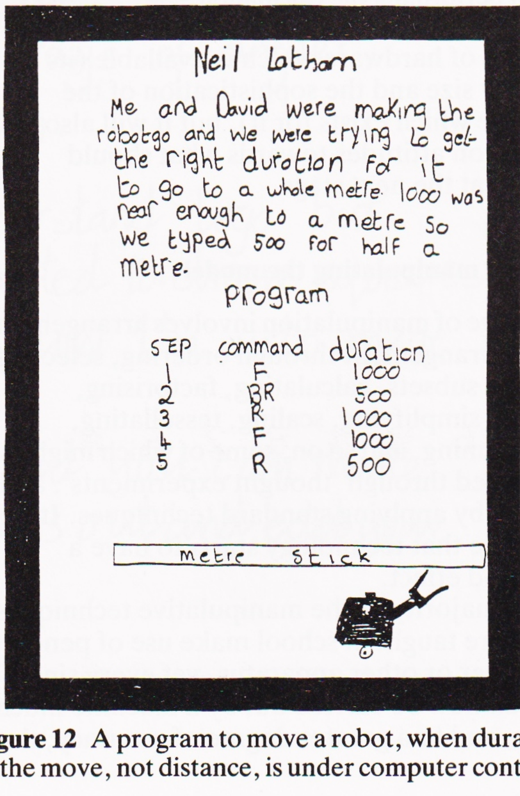


Figure 12 A program to move a robot, when duration of the move, not distance, is under computer control.

My Program for a rectangle

```
10 PRINT "what is the width "
20 INPUT width
30 PRINT "what is the Height "
40 INPUT ~~HEIGHT~~ height
50 Perimeter = 2 * (width + Height)
60 PRINT "Perimeter is "
70 PRINT perimeter
80 Area = width * ~~HEIGHT~~ height
90 PRINT "Area is"
100 PRINT Area
```

Susan (11)

```
10 PRINT "WHAT IS THE WIDTH"
20 INPUT WIDTH
30 PRINT "WHAT IS THE HEIGHT"
40 INPUT HEIGHT
50 PERIMETER = 2 * (WIDTH + HEIGHT)
60 PRINT "PERIMETER IS"
70 PRINT PERIMETER
80 AREA = WIDTH * HEIGHT
90 PRINT "AREA IS"
100 PRINT AREA
```

Figure 13 A computer program, written in BASIC, designed to calculate the area of a rectangle – a new way of performing the calculation.

the type of hardware which is available (its memory size and the sophistication of the software which exists for it), but it will also depend on attitudes towards what should happen at the next stage.

Stage 4: manipulating the model

The stage of manipulation involves arrangement and rearrangement through ordering, selecting sets and subsets, calculating, factorising, solving, simplifying, scaling, tessellating, transforming, and so on, some of which might be conducted through 'thought experiments', and the rest by applying standard techniques. It is at this stage that technology starts to have a profound effect.

The majority of the manipulative techniques which are taught in school make use of pencil and paper or other apparatus, yet every single one can now be carried out by a machine much faster, and to a greater degree of accuracy, than can be done with the traditional tools of the trade. Just as young children discover the properties of plasticine by playing with it, by feeling it, by observing how it behaves in different conditions, so might a mathematician discover the properties of, say, multiplication, through experimenting with a calculator and gaining feedback from it. How easy it is then to discover that $A \times B = B \times A$, that multiplying by a number less than 1 makes the answer smaller, or that if $A \times B = C$ then $C \div B = A$.

We will of course need to retain the manipulation of mental images, one of the mathematician's most powerful ways of working. We will also want to retain the arrangement and re-arrangement of three dimensional objects, partly for the tactile experiences which they offer, partly because they are concrete, and partly because their representation on a two-dimensional screen is difficult to interpret. But as far as other manipulative techniques are concerned we will need to decide whether they have any intrinsic interest in themselves, or whether they are simply a means to the end of more interesting mathematical activity at stages five and six.

It is in discussions about these issues that attitudes harden and differ. If the techniques are of interest, then we should continue to find ways of helping children to learn them; if they are simply a means to an end, then we should adopt the technology as soon as resources permit. Calculators can be used for calculating; the database, spreadsheet, or design package can be manipulated; graphs can be drawn and redrawn on a screen; programs can be written and run (figs. 14, 15, 16). If we merely made full use of the technology which exists today – without even considering what possibilities future technology might offer – then it would cause the most major change in the mathematical content of the school curriculum since the Renaissance.

For many adults, including parents, employers, politicians, and maybe even some teachers, school mathematics is still synonymous with stage four: learning, practising and remembering the standard techniques of manipulation. (Many of the same adults have forgotten the tedium of that practice, that in spite of making an effort, many pupils found the techniques difficult to understand and hard to remember, and that for many more the choice of the technique to use in an unfamiliar mathematical application remained a mystery.)

Even those who appreciate that mathematics is far more than manipulation and who understand the importance of the processes of mathematics have a dilemma to resolve. The idea that creative mathematical work can be

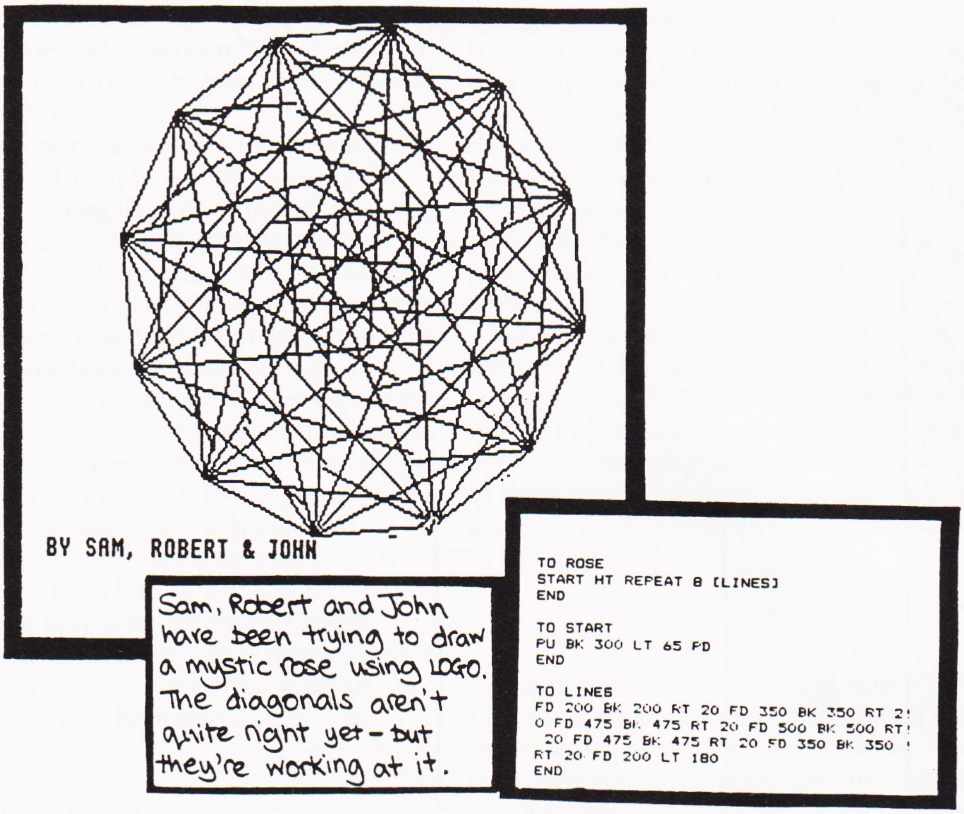


Figure 14 A new technique for investigating number patterns.

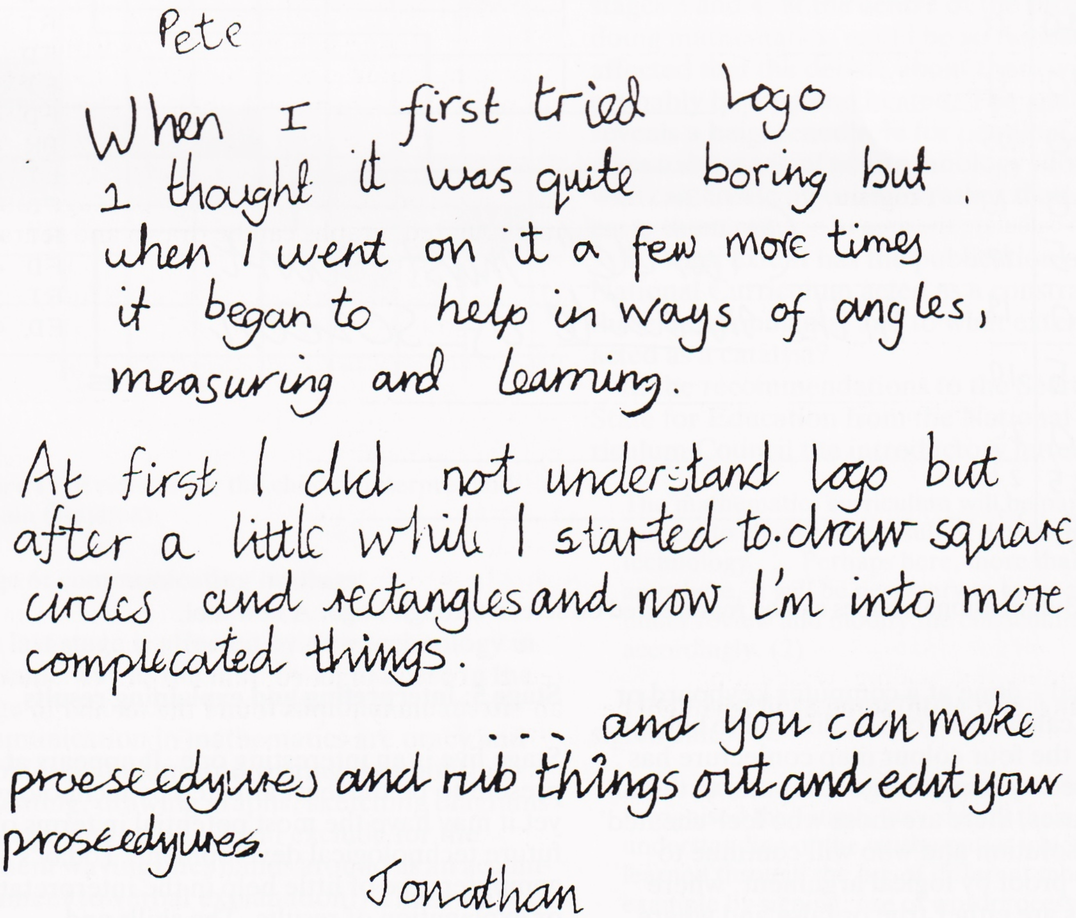


Figure 15 Logo offers an opportunity to explore 2-dimensional shapes in a way which was, previously, not available.

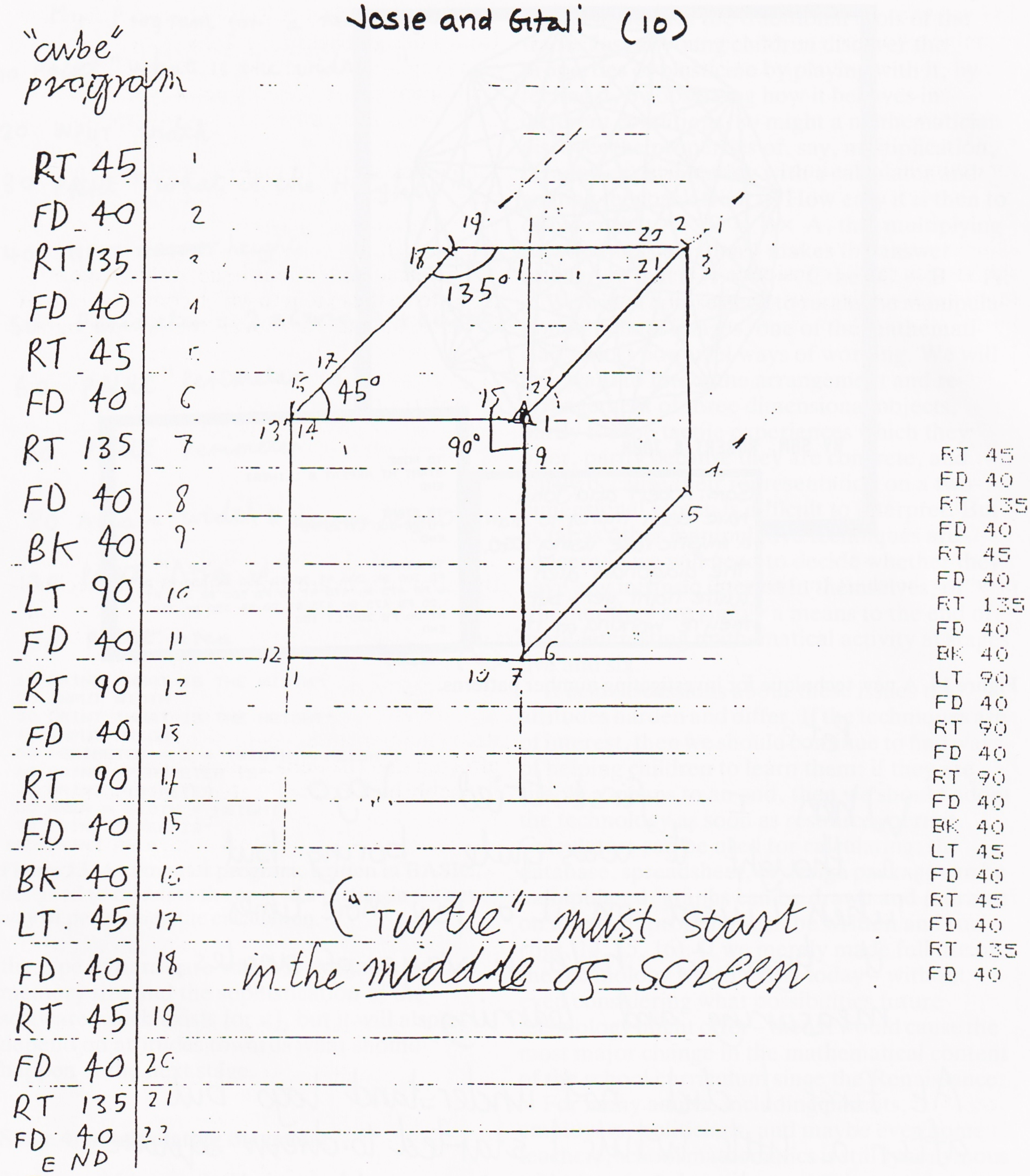


Figure 16 3-dimensional shapes can be represented on screen through Logo. A new tool.

mechanised – done at a computer keyboard or by using a calculator – can be difficult to believe. Although the four colour map conjecture has been proved by using a large computer to test all possible cases, there are those who feel 'cheated' be such a solution and who will continue to search for proof by logical argument, where statements are either true or false and where properties do or do not exist.

Stage 5: interpreting and explaining results

Stage five is an interesting one. It appears at present to be the least affected by technology, yet it may have the most potential in terms of future technological development. Today's computers are of little help in the interpretation or explanation of results. The skills and experience of the mathematician are needed to spot patterns and relationships, to generalise, to examine evidence and determine its validity, to check solutions and to match them to the original problem, and so on.

There are of course examples of software which might help to explain a relationship, as, for example, in finding the line of best fit to a set of experimental data, but the mathematician must still decide whether or not the best has been achieved: the software can only suggest relationships which can be considered. It may be that the more accurate displays obtained in computerised graphs, patterns and tables of results could also be helpful at the interpretation stage, as well as the speed at which alternatives can be computed (fig. 17). For example, a group of eight-year-olds can now look at a piechart produced from a simple database and from it decide that more than half of the children in the school rate their favourite fruit as an apple, although the same eight-year-olds may not have the computational or manipulative skills to produce the chart for themselves.

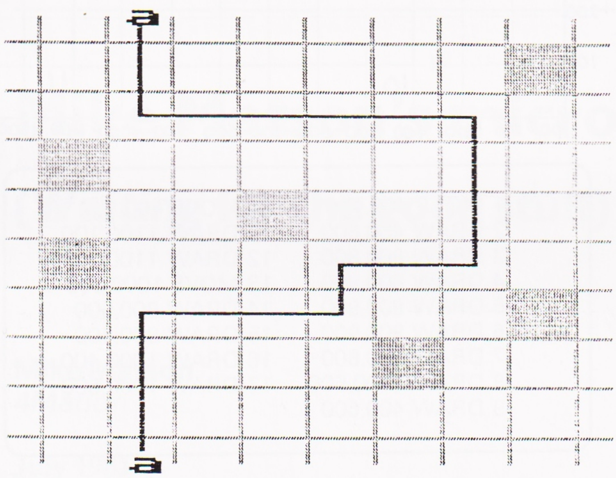


Figure 17 Evidence for the child to interpret and explain (Raybox).

Stage 6: communicating findings

The last stage is affected by new technology in the same way as the first: by an increase in the range of resources. The traditional means of communication in mathematics are oracy and graphicacy: talking and writing, symbolising, tabulating, drawing graphs, sketching diagrams or maps, and so on. (I will exclude for the moment waving ones hands around as an accompaniment to verbal explanation!) These ways of communicating can now be accompanied by, or sometimes replaced by, computer print-outs: text from a wordprocessor, patterns or diagrams from a design package, graphs from a database or a graph-plotter, and so on. Again, the traditional media are enhanced by the new. Sometimes the mathematician will opt for the old (for example, the back of an envelope for a quick sketch or map), sometimes for the new (for example, a print-out from a graph plotter when the degree of accuracy is important).

The most contentious issue at this stage is likely to be the extent to which computer output is permissible in traditional tests. How long will it take before those being assessed are encouraged to submit wordprocessed text, or to include in their course work or examination answer graphs which have been produced by a calculator or computer?

* * *

The analysis of mathematical activity reveals that some stages are more influenced by technology than others. Some are affected, but not in controversial ways; some are unlikely to be changed very much by today's technology, although the position may alter in the future; stages 3 and 4, at the centre of the process of doing mathematics, could be so radically affected that the debate about them will probably be long and heated. The analysis also reveals a heightened role for people if full use were to be made of new technology – for people who can create algorithms rather than merely carry them out.

To what extent has the publication of the National Curriculum acted as a constraint to these developments, and to what extent has it acted as a catalyst?

In the recommendations to the Secretary of State for Education from the National Curriculum Council the introductory letter states:

> The mathematics curriculum will be particularly subject to change as a result of developments in technology . . . Perhaps here, more than anywhere, it will be necessary to keep changes under review and modify the curriculum accordingly. (2)

There are other paragraphs which are also significant.

> 3.8 In any statement of attainment it should be recognised that pupils may signify their understanding of the mathematics which is being learned through the use of different modes, for example by signing, use of wordprocessor or computer, use of a speech synthesiser, braille, or oral explanations.

3.12 Reference is made to the extensive use of computers in the world of work for the performance of mathematical tasks. Council considers that all children should gain some experience of the use of computers in mathematics and would expect teachers to introduce this method of working when appropriate. Some statements of attainment and examples require the use of the computer; others allow for alternative methods but are suitable for use with computers.

3.13 Calculators have a valuable role in supporting teaching and learning in mathematics. At different levels and in different contexts we need to use different methods of calculation – mental, pencil and paper and electronic. (2)

Examples of the attainment targets for mathematics

It is important to remember that attainment targets must now be taught by law, and that they will be assessed in national tests at the ages of 7, 11, 14 and 16. Level 2 corresponds to the attainment expected of an average seven-year-old and level 4 the attainment expected of an average 11-year-old. The most able 11-year-olds are expected to reach Level 6.

The targets printed in italics are contained in the orders as illustrative examples and are described as non-statutory. Those which relate to IT are these:

Level 1
Give and understand instructions for moving along a line.

Level 2
Give and understand instructions for turning through right angles eg *Turn to left or right on instruction (PE games or Logo).*

Level 3
Solve problems using multiplication and division of whole numbers or money using a calculator where necessary.

Know that 3.6 on a calculator means £3.60 in the context of money.

Understand a negative output on a calculator.

Deal with inputs to and outputs from simple function machines.

Use Logo commands, including recognising FORWARD and BACKWARD as inverse operations.

Read digital and analogue clocks correctly.

Enter and access information in a simple database.

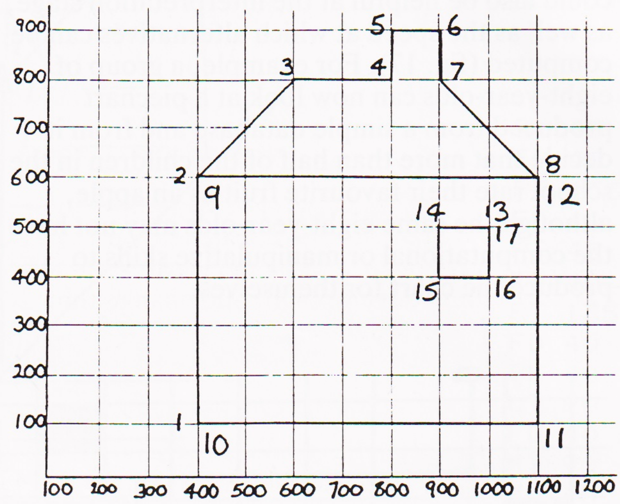
Level 4
Without a calculator add and subtract two 3-digit numbers, multiply a 2-digit number by a single digit number and divide a 2-digit number by a single digit number (using whole numbers).

Read a calculator display to the nearest whole number.

Know how to interpret calculator rounding errors eg *Interpret 7 / 3 × 3 = 6.9999999 if it occurs on a calculator.*

Use and refine trial and improvement methods.

Create shapes by use of DRAW and MOVE commands in the appropriate graphics mode, or using Logo (see fig. 18).



1 MOVE 400,100	10 MOVE 400,100
2 DRAW 400,600	11 DRAW 1100,100
3 DRAW 600,800	12 DRAW 1100,600
4 DRAW 800,800	13 MOVE 1000,500
5 DRAW 800,900	14 DRAW 900,500
6 DRAW 900,900	15 DRAW 900,400
7 DRAW 900,800	16 DRAW 1000,400
8 DRAW 1100,600	17 DRAW 1000,500
9 DRAW 400,600	

Figure 18 An example of a Level 4 activity (in BASIC).

Use Logo commands for distance and direction.
Interrogate data in a computer database.

Level 5
Using whole numbers, understand and use non-calculator methods by which a 3-digit number is multiplied or divided by a 2-digit number.

Calculate fractions and percentages of quantities using a calculator where necessary.

Read a calculator display approximating to 3 significant figures.

Use and refine trial and improvement methods.

Follow simple sets of instructions to generate sequences eg *Understand the program:*

```
10 FOR NUMBER = 1 TO 10
20 PRINT NUMBER * NUMBER
30 NEXT NUMBER
40 END
```

Insert and interrogate data in a computer database, and draw conclusions.

Level 6
Use spreadsheets or other computer facilities to explore number patterns.

Solve linear and simple polynomial equations by trial and improvement methods eg *solve equations such as* $x^2 = 5$ *and* $x^3 = 20$ *using a calculator.*

Use computers to generate and transform 2-D shapes eg *Use Logo to draw regular polygons and other shapes.*

Devise instructions for a computer to produce desired shapes and paths.

Design and use a questionnaire to survey opinion, collate and analyse results.

Conclusion

The National Curriculum has been greatly feared by many teachers in England and Wales. It could have proved to be the greatest inhibitor of curriculum development and change that could have been devised. Two years ago, more than three quarters of all teachers were against the idea; the latest Gallup poll shows that three-quarters are now in favour.

There are still many pitfalls to overcome. More hardware in classrooms will be vital; courses and other forms of support for teachers will need to be provided; relevant ways of assessing pupils' progress will need to be found. But now all pupils will be expected to be competent in the use of a calculator, to use a design package, database or spreadsheet to solve mathematical problems, and to write a simple program to investigate or produce particular results.

History is in the making. We have begun.

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2. *Mathematics: Consultation Report.* National Curriculum Council, 1988.

Mike Matson's micro memories 1981–1991

(Waiting for the good stuff)

Mike Matson
4Mation

July 1981

I spent a whole weekend looking for gold nuggets and avoiding the psychopathic dwarfs which inhabited a friend's Hewlett-Packard computer. I thought to myself 'if my school had £20,000 to spare it might be worth investing in one of these machines'. The machine had a small green screen and there were no graphics, but it did have the intelligence to reprimand me whenever I told the dwarfs to indulge in unusual sexual practices. I could see that there was potential here to develop childen's imaginations.

December 1981

I attended a four-day residential course organised by the NUT and entitled 'Microcomputers in Primary Schools'. I remember very little about it except that a certain Roger Keeling gave a talk entitled 'The Potential of Micros in Schools', someone 'liberated' a Sinclair ZX 81, and a BBC employee talked about the wonderful new machine which was on its way. I wasn't convinced that these little machines had any future in either education or my life as all the programs I saw were primitive and about as dynamic as the school managers' sherry evening. There was one exception, however. Ian Whittington and Brian Richardson (of CSH) demonstrated an archaeology simulation called *Expedition to Saqqara.* It convinced me that the micro had the ability to transport kids into imaginary worlds. And that had to be good, even if not apparently educational. During the next few months I wondered if it was possible to have a non-subterranean adventure with a motivational element other than a search for dwarfs' nuggets or ancient artefacts.

October 1982

I cancelled my order for a Sinclair Spectrum (as I was fed up with waiting months for it to arrive) and bought myself a Beeb. I'd also persuaded my school PTA to buy one. Two miracle machines which I knew could perform magic one day soon. Obviously there was someone, somewhere, writing exciting software so I waited . . .

And I waited . . .

The whispers of 'We should have spent the money on football shorts' became murmurs. The murmurs became emphatically delivered statements. When I caught members of staff reading books on mediaeval torture techniques I decided that the only solution to my dilemma was for me, somehow, to write a few little programs *just to keep us going until the good stuff arrived.* I didn't have a clue how to go about it, but the thought of being mediaevally tortured is a great motivator.

July 1983

I sat in the garden one afternoon and typed the notes to accompany *Granny's Garden*. The word processor had yet to appear. A few weeks earlier my friend, Neil Souch, had suggested that we set up a small business with me writing and him selling. The idea was to produce material just to keep schools going until the good stuff arrived. I also resigned from my post as deputy head in order to become an advisory teacher.

September 1983

I was 'persuaded' to attend the very first BLUG (British Logo Users' Group) Conference. Until then I'd thought that Logo was quite neat, but a weekend being surrounded by Logo fanatics (and falling asleep on both occasions when Seymour Papert delivered a jet-lagged address) gave me an aversion to Logo which still persists today.

Along with Dave Cowell, another ex deputy head, my role as an advisory teacher in Devon was to process the 400+ primary schools which had received their Beeb through the government's half-price micro scheme. What joy! Virtually every day for a year was to be spent persuading a dozen or more cassette recorders to load those state of the art programs which comprised the *Primer Pack* and then trying to convince teachers that this time-consuming activity had some educational value. It would have been easier getting Jo Stalin to join the Samaritans.

July 1984

Having gained the impression that the good stuff was going to be a long time in arriving I decided to give up my job and devote all my energies to writing adventures. There had to be more to life than day after day of cassette recorders and teachers who refuse to believe that such devices were at the leading edge of technology.

February 1985

Neil and I undertook our first trip to Australia and were lost for words upon entering a *Granny's Garden* classroom in Penguin, Tasmania. I realised that the queue for the good stuff was longer than I'd imagined.

1985–1987

These were the good years. The software orders poured in. Working 100 hours a week was worthwhile. Schools everywhere were discovering the magic powers of computers. Small publishers were producing the good stuff at last. The big publishers, of both books and records, had long ago abandoned the notion that there were rich pickings to be made from software (but it had been interesting to observe their reactions when they discovered that software was being created in, and marketed from, back rooms, cellars and lofts in private houses).

November 1988

I waved my 'The end of the world is nigh' placard at the RESOURCE Conference. I had become increasingly depressed during the year as it became more and more obvious that the educational software industry was facing a crisis. Having spent twelve months or more writing *Worlds Without Words* and feeling that it was the best package I'd ever produced, it was heartbreaking to realise that we'd be lucky if the revenue from sales even covered the cost of the materials. It looked as if I'd worked for a year without pay.

Due to the 'generosity' of the DTI (Department of Trade and Industry), schools had benefited from three years of software subsidies. We, as publishers, had appeared to benefit as well, but what the government had failed to take into account was that small businesses (and all educational software publishers are small) cannot survive the sudden drought which occurs when subsidies come to an end. It was astonishing that a government which preaches the gospel of market forces could artifically inflate the market with its grants and then cause a sudden recession when the grants ceased. The 'years of plenty' had resulted in schools having so much software that they were reluctant to buy any more. Publishers had tended to peg their prices during the days of the big orders so the situation in 1988 was that price rises had to be made if publishers were to have any hope of surviving. The consumers, of course, were convinced that they were being taken for ride.

Another cause for concern was the steady trickle of 32-bit machines into schools. Should we spend a year producing a 32-bit package only to discover that there were insufficient machines to make the project viable? Or should we spend a year on an 8-bit package at the risk of finding that everyone wanted 32-bit material? I'd already decided that the epic adventure was a thing of the past. During 1988 I wrote two utilities, *Snatch* and *Stretch*, which were as applicable to the Beeb-owning enthusiast as they were to both primary and secondary schools. It is probably true to say that if I hadn't written them then 4Mation would have disappeared. The only way to survive, it seemed, was to produce material which would appeal to as wide an audience as possible. Writing programs for eight-year-old girls with one leg and a stutter is not commercially viable.

January 1989

At the BETT show in London I was quite convinced that we wouldn't have a stand at the 1990 show. But then I managed to persuade Acorn to let me know what their plans for the Archimedes were. As soon as I knew that the primary market was going to be targeted that summer, Neil and I had a 30-second board meeting and made the decision to throw caution to the winds by devoting all our energies to the production of material for the Archimedes/A3000. What a gamble! And it could so easily have failed.

May 1989

Immediately after speaking at the Australian Econet Conference, when I indulged in my favourite pastime of baiting enthusiasts of computer rooms, I gave a number of talks to groups of teachers in New Zealand. After one talk in Christchurch I was introduced to 16-year-old Carl Ansley who assured me that he was a capable Archimedes programmer. The grog tends to flow when New Zealand teachers get together so it was just as well I wrote down Carl's mailbox number. After I'd been home for a week I found the scrap of paper and sent Carl an outline of a program which would convert sprites into Jigsaw pieces. A few weeks later a copy of *Jigsaw* arrived in the post. This was significant as I was beginning to realise that I wasn't sufficiently capable of getting the best from the Archimedes and RISC technology.

Early Summer 1989

'Hello. Is that 4Mation? What do you have that's new for the Beeb?'

'Nothing. We're concentrating on 32-bit technology.'

'How disgusting! What about our needs?'

Summer 1989

'We are thinking of putting A3000s into our primary schools. What 32-bit software do you have?'

'Noting yet, but we're working on it'

'You software houses are all the same.! You should have started work on 32-bit programs sooner. Well, what about 8-bit programs versioned for the A3000?'

'No, you don't want those. What you need are brand new programs which take full advantage of the new machine's facilities.'

'Don't talk rot!'

Late Summer 1989

'We are about to put A3000s into our primary schools. What 32-bit software do you have? And I don't want to know about old 8-bit programs that run under the emulator! That's a con. What we want is brand new material.'

Autumn 1989

Having set young Carl another programming task I began to appreciate that someone in their teens or twenties is going to find programming a lot easier than someone who didn't know what a GOTO was until he was heading towards forty. I made a few enquiries in Kiwi Land and discovered Dave Caughley and Paul LeBeau, two employees of New Zealand Telecom who were just waiting for someone to ask them to put some Archimedes code together. Between us we came up with the idea of *Poster*.

January 1990

At the previous BETT show we'd taken the brave step of 'going Archimedes'. At the 1990 show I made the decision to retire from programming. Having spent most of 1989 sweating blood to produce my *CraftShop* suite, and having admired the apparent ease with which the Kiwis seemed to be able to put things together, it seemed sensible to leave the programming to others while I concentrated on coordinating projects.

July 1990

On my second visit to New Zealand I managed to meet not only Dave and Paul but a number of other capable young men (but no women) who were ready to join the team. The youngest was 14 and I've managed to come to terms with the fact that he probably has more programming ability than I ever had. The reason why there is this wealth of talent in New Zealand is still a mystery but one factor is that in Christchurch there is an Acorn dealer, Fred Frampton, who provides an open house for youngsters with talent and determination. Late at night the lights are still burning as a small crowd of enthusiasts get to grips with the technology in a bid to create something that the world will find useful. I'm tempted to make a comment about how I believe an environment conducive to learning is far more effective than a good teaching environment but I'll restrain myself. The imposition of a National Curriculum had the same effect upon me as that first BLUG conference: I now have an aversion to education. When everyone is talking about Attainment Targets and getting back to the basics I realise that my views on education are out-dated, subversive, and the cause of our schools being such terrible places. No longer am I prepared to stand in front of a group of teachers and allow myself to get excited about kids in classrooms. Neither will *4Mation* try to sell its products on the grounds that they fit in with Science Attainment Target No. 589. In fact we made the decision to drop the *Educational Resources* part of our name. We produce software. We make no claims for its educational worth. It's up to teachers to decide if they can use it effectively within today's educational system.

While I was in New Zealand my wife, Judith, stopped being a primary school headteacher. You can probably list the reason yourselves.

January 1991

Our stand at BETT this year is crawling with Kiwis. On our display is a sign declaring 'This is a National Curriculum Free Zone'. I take a stroll around the exhibition and see the incredible array of innovative software and hardware on show. It may not have the same magical effect on me as my Beeb did all those years ago, but it's all good stuff.

Talking to myself – through the word processor

Gareth Davies
Advisory Teacher for Information Technology, Cambridgeshire LEA

> *'If you write with a goose quill you scratch the sweaty pages and keep stopping to dip for ink. Your thoughts go too fast for your aching wrist. If you type, the letters cluster together, and again you must go at the poky pace of the mechanism, not the speed of your synapses. But with him (it? her?) your fingers dream, your mind brushes the keyboard, you are borne on golden pinions. . . .'*
>
> Umberto Eco, *Foucault's Pendulum*

I want this article to be a glowing tribute to the power of the word processor and the way it has transformed writing in the primary school. I want to wax lyrical about the ways in which children's attitudes to writing have changed. I want to sing a paean of praise to those features which allow children to approach drafting and re-drafting with enthusiasm. I want to vaunt to the high heavens the benefits of a legible end product. I want to chorus approval of the greatest educational tool since the pencil. I want to raise the rafters. . . .

But do you? Not entirely. Admit it. Of course you want to be positive. There is much to be positive about. You have seen what children can achieve with a word processor. It has been well documented by MAPE and the National Writing Project, to name but two. Yet, at the back of your mind, you know that it isn't all success. There's a niggling worm that says the reality for some children is quite different. Best practice is not necessarily universal practice.

Take drafting, for instance. In theory the word processor provides unrivalled opportunities to encourage children's development of this skill. As they mould and remould their thoughts, a click here, a press there and they have a new improved version of their writing without any of the agony of re-writing in longhand. What happens in practice? Perhaps the children are using a program that does not allow text to be moved from one place to another. Or, all too often, they set out their poem or story, write up their science experiment, and then, the creation process complete, copy-type it into the word processor so that they can have a professional looking print out for their book or display.

Of course, I know that happens. It's perfectly understandable. Teachers are under pressure. Even if we are lucky enough to have a computer permanently in the classroom, how else are we going to ensure that each one of our thirty-five children has their fair turn? You know how long it takes children to type a piece of any length.

So is the most important consideration to let everyone have a turn, rather than using the machine in ways which maximise its educational value? Let's question that. Why does everyone have to have equal turns? Surely every other item of educational equipment is employed because the children using it have a need, not because their turn has come round. Perhaps some children's need to word process is greater than others and they should have more time?

But the National Curriculum makes information technology an entitlement for every child! And in any case, irrespective of how the content is arrived at, surely having a legible, professional-looking piece of work is justification enough for using the word processor.

Let's come back to that in a minute. For the moment, stick with this question of time. We both know that computer time in schools is at a premium. With very restricted resources there is necessarily a finite limit to what can be achieved. But do we really make the best use of what we have? If every time we launch a writing task we expect every child in the class to use the word processor, we must not be surprised if the benefits are limited. Would we expect a whole class to write with one pencil ? If every child must have a turn, then why not plan over a longer period. Over a term or over a year each child could use the word processor for one or two real writing tasks, could really 'brush the keyboard with their mind', rather than having a ten minute fling with the printer.

One more thing before we leave the problem of time. You keep telling me that the word processor is a thinking tool. It allows you to jot down your thoughts, reorganise and clarify them. Well, how fast do you think? How fast do children think? Considerably faster than the painfully slow keyboard skills that most of them possess. No wonder it takes an age for children to complete a piece of work.

But that's one of the skills that they are learning as they work at their writing. They get much quicker with practice . . .

. . . as one or two finger typists who have to look at the keyboard to find every letter. Look at you. Even after fifteen years of practice your fingers can only just keep up with your thoughts, and that is because your thoughts are slowing down rather than your fingers speeding up. Just think of all those children you have seen, bursting with creative ideas, desperate to share them with a wider audience, who have entirely forgotten them by the time they have typed 'The' or 'Once'. Why don't we teach children typing skills as soon as they come into school, just as we teach them the correct way to hold a pencil and form letters? Why don't we ensure that they are at least sitting at the right height in front of the keyboard, just as we teach them the best posture for handwriting? Even if we only encouraged the use of both hands, and the thumb on the space bar it would be something. And perhaps we should bear in mind that there are word processing techniques which need to be developed alongside children's writing. It may be enough, initially, to demonstrate the delete key, but when you have children in Year 6 deleting half a page of work to correct one small mistake isn't it time they learnt about the insert and overwrite facilities?

In an ideal world you might have a point, but machines are scarce. How can we justify tying them up with children practising typing when there is real work to be done? Even if we could, where are the teachers with the knowledge to introduce such skills? Surely they are better taught at secondary level. And if children are slow at typing, they do still produce some first-class work. Whatever process they have gone through, you have only to look at their faces when the text comes out of the printer or when other children are queueing to read it, to see benefits in terms of the enhanced status of their work. You must agree that the word processor is a powerful motivator, even for children who normally dislike writing.

Interesting isn't it? Word processing. The very name focusses us on the 'process' of writing. Well, which parts of the process are the most important? Is it the secretarial skills of spelling, punctuation and presentation? Is it the drafting and re-drafting? Or is it the pre-writing; the thinking that happens before ever pencil meets paper or finger meets keyboard? And how do any of these compare in importance to the finished product?

Surely they are equally important. We don't need to argue here about whether process is more important than product. Both have a place.

Quite so, and yet you are in danger of arguing that product alone is justification for word processing. And, too often, isn't that the reality? It is the quality of the product that makes the word processor so motivating.

Perhaps it is too motivating? Think about the real process of writing. It begins with an idea. You, yourself, are only now sitting down to write this article after letting ideas percolate for the last two or three weeks while driving the car, walking the dogs or watching the television. Writing depends on having something to say. Ideas don't necessarily come instantly, certainly not the best ones. Sometimes they don't come at all. Yet we often expect children to write on demand. Just think for a minute about your own classroom. How often did you introduce the idea for a writing task two weeks, a week, even two days before you expected the children to actually begin writing? Virtually never. Writing was usually a discrete activity. Bang! Stimulus! Bang! Output. Little time for thought. The word processor has made it worse. The children are so motivated, so keen to get the words down, so anxious to see them printed out, that even cursory thought for what they are going to say has, too often, flown out of the window. If we are trying to encourage better writing is this the right way to go about it?

Aren't you are being unnecessarily restrictive in focussing on writing? Word processing has an equally important part to play in developing reading. For instance, it could be argued that re-drafting is actually a reading, rather than a writing, skill.

I would agree whole-heartedly with that. Re-drafting is designed to hone a piece of work to the exact requirements of an audience. In order to appreciate those requirements children must be able to approach their own writing and see it as the reader will see it. Again that requires time. The writer must be able to step away from the creative furnace and come back later for a cooler look when the words seem less familiar. We have all heard children reciting work and inserting words that are not present on the page, because they are reading what they intended to write not what they have actually written. We have probably all had that sensation of coming across copies of correspondence written years before and wondering how we could have been so pretentious in our thoughts, clumsy with our grammar or surprised at our eloquence. The word processor's ability to save work for later retrieval certainly should encourage that transition from writer to reader, but does it, if the motivating power lies solely in the quality and presentation of what emerges from the printer?

Perhaps we are emphasising the wrong aspect of word processing. Especially as presentation of work is in future likely to become less and less the province of the writer and more and more the choice of the reader. The advent of desktop publishing and electronic mail are both leading to a world in which the reader determines how text will look. The writer's task, increasingly, is focussed on ensuring clarity of meaning.

Even if I accept everything you have said about the word processor's role as a tool for enhancing children's learning, there is another perspective which you have not considered. In their life outside school, children will find information technology surrounding them. It is an essential life skill and they should be fluent in its use and aware of its potential. However limited the uses to which the children put the word processor in school it at least gives them a foothold in an adult world and an appreciation of what can be achieved and how the technology might be used in the future.

Granted. But what about the word 'appropriate'. What is the most significant thing about the way word processors are used in the world outside school? In offices or homes they are used for real tasks when they are 'appropriate'. How many people do you know who write their notes to the milkman on a word processor? None. The process is simply too time consuming. Some writing is more appropriately done by scribbling hurriedly on the back of an envelope. How do we know what is the most appropriate tool for the job? Well, mainly, we learn by trial and error. We choose a tool and try it. If it doesn't do what we want or it takes too long to use then next time we choose something different. Experience teaches us what is appropriate and experience is gained by being able to make choices and make mistakes. Do we give children the opportunity to gain that *experience? All too rarely. How often in your classroom did they have the choice of deciding whether to write with pencil, typewriter or word processor? All too rarely.*

If they did not have that opportunity they certainly had others. Amongst them I would place very highly the almost unique one that the word processor provides of being able to work collaboratively, without the writing becoming the possession of the most dominant member or members of the group.

I would be the last person to decry collaborative working for that and many other reasons, not least of which is the enormous contribution it can make to developing children's oracy skills. I would just note, though, that if children only ever experience word processing as a group activity, this creates a mismatch between school and the outside world. Outside school, collaborative work of such intensity is still rare. Adults are much more likely to find themselves sitting alone in front of a word processor than sitting next to a colleague.

Don't you think that teachers will find some of your concerns irrelevant to their situation? Many are related to lack of resources. Of course, children can only have limited choice if there are few tools for them to use. Of course, what they can achieve will be restricted. Of course, they are more likely to work in groups rather than individually. In ten years or less these will seem like the issues of the distant past. By then laptop computers will be as cheap and available as calculators. Children will bring their own to school. They will use them as naturally, and with as little thought about the equipment, as they now use a pencil.

Perhaps changing technology will solve many of the problems. The danger is that how we operate at the moment may develop attitudes and approaches that cannot be shaken off, even when the need for them is long past. Unless we are clear about our ultimate aims and the obstacles that currently prevent us from achieving them, then the risk is that we will not recognise the solutions to those problems when they are presented. We may find ourselves in the position of the driver who still follows a man with a red flag even though his car can travel at 120 mph and horses and pedestrians no longer throng the road.

Think about it . . .

'Although I am, on the whole, by no means dissatisfied with the work done, during the past year, in the schools under my inspection, yet I cannot say that the year has been a favourable one for them. There have been too many causes of excitement and distraction at work; school managers and school teachers have naturally had their attention engaged, at first in speculating as to what changes might follow . . . [the proposals for educational reform], afterwards in discussing these changes when they had been announced. The year therefore has been one of anxious looking to something which was to come, rather than undistracted prosecution of the work which was in hand.'

Matthew Arnold's *General Report for 1861*

'No teacher can do his best work with a new method until he has welded it on his educational faith and has coloured it with part of his personality.'

Hadow Report, 1931

'The wholly satisfactory form of record has yet to be devised. If it is to be of real help to the teacher in his work, as it should be, it will not be over-elaborate, nor entail excessive clerical labour; it will be more concerned with the points in which a child differs from his fellows than with those in which he belongs to the common average; . . . it will wherever possible be based upon objective standards of assessment rather than depend upon personal impressions; and it will be wide enough in scope to enable the reader to form some picture of the development of the child as a whole.'

Handbook of Suggestions for Teachers
Board of Education, 1937

'The mechanical rules of written arithmetic are primarily devices for adding, subtracting, multiplying or dividing quantities that are too large or too complex to be dealt with mentally. If the child were supplied with actual machines to do the work of these rules automatically, his power of attacking problems would hardly suffer. Indeed it might be increased.'

Handbook of Suggestions for Teachers,
Board of Education, 1937

'The whole thinking process is still rather mysterious to us, but I believe that the attempt to make a thinking machine will help us greatly in finding out how we think ourselves.'

Alan Turing in a radio broadcast on
'Can Digital Computers Think?' 1951

'It is often a matter for mild amusement at educational conferences that nothing is more certain than that, at a session in audio-visual aids, the aids will in some way fail: the films break, the record player is so sensitive that it exaggerates extraneous noise, and, at the very least, the plug is of the wrong size.'

Plowden Report, 1967

'This is an age of increasing mechanisation. Inevitably, more and cheaper mechanical aids will find their way into the primary schools. Teachers must, therefore, consider how they can use them best to enrich the ways in which children can learn.'

Plowden Report, 1967

'The computer is incredibly fast, accurate and stupid. Man is unbelievably slow, inaccurate and brilliant. The marriage of the two is a force beyond calculation.'

Leo Cherne, '*Creative Computing*', 1977

Geography and IT?

Chris Parker
NCET

It is not surprising, when we look back to 1981, to find Geography identified as one of the areas of potential highlighted in the original MEP Strategy Document. This followed the work of a number of projects, in the late seventies, which explored the potential uses for the microcomputer in Geography. A quick survey of the current secondary scene would, I think, support the view that these early developments have been sustained and that IT is as well integrated into geography as it is into any subject in the curriculum. This may be something of a contrast with the perception that IT in the secondary sector has experienced difficulties due to timetabling, forty minute lessons and centralised resources.

But what of the primary sector, can we be as positive about the development of IT in geographical education?

In 1984, Andrea Tapsfield in *Primarily Geography*, outlined four themes of microcomputer use in primary geography – mapwork skills, simulations, information handling and spatial awareness.

Whilst most mapwork skills programs date from the early/mid eighties software boom and are generally of the structured reinforcement type, the manner and situation in which they are used remains crucial. Simulations also benefit from similar considerations along with careful selection to meet the teachers educational aims and objectives.

> 'The type of simulations that are of greatest value in primary school geography are those that encourage the children to make decisions in the context of different real-life situations.'[1]

Information handling builds upon much that had happened prior to the introduction of the microcomputer. Children investigating the weather have traditionally collected data; however the use of a data handling package allows the investigation to be taken to greater depth than was previously possible.

Spatial awareness in young children, along with many of the early concepts of mapwork, can be developed through the use of programmable toys, floor turtles and turtle graphics.

Writing in *Geographical Work in Primary and Middle Schools*, some four years later Andrea Tapsfield adds three further 'themes' for use of the microcomputer – adventure games, text handling and new developments in technology.

Adventure games, whilst set in fantasy worlds, can provide opportunities to use maps, compass directions and bearings. Text handling programs such as *Front Page Extra* and teletext emulators allow children to convey information they have collected, in a manner which reflects the real world and to a variety of audiences – other children, parents or the local community.

In the final theme of 'new technology' the potential of both electronic mail and interactive video are outlined. There is a great deal of evidence to support this claim notably the 'Friends around the World' electronic mail project and the BBC Domesday project, the results of which are on videodisc. Both, however, are relatively expensive either in running costs or initial outlay and therefore remain drastically under-used.

One additional 'theme' to be developed over the last two or three years is that of the concept keyboard and *Touch Explorer Plus*. This combination is particularly significant in geography as it allows overlays to be developed to supplement a teacher's own resources, and to match them to the needs of the children. Opportunities exist to use colour magazines, calendars, posters, maps and illustrations to create interesting activities for children to begin to investigate distant and unfamiliar places.

Through the eighties an increasing breadth of opportunity has developed for enhancing geographical work in primary schools. Undoubtedly all the uses of IT outlined above have been widely offered in classrooms over this period. But have they been used with the specific intention of developing children's geographical understanding? HMI in *Aspects of Primary Education – The Teaching and Learning of History and Geography*, report that in their visits to some 50 primary schools, where good geographical practice was taking place, they were able to identify examples of information handling, word processing, simulations and mapwork programs being used to support geographical work. However, and perhaps more relevantly to the original question, earlier visits to 235 schools had revealed a disappointing picture of geography in the primary years. Much of the geographical work formed part of a topic or theme and was incidental rather than central.

So, regrettably, the answer to the question has to be no, we cannot be as positive about developments in geography and IT in the primary sector as we can in the secondary sector largely because of the lack of geographical education in the curriculum of many primary schools. The reasons why this situation has occurred are, without doubt, numerous and complex but from September 1991 Geography will form part of a basic entitlement for all children in key stages 1 and 2, as a foundation subject within the National Curriculum. We can, therefore, look forward to realising the potential which exists to support children's geographical education with IT.

There is, of course, a need to look at the way in which geographical work will be handled by primary schools from September. The all encompassing topic which has been the centre of much criticism in recent years does not seem to be the right vehicle, equally a return to defined subject boundaries would be very unpopular. Perhaps the common-sense solution is somewhere between the two. Topics of a shorter duration and with a clear central focus supported by two or three other subjects may well prove to be a successful way of working. In this way a topic on weather, for example, may have a distinctive geographical focus but with science and technology playing the supporting roles. Equally in a local history study unit geography may play a supporting role with English. If this model is to prove useful we must look at how geography and its potential subject partners link together. We are concerned here with geography and IT and further examination provides evidence that many possible links exist. *Geography from 5 to 16 – Curriculum Matters 7* identifies a range of skills which can be developed through geographical enquiry, many of which are relevant situations for the use of IT, for example:

- collect, describe and classify relevant objects
- prepare and use a questionnaire
- locate and extract information from a variety of sources
- measure and quantify as part of a process of gathering and organising information
- record information in appropriate ways
- draft and edit materials being prepared for presentation

The *Interim Report of the National Curriculum Geography Working Group* (November 1989) recognised and developed these links. They identified all of the 'themes' outlined above adding the more recent developments in receiving and analysing satellite images, geographic information systems and data logging. They conclude that the potential IT uses in geography, 'are greatly expanding the range of possibilities for teaching and for active, enquiry based learning.'

The Proposals of the Secretary of State – *Geography 5 to 16* (June 1990) highlight the numerous links with Technology attainment target 5, by outlining the possible areas of development in terms of IT capability –

Figure 1 IT capability within Geography (after Appendix G – Geography NCC November 1990).

Gg 1/1a. follow directions	use a programmable toy to follow directions around obstacles in the classroom.	Te5/1b talk about ways in which equipment such as toys and domestic appliances respond to symbols or commands.
Gg 1/2a make a plan of a real or an imaginary place.	use a graphics program to create a plan of an island from pictures or symbols already created.	Te 5/2a use computer generated pictures, symbols words or phrases to communicate meaning.
Gf 1/2d record weather observations made over a short period of time.	use a word processor to write about the weather store and retrieve text to add each subsequent days observations.	Te 5/2b use information technology for the storage and retrieval of information. copy.
Gg 2/1d identify activities carried out by people in the local area.	use a concept keyboard linked to a word processor to find out information about people in the community	Te5/1a work with a computer.
Gg 2/2c identify the features of a locality outside the local area and suggest how the environment of the locality might affect the lives of the people who live there.	use a concept keyboard with a photograph of people in a distant place to retrieve information about what it is like to live there.	Te 5/2b use information technology for the storage and retrieval of information copy.
Gg 2/3e explain the relationships between land use, buildings and human activity in the local area.	collect information about buildings in the local area; enter it into a database and sort and retrieve information to identify the different activities within each building.	Te5/3c information and enter it into a database (whose structure may have been prepared in advance), and to select and retrieve information information from the database.
Gg 2/4c give an account of an issue that has arisen from recent or proposed changes in locality. Gg2/4d compare viewpoints arising from the issue studied in 4c and present their own conclusions. Gg4/4e explain how conflicts can arise over the use of land in a locality.	produce a newspaper front page giving an account of a current local issue e.g. the construction of a bypass. Present a variety of views and an editorial comment.	Te5/4a use information technology to retrieve develop, organise and present work.
Gg3/2a recongnise seasonal weather patterns.	from banks of words and pictures create a design for a new set of postage stamps which convey observations and experience of the seasons.	Te5/2a use computer generated pictures, symbols, words or phrases to communicate meaning.
Gg2/4a explain how site conditions can influence surface temperature and local wind speed and direction.	use a datalogging device to identify differences in temperature in a small area of the playground over a period of time.	Te5/4c amend and add to information in an existing database to check plausibility and interrogate it.
Gg5/2c suggest how they could improve the quality of their own environment.	use a simple art package to create a poster urging other children to save waste paper for recycling.	Te 5/2a use computer generated pictures, symbols, words or phrases to communicate meaning.
Gg5/3c give an account of an activity designed to improve the local environment.	use a word processor to create an information sheet on an environmental improvement activity for circulation to parents.	Te5/3a use information technology to make, amend and present information.
Gg 5/4c describe the ways in which damaged landscapes can be restored.	create a presentation of words and pictures for the school entrance following a visit to a land reclamation scheme.	Te5/4a use information technology to retrieve, develop, organise and present work.

communicating information, handling information, modelling and measurement and control. The fifth strand of evaluating applications and effects is not included but it is not too difficult to see how a visit to the High Street, or the local factory may provide suitable links.

The National Curriculum Council's *Consultation Report* (December 1990) provides clear examples of how opportunities to work towards statements of attainment in geography and technology AT5 can be achieved through common activities. (Figure 1 extends the examples given for levels 1–4 in Appendix G of the Consultation Report).

Whilst many reservations still surround the National Curriculum it has clearly helped to place geography back on the primary agenda and consequently opened up a number of avenues, previously unexplored by many teachers, for the use of familiar IT applications. Many of the IT activities which currently take place in primary classrooms have potential uses in geographical situations. These possibilities will obviously be broadened by current and future developments. The use of packages such as *Genesis* and *Magpie* for children to create and present the results of investigations using graphs, diagrams, maps, scanned and digitised images, or the use of a spreadsheet to plan and model the costs of a housing estate are just two of many current developments which have an exciting part to play in the next few years.

Whatever the developments of the next decade the major consideration remains the same as it was in 1984. The 'overriding goal must be to harness this potentially very powerful resource to help children understand key geographical ideas . . .'.[1]

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Computer systems in primary education: a personal view of developments over the next decade

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Heaven forbid that I or anyone else should be sufficiently deluded to consider predicting a decade of technological development with precision! Having said that, there are major changes that I am confident will occur and I will outline some of the more important of these for you.

1. What is driving developments?

The underlying force fuelling change in Information Technology is the astounding rate of change in the amount of electronic function that can be purchased for a given cost. For the last thirty years, this has increased by a factor of approximately ×1.4 per year. This translates into a factor of ×5 every five years and ×30 every ten years. Future developments in the semiconductor (the silicon chip) industry are well enough understood for us to expect this rate of change to continue for at least the next decade.

What does this mean? Does it signify that today's £800 computer will cost £27 in ten years time or that today's computer with 1 million Bytes of memory will have 30 million Bytes of memory for the same price? In practice, I expect that we will see a bigger change in performance and function and a lesser but still important change in the price. Today's £800 computer with 1 MByte of RAM and 20 MBytes of disc storage might translate into a computer in 1995 which costs £400 with 2 MBytes of RAM and with 60 MBytes of disc storage. In the year 2001, this could well become a £300 computer with 15 MBytes of RAM and 300 MBytes of disc storage.

Why not a computer exactly like today's £800 computer but for £27? The reason for this is that even today's computer has a significant fraction of its cost in metal and plastic and copper and glass. The cost of these parts and the labour associated with fabricating them is not declining at all. We will see computers which do cost a few tens of pounds but these will look very much like today's calculators in terms of size and in terms of limitations of their display and keyboards.

In summary, by the year 2001, I expect the following:

1. The price of computer with a *full size display and keyboard* will drop to a *few hundred pounds*.
2. The performance and memory capacity of these computers will increase fifteen-fold.
3. For education I think that this will mean that we will see an important, *but not revolutionary change in the cost of hardware*, together with *much more important changes in the capability of hardware*.

2. What will limit the rate of development?

In short, the rate of development of software; of curicular support materials; of know-how and experience in schools and of the curriculum itself. The basic technology for writing software is changing so slowly that the time it takes to write or update a major program is actually increasing. Whilst the next ten years will see an astounding thirty-fold price/performance improvement in hardware, many major software products are taking three years to get to market and a further five years of updating to really mature. The time it takes a teacher or student to become familiar with a package and to integrate it into their process of teaching or learning can also be measured in years and clearly has nothing to do with the rate of change of the cost of transistors!

What conclusions should we draw from this large imbalance between the relative ease and fast rate of development of hardware and the relative difficulty and slow rate of development of software and classroom activities? My conclusion is that **it is vital for RM and for you, the users, to follow a hardware strategy which allows you to fully benefit from new hardware developments but which, at the same time, maximises your access to software and support.**

Our whole system strategy at RM is driven by this perspective. Now to look at some more specific issues:

3. The emergence of a major role for microcomputers in providing an *information service*

Today, the major role of microcomputers is to provide an *applications service*. In the main, teachers and pupils use microcomputers to manage and process information which they have created sitting at the computer or which they have researched elsewhere. The rapid increase in mass storage capacity is changing this. Already, we have CD ROM drives which are capable of storing 600 MBytes of information; the equivalent of about 600 average books. Thus, microcomputers will provide both an *information service* and an *applications service*. This is making it possible to have major reference texts on-line.

Over the last few years we have found that the main benefit of this is not that it saves one having to find an encyclopedia or that it speeds up looking up 'IRAQ' under 'I'. It turns out that the major benefit comes from a revolution in indexing. Typically, these digital texts now have every occurrence of every word indexed. In a few seconds, the system will find and usefully display to the user all the articles in the encyclopedia which make references to 'IRAQ' – usually this provides the enquirers with an index to many useful references to IRAQ outside the main 'IRAQ' entry. Furthermore, the user generally has the ability to have an index created in a few seconds which looks at the reference material from the point of view of their particular interest, such as articles or paragraphs that contain the words 'IRAQ' and 'weapons' or 'IRAQ' and 'Britain'. This interactive indexing is transforming the accessibility of the information which the user is searching for, together with a broadening of perspectives on this information.

We are rapidly moving to a point where many students using a microcomputer to process information will, at the same time, have access to information services such as an encyclopedia, a dictionary, a thesaurus, a book catalogue with a subject index and a year of a national newspaper. Microcomputers going into Primary schools will soon have a Winchester disc drive with enough storage capacity for a valuable children's encyclopedia. A few Primary schools have microcomputers already networked together to a larger central disc drive.

Over the next few years, we will see the storage capacity of both stand alone and network systems increase rapidly, with this storage being used both to store a library of applications and a growing library of reference information. In addition , we are just starting to see individual CD ROM drives being connected to stand alone systems and multiple CD ROM drives connected to networked systems. By the end of the decade a typical stand alone computer, perhaps with a removable read/write optical disc, will store the equivalent of hundreds of books of reference text. A typical network system will have the equivalent of thousands of books of reference texts on-line. The experience so far is that this will *increase* the use of paper books and libraries through transformation of the ease of identifying the books and parts of books of interest to the student.

Information has a special role in education. A significant part of education involves the acquisition of knowledge and the acquisition of understanding which comes from looking at information.

I think that within the next few years the information service provided by micro-computers in Primary schools will be seen to be as important as the application service currently provided.

Apple has pioneered a combination of operating system and applications which solve many of these problems. A very similar solution is becoming available on MSDOS computers in the form of Microsoft Windows, in particular Windows version 3.0.

With Windows 3, installing a new program is getting much easier, particularly as a Windows application does not have to be configured by the user for different printers. There is much less aversion to trying out new applications under Windows, because every application has a very large commonality in user interface with other applications with a nice 'point and click' menu and mouse approach. Lastly, on larger systems, it is possible to switch between applications without 'leaving' any of them whilst seeing through your task. On all systems, it is possible to cut and paste between applications. As well as providing an excellent platform for the future, Windows is, appropriately, a slave to today's programs. Thus, the Windows 3 environment can be used very effectively to provide 'click on an Icon' access to a library of ordinary MSDOS programs.

I expect that for MSDOS based computers in primary schools, Windows 3 will gradually become the dominant method of access to all applications.

4. Evolution of applications: standardised, quality, user interfaces

The largest bottleneck in the application of information technology is know-how. This means that new software should make programs and systems easier to use as well as providing new functions.

What are the major bottle-necks in software use today? Firstly, programs can be very difficult to install and configure. Selecting the right display mode can be difficult and getting programs to print successfully with the expected fonts can be a nightmare. Secondly, programs are difficult to learn. All of us who just want to get on with using our computers have an aversion to trying out a new piece of software because each package is different and lots of things don't behave in quite the way expected. Thirdly, most of today's software forces us to tackle the task in hand through the narrow use of one application at a time, even if natural execution of the task would require us to switch between a number of software tools.

5. General developments

There are a number of developments occurring in systems and applications quite separate to those described above. Firstly, over the next few years, you will see a steady progression in the general processing power, RAM and disc storage capacity of typical systems. As well as this, we will see some other developments:

Documentation-free applications

In this world of applications with more and more functions, we have reached a documentation impasse: even if the facilities of a program are largely self-evident, intuitive and easy to use, their exact operation needs to be described somewhere in the text. The unfortunate result is that the texts are now so large that they are really only usable by indexing into the section of interest and the indexes themselves have become large and confusing. My expectation is that developers will find very effective ways of using the growing systems mass storage and

Information services tools, discussed above, to deliver easy to use, highly accessible documentation on disc.

Sound

Options are becoming available to record or play-back sound as part of a program and to have access as standard to the equivalent of a small midi sound synthesizer, again under program control. The ability of a program to 'talk' has got potential applications for pupils below reading age, for programs which aid in teaching to read, teaching to write and in teaching new languages.

Over the next few years a growing amount of interactive tutorial software including tutorial software which teaches us how to use a new program, will combine activity on the screen with a voice based tutorial. Sound will also have a role as part of certain reference material. An encyclopedia article about Churchill could include speeches which can be heard by clicking on an appropriate word or picture. A reference work on Birds might include the appropriate bird songs. We will see systems develop to the point where a pupil can record their own sounds or cut and paste sounds from some reference work and include these sounds in the pupils' own document.

Graphics

Colour graphics are already pervasive in Primary computing. Future developments are in two forms. The first development is 'near picture quality graphics' as exemplified by the 'enhanced VGA' on RM PC 286 systems. This provides the combination of full professional resolution of 640 × 480 as required for normal text and graphics together with enough colour flexibility (256 colours out of a palette of 250,000 colours) to show a near photographic quality picture. This will enable applications to use colour pictures wherever appropriate. (Note that standard VGA misses the goal – it only allows you the full resolution with 16 colours or 256 colours at the much more limited 320 × 200 resolution.)

The second development is motion picture graphics, usually called full motion video. This will provide the ability to capture a television type picture, store it on disc and to replay moving pictures (and sound) onto some, or all, of the computer screen.

The technology which will enable this is a combination of a powerful silicon chip which compresses or decompresses the data, together with a large mass storage device such as a CD ROM drive. Most of this technology exists in one form or another today. It should become fully functional and affordable somewhere in the next five years.

The value of full motion video, when it becomes generally available/affordable has to be considered carefully. It is subjectively very impressive. Clearly it will have many applications in the area of video *per se*. It will have many applications in entertainment. It will add excitement to the whole concept of computing. In spite of this, my personal view is that for the next decade, full motion video is a facility which will only be used for accomplishing a small minority of educational and professional tasks.

Portability

Portable computers are here and in use in schools today. Portable computers provide one major and one minor benefit. The major benefit is portability; the minor benefit is smaller physical size *per se*. Objectively, portable computers have a number of drawbacks: colour is too expensive; they are intrinsically less expandable than desktop computers; for a given functionality they are more expensive than desktop computers and they are usually not connected to networks. Current portables have two major drawbacks in education: firstly, their three hour battery life will not cover a whole day's use without access to mains power. Secondly, they have poor expandability.

Many of today's latest portables have very limited memory expansion. Most portables cannot have any mass storage upgrade, most have no proper method of connecting to a network, or a CD ROM, or of adding sound etc. In the commercial market, dealers cannot afford to worry about customer's future satisfaction and many commercial customers are happy to write products off after a few years. Commercial customers for portable computers often also have one or more desktop computers. Given this, the current market pressure is for smaller size rather than greater expandability or for longer product life.

My conclusion at present is that where portability is a major requirement, then portables can and should be used in education. Equally, it is important that customers should be aware of their major drawbacks.

6. Strategies for success

Progression for the individual

Limited know-how is the largest constraining factor on the value that virtually any of us obtain from the use of computers.

Given this, it is encouraging that there *is* a technical strategy that we and our customers can follow which allows pupils to carry their primary computing experience directly to secondary school and from there to tertiary education and/or to work. For example, we at RM use what are generally accepted as the world's best spreadsheet and the world's best word-processor, that is Microsoft *Excel* and Microsoft *Word*. At the same time the identical packages are being used in Universities, Polytechnics, CFEs, Secondary schools and *in the more senior years at hundreds or perhaps thousands of primary schools*. Clearly there is and always will be, a need for a wide range of software which is specific to primary education. However, it is demonstrably possible to follow a computing platform strategy in primary schools which is compatible with the standards which are followed by approximately 90 per cent of the world's installed base of 55 million professional personal computers.

Progression for the school

Over the next ten years we might well see a five- to ten-fold increase in the number of microcomputers per primary school. The biggest technical challenge for the school will be to successfully assimilate and manage this resource. Major discontinuities which make software and know-how obsolete will become progressively more costly as the size and duration of a school's investment continues.

At RM our strategy is to provide our customers with a guaranteed progression over time. All our new systems for primary schools for the next decade will use evolutions of current Microsoft operating systems. All of these systems will use evolutions of Intel compatible processors and all will be able to run the majority of applications written specifically for our current systems.

Our approach is based on a technically and commercially sound standard adopted by an installed base of 50 million users, with a further 15 million compatible system being purchased in 1991 alone.

Support – the third leg of the stool

Microcomputers are already having a significant effect on teaching and learning. In primary schools this effect is likely to multiply several fold as the technology and experience advances and as the installed base multiplies. At the same time virtually all users of microcomputers find the products more or less bewildering and frequently frustrating and threatening. Your need is for tools that are competitive in their capabilities and price and which are easy to assimilate and manage. The support you get from your supplier is truly the third leg of the information technology stool. **Your supplier choice, in terms of the support you will then receive, will probably be the most important technology related decision you will make.** This is even more important during the time of contracting LEA support services.

At RM we have always recognised the current and future potential size of the gap between promise and reality and we border on the fanatical in terms of our efforts to improve our support. We try to minimise issues of system proliferation by designing products for education with particularly long product lives. We build these products with exceptional quality and robustness. We provide complete solutions for education with no middleman to insulate us from your problems. We have what may be the world's largest educational support team. We offer a wide and growing array of types of support, for teachers, for educational software developers and for LEA support staff. Even so we recognise that we are only at the foothills of this particular mountain and our support operation is the most rapidly growing division within RM.

In writing about exciting future developments, it is appropriate to end on a less technical note. In my 13 years experience of computing in schools, I have often been involved, with others, in trying to identify the major factors which determine why some schools are much more successful in their use of IT than others. The conclusion the data supports has always been the same: the success of a school in all areas is largely determined by the general quality and effectiveness of the Head Teacher and his or her colleagues. In wading through the fog of the last few years of debate about education in Britain, I have discovered a little publicised fact: Britain is a world leader in terms of the academic capabilities of our teachers. This gives us high hopes for the future and makes it all the more stimulating and rewarding for us to do everything we can do to facilitate your success with the country's children. My colleagues and I look forward to working with you for the next decade.

Electronic communication between small schools

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The University of Exeter Small Schools' Network is developing opportunities for teachers and children in small primary schools to use electronic communications. This article describes the first in a series of projects involving fifteen small primary schools in Cornwall, Devon, Durham and Staffordshire.

Background

The Exeter Small Schools' Network has contacts in most shire counties where there are a significant number of small schools. Fifteen schools from Cornwall, Devon, Durham and Staffordshire took part in the first 'E-mail Day'. The idea came from a group of Head Teachers of small schools in Cornwall who attended a residential course at the Goonhilly telecommunications station near the Lizard. The course provided the Cornish group of small schools with an introduction to the use of Campus 2000. The teachers wanted to use E-mail in economic and concentrated bursts and they wanted the focus to be consistent with good primary practice and the National Curriculum. The opportunity to link with schools outside Cornwall was also welcomed. The Exeter Small Schools' Network took on the organization of the project and set up the first small schools E-mail Day.

Electronic Mail. What is it?

Electronic mail, or E-mail as it is often known, is a form of information technology which enables communication between computers via a standard telephone line with the addition of a modem. The information communicated is best prepared on a word processor and stored on a computer disc before being transmitted. TTNS (The Times Network System) has now become Campus 2000 and is used by many schools not only in the United Kingdom but around the world. It is this system which enables the communication link to be made between schools and other users. For more information on these technical aspects see Keep (1988) and Wagstaff (1988).

E-mail Days

Schools were sent a pack which included information on the focus of the project, the E-mail procedures to be adopted, suggested ways of developing the project, connections with the National Curriculum and a list of likely participants. The focus of the first 'day' was 'playground games'. Briefly the plan was to tell the children that they would do some work on games played in the playground on a particular day. The information generated would be circulated to all participating schools. The participating schools registered for the project by transmitting their intention by E-mail. The Exeter Network received and co-ordinated the messages.

On May 1st 1990 children in the E-mail schools played their games and recorded them. The recording was in two forms: subjective accounts and information as part of a more systematic games survey. As part of the survey the children recorded the name of the games plus any known local versions; the ages of the players; and any equipment that was used e.g. bats, balls etc. On the morning of E-mail day each school sent a brief message naming the games played. From Stokeinteignhead in Devon came the message:

> 'we have played games
> (see below, more info tomorrow).
> Spot – a football game
> Ghost busters – a pretend game
> Handstands
> Rainbow Towers
> Count Duckula
> Non-stop rounders.'

On 1st and 2nd May the children analysed their own school's data and prepared it using word processors so that it was ready and convenient to transmit from disc. With the information on disc the children were all set to use Campus 2000 to communicate their local data. Again the data was sent to Exeter to be forwarded to all participants. Some schools had problems in transmitting from their carefully prepared discs and had to resort to typing in the data while the computer was 'on line', that is while the price of a local telephone call was being charged.

David Vipond and his children at Lerryn, Cornwall, went to their electronic mailbox first thing on 3rd May and found a mass of information waiting for them.

> 'Most of the work in the school is topic-based, so a topic was designed around the theme of children's games. Discussion took place in the classroom about the games that were played during playtimes. From the children came the idea to do an in-school survey of the games played. This information was turned into graph work showing the order of popularity of games. Many of the games played by the children were new to me, so the children undertook the task of making illustrated rule books to show how the games were played. The children read one another's rule books and they were asked to look for common features in the games. Working in groups the children then sorted the games into categories named by themselves. Class discussion then took place about the various categories. Some category headings were common, but others, although containing the same kind of game, were different. These headings were pretending, tig, football, rounders, ball games, skipping, jumping, hiding and, for games that fitted into none of those categories, other.
>
> On the day of the survey, two children made a record of all the games that were played. This information was typed into file and sent to Exeter using E-mail. The information sent to our mail box that had come from other schools via Exeter was downloaded onto a disc. The children printed out the information received and cut out the information provided by individual schools. Much interest was shown in the names of these schools and the children spent a lot of time finding them in road atlases. A large map of Great Britain was drawn and displayed on the wall. Using mapping pins the children pinpointed the position of the schools. From the pins showing the places pieces of cotton were led to sections on the display board and there the children pinned up the games that had been played in those schools.
>
> Further work followed using the computer data handling package *Key*. The results from the survey were entered into the computer which has allowed the children to interrogate the data further and allowed them to use the computer to create bar charts and pie graphs to display the data.'

Good primary practice and the National Curriculum

The mini project on games was an integrated learning experience for the children. The children's learning started with observations of their own playground games. As far as the National Curriculum is concerned there were a number of subject-related tasks. For Information Technology there was the opportunity to use a word processor, to present and amend a text. The children were given the opportunity to put information in a new format and send to a 'remote receiver'. They worked together to collate and present information which they had received from other schools. The information generated by the survey provided each school with the opportunity to collect, record and process data. Some schools used a data-base to handle the information. Playground games, like many projects, gave opportunities for children to use a number of language skills such as 'revise and redraft in discussion with the teacher, other adults or other children'. The children communicated orally, in writing, by word processing, and by using databases and transmitted their message to real audiences across the country.

The description of Lerryn children's enthusiasm to locate the other schools in the atlas was not unique; indeed this school was able to point out the messages and map on the wall in response to an inspector's question on the aspects of isolation of the rural school. Electronic communication brings geography alive, through the feeling of a 'global village'. The adults also developed an interest in the research, which showed that regional differences had declined with the influence of TV. The classification suggested Opie's book on playground games published in 1969 had to be completely revised as you can see in the message shown which includes *Count Duckula, Ghostbusters* and *Rainbow Towers*.

The potential of electronic communications for small schools

More E-mail days are planned. Exeter Small Schools' Network plan to take foci which will assist in the more difficult areas of the National Curriculum. There are many other potential applications for these small schools. Children can continue the contacts made, exchanging messages of friendship and information on their current project work.

Work of this nature has been monitored by the National Council of Educational Technology Communications project co-ordinated by Ros Keep, for example schools which share the same river compared nature study along its banks (Keep, 1989). Primary children may also develop links with their secondary school and children abroad.

There is potential for teachers to benefit professionally too. Curriculum planning and assessment may be supported when teachers communicate via electronic mail. This has happened at the other end of education:– prevocational education. In that case the start was by collaboration of Regional Curriculum Bases (see Davis, 1988). For teachers the additional facility of computer conferencing may be worthwhile. Computer conferencing is more structured than electronic mail. Items which raise issues may be accessed by all participants. Participants' responses are added to them to make up the general feel of a conference. In this way, teachers in small schools could develop a responsive network of support for each other across the UK. They could share information on resource material and discuss issues and solutions at the time they arise throughout the UK.

Conclusion

The teachers involved in the Exeter Small Schools' Network E-mail day on playground games were delighted with the event. A group continued on the topic and communicated together as they progressed. E-mail successfully supported these teachers and enriched their curriculum and we will continue to co-ordinate the work from Exeter. If you are interested in joining please contact David Keast at Exeter University School of Education.

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"'*MICRO-SCOPE* – the letters stand for – MICROcomputer Software CO-operation for Primary Education'.

MICRO-SCOPE 1, page 1, John Lane

'In the Primary school it [the Micro] must be sensibly seen as a STAFF resource, not an expensive toy for the enthusiast. (Careful – it is addictive!)'

MICRO-SCOPE 1, page 3, John Lane

[From an article advising on hardware purchasing.]
'. . . discs themselves are about £3.00 each . . .'.
[Taking into account inflation these discs would now cost in the order of £5.65 each, whereas at today's prices they are around 80p.]

MICRO-SCOPE 1, page 17, Roger Keeling

'Latest news, the BBC has ordered a new design from Acorn, may be significant.'

MICRO-SCOPE 2, page 2, John Lane

'Microcomputers are tremendously adaptable, but it takes imagination to put them to good use. Imagination plus a thorough knowledge of the jobs they are required to do is the province of the serving teacher'.

MICRO-SCOPE 2, page 5, M.E. Fowler, Short Heath School, Erdington"

All in a lifetime – (past → present → future)

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1981 saw the announcement of the Government's scheme to put one microcomputer into each primary school. When this scheme (set up by the Department of Trade and Industry) ended in 1984, almost 32,000 primary schools in England, Wales, Scotland and Northern Ireland had micros.

Shortly after this decisive move by educational string-pullers, we saw the first range of official educational software. Up to this point entrepreneurial activities by the likes of Don Walton at Huntington's Houghton Primary school for the splendid Commodore PETs (remember them?), and Research Machines 380Zs, had shown the potential for computer-assisted learning with software written by the teachers themselves.

In 1983 the Microelectronics Education Programme (MEP) released four *MicroPrimer* packs containing an amazing 30 programs (some still in use in schools today). In 1985 we were exposed to the superbly talented Anita Straker (et al.) who produced 'Primary Maths' and 'Micros and Language Development: The role of the micro'. Soon specific software packs backed her educational vision with 'Infant and First School: The role of the micro'. (Remember *Ourselves* and *OurGraphs*?) Other software soon arrived; in language the soon ubiquitous *Developing Tray* cloze procedure program arrived; in Maths the genius of Seymour Papert began to become practicable reality, transferring from bookshelves in the form of *Mind Storms* (1981), to implemented Logo languages from two Cambridge companies in the form of Acorn and Logotron (now Longman Logotron).

As software became more curriculum-specific, so it became more child-specific, with the development of special needs software. With the interfacing possibilities of the BBCB and Master 128, with their user ports, analogue to digital converters, RS 432 ports and their 1MHz bus, applications flourished. By 1985 Star Microterminals and their aptly-named 'Concept Keyboard' with its interactive picture and symbols overlay, was becoming an increasingly popular add-on. This heralded the way for further switching devices: joysticks, AMX mice, Grafpads, Cumana Touch Pads, Marconi Tracker balls, CTS Resolution Graphics Tablets and the Microvitec Touchtech 501s. Such visionaries as Dr J.B. Cole even developed head switching devices, whilst firms such as Queenswood Scientific and Quest Educational Designs marketed increasingly ingenious switches.

Today we are in the remarkable situation of having the most sophisticated and developed educational software in the world. Whereas in many countries drill and practice programs became the norm, in Britain programs such as *Granny's Garden, Flowers of Crystal, Page Maker* etc. have led to the current proliferation of intuitively useful productivity tools (see programs such as *Edit, Draw, Pipedream, Artisan, Folio* or *PenDown* as examples). This has all been exciting, but what of the future?

To maintain our mood of celebration we shall put the politics of funding aside. I would envisage the development of three main areas in our primary schools. First, the well-documented Compact Disc. This will not be of the 'read only' variety, but 'read and write'. Compact Disc Interactive (CDI) with its combination of quality audio with video, graphics, text and data, all interleave together on a single disc to offer information retrieval under user control. The potential goes far beyond the now rather outdated Domesday operating style (discounting the excellent 'content' of this project). Primary schools will be able to conceive, design and develop, produce and integrate, test and distribute their own projects, creating personalised interactive environments by pupils and teachers, for pupils and teachers, all within the environment of the school itself, both in terms of equipment and content. Already a read-only version has been approved by Acorn for the A3000, developed by Next Technology.

The second area is that of satellite images. Space images significantly extend the scale and nature of the synoptic and temporal information available about the Earth's environments. There are numerous links to other areas of the curriculum: Geography (geology, cartography, hazards, water, forestry, urbanism); Science (communications, signals, planetary geography); History (history of space flight, history of communications); English (log books of space missions, oral work, newspaper articles, audio cassette recordings); Art and Craft (paintings, models of satellites, photographic studies). Satellite receivers are available from Spacetech for the Acorn and Research Machine computers, and Dartcom for Apple machines.

The third area of importance for the future is the much under-exploited use of communications. This presents the greatest all-round benefit from technology in terms of teacher and pupil. What is envisaged is a complete nationwide online service whereby teachers and pupils can communicate with other schools, pupils and teachers, simply by using any personal computer as a terminal. In the staff room of a primary school such a service would be invaluable; schools could share resources putting in requests to all local schools for equipment, organising sports fixtures, arranging INSET days, receiving National Curriculum updates, job adverts, information of software and best buys. Central government could use the system for the fast dispersal of new documents, recommendations, and any other paper-consuming item. Unions could use it to keep their members informed. Teachers could use a conferencing facility – a scrolling screen set up for any teacher to voice his/her opinions, experiences, worksheets on a set subject/problem, exploiting the teaching profession's inherent talent at self-directed learning. Pupils could use such a facility to communicate with other pupils in different countries/areas, share projects, relate experiences; for both the staff room and classroom the potential for such a concept is huge [cf. Niki Davis and David Keast's article]. The communications hardware/software is already widely available, and some early attempts have been made, but it needs the initiative and funding to set up the online service on a large scale with comprehensive coverage in a local area – anyone join me?

Thus it is hoped that primary computing will flourish with new ideas, and children's education will become richer and more appropriate for a modern world. However, I feel the most potent hint of what the future will hold lies in the history of primary computing – namely the time that all I have described has taken to develop; that of a lifetime, my lifetime . . .

[Andrew Read is a student teacher, aged 21.]

What turns you on to IT?

Don Walton

Each year another several thousand words are written about Information Technology in education. IT has, in ten years, moved from a fringe activity to a place in the National Curriculum which may be regarded as a measure of its acceptance in education. We are told that IT is a 'cross curricular tool' and that there are five areas of strands or themes that we should concentrate on; somewhere someone is channelling our efforts into 'worthwhile educational endeavour'. But if you are a fan of IT in the classroom what really turned you on to IT? What was it that made you give up those hours, loading tapes, copying discs, struggling with intractable software or even writing your own software for the children?

Over ten years ago, before the advent of the personal computer, one could use horrendously complex teleprinters to communicate with large mainframe computers which existed in some far-off location. The Open University made available, to students of their technology foundation course, two simulations to investigate using these terminals. One was *Moon Lander*, a classic simulation on early computers which was a little program which allowed the user to control the descent of the lunar lander by typing in a number which controlled the thrust of the lander rocket motor. The second involved driving a car round a corner at its optimum speed bearing in mind road conditions and tyre width etc. These two pieces of software excited me. I would never be able to fly a moon lander or crash a car just to prove my solutions to these problems correct, but the information on the paper printout enabled me to take a full part in both simulations. The computer output was not real time, 3-dimensional graphics – it was numbers printed by a fading ribbon – but the excitement of the situation was just as real. I felt that in a similar way this excitement could be transmitted to children.

Very soon the first personal computers arrived in school with no software and so I became involved in writing my own. I found this very exciting too and some of the children who were in my school at that time learned along with me. It was a very interesting learning experience and one where I was made acutely aware of the tremendous capacity for learning and problem solving that is the gift of all children and which combined with their enormous curiosity is a powerful driving force in their development.

I still believe these motivational forces to be true, and fear that in some ways they are being lost in education. Curiosity is not confined by curricula and is not moved on when the correct standard is reached; it has its own path and its own momentum however eccentric these may be. I think that IT provides a rich play ground for the development of children. I use the word 'play' because it seems to me that children and adults who are fascinated by what technology has to offer are often playing, experimenting in a creative 'what if' environment using a highly flexible medium.

Education is now emphasising IT as a tool, a powerful tool, for doing tasks we have largely been doing for many tens or hundreds of years, more quickly and more efficiently. But at home many children see the computer in a different light as they tangle with the latest game with stupendous graphics and the real excitement of exploring problems which when solved open up more fascinating problems. Perhaps education is missing out on this powerful motivating force.

Another area where IT does not appear to be making any impact is in ways of thinking. Edward de Bono set out to show us how to nibble at the boundaries of thought processes. It seems to me that the computer could provide situations which could have the same effect and provide the motivation for flexible and lateral thought. There are, stored away in journals of psychology, hundreds of tiny insights into the way children think, or do not think, which would provide material to build on in these exciting thinking games. IT is no longer in the world of the BBCB or the RML 480Z – there are so many new options open to us to stretch thinking to its limits and that is without CD ROM and interactive video.

There is one area which is continually pushing forward and that is the use of IT as a creative medium. This becomes easier by leaps and bounds with each increase in computer power and memory. Unfortunately the national curriculum does not seem to allow for this, and in any case the shortage of hardware probably means that a tick on the AT 1 L3 box (whatever that is) may be the limit of a child's achievement.

So what turns you on to IT? Is it still exciting you and your children?

Letters

A tale from ten years ago

In January 1981 we decided that educational computer software was going to be the thing of the future and that we ought to get involved in it somewhere along the line. A meeting of minds was duly convened in the local pub and a few jars of ale later Cambridgeshire Software House was born. Within six months we had produced four packages that ran on a Commodore Pet and an Apple II. One of these packages, *Expedition to Saqqara*, is still talked about to this day but at the time we seemed to have reinvented the wheel and on the same day! Oh for those halcyon days!

Unbeknown to me, one of our authors, Barry Holmes, had been elected to be the Secretary of a fairly new organization called Micros and Primary Education (MAPE). Barry called into our office one day and said that the Chairman (a Head by the name of Ron Jones) wanted to come and see me for a discussion on various aspects of MAPE's work. At the subsequent meeting I soon discovered that MAPE was almost penniless and what the pair of them were really after was £50 to buy some postage stamps so that they could send out a mail shot! How could we refuse? As I recall it the mail shot was to every LEA advising them of MAPE's existence and was inviting new members to attend a Conference in Exeter the following Easter!

So as we both approach our respective 10th Birthdays I am really pleased to be able to say that we are still here and so is MAPE, although I sometimes do wonder what would have happened if I hadn't had that fifty quid! Answers please on the back of a postcard to the Editor.

Happy Birthday, MAPE.

Brian Richardson
Cambridgeshire Software House

[A MAPE badge to the first person to write to the Editor and tell her what Brian would need to give today to equal his £50 donation in 1981.]

And from MAPE, **Happy Tenth Birthday** *to Cambridgeshire Software House.*

Desert island discs

Anne Farr
Newman College

It doesn't seem ten years since I first saw, touched and shuddered at the first BBC micro my school received through the DTI scheme (thanks to the foresight of Kenneth Baker!). But as I was doing my usual Sunday morning chores, listening to Sue Lawley, I started to think about the last ten years and my very own 'desert island discs'.

The first few months of using *Cat and Mouse* didn't really inspire or convince me that this machine was going to make a great impact on my class of five- and six-year-olds. If it hadn't been for a friendly teaching parent, involved with computers, I might have taken much longer to accept that this 'new technology' had something quite different to offer. Mick arrived one morning clutching *Granny's Garden*. My class and I spent nearly a term using it as a stimulus for a theme and it certainly changed my teaching style and made the classroom a 'good place to be'. It's many years since I used *Granny's Garden* but it was a catalyst that eventually changed the pattern of my career so it must be the first of my selection – and I'd quite like the time to use it again!

It was around this time that I became acquainted with MAPE. On Saturday mornings a friend and I would drive to Newman College to soak up information like sponges, meet similar people from all over the West Midlands, and generally get a shot of enthusiasm to carry us through the next few weeks until the next MAPE session.

Program two has to be *Front Page Extra*. It was like nothing I had seen or used before, and I used it for news, birthday cards, worksheets and anything else I could. The birth of our class guinea pigs was excitedly announced to the school by *Front Page Extra* telegrams despatched to other classes in **multiple** copies created by the children with me acting as scribe.

I had been bitten by the bug! After trying to convince an inspector that computers weren't a 'seven-day wonder', and that I really did want a year's secondment to do a diploma in computer education, and with the support of my head-teacher, I started at Newman College. Having given in a handwritten essay on the first morning, we were informed by a serious-faced Roger Keeling that all future work had to be word-processed! We were shown the delights and pitfalls of *Wordwise*. I struggled with the embedded codes and got underlining everywhere except where it was required, and the paging was horrific, so thank goodness for *Interword* which I've used for many years since those early word-processing days. However, choice number three has to be *Stylus* for its ease of use and different facilities. As an IT advisory teacher I discovered that *Stylus* has encouraged, stimulated and introduced many teachers and children to word processing. The look on children's faces as their work is printed out is as exciting as a child beginning to read. Teachers on in-service experienced the same feelings too!

Make Your Own Adventure is number four. Suitable for any theme, marvellous for language work and fun with any age-group including staff parties.

A Logo chip has to be included as my fifth choice. On a desert island I could design shell patterns and do all those things like list processing that I never get round to!

OurFacts and *Grass* compete for number six. I have found *OurFacts* a great start for work on databases with younger children, but would probably prefer the wider facilities for making my own files, recording the weather, flora and fauna on the island. *Grass Roots*, soon to be released by Newman Software, will probably take over as more appropriate for use with younger children.

With spare time an art package would be a must. *Artisan 2* would give me plenty of scope to improve my artistic talents! A colour printer could be part of my system.

Number eight is a music package. *Compose* has proved to be very popular, especially with younger children, and is still going strong. The latest package from Andy Pierson has to be included as *Compose* has enabled the non-music-specialist to try doing music without having to play the piano.

The choice is getting harder. I ought to have a spreadsheet – *Excel* or *Grasshopper*, *L* the adventure game I've never completed and what about some Control software. My design and technological capabilities would certainly be tested on the island. Identifying needs (attainment target 1) wouldn't be difficult – whether it was designing and making artefacts, systems or environments, each of which might be essential for my survival. *Numerator* would provide me with hours of work. A few sessions recently whetted my appetite and I'd appreciate something stimulating and new to work on. However, a desk-top publishing package would enable me to write all about my experiences and DTP them ready for the day I was rescued. *Pagemaker* would be Number nine.

My last choice has to be an all-time favourite. As an early years teacher I found the software for younger children was so limited in the early days that the arrival of *Lost Owls* made a big difference. Being involved in the trialling of this I made many friends, both adults and children. My last few months as a classroom teacher were spent using this as a starting point and owls have played a major part in my life since. There might be some children on this magical island who haven't seen it.

If I had to choose a book it would be *Children Using Computers* by Anita Straker, so readable yet packed with help and ideas.

A luxury object, (I am anticipating that a computer system, i.e. computer, double disc drive, printer and concept keyboard would be already on the island!), would be a huge quantity of blank overlays of every size, so that I could spend some time making all those overlays that I always say I'll do which never seem to get past the idea stage.

These programs span my experiences with the computer over the last ten years. I'm so glad that Mick Trott introduced me to *Granny's Garden* all those years ago. Teaching and learning have been more exciting since that time. Teaching strategies have changed, the National Curriculum has arrived, and technology continues to develop. How I would like to be a child again, learning and discovering alongside the teacher in this technological world.

Lead me to this desert island!

Young children in control

Ann M. Hammersley
Alderman's Green Primary School, Coventry

The idea of using a programmable toy as an aid to childrens' learning appealed to me right from the start because it is not only something children can relate to but it also gives them the opportunity of using first hand experience to discover the capabilities of a very powerful piece of technology. Having discovered for myself the benefits of using Logo to aid the understanding of mathematical concepts and read a little research material on using Logo with young children, I wanted to see for myself how a Logo environment could enhance the learning of children in my own classroom situation. The development of language and cooperative skills were areas that I felt needed highlighting and what better resource to stimulate the childrens' imagination than a turtle!

Many of our children find it difficult to share or cooperate in a learning situation and are very possessive with regard to their own belongings and friends. They have very little self discipline and not a great deal of self esteem. The boys in particular tend to be aggressive towards each other and show so little respect for girls that they are often overlooked in some learning situations because of the dominance exerted by the boys.

I wanted to introduce a project which could help to solve some of these problems and I thought a Logo environment might give these children the opportunity to learn to cooperate with one another and think through problems together. By talking through their ideas they would not only arrive at conclusions and be able to justify them but also understand some of the more difficult mathematical concepts and at the same time develop their use of language. I felt Logo would also be a good starting point for developing language, instilling self-discipline, and to a large extent, a confidence booster for the children I work with.

Many children in my school will choose to work with a partner of the same sex as themselves and if the pairs are mixed the boys often object to working with a girl. If a project is tackled by a mixed pair or group it is usually heavily dominated by the boys, or individual ideas arise showing little cooperation. Ainley and Goldstein (1988) found that, 'Girls were more comfortable with cooperative working than boys. Girls formed more stable partnerships, while the boys tended to change partners more often and were often keen to work on their own.' I was interested in investigating whether or not this would still be the situation with very young children.

To be able to look at my concerns in a positive way I chose to group the children in boy–boy, girl–girl and boy–girl pairs, taking into consideration friendships and high, average, low and mixed mathematical abilities. I introduced twelve pairs of children to 'Bright Eyes' (the turtle) and then guided, questioned and observed them in their Logo environments. Overall the girls had better negotiating skills but had difficulty keeping to the task whereas the boys kept to the task on an individual basis but had to learn to share their findings with their partners.

'How I move' was our introduction to Logo. Children were given directions to move at different speeds, backwards and forwards, over, under, through and around apparatus. A number was added to the commands for backwards and forwards so that the children were made aware of the distance travelled. They worked with a partner, one being a turtle and the other a computer which controlled the turtle's movements. One pair suggested a sideways movement which led to the introduction of left and right. Out of my class of 28 only six children could distinguish left and right so they wore labels on the backs of their hands with the words written on them in different colours. The word 'turn' was introduced to follow left or right and the turtles automatically turned through 90 degrees when the command 'left turn' or 'right turn' was stated! I don't know why the children turned an exact right angle unless it was because we had been following the markings of a netball court the previous week.

The theme of 'Ourselves' was well under way by the time the turtle joined us. The children had painted portraits of themselves, made pictures of themselves using gummed paper shapes, talked about themselves, their school and their homes. We discussed our journeys from home to school and the different things we saw on our way to school. We made models of our houses, the school and the shops we passed and placed them on a large sheet of paper so that we had a plan of our journeys to school. We used toy cars and play people to show the way and then we asked Bright Eyes if he would like to see where we lived. Starting from school, pairs of children directed him along streets to their homes.

We used a concept keyboard overlay called Giles which is a file on *Turtle Concepts* produced by NCET (National Council for Educational Technology) for children with special needs. The overlay proved to be a very good starting point for our children because they were able to relate to the signs without any difficulty. Two large arrows showed the directions backwards and forwards and two large curved arrows showed the right angled turns left and right (Figure 1).

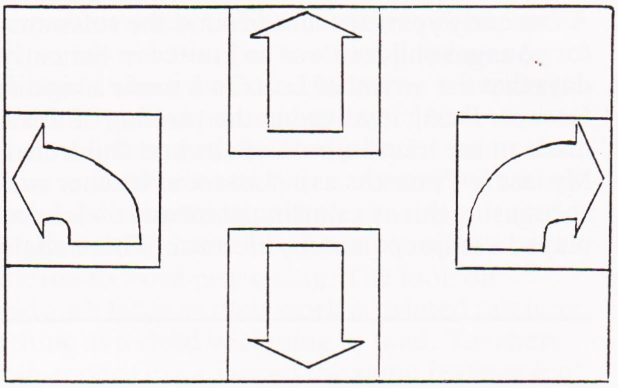


Figure 1. The simplest overlay.

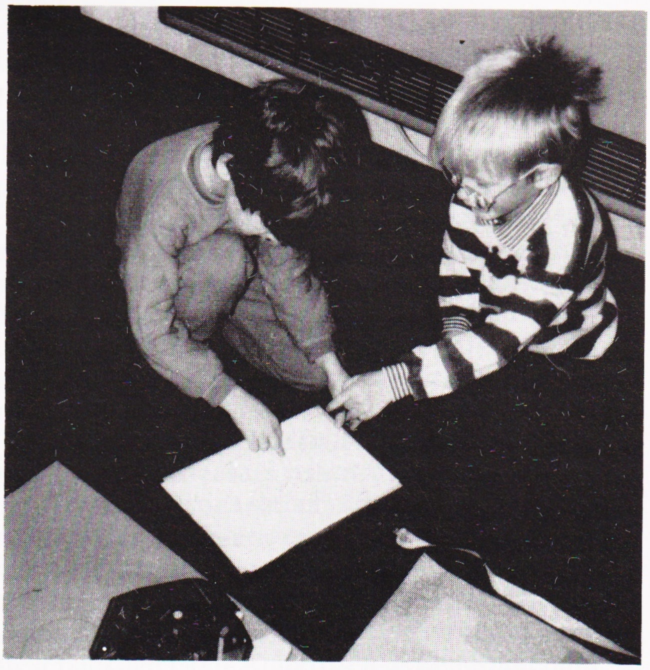


Figure 2.

Some children had problems with the turns once the turtle had left his starting point, especially if they did not turn the concept keyboard with the turtle. These children were from the groups with low mathematical ability who had problems with left and right. Other children did not have a problem with the position of the concept keyboard and left it in its original position.

The children looked at the individual shape pictures that they had made of themselves and each pair decided on which one they were going to ask the turtle to draw. I used *Concept* to create an overlay to use with *Turtle Concepts* that was suitable for the stage the children had reached. Although *Giles1* was appropriate in the initial stages its use was limited when the children wanted smaller or larger steps and turns. A new overlay, which I called *Giles2*, enabled the turtle to move forwards and backwards 100 or 200 and turn 45 or 90 degrees to the left or right. The drawing could be printed out at any time by pressing 'print' on the overlay (Figure 3).

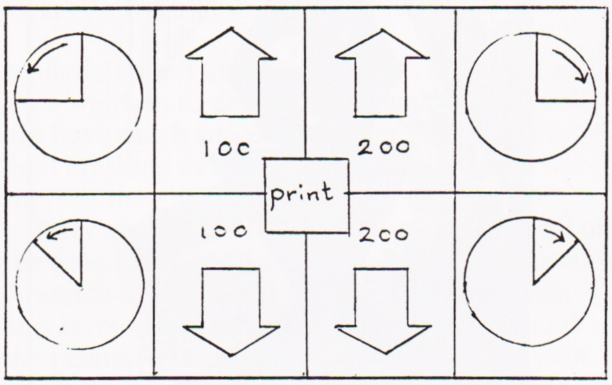


Figure 3. A more versatile overlay.

Daren and Carl began by showing Bright Eyes how to draw a square and a rectangle, but Daren was concerned that he would not be able to make a rectangle small enough for the legs and feet (Figure 4.)

I showed both of them how to use the computer keyboard for smaller distances and how to put the pen up and down.

Initially they took it in turns to have a go at directing the turtle asking me if they were 'right' to press a certain area of the keyboard. I told them to do what they thought was 'right' and then they started communicating with each other rather than me. They used each other as a 'turtle' to check out their assumptions. For example, Daren told Carl to stand by the turtle, facing the same way as the turtle and then told him to turn, by pointing his finger in that direction. If Carl turned as Daren expected he pressed the area on the concept keyboard.

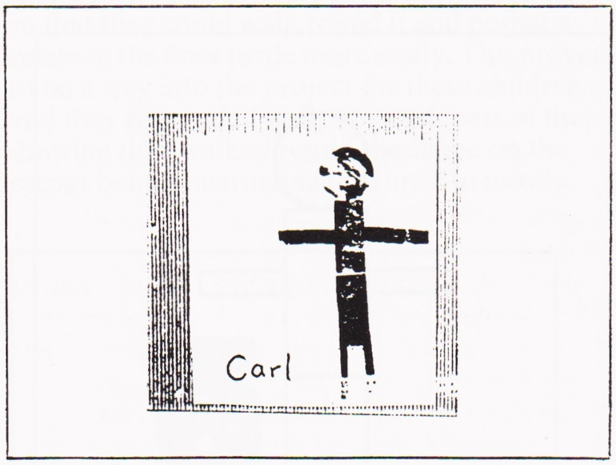


Figure 4. Carl and Daren's starting point.

Their first attempt at drawing the figure went off the top of the screen as they had not started with the screen turtle near the bottom.

They were very concerned that the drawing on the screen did not match the drawing on the floor and wanted to start again. Daren was obviously the leader, inviting Carl to have a go and telling him what to do. When it came to working out how wide the legs needed to be Daren asked Carl for advice and Carl suggested lifting the pen up so that they would not make a mistake if their guess was wrong. Carl was happy for Daren to be in control while he watched both the floor and the screen turtle. Daren only watched the screen turtle. Neither had problems with estimating distances and turns and even when it came to drawing a circle Daren knew that the turtle need to move forward and turn a little at a time lots of times because he remembered playing turtle and being given those instructions.

When the figure had been completed they were overjoyed at their success and wanted to tell everyone all about it. It had taken four 45-minute sessions to complete and they were very keen for the whole of the time and patient when the turtle was 'tired' (batteries needed recharging) or the program 'crashed'!

They wanted to design their own project and so they drew a picture of a car to show Bright Eyes. They only asked for my help on one occasion in this project and even then it was just to check out what they already knew. They needed a smaller turn which the concept keyboard overlay did not offer and so they asked if RT 35 would create a smaller turn. Although the car did not turn out to be an exact copy of their drawing they were more than satisfied with the outcome. (Figure 6).

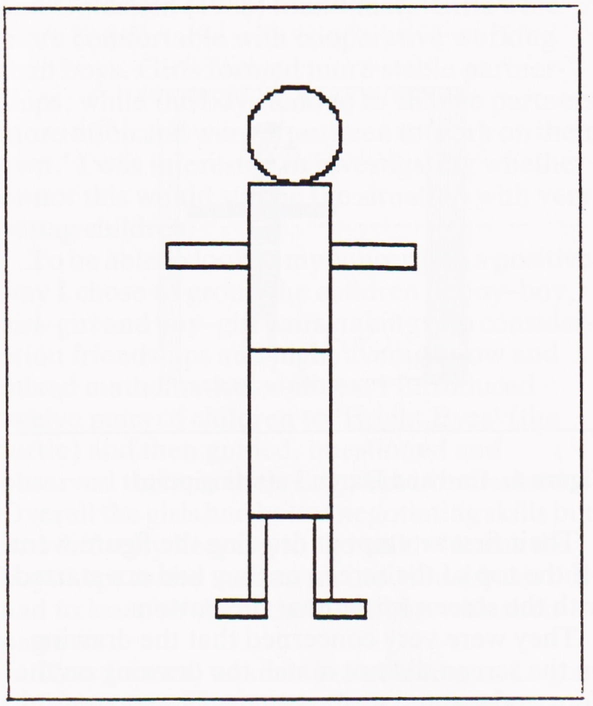


Figure 5. Carl and Daren's completed drawing.

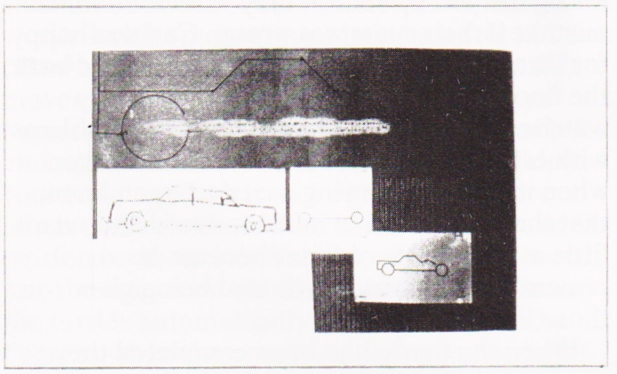


Figure 6.

Their cooperation and communication developed as they became more involved with their projects. Daren wanted to see what his own individual thoughts produced before involving Carl, and Carl was keen to observe.

Daren and Carl's next project was to try and draw a dinosaur. Once the software had been loaded they did not need any help at all. Carl got the turtle ready and Daren found a large piece of paper for the turtle to draw on. Daren gave Carl instructions as he stood by the screen. Daren observed the screen turtle and told Carl which areas to press on the concept keyboard while he used the qwerty keyboard for shorter distances and turns. The achievements of both boys were far greater than I had expected in such a short time.

Margaret and Tom were from the same high mathematical ability group as Daren and Carl but they did not interact to the same extent. They tended to work quite separately although they took it in turns to draw parts of the figure, Tom being a little less confident in his own ability to turn the turtle in the direction he wanted. He sought help from me rather than Margaret and was reluctant to make a mistake. Margaret was much more confident and quickly picked up the commands using the qwerty keyboard.

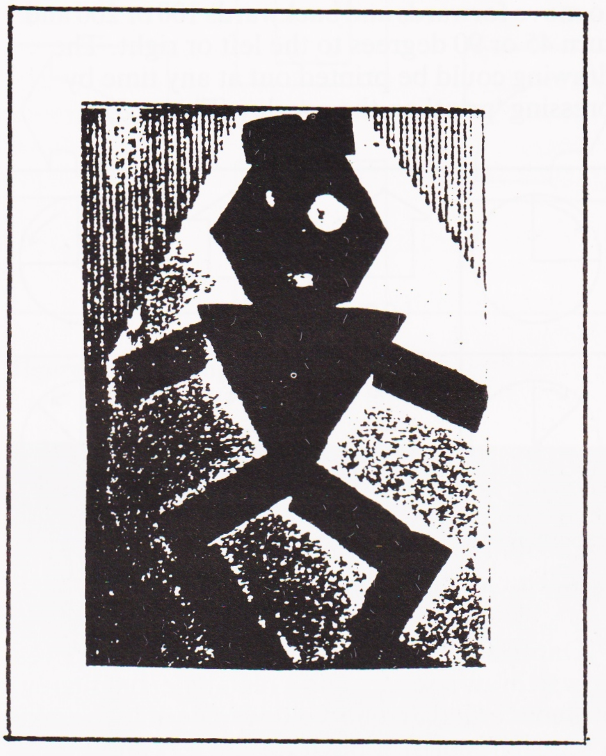


Figure 7. The starting point for Margaret and Tom.

She raced ahead with her ideas leaving Tom to look on. She tried to draw the hexagon using the 45 degree turn on the concept keyboard but then thought it must be 60 degrees because there are 6 sides! Her assumption was correct although she will find that not all shapes have the same angle as the number of sides (Figure 8).

I found that I needed to intervene more with this pair to enable them to cooperate more effectively if only because the floor turtle was 'not doing as he was told' according to Margaret. She had typed in commands but omitted spaces between FD and 100 to which the computer

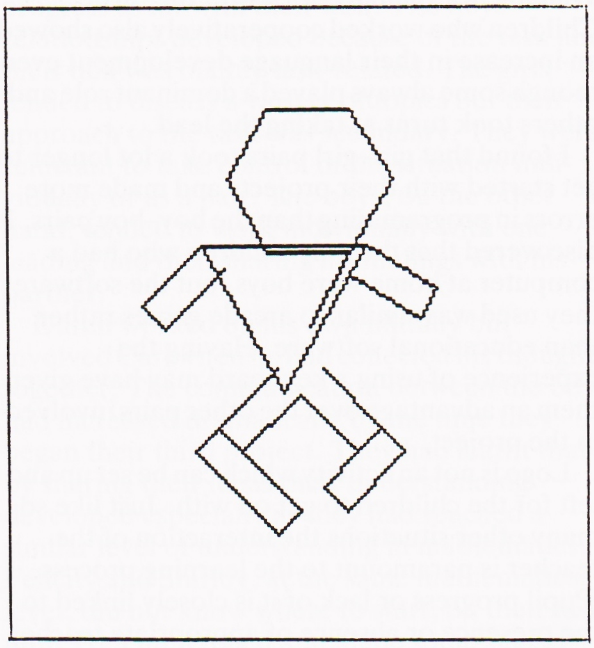


Figure 8. Their finished drawing.

replied, 'I don't know how to . . .'. Margaret and Tom went on to design their own boat but did not have much success as either the program kept crashing or I was unable to give them the support they needed.

Jerry and Amanda needed my attention all of the time to enable them to make any progress. Amanda has difficulty understanding English and Jerry is only just beginning to understand the printed word. Amanda is five and Jerry six and both have low achievements in mathematics. They did not ask each other for help and worked completely independently of each other not realising what commands they were giving the turtle.

I had to spend a lot of time working with them, encouraging them to 'play turtle' prior to each move. Eventually they were able to produce, with my help, a drawing which looked a little like the shape picture they started with (Figure 9).

The stages of development are shown very clearly in Figures 10a, 10b, and 10c. They spent more than an hour on each stage. Having drawn the square they seemed confused about the direction in which the turtle needed to go to draw the next part of the figure. They followed the floor turtle with the concept keyboard, Jerry holding the board and Amanda standing behind him. With their first attempt I did not intervene because I wanted to see how they handled it. I realised that they needed a lot of support just to get started and were very worried about failing.

I suggested we made a big outline of their shape picture on the carpet using masking tape so that they could walk round it and perhaps relate to the floor turtle more easily. This proved to be a way into the project for these children and they responded well. For each part of their drawing they walked round the shape on the carpet before instructing the turtle to move.

Figure 9. The starting point for Jerry and Amanda.

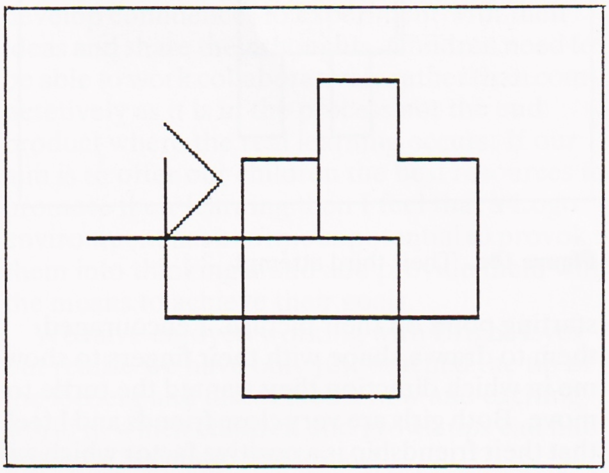


Figure 10a. Their first attempt.

Constance and Gemma are two children with low mathematical ability and are the youngest involved in the project. Their level of ability is comparable with Jerry and Amanda. They adore 'Bright Eyes' and almost believe he is 'real' or alive. They have not, as yet, shown any real understanding of how the overlay relates to the turtle. They do not understand the concepts of left and right and have difficulty locating the

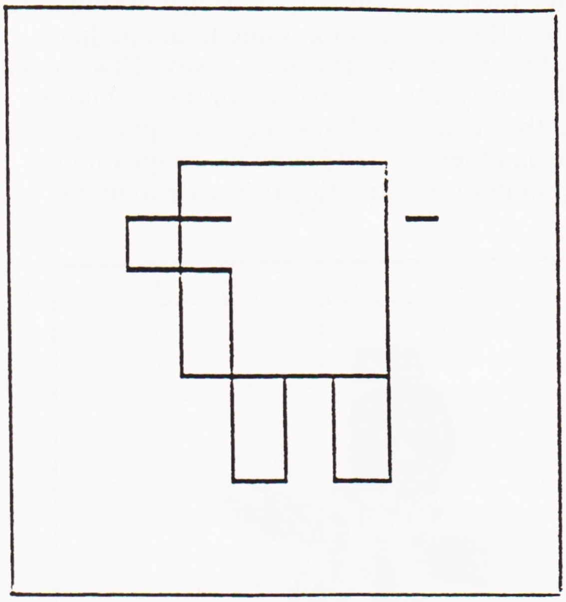


Figure 10b. Their second attempt.

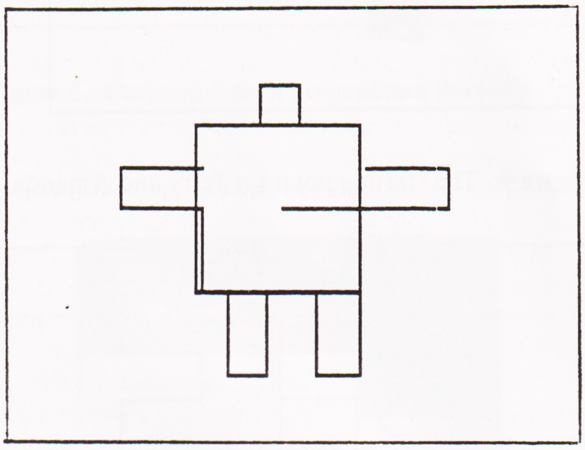


Figure 10c. Their third attempt.

starting point on their picture. I encouraged them to draw a shape with their fingers to show me in which direction they wanted the turtle to move. Both girls are very close friends and I feel that their friendship is a positive factor which will help them to develop their understanding together.

Overall the children spent four months on their projects although some worked for longer periods of time because of their interest or the rate at which they learnt new concepts.

The cooperation and language development of the pairs increased as time went on. The pairs who showed little language development or less cooperation spent less time on their projects than the others for various reasons. In some cases a partner was absent or involved in other learning situations or the time was just not available for them to work with the turtle. Children who worked cooperatively also showed an increase in their language development even though some always played a dominant role and others took turns at taking the lead.

I found that girl–girl pairs took a lot longer to get started with their projects and made more errors in programming than the boy–boy pairs. I discovered that the only children who had a computer at home were boys, but the software they used was similar to arcade games rather than educational software. Having the experience of using a keyboard may have given them an advantage over the other pairs involved in the project.

Logo is not an activity which can be set up and left for the children to get on with. Just like so many other situations the interaction of the teacher is paramount to the learning process. 'Pupil progress or lack of it is closely linked to the presence or absence of appropriate teacher intervention' Hoyles and Sutherland (1989).

Hoyles and Sutherland sum up the role of a teacher in a Logo environment: 'the teacher is the pivotal mediator of the technicalities of the language, the mathematics embedded in the computer activity, the problem solving processes and the connections between logo and paper and pencil work.' The teacher needs to be aware of the level which the child has reached in order to offer further directions or considerations. Sometimes I set up a video camera to record the children's progress, or lack of it, and then discussed their work the following day but although this was useful for me the children really needed my input during the activity.

Although the floor turtle was a great motivator in the early stages of the project, some children quickly turned their attention to the screen as their ideas developed. When I was talking to Daren about his preference for the screen he said that he felt that the drawing on the floor belonged to the turtle, and that on the screen was his own. He also felt that he could get on with his task at a faster pace by just using the screen. Constance and Gemma, on the other hand, needed the floor turtle in order to carry out their task. They did not pay any attention to the screen at any stage in their project. Whether the childrens' concentration was on the floor turtle, the screen or both, the immediate feedback from the hardware promoted 'thinking out loud'.

In my study I found good cooperation between single sex pairs. The girl–girl pairs, however, did not reach as high a level of performance as the boy–boy pairs. The girls developed good relationships with each other but did not progress as far with their task. The boys' relationships developed because of the task and their talk was mainly task-related. The girls tended to discuss a variety of topics but their approach to the task was secondary. They were reluctant to take control of the situation individually or as a pair. The boys, on the other hand, tended to work individually with one leading and then sharing his findings with his partner.

Daren worked on his own initially but involved Carl when he had collected his thoughts together. The communication between the boys had increased dramatically by the time they began their third project. They had learnt that by sharing their ideas their understanding developed especially as they had reached a similar level of understanding in mathematics. Felicity and Shirley, at the same mathematical level, did not know where to start, on their task until Tom intervened and made some suggestions. Marlene and Julie and Constance and Gemma also needed a lot of input from myself to keep them on task.

The research carried out by Hughes, Brackenridge *et al* (1988) suggests that 'the girls who worked in single sex groups were at a serious disadvantage compared both with boys and with girls who worked with boys.' My findings appear to echo this research but it is important that we ask ourselves what we are hoping the children will achieve from the task, whether it is understanding the concept of angle or an improvement in cooperative skills. This brings us back to looking at the possibility of boys being able to enhance a situation which requires task-related thinking whilst girls are more adept at encouraging cooperation.

Logo is not something which can be introduced and then forgotten or introduced to six-year-olds and not developed at a later stage. It is not just a programming language to be taught in computer studies. It is a powerful resource which can enhance the learning process of our children in many areas of the curriculum. If it is to be worthwhile a Logo project needs a long time span and a whole school policy outlining the stages of development the children would have access to as they progress through the school. There are many drawbacks regarding the resourcing of such a venture. It is costly from the point of view of securing the necessary hardware and providing the in-service training for teachers. It also take a lot of time and energy setting up and integrating into the curriculum. It should not be seen, however, as another subject to be added on but as a useful resource linking other areas of the curriculum together.

I believe that are many advantages in using Logo particularly with children who find mathematical concepts difficult to grasp. Children with special needs are able to achieve goals that would previously have been unattainable.

The concept keyboard has made the floor turtle accessible to children of nursery age and free-standing turtles such as Roamer and Pip offer a new world for younger or less able children to be able to grasp concepts which would not have been possible without the technology we have today. We can look forward to being facilitators, enabling our children to be in control of their learning with the resources we have available in the nineties.

Working in a Logo environment the children need time and space to try things out and develop confidence, to experiment with their ideas and share their thoughts. Children need to be able to work collaboratively rather than competetively as it is in the process not the end product where the real learning occurs. If our aim is to offer our children the best resources to promote their learning then I feel that a Logo environment has enormous potential to provoke them into thinking aloud and provide them with the means to achieve their goals.

We have enjoyed working with Bright Eyes but realise we have only just touched the tip of the iceberg and discovered a new and exciting world in which children and grown ups can find out what learning is all about!

MAPE Curriculum Development Fund

In the last issue of *MICRO-SCOPE* members were invited to submit projects to be funded by the 10th Anniversary Curriculum Development Fund. There was an encouraging response to this and a number of submissions was considered by members of the sub-committee at the National Council meeting in January. Five projects have been shortlisted and there will be brief details of those finally selected in *MICRO-SCOPE 34*.

Logo in control

Simon Hill
Northaw School, Salisbury

After my last article about Control Technology appeared ('On the right lines', *MICRO-SCOPE 30*), LEGO Dacta wrote to me and asked why I had written so much about the LEGO *Lines* program and so little about using *Control Logo* with LEGO Technic components and the LEGO interface. However, this term my band of young robot-builders at Windlesham have had a LEGO 9700 set to experiment with and have been using *Control Logo* for the first time.

LOGO versus *Lines*

The world of education often seems to be divided into Logophiles and Logophobes, with the Head of IT being in the latter group. However the children's lack of experience with Logo has not been as big a problem as I thought it would be. Most of *Control Logo*'s commands (such as TURNON, TURNOFF, WAIT, or END) were easily understood by the children and editing procedures we had created was a fairly straightforward business. There was some confusion when we found that pressing ESCAPE while a procedure is running means that everything stays as it is, with lights on and motors running. (This simply means that you have to create a procedure to switch everything off.) My fears that writing procedures with INPUTs would be too complicated for eleven- and twelve-year-olds proved groundless. The little lights on the interface's input channels and the clarity of the *LEGO Control Tutorial* manual certainly helped the children to understand the difference between an output and an input (see Fig. 1).

The procedure FOLLOW sets the buggy off driving along the line and keeps checking it is on the line. If not it calls a subprocedure FIND.A.LINE which sets the buggy searching until it finds the line again.

```
TO FOLLOW            drives buggy forward
TURNON [ 0 2 ]
IF NOT IN? 7 [ TURNOFF [ 0 2 ]
  WAIT 50 FIND.A.LINE 10 ]
FOLLOW
END
```

If there is no input on input 7 (ie. the line is lost) stop the buggy, wait half a second then call FIND.A.LINE.

```
TO FIND.A.LINE :SAM

TURNON [ 0 3 ] WAIT :SAM TURNOFF
  [ 0 3 ] — turn left a bit

IF IN? 7 [ STOP ] — if a line is found
  FIND.A.LINE stops and the recursive
  procedure FOLLOW continues and drives
  the buggy forward again.

TURNON [ 1 2 ] WAIT :SAM + 10
  TURNOFF [ 1 2 ] — turn right a bit more

IF IN? 7 [ STOP ] — if a line is found
  FIND.A.LINE stops and the recursive
  procedure FOLLOW continues and drives
  the buggy forward again.

FIND.A.LINE :SAM + 20 — call another
  copy of the procedure FIND.A.LINE

END
```

Figure 1.

LEGO *Dacta* and Control Technology

The standard of presentation for all the LEGO Dacta materials is excellent. In particular, the diagrams and drawings in the pamphlets that come with the 9700 set are very clear and easy to follow. They are definitely far better than the photographs of the different stages of construction that appear in Pawson's *The Robot Book* and are in general more straightforward than those in Clark's *Make and Program Your Own Robots*. The construction guides also appealed to the children because they were colourful and easy to follow, without inhibiting their own ingenuity. One hopes that these assembly diagrams are also sold separately, as this is important for a school that has accumulated a large collection of LEGO components but does not want to purchase more sets solely in order to have more assembly plans.

The 9700 set

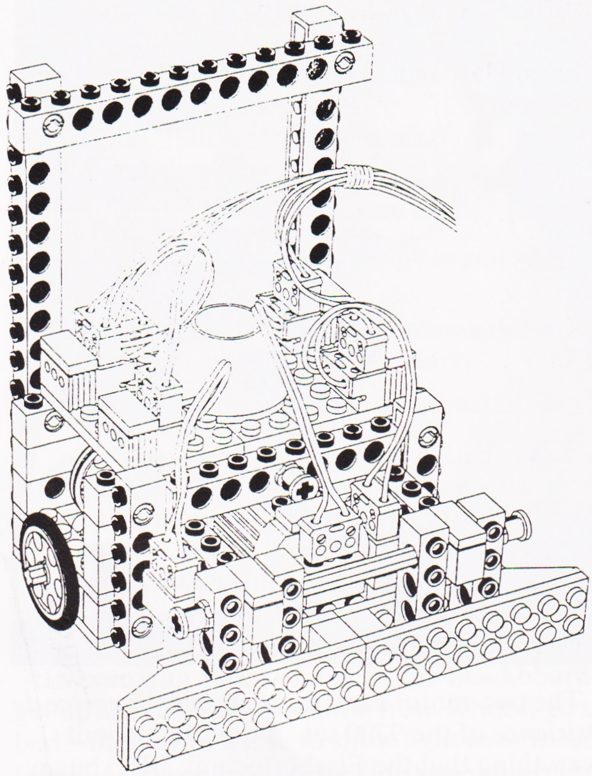
The components and construction diagrams that come with the LEGO 9700 allow you to build an interesting variety of robotic devices. In his article 'All the fun of a LEGO fair' (*Educational Computing*, November 1988), Richard Bennett describes how the LEGO roundabout became the starting point for a series of models to do with fairgrounds, including a working dodgem car,a ferris wheel and a computer-controlled ghost train! The robots we built, however, were simply those for which we had plans and this reflects the fact that robot-building at Windlesham is an extra curricular activity, not linked to the children's work in the classroom (as it probably ought to be).

The simple car that can be made with the 9700 set incorporates a touch sensor as a reversing switch. This was an instant success; my only quibble being that it is a pity that the worksheet that accompanies this model does not suggest ways of incorporating steering. Perhaps a gearbox (not included in the 9700 set, but easily available), would be needed to produce the low revs and greater torque essential for steering. Another small difficulty is that the touch sensor is not always depressed when the model hits an obstacle. This is because the car is too light, so adding some weight solved the problem.

The computer-controlled washing machine was also very popular, although it did take me a while to make clear to the children the function of the touch sensor that is depressed when the door is closed. This is, of course, rather important, otherwise you are going to have water and wet clothes all over the floor!

A Steerable Vehicle

Build the two motor buggy from LEGO Technic Card 9700 - 8.



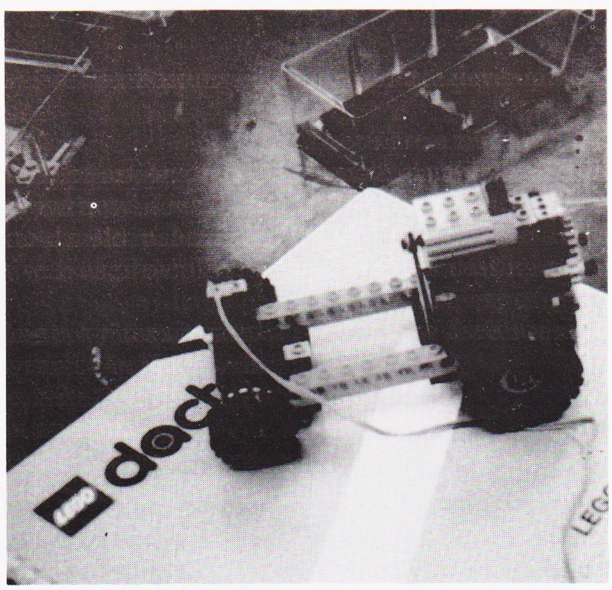
It was the two-motor buggy that made clear to me the superiority of *Control Logo* when compared with the LEGO *Lines* program. The way that LOGO enables the user to name a procedure and then to incorporate that name into another procedure makes it a uniquely powerful and flexible learning tool and one ideal for Control Technology.

The two-motor car is undoubtedly the *pièce de résistance* of the 9700 set. It does just about everything that the Fischertechnik BBC buggy does, but at a fraction of the price. There is also the advantage that it can be dismantled and the components can then be used for other robots. The thrill that the children had when their car bumped into an outstretched foot, only to steer round it and then happily continue on its way, convinced me yet again of the value of Control Technology. This was matched and even exceeded by the buggy's ability to follow a black line on white paper, using the optosensor to detect changes in the colour of the surface over which it was passing. Throngs of excited childen watched enthralled and there was excited talk about the implications for British Rail's approach to passenger safety and solutions to London's traffic jams.

Some useful references and addresses

Make and Program Your Own Robots by William Clark (Beaver Books).
'All the fun of a Lego fair' by Richard Bennett (*Educational Computing*, November 1988).
The Robot Book by Richard Pawson (Windward).
'What is Control Technology?' by Reg Eyre (*MICRO-SCOPE Logo Special*).
'To build a robot . . .' by Simon Hill (*MICRO-SCOPE 28*).
'On the right lines' by Simon Hill (*MICRO-SCOPE 30*).

Economatics (Education) Ltd., Epic House, Darnall Road, Attercliffe, Sheffield S9 5AA.
LEGO (UK) Ltd., Wrexham, Clwyd LL13 7TQ



Review – data logging with 7- and 8-year-olds

Title: **The Measuring Box**
Manufacturer: Panthera,
5 Cedar Avenue, Beeston,
Nottingham NG9 2HA.
Price: £60.00

During the last academic year, I was working for an Advanced Diploma in Computer Studies (part time) at Nottingham University. The organisation of this was very difficult as the County were 'not able' to grant me any financial assistance or supply cover, so I covered the complete cost myself and begged my long-suffering colleagues to take my class each Wednesday afternoon while I drove like the wind to be there in time for a 1.30 pm start (no lunch). I apologise for this little moan, but feel it has to be said.

One of our sessions dealt with the subject of Data logging, a relatively new idea for primary schools. Dr Richard Phillips was at the time involved in developing a Measuring Box pack and wished to know how best it could be used in schools, and what age range could cope with the actual hardware and the interpretation of the graphs from this computer-based data logging system. I was very keen to 'test' it with my class of seven- and eight-year-olds as I was the only primary school teacher on the course, and a fellow student offered to test it with his secondary classes.

The pack consists of one disc, and you need a blank disc if you wish to collect data over several days, a pressure mat which can be taped down near a doorway and which plugs directly into the measuring box, and the measuring box itself which plugs into the analogue port on the back of a BBCB or Master.

The measuring box records four different things:

Sound Level: the box has a sensitive microphone which will detect speech and other noises several metres away.

Light Level: the light detector records changes in natural and artificial lighting.

Movement: a pressure mat is triggered when people tread on it.

Air Temperature: in degrees Celsius.

The hardware and software is extremely easy to use. I was pleasantly surprised as all the ideas were new to me and I approached the exercise with some nervousness.

The Menu shows four options:

NOW, which shows the current values for sound, light, temperature and pressure mat.

GRAPH, which plots a line graph as you watch over a one minute period.

COLLECT, which records the information in a data file for anything up to four days.

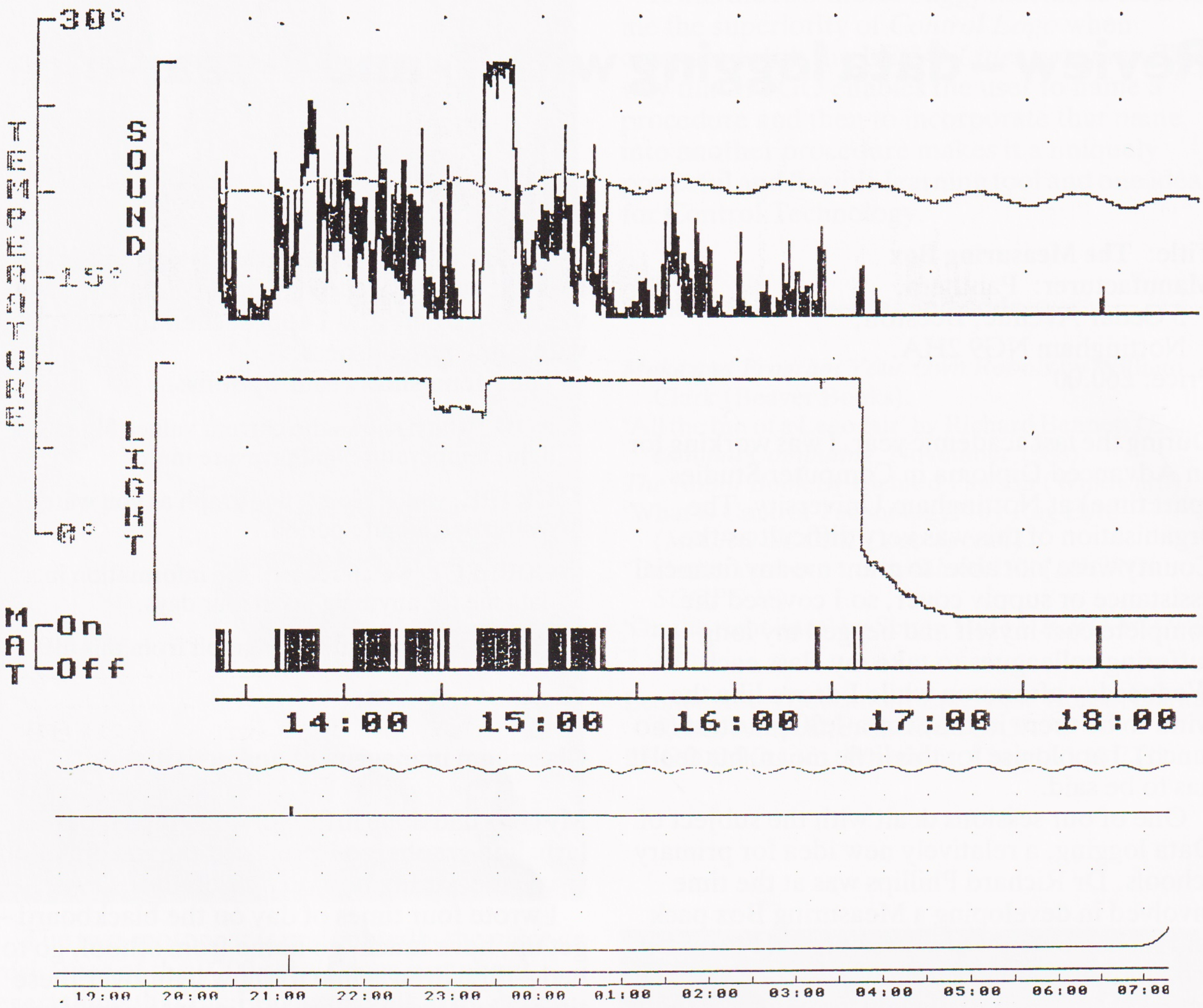
PRINT, which prints your graph from this file.

Classroom management and activities

My class had done little work on graphs, particularly line graphs, so I prepared the introduction to the measuring box very carefully.

I wrote four times of day on the blackboard – get up, have lunch, go home from school, go to bed – then drew a line to show light over these times. As it was January the line was simple and I asked the children just to think of light. They soon got used to the idea, and we talked of the words dawn and dusk. We used these same four times for noting temperature in the classroom, with the heating coming on before the children arrived at school and going off after they had left but before they went to bed. The sound aspect received the most discussion as we talked about what it was like in our room when we first came in, then when we went out to assembly, or out to lunch etc. This discussion lasted on and off for two or three days and we drew lines on paper and then asked each other what they meant – we had some very ingenious ideas! We then went on to putting the actual times onto the graphs and the three lines for sound, temperature and light onto one piece of paper along with a space for the pressure mat (see accompanying figures).

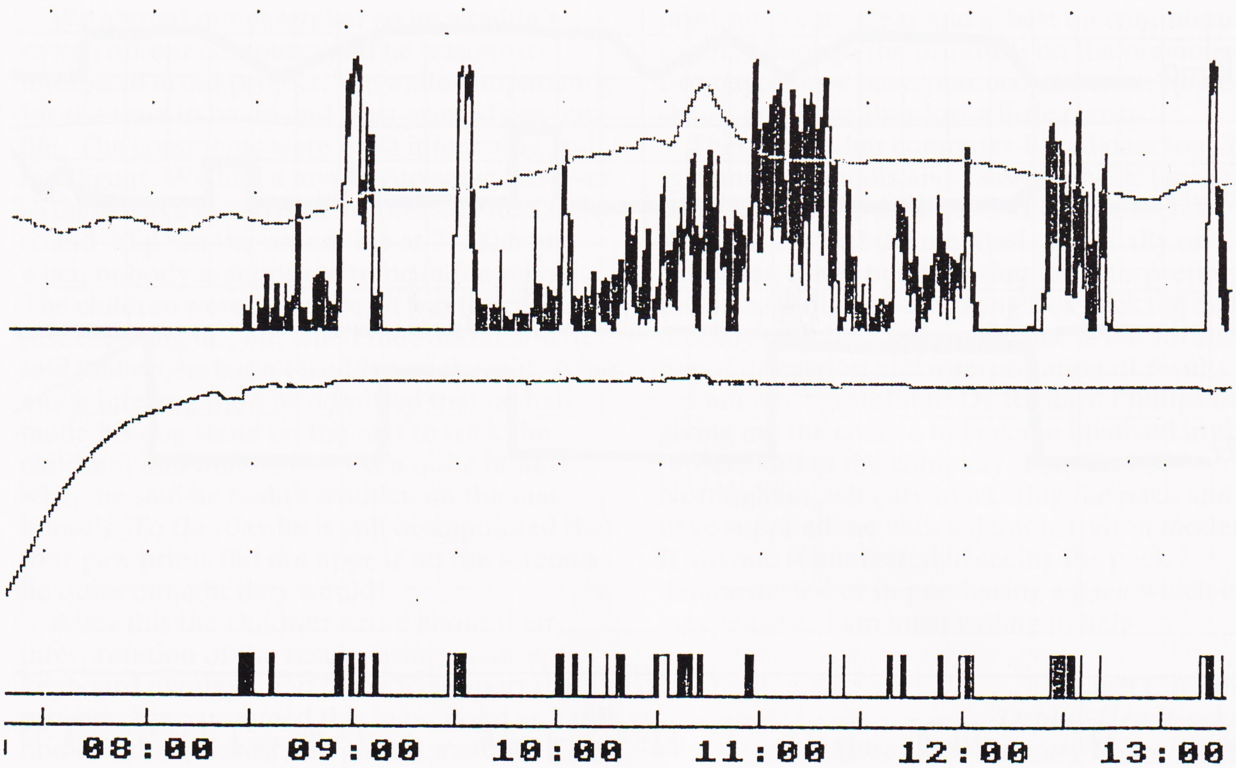
This preparation really paid off when we connected the measuring box and pressure mat to the computer the next day. We spent some time on the *Now* program, just making the indicators go up and down and the pressure mat on and off, but we soon got on to the line graphs. We had a great deal of fun screaming and then



data logging

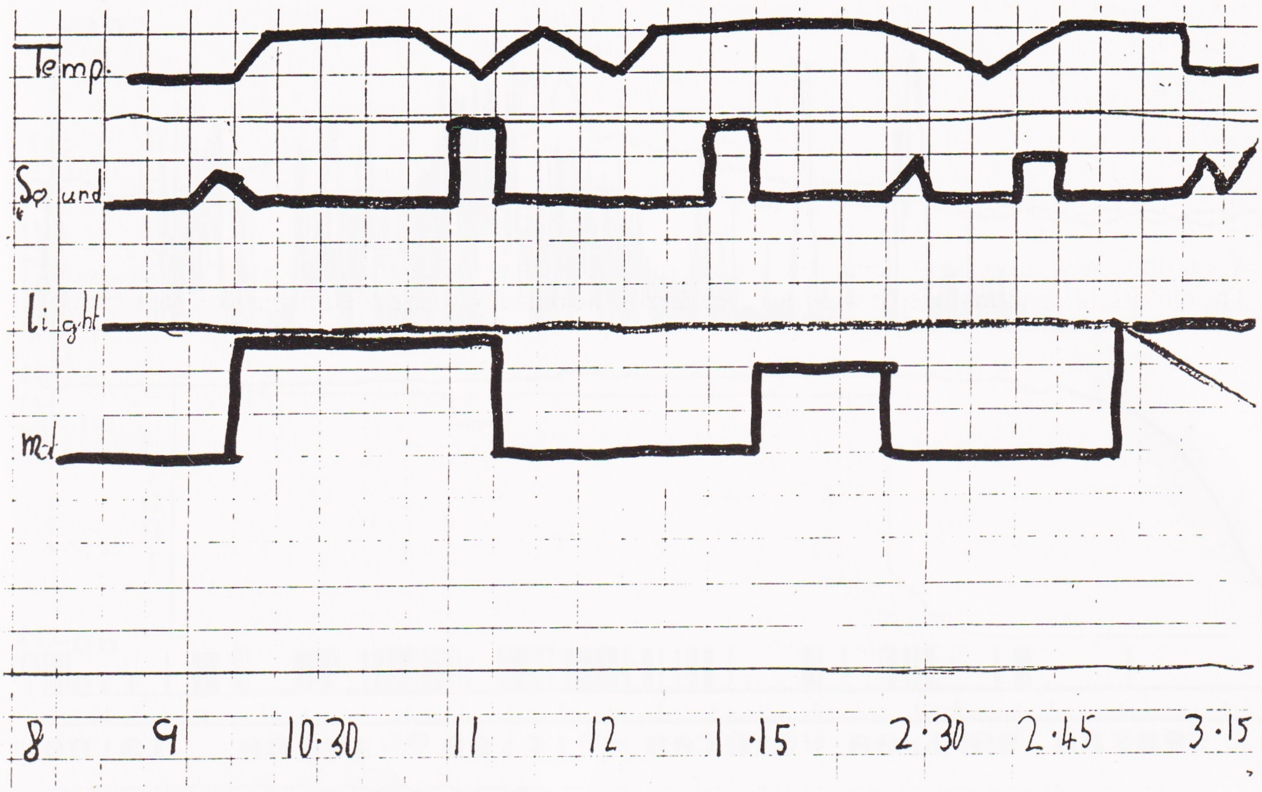
We plugged the pressure mat and the black sensor box into the back of the computer. The mat was switched on. I found it very interesting to find out some very interesting facts about how dark it would be at night time and how light it would have been in the morning. We shouted to see what happened on the sound line. Our Caretaker played a trick on everybody because our Caretaker didnot tread on our mat he got his dog to tread onto the mat. At playtime it went all quiet but when we all came in it went all noisy again. Mrs. Corcoran said to shout help so we all shouted help in our loudest voices. We all got sore throats. We collected data for 24 hours.

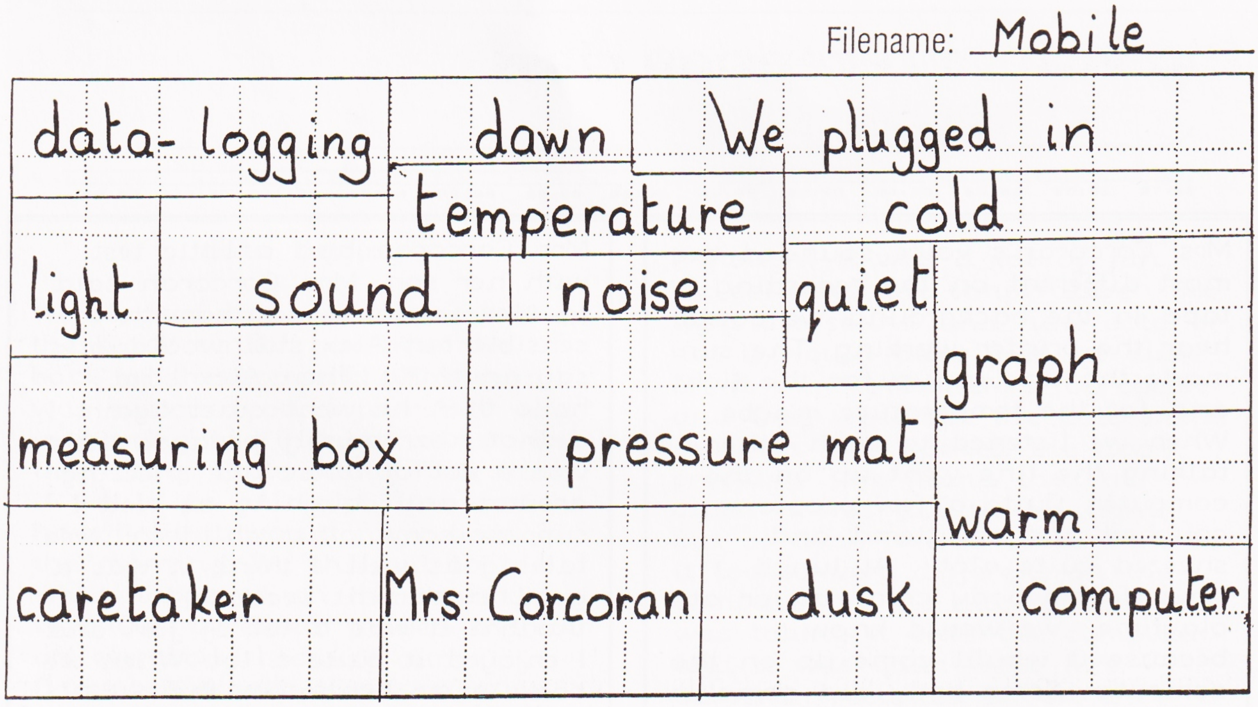
I thought it was a lot of fun. We collected the temperature the light the sound and how cold or hot it would have been at dusk or at dawn. When Mrs. Corcoran and Greg went out the cold came in when they opened the door probably. We found that at dawn it was a little bit light. But at dusk it was quite dark so it looked very different on the computer. In the day at school it was taking it onto the computer and it was quite light. Mrs. Corcoran recorded us on a recording tape. Then Mrs. Corcoran turned on the recording tape and we listened to it. Everybody could hear each other on the recording tape and we all laughed at it. We could hear the printer on it as well. On the recording tape our voices sounded quite different.



Mrs. Corcoran's voice sounded the most different on the recording tape. In the background we could hear the printer working. The sun made the line go up for the light and for the temperature maybe. When we listened to each other talking the line went up on the computer. Quite a few people coughed and spluttered and sneezed quite alot. At lunch time if somebody came in, or at playtime we would know because it would come up on the computer. Some body did come in at playtime because we could see it on the computer. When Christopher Wing switched off the lights the line went swooping down the light line did.

Mrs. Corcoran had a little test with her son. Mrs. Corcoran said to Alex Corcoran say something sensible but Alex still wouldnot say anything. Then Alex said hello then he went quiet again. I didnot hear myself because there was a lot of noise like sneezing around and coughing as well I suppose some other children were talking as well. I think it was a good experiment because I thought it was a lot of fun and I enjoyed it quite a lot. When we came in to school in the classroom it was quite cold because heaters were only just warming up. Mrs. Corcoran comes in at quarter past 8 with Greg and Mrs. Corcoran marks some work and Greg did some drawing and colouring. Greg might have done some writing for Mrs. Corcoran.





going absolutely quiet, making tiny noises to see how much sound would register and switching the lights on and off and drawing blinds to make the sensors react. I recorded on tape the children's comments for my report for the University and we had some very shrewd and intelligent comments.

We then set up the computer to collect data over a 24-hour period. Again this was very easy to do, though one must ensure the computer is left undisturbed during the collection period. I felt that the children understood enough about the 24-hour clock to carry them along in interpreting the results so we collected data from 13.20 hours on 29th January 1990, to 13.20 hours on 30th January 1990.

We alerted our caretaker so he wouldn't switch off our computer and he was most interested in our project. We waited impatiently for the time to be up and then printed out our file. The comments were most interesting and intelligent. We had a mystery to solve however, as there was a mark from the pressure mat and a sound 'blip' on the sound line at 21.00 hours when nobody is supposed to be in the school. The children were convinced it was the caretaker just checking up, but when they asked him he said that no, he hadn't trodden on the mat. After much interrogation he admitted that he had made his dog stand on the mat to trick the children, and that he had been quite honest when he said he hadn't trodden on the mat himself. To this day he is still disappointed that four paw prints did not appear on the screen as he quite thought they would!

After this the children wrote about their interpretation of the results using a concept keyboard overlay I had made to support the process. I programmed this in on *Folio* as I still find this the quickest and easiest method. The printout is very clear and is best on continuous paper, although the printouts on the previous two pages have been photocopied from single sheets and have thus lost a little clarity.

There are other computer-based data logging systems for schools and I saw the NCET system demonstrated at the last MAPE Conference. With these I feel the emphasis is actually on collecting the data rather than on interpreting the data. With the Measuring Box pack the data is easily collected and much time is left for the fun of discussion and interpretation of results.

I am most grateful to Dr Richard Phillips for giving me the chance to become involved in the project and to the company, Panthera of Nottingham, who are marketing the pack and have supplied me with a demonstration model. If anyone is interested in seeing the pack demonstrated or in purchasing a pack which is inexpensive, I am most willing to help.

Janet Corcoran
Deputy Headteacher,
Sibsey Free Primary School, Lincs

Pip visits a reception class

Niki Davis
Exeter University School of Education

'Pip' is one of the family of 'animals' or robots used to introduce 'Logo-like' programming to children and students in teacher education. It is a robot in the same family as the turtle, BigTrak and the Valiant Roamer.

This is a brief article to describe the loan of a Pip robot to Exeter Road Primary School in Exmouth, Devon. In particular Pip was tried out by children in the early years. This is what happened over two weeks.

Pip was taken into the reception class by two juniors who helped a small group to use Pip, but were told to let them explore on their own as well. At the end of two weeks I arrived to work (or play) with the children during their free-style Friday afternoon. Mrs Trend (the reception class teacher) had very kindly made a few notes on Pip and her enthusiasm was obvious:

> 'Definite place in primary curriculum. Maths, shape-space, logic, directional work, number, language, geography, science. Cooperative work. Challenge.'

However she voiced a note of caution: 'Not user-friendly. Can they make any sense of numbers/ any logic/reason?' I soon discovered why.

Fred (a five-year-old) had previously used Pip and was playing with it with another two boys while I looked on. Soon the group increased to six with Fred directing, taking a turn and then pressing the CM key twice to clear the last instruction and directing another child to press a white key and a number. It often took several goes to get an instruction in, mainly because they were pressing more than three numbers, so Pip signalled that it was unacceptable with a grumble tone. The children then started again by using the CM key.

The children understood that Pip moved forwards and backwards, but they did not try to limit the distance. Instead Pip was picked up and turned around if it looked as if he was going too far. Their remedy for this was to ask permission to go into the corridor and here Fred's control over the group became stronger. He pressed

FORWARD 100 and we all slowly followed Pip with Fred nudging Pip in the right direction where necessary. On the second 100 the children made themselves into bridges without any attempt to guess where Pip would stop. It didn't matter because Fred pressed GO again!

I then suggested the children split into two groups and sat opposite each other and sent Pip across. Again big numbers were used and Pip was stopped by pressing a key (this makes Pip stop). A difficulty arose when another child, Kevin, decided to use turn with a big number. This revolved Pip on the same spot so that Brian had another turn! This made Fred think, and when Pip arrived on his side he pressed backwards instead of forwards to keep Pip on his side and said 'We tricked you!'. It is always difficult to give a toy away! This activity was accompanied by talk but it was mostly about turns and the children found it difficult to plan moves. At one stage Fred did suggest that FORWARD 6 could be 'count tiles' but Pip went 16 because two numbers were pressed.

Kevin asked me to write down his number after he had seen me write down the previous two, so the list looked like this:

789 123
789
96

I think Kevin was starting to realize that the number was getting smaller but this would need reinforcement. It was his first session with Pip. Fred had had the benefit of a PE lesson where the children played Robots, moving steps forward and backward and doing turns (in 90° units). Pip, even with the times 10 plug requires a white turn key and a 9 to be pressed to get the same turn. The children seemed unable to make a connection between number and angle.

I also encouraged and observed four rising five-year-olds who had used Pip before. They were less keen, probably because I was a stranger asking them to do things alone in the room. They were very able in directing Pip and could remember up to three commands. They had not fixed on big numbers but one scallywag had discovered that pressing the TEST key sent Pip off to do clever things, while she went to the Wendy house! At the end of the session I lined the children up and gave Pip three instructions: FORWARD 5, RIGHT 9, FORWARD 5. They managed to go forward and right and forward but then they also did exactly the same with two commands: FORWARD 5, RIGHT 9. Mind you, I think some adults would, too!

The children's teacher, Mrs Trend, would like to have Pip around and she noted a lot of directional language when children used Pip. She can envisage all sorts of cross-curricular work:

'Make a Pip environment.
How do you think it works?
Assault course.
Pip's home.
Robots – PE movement/directional/cooperative'.

In conclusion, Pip was welcome and has been invited back. He compares more favourably than the Valiant Roamer on the following points:

'Solid – functional.
Accurate.
No batteries.
Cheap to run.'

However, he is more expensive to buy and his black brick shape is less friendly than Roamer's ovoid. Our Pip has now got eyes, nose, a smile and a bow tie, thanks to the children at Exmouth.

The difficulty with moving large distances in the classroom was directly related to the insertion of the 'times 10' plug into Pip. The error signal does not change, but should occur at least one unit earlier. It would also be useful if it were a distance times 10 and an angle times 90! Perhaps that is asking for the technically impossible at this stage.

The school of Education will now encourage our early years' students to capitalise on Mrs Trend's ideas. Pip is going to have his own environment in the Primary Base and from there he can pay visits to children in the students' holidays!

Pip is available at £224.25 from:
Swallow Systems,
32 High Street,
High Wycombe,
Buckinghamshire HP11 1BR.

Acknowledgements

Many thanks to Sandra Trend, Martyn Reynolds, the Head and children of Exeter School, Exmouth.

The Logo file

Chris Robinson
BLUG (British Logo Users Group

With a couple of ZX81s, the group of 'computer nuts' were eagerly exchanging whatever software they could lay their hands on in the fringe session at Exeter. Most of it was of the 'drill and practice' sort and of little value. I remember, though, obtaining a simple program the name of which escapes me as does that of the author, unfortunately. The computer drew a pattern of shaded squares, through which a track was laid like a simple maze. The child had to reason out how to steer his counter along the track using commands such as 'F2R2F4 . . .' (rather like the Microprimer *Crash* program that superseded it).

I remember, after the euphoria of Exeter, joining a local teachers' group of 'computer nuts' and one day being told about 'Logo', though not having the software there to peruse I found the idea strange.

It was shortly after this that I had my first glimpse of the language itself, at a regional MAPE meeting. Like everyone else, I made the 'mistake' of typing RT 60 when attempting my first triangle, but I was hooked. So when MUSE rushed out *Turtle* for my newly acquired Spectrum in 1982, I started using it with my 11-year-olds (one of whom, I have learned, is now studying something to do with computer programming at Cambridge University)! *Turtle* was superseded by *Turtle 2* and then came the first commercial package for my school's fleet of Spectrums, *Snail Logo* (actually a misnomer inasmuch as it was only turtle graphics but it moved as slowly as a snail), with which we cut our teeth with 'proper' Logo commands and procedures.

I was ideally placed when, having been invited to participate at the Sinclair Education exhibition in London demonstrating use of Electronic mail (mine was the first school in the country every to do so), I saw Spectrum Logo being 'launched'. There had been a transport strike in London that day and few people actually made it to the exhibition. No-one really understood Logo and although the software was ready, the documentation hadn't been completed. Thus it came to pass that I spent most of my afternoon demonstrating Logo to the customers and returned to school the next day with a pre-release version of full Spectrum Logo at a time when many schools were still waiting for their long-promised BBC computers. Extensive (and intensive) employment of six computers in one classroom, followed by a year at Newman College where I probably became labelled as a bit Logo obsessive (things haven't changed, have they?), convinced me of Logo's educational potential.

It is now ten years on from my first graphic encounter with a 'Logo-like' program and what has changed?

Logo is being used in many schools. Logo is being used in many ways. (In my school, turtle graphics, adventure games, electronic magazines, interactive quizzes, and control technology all owe their existence to this powerful computer language.)

Newer, more powerful machines operate Logo more easily. Newer versions of Logo (eg *LogoWriter*) make using Logo easier. Research and accumulated experiences provide indicators for making the introduction of Logo tasks easier.

BUT many teachers have yet to make the leap into this exciting world of discovery. Perhaps these articles may just provide the push they need?

One plea I would make. I started with 'Logo-like' turtle graphics programs because full Logo was not available at the time. Anyone starting now has no excuse to use anything less than a full version of Logo.

Supporting National Curriculum Geography with Logo

Chris Robinson
BLUG (British Logo Users Group

At the time of writing, the Geography standing orders have not been released. The attainment targets and levels mentioned herein are those enumerated in the June 1990 discussion document.

a) Using Turtle power

'Pupils should be able to follow directions using such terms as front and back, up and down, left and right.' (1 Gg 1b) – I hadn't considered children playing 'pre-Logo' games were doing Geography before!

My class of nine-year-olds were learning to 'identify and name on a map of the British Isles, the constituent countries and selected cities and physical features.' (3 Gg 3a)

As a technology task, they had been grappling with the challenge of making a map of the British Isles with indicator lamps to identify the location of the capital cities on request. (This was designed to fit between earlier electric circuit experimentation and introduction to computer control.)

'How about getting the turtle to draw the map and show us the cities?' was one of their suggestions.

In discussion, we decided that teaching the turtle all the commands to steer it around our coastline was unrealistic but an outline on an OHP transparency affixed to the screen offered a reasonable challenge.

Now to teach the turtle where the capital cities were. This is where the SETPOS command was to prove helpful. With the Pen Up, SETPOS [100 200] takes the turtle to the screen pixel identified by the cartesian coordinates (100,200). (With the Pen Down it would draw a line.) Coordinates' work at this time was appropriate for comparison with Ordnance Survey 4-figure references. (1 Gg 4a).

The turtle's origin is in the centre of the screen, however. This provided greater difficulty for establishing the coordinates for Cardiff which was in the lower left quadrant of the screen. To discover the required coordinates, the children used the familiar FD, BK, LT, RT commands to steer the turtle to the correct position whence PRINT POS was to provide the answer.

Minus numbers were (again) encountered as were masses of trailing decimals which needed more mathematical investigation taking the children swiftly to level 5 in Maths attainment target 11 and reaffirming level 4 in Maths attainment target 4.

Eventually, however, they were able to write procedures TO LONDON, TO EDINBURGH, etc, so that typing the name of the city sent the turtle as an arrow-head to indicate that location.

(N.B. This technique could equally have been used to cover the following SOAs: 3 Gg 4a, 4 Gg 3a, 4 Gg 4a or 4 Gg 5a.)

b) Using word power

'You are on a treasure hunt in Petersfield. You are standing outside the church. Your first clue says, 'The rain here stays mainly on the plain.' Do you walk down SHEEP Street, St. PETERS Road or cross the square to the HIGH Street?'

This text greets users who have typed START to the 'Petersfield Discovery' Logo program written by a different group of nine- and ten-year-olds.

Using only TS (TextScreen) and PRINT [. . .] commands, (apart from the previously familiar TO . . . END to build procedures) they have created a treasure hunt linked to their knowledge of the ten miles to the north and reference to maps and interpretation of symbols. (I leave it to readers to check the quantity of SOAs encompassed by this.)

In response to the text above, anyone knowing Petersfield would know to take SHEEP Street to an area known as 'The SPAIN'. There happens to be a police station in St. Peters Road. If the user has incorrectly chosen this route from the church (by typing PETERS), he or she is told to ask the POLICE for help. Typing POLICE provides the answer to the first clue and directs them back to the church to start again.

Sometimes, the procedure names are names of roads, as when the user is asked to type in the name of the road that will lead them to the Welsh or Chinese monster. (HYLTON Road leads from that location to Dragon Road.) In these circumstances, if the wrong answer is typed, the user receives the error message, 'I don't know how to . . . in line . . .' which may not be the most user friendly message possible but at least indicates that they need to have another 'guess'. In other cases, as with the START procedure, alternative choices are given. For each alternative a procedure needed to be written even if it were to say the explorer had ventured the wrong way, was lost or had had to hail a TAXI! At other times the adventurer may be asked to 'Type S to go down Station Road or B to walk up Bell Hill.'

The program is not yet finished. I'm glad we're using an Archimedes. We might have run out of memory space with the Beeb.

The first group required much assistance from me but gradually involved more and more children as they passed on their acquired skills. I'm not sure where the children have decided to 'bury' the treasure but they are wanting to use a turtle-drawn picture of King Charles' helmet as a reward.

P.S. If anyone using Archimedes Logo is interested in having a copy of this work, I shall be happy to oblige on receipt of a formatted disc and return postage. It should be sent to Chris Robinson, Horndean C.E. Middle School, Five Head's Road, Horndean, Hants PO8 9NW.

Word processing and dyslexia

Jean Hutchins
British Dyslexia Association Computer Subcommittee

When enquirers ask about computers for dyslexics they often have reading and spelling programs in mind. However, I always discuss word processing, and of course, some enquiries concern WP. If a family has a computer for which there are few, if any, suitable educational programs, they can still do word processing. Parents usually say, 'But he will have to learn to touch-type first, won't he?' The short answer is 'No.'

Ideally, one would like all dyslexics to touch type – i.e. type using all eight fingers and two thumbs, without looking at the keys, but not all dyslexics will have the opportunity, motivation and perseverance to learn to touch type. It needs frequent practice, daily if possible. There are touch-typing tutor programs for most computers, and one or two which are suitable for children and those not intending to get to secretarial levels. However most people will use two fore-fingers and one thumb, and will look at the keyboard. They can become remarkably fast at typing. Most journalists, policemen, programmers etc have not learned touch-typing skills. There are also computer programs for keyboard familiarity as opposed to touch typing.

I would not recommend using an old typewriter first, nor learning on a typewriter. While a typewriter has some advantages over handwriting for those who find letter formation difficult, it is so much easier to correct typing or spelling mistakes on a computer that it is better to use one straight away.

Without even discussing editing and spelling checkers, word processing has the following advantages:

It is physically easier to press a key than to form a letter, especially confusable letters. ('b is on the bottom row' is a good mnemonic.) Dyslexics' handwriting is often poor because they pause to think what the next letter might be.

Young children quickly learn the relationship between capitals and lower case letters by using the keyboard. I put 'Tippex' on capital 'l' to make it into 'I'. 'B', 'D', 'P', 'Q' are easier to distinguish as capitals.

Dyslexics say they can look along the keyboard and spot a letter which would look right in the word they are trying to type. Print on the screen or printout looks more like the printed form in which we usually see words, so dyslexics are more likely to notice mistakes. Typing makes us think out words from left to right in sequence.

Dyslexics do not mind having a go on a computer, because it is so easy to change mistakes. Typing looks good all the way through the text and does not deteriorate like handwriting.

Pupils discover letter patterns in the keyboard – 'was' is a triangle on the left side; 'were' is along the top row and back one; 'out' is alternately backwards along the top row; 'gh' which are often together in words are together in the middle row, etc. Common letter patterns in a spelling word list are reinforced in a visual and spatial way by repetition.

The same keyboard familiarity skills will apply to most Spelling Aids including the excellent *Franklin Elementary Spellmaster*.

Many adult dyslexics have said that word processing has transformed their lives. All pupils can submit a proportion of GCSE coursework on printout, so they need to get used to using word processing early.

News from the world: Geneva – part I

Chris Robson
Overseas Representative

Introduction

Whilst I thoroughly enjoyed visiting the Isle of Wight and Belfast (and am always open to invitations to return there!), neither convinced me that I was really MAPE's overseas representative in the same way that writing this article in brilliant sunshine whilst cruising on Lake Geneva does!

It was on a cold wet night in April that I answered the phone, expecting a call from a colleague about a forthcoming Baker Day, and instead heard the magic words: 'Hello! this is Dennis Unsworth from the Geneva English School. We're having some A3000s delivered in June. Please would you come and run a 3-day course for us in August?' Although many of our primary schools have been using Archimedes' for some time and I 'knew' quite a lot about the micro and its software, the opportunities I had had for hands-on experience could be counted on the fingers of one hand. But, with four months to prepare, would you have hesitated? No, nor did I!

Pre-course preparations

I am fortunate in having access to a comprehensive library of Archimedes software in our computer centre, and to advice from many colleagues who have used it in the classroom; in the next few months I set about putting together a representative collection of programs to suit what I expected would be a group of primary teachers with the usual mix of experience, ranging from quite a lot to virtually none. Two years ago the problem would have been finding enough software to take; my problem now lay in deciding what to leave behind!

Having selected the software my next task was to try it all out and become familiar enough with the micro to answer all the questions which might arise on a three-day course! Numerous meetings and the other demands of a new job meant that I was unable to spend much time on this until August so my crash course began as schools broke up and the round of meetings, school visits and telephone enquiries abated. Fortunately, as I was about to begin, a copy of Sherston Software's *!Help* arrived on my desk and a couple of self-tutorials with the book and accompanying disc gave me a head start. I can thoroughly recommend this package to anyone who has spent years learning the tricks of the trade on the BBC and wants to acquire similar information quickly and painlessly on the A3000.

Thanks Dave!

Another excellent source of that basic information which many software companies often mistakenly assume everyone knows is the documentation accompanying 4mation's Archimedes programs. As usual, this is not only informative but written with a sense of humour which puts it in the rare category of program notes one actually looks forward to reading.

Thanks Mike!

As my knowledge of the Archimedes and its software grew daily, so did my confidence and so, with one day to go, I managed to 'learn' *Impression* and *First Word Plus* in the morning before packing in the afternoon!

More mundane travel preparations had been made with help from a number of friends more accustomed to travelling abroad and so I arrived at Gatwick at 6.45 am on August Bank Holiday Monday complete with concept keyboard, discs and dongle packed separately to avoid X-ray!

The course – preliminaries

As we began the descent into Geneva airport I went through the arrangements for meeting my host. 'How shall I recognise you?' I'd asked on the phone 'I shall be carrying a copy of The Times and I'm incredibly handsome!' was the reply, 'How about you?' I replied that instead of the traditional red rose I would be carrying a bright yellow A3 sized box containing my concept keyboard. With such unmistakable characteristics we correctly identified one another, and after a working lunch and brief tour of the school I returned to my hotel to plan the next day; I had arrived 24 hours early to take advantage of cheaper airfare and so had a day to myself. My cruise on Lake Geneva lasted until early afternoon and was followed by indulgence in several of my weaknesses: coffee, shopping, pizza and Death by Chocolate! and so to the course. . . .

The course – at last!

> 'The Geneva English School was founded in 1961 by a group of parents who were seeking primary education for their children based on the British curriculum, thereby avoiding disruption in their children's education when they returned to the United Kingdom. . . . . The school now has 170 pupils mostly of British or Commonwealth nationality and aged from four to twelve years of age. In 1989 the school moved to Genthod, a village on the north shore of Lake Geneva, where it inhabits Le Petit Malagny, a magnificent 'maison de maitre' constructed in 1845, and is surrounded by spacious playing fields and playgrounds.'
>
> *Information taken from the school handbook*

An imposing marble staircase leads up to quite the most splendid staff room I've ever been in, with a nineteenth century frieze round its walls depicting cherubic children engaged in a variety of uncherubic activities, and breathtaking views of Lake Geneva and Mont Blanc! Other aspects of the school were more familiar; modern light-wood furniture gives all the classrooms a cheerful and airy appearance; the eight staff are all English; the equipment, apparatus and books are such as might be found in any British primary school, and on the head's bookshelves were well-thumbed copies of the familiar red, blue, yellow and green 4-hole ring binders!

I knew that the school 'pays careful attention to all the relevant aspects of the National

Figure 1. The Geneva English School

Curriculum' and so had decided to use technology attainment target 5 as the basis for the course. After a brief introductory talk about IT in the national curriculum, AT 5 and its relationship to IT in other foundation subjects, I said that Day One would be devoted to *communicating information,* with pictures, sounds and words. I explained my own classification of Archimedes programs, into three categories:

1. Full RISC-OS programs which operate in the multi-tasking window environment of the Desktop (eg *Jigsaw, PenDown, Phases #1, Datasweet, Impression*);
2. Programs which 'take over' the desktop, but neverless are mouse-driven (eg *Picture Builder, Stylus, Droom, Desk Top Stories, Artisan 2, Front Page Extra*);
3. Adapted BBC programs which operate under !65Host, a utility which effectively turns the Archimedes into a BBC, so that the programs work as they do on a BBC and are run entirely from the keyboard.

I added that in the next three days we would be looking at programs from the first two categories but not from the third, since I do not believe that such programs make the most effective use of such a powerful micro as the Archimedes.

Communicating information – pictures, sounds and words

Several weeks earlier I had established that the only Archimedes software the school had was the two applications discs which come with the micros. Whilst *!Draw* and *!Paint* are extremely versatile programs and essential tools for any Archimedes user I don't regard them as the most appropriate graphics packages for beginners, especially inexperienced teachers and young children. (If you find the Welcome Guide tutorials difficult, try those in Sherston's *!Help.*) Consequently I had decided to begin the course with Newman Software's *Picture Builder* and would do so again. *Picture Builder* allows the user to create pictures using squares, triangles, circles, semicircles and hexagons each of which can be rotated clockwise or anti-clockwise, stretched, shrunk or reflected horizontally or vertically, and coloured as either outline or filled shapes; lines and text can be added and the picture printed on either an Integrex or Epson compatible printer. It offers plenty of opportunity for mathematical discussion with even the youngest children and provides a good introduction to the use of the mouse; the teachers were delighted with their first pictures which could be printed out and saved without having to explain, at this early stage, the loading of printer drivers and the procedure of saving by dragging from one directory window to another. It also gave me the opportunity to 'assess' my pupils; within the first hour I established that their experience was as varied as I had expected, but also discovered that they all share two outstanding characteristics: immense enthusiasm and an eagerness to tackle anything new!

I know from letters I have received that one of the biggest problems faced by overseas schools is that of being able to view software before buying it. Software costs more now than many schools have been accustomed to paying, reflecting both the increased development time which is needed to produce programs for the more sophisticated machines, and the curtailing of national and local software schemes. (Having said that, I still don't think that our good educational software is at all expensive; we were spoilt in the early days and the prices now being asked are still considerably lower than those being asked in the commercial world!)

Many LEAs in the UK now provide facilities where teachers can evalute software before buying, exhibitions and shows are held in many parts of the country and there are always colleagues in neighbouring schools to talk to. Such opportunities are not however available to most overseas schools and so when planning what to take, I had been concerned to offer a selection of software which was broad enough to allow them to make their own choices and yet not so enormous as to be either confusing to them or overweight baggage to me! Consequently, whilst most of the teachers were experimenting with *Picture Builder,* the head and deputy spent some time evaluating *Artisan 2.* This pattern was sustained throughout the three days; after introducing the whole group to one or two programs, I made others available for anyone who wanted to look at them, leaving the less experienced group members ample opportunity to become confident by using a smaller range of programs.

After two hours of artistic effort we moved on to communicating with sounds; I have long been a fan of Andy Pierson's *Compose*; we have used the BBC version, (with and without concept keyboard) very successfully in Berkshire with children aged four upwards, and with teachers and headteachers of unspecified ages. The Archimedes version is very easy to operate, again making good use of the mouse. There are nine small pictures – tree, bird, house etc – across the top of the screen, each picture having a short phrase of music associated with it. Each picture can be 'listened to' and pictures are then dragged onto a 4 x 4 grid to form a tuneful sequence. Pressing the middle menu button on the mouse presents options such as **listen** (to a picture) **play** (the complete tune) **instruments** – to choose different voices. Pressing ESCAPE allows the user to choose one of eight tune files, each with different characteristics such as the Chinese, Egyptian and pentatonic files, change the layout of the grid from 4 x 4 to, for example, 2 x 2 or 10 x 10, alter the speed and volume etc. whilst the **Edit** option gives more experienced users the chance to create new files with their own pictures and tunes. Amid the cacophony we had some useful discussions about the uses of the program in the classroom.

You'll remember that I had taken my concept keyboard with me; the school has not yet fitted the necessary 'podule' to enable them to use this with the Archimedes but I knew that the school's two existing BBC machines would continue in use with the younger children. As an enthusiastic supporter of the concept keyboard I could not resist the opportunity to demonstrate its many uses to a new audience, so just before lunchtime I connected it up and began with that ideal introduction, *Moving In.* The house was soon full of furniture and before we broke for lunch, Jane had had her bath and Jim had demonstrated his pianistic talents several times!

We began the afternoon communicating with pictures again as I introduced them to their first fully RISC-OS programs, 4mation's *Jiglet* and *Jigsaw. Jiglet* cuts up a picture into between four and 12 pieces which can be traditional jigsaw shapes or simpler shapes, each shape rotated or not rotated. The pieces are then reassembled using the mouse. *Jigsaw*, the 'grown-up' version, with a maximum of 120 pieces and 24 levels of difficulty is, I warn you, totally addictive! Both are programs which can be used in any topic or theme, since any picture (or a screen of text) can be 'jiggled', and used to develop logical thinking, problem solving and social skills such as cooperation. For the first time we talked about the necessity of sometimes performing a 'hard' reset – pressing CTRL and BREAK to maximise the available memory – and looked at the technique of loading a program onto the icon bar.

We moved on to communicating with words, and as all good MAPE members should, looked at the Archimedes versions of *Stylus* and *Front Page Extra.* Although both are similar enough to the BBC versions for users of those not to need to re-learn the programs, they are 'real Archimedes programs' rather than BBC conversions; both are mouse-driven, and proved as easy to use on the Arch as on the BBC. (Unfortunately, although they found *Stylus* easy to use, we soon discovered that we could not get it to print on their Panasonic printers and so I decided to show them a different word processor the next

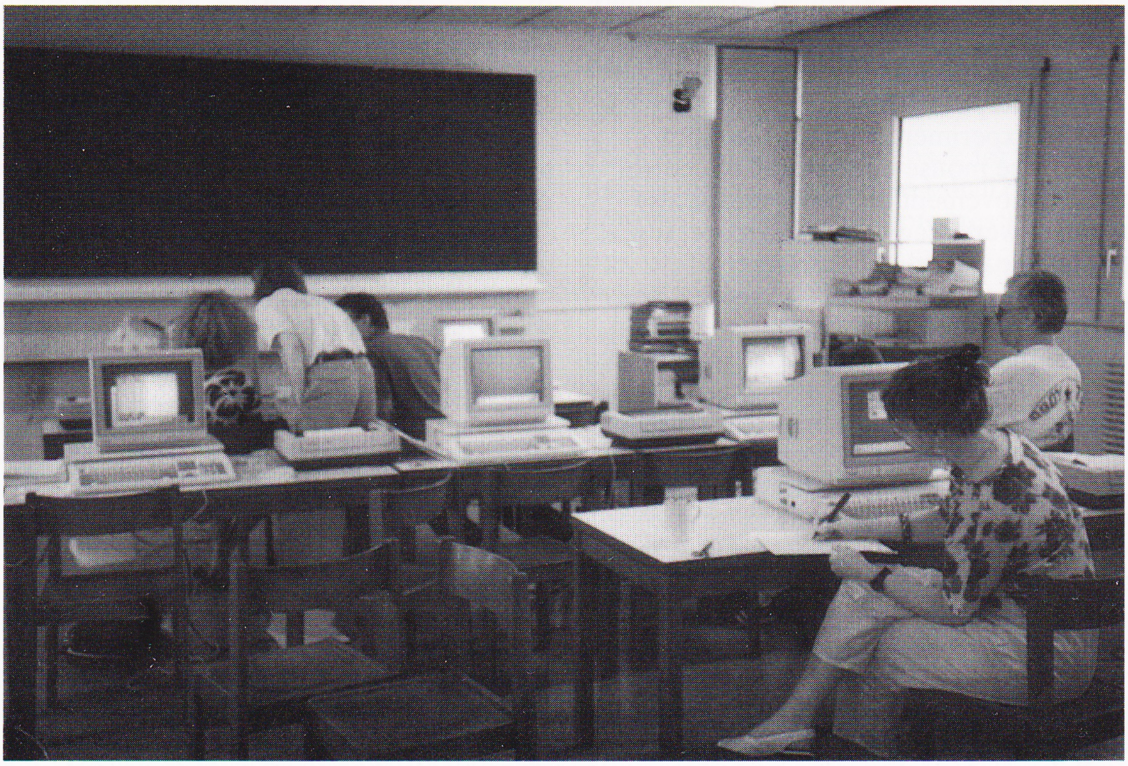


Figure 2. Can you tell it's a school in Switzerland?

day). During this session I was also using *Prompt/Writer* on the BBC with some of the sample overlays and others made by Berkshire teachers and was delighted when I later heard the two reception teachers making out a very good case to the Head to buy concept keyboards immediately!

We finished the afternoon by looking at *A La Une*, the French version of *Front Page Extra* and by giving everyone the opportunity to look again at the programs which had most interested them during the day.

Next day we began with *Phases*, a simple word processor with six sizes of text on screen and additional features such as the facility to incorporate pictures in the *!Paint* format. The program, like so many which are widely used in primary schools, was originally developed for use in the special educational needs field. The program currently available is *Phase #1* and further *Phases* are under development in consultation with schools and teachers; successive *Phases* will be compatible in that files created in previous versions can be used and the mode of operation will remain the same.

As the program is a RISC-OS 'desktop' program I introduced the group to some desktop operations; we loaded the printer driver onto the icon bar and looked at the Task Manager, discussed why increasing particular areas of memory could be of benefit when using particular programs and, as we were about to use a word processor, increased the font cache. I was pleased that I had not introduced these 'technicalities' on the first day; had I done so, I have no doubt that I would have been faced with glazed eyes and polite smiles! Instead, they had had a day to experiment with the different functions of the mouse buttons and to control the mouse's movement up, down and across menus and so were ready to absorb more! It was not long before the printers sprang to life displaying letters, poems and and stories, and one group discovered for themselves how to incorporate pictures into their work. This was also the first session in which we talked in some detail about the hierarchical directory structure and looked at the standard procedure for saving files, by dragging them into a directory window.

Our youngest course member was Jacqueline, the deputy head's daughter and a pupil at the school (actually, I think Tasha the dog was younger, but after enthusiastic greetings all round she lost interest and went to sleep!) Jacqueline and her older brother Keith had performed sterling service on the first day, formatting discs and making backup copies, so today, whilst some of the staff were using *Phases,* she began to create her own book with *Desk Top Stories* and as is so often the case, was a remarkably apt pupil! At the same time, another group was looking at Archimedes *PenDown* and *Desktop Folio* with a view to using them with the older children and the infant teachers were using *Fairy Tales* and *Caption* on the BBC, and so by coffee time we had explored a variety of ways of communicating information using words, sounds and pictures and I was more than ready for my coffee!

Handling information

Datashow first appeared in the MEP Primary Project's Maths pack, is now part of NCET's Information Handling pack, and is, in my view, an indispensable program for anyone introducing information handling skills to a group of teachers, especially if they need convincing that computers have a valuable role to play in data handling and that they aren't really as difficult as they thought they were going to be! The names and quantities of up to eight items (pets, favourite foods, animals etc) are entered in a table; the information can be sorted numerically or alphabetically and displayed as a bar chart or pie chart, with or without percentages; these displays are printed out simply by pressing P for print! Although my present audience didn't need convincing, I still began our information handling session with *Datashow* on the BBC and then moved across to the Archimedes and *Dataplot*, part of *Data Sweet. Data Sweet* is a desktop RISC-OS package comprising *!DataPlot* – very similar to the BBC *Datashow*; *!DataCard* – a card index type program with up to six keywords; *!DataPick* – similar to *!DataCard* but with key pictures (created in *!Paint*) instead of key words; *!DataFind* – a database with fields which can be sorted and searched; and *!DataCalc* – an easy-to-use spreadsheet. Data is interchangeable between the various elements of the program which is helpful in enabling children to learn acquire meaningful information handling skills. The program is accompanied by a comprehensive manual written by advisory teachers in Warwickshire and Hampshire, and deserves a place in the Archimedes library of any primary school.

That afternoon began with a demonstration of *Touch Explorer Plus* on the BBC, using a zoo file and one about Spot the dog, but by this time, I decided that the Archimedes group had looked at enough 'new' programs and that consolidation was called for! They spent the rest of the the afternoon looking again at their own choice of programs, and I was delighted to note during this session that the 'cascade' system was beginning to work. When running a course, one of the most difficult things to do is to put your hands in your pocket and keep quiet, but as I noticed them asking advice and help from one another I retreated and worked through Archimedes *Droom* with Jacqueline whilst her father tackled the *Impression* tutorial!

The final day began with a discussion of the programs we had covered so far and we then talked briefly about the role which adventure games have to play in the modelling strand of IT capability. The BBC users were introduced to the delights of *Albert's House* , Keith and one of the teachers tried *Droom* and *Desk Top Stories*, some looked at *!DataCalc* and others decided to explore in more depth those programs which they had decided they would use with their children. The confidence and expertise which everyone had acquired during the three days was remarkable and underlined how much more effective an intensive course is than a fragmented series of twilight sessions. We finished the morning by collecting together all my discs and drawing up a short list of programs to be ordered from the selection of catalogues I had taken with me.

Evaluation of the course

I had, as I mentioned earlier, based the course on technology attainment target 5, and although some of the details changed to reflect the needs and experience of the participants, we did follow my outline fairly closely. Catering for a mixed ability class is always difficult but I was pleased that my plan, to demonstrate a few basic programs to the whole group, but to make discs and manuals of more complex programs available to those who wanted to try them, worked well, not least because everyone was highly motivated. The numbers involved meant that I was able to work with individuals most of the time. I certainly enjoyed the course, and not only because of the splendid surroundings and the generous hospitality of my hosts.

But what about the participants? I asked them all to write a paragraph saying what their expectations had been and how these had matched up to the reality, promising that I would include their comments in this article – unedited!

'I feel that we covered a great deal during this three day course. . . . The explanations were good but we were able to try things out ourselves and most important of all, we were allowed to make mistakes, which is a good way of learning!'

'. . . You let us get on with the work but always managed to pop up at the right moment when the gremlins struck. The more nervous amongst us built up a store of confidence that is going to last a long time.

PS my dog enjoyed it too!!'

'Thank you – the course was absolutely marvellous! I have a computer at home which I have not even looked at before, but now I am no longer afraid and I can't wait to go home!'

'The last computer course I went on was full of high-falutin' terms and I expected to be blinded by science again . . . BUT . . . . instead I found it to be WONDERFULLY PRACTICAL!!!

COME BACK SOON!'

'Super! I got out of the course exactly what I wanted and feared that I would not get. We all wanted lots of 'hands on' and time/help with the software. We did NOT want the theory or too much "lecturing". Terrific – we'll expect you back soon!'

PS I've just been invited back for a couple of days at the end of March so I shall be able to see how well my pupils have progressed!

PPS If any other overseas schools would like a course organising, my rates are very reasonable . . . address and phone number at the end of this issue of *MICRO-SCOPE*!

"[Following a week's trial with a 380Z on loan from Newman College:]
'1) The initial response was favourable, it was felt that we should know more about the long term value of the micro when the novelty wore off.
2) How available was good software?
3) Many of the programs were maths oriented – what about programs in other subjects?
4) If we bought a micro, how long before it became obsolete?
5) What facilities are there for INSET?'

MICRO-SCOPE 2, page 9, R. Butcher, Rounds Green School

[This following the first conference, held at Exeter.]
'A proposal was made to create a National Organisation for users of microcomputers in Primary Schools. Ron Jones, a Cambridgeshire headmaster, introduced a draft proposal outlining a possible structure. There was overwhelming support.'"

MICRO-SCOPE 3, page 3, John Lane

MAPE celebrates its Tenth Anniversary

Ron Jones
Founder Chairman of MAPE
Member of MAPE Executive and co-opted member of the National Council
General Inspector with Lincolnshire County Council

In April 1991 MAPE celebrates its Tenth Anniversary. MAPE, which is the UK's support association for Information Technology in Primary Schools, has nearly 6000 members and is still growing.

In an article celebrating the 'coming of age' of an association, the history of which mirrors the developing use of computers in primary schools, one can perhaps be forgiven for devoting a few words on the origins of the association.

It is just ten years ago that a group of educationalists, who were exploring the use of computers within the primary sector, met at Homerton College, Cambridge, as a follow-up to a national survey on the use of computers in primary schools. In those early days only 32 schools in England could be discovered using the 'new' technology. The machines used were mainly Commodore PET's which had to be patiently loaded by tape, often with programs created by the user. Such was the persistence and dedication needed that it engendered a real pioneering spirit within the few enthusiasts who could see the enormous educational potential of the technology provided that it was used to support the curriculum. The Homerton weekend led to representatives of the group attending a conference at St Luke's College, Exeter, which even in those early days attracted over 200 delegates. It was at that conference that a working group was established to explore the possibility of setting up a national support group to promote the use of the technology within the primary school sector.

The first meeting of that working party set the ground rules of the association which are just as firmly held today, that it would not promote computer studies within primary schools but would do all it could to use the technology as a support for the curriculum. It has always been keen that teachers see computers as tools which can enhance and support the child's learning environment. It sought sponsors and received pump-priming support from IBM and from BP. It also received valuable sponsorship in kind from Newman College, Birmingham, with which it is still very closely associated especially through its in-house journal *MICRO-SCOPE*, now on issue 32.

MAPE, at its embryo stage, coincided with the launch of the government's microelectronics initiative with the setting up of MEP (Microelectronics Education Programme). The group were fearful that the programme would only promote the use of the technology in secondary schools. Therefore one of the first tasks of the group was to lobby DES and MEP to expand the programme to include primary schools. The programme was expanded and computers were introduced into every primary school in the country through the Micro Primer Pack. This helped towards raising awareness of the importance of Information Technology and created an escalating demand amongst teachers. MAPE's membership continued to grow, supported by a regional structure. An expanded and strengthened version of this structure exists today and representatives of the regions which cover the whole of England, Scotland and Northern Ireland meet each term as a National Council. Some regions which are flourishing are developing area networks of teacher support, especially following the statutory requirements introduced under ERA that all teachers must introduce IT Capability as part of the National Curriculum.

It is perhaps surprising that a teacher support group run by volunteers and established so long ago to lend support because there was no other source, should still be expanding now that all Local Authorities have a statutory obligation to give such support. It is perhaps even more surprising, especially when considering that government support has continued through carefully targetted financial incentives such as ESG and Hardware and Software Schemes and through quangos such as NCET and NCC etc.

The annual National Conference has become established in the education calendar as a mecca for many such teachers. In order that teachers within a particular region can more easily attend the national conference, MAPE deliberately arranges that the venue is moved around the UK. For example MAPE Conference '91, under the theme 'IT's working for me', will be held for the first time in Scotland, at Jordanhill College of Education, Glasgow from 3–5 April. Moving the venue also helps to focus the activity of that region's committee and leads to the sharing of experiences of organising a major national event. It also involves a good deal of forward planning which is so important in a national organisation dependent on voluntary support. Indeed preliminary plans are already in place for Conference '92 (Bangor College, North Wales) and for Conference '93 (York or Durham).

In the ten years of MAPE developing a network of support for teachers, Conferences, as important as they are for those who are able to attend , represent only the very tip of the support service offered. Classroom teachers demand support which can be applied directly in the classroom. This has been developed over the years through a number of ways. In the early days, when there was a dearth of software and to help promote good practice in the use of software which could support the Primary Curriculum, MAPE Tapes were established. It is interesting to note that the organisation has just issued its MAPE 7 Disc. Walking around many schools today many of those early MAPE Tapes, now of course put on to discs, can be seen in regular use, especially such favourites as *Front Page Extra* which did so much to introduce the concept of a broad-based applications tool for use in schools over a wide age range. Such is the demand for many of those early programs that they have been put onto MAPE Compendium discs and include programs such as *Canal Locks, Mangonel, Mallory Manor, Deetree, Jumbo* etc. Many teachers who are not members of MAPE are to be found using programs initiated and distributed through the association because it has always been MAPE's policy to supply LEAs copies of the programs under licence so that as many teachers as possible are supported.

It was the production of the MAPE Owl Pack that initiated a development which will probably lead MAPE to explore new paths in the future. The Owl Pack revealed the need for certain types of software to have the extended support of classroom materials which would enhance its use. This has had a double spin-off as far as MAPE is concerned, for it illustrates the value of organising working weekends which involve members working on a particular theme. In this case, assembling teaching materials which would support the project approach, and secondly the importance and popularity of such classroom support material. Indeed working weekends have become a regular feature of the organisation not only for the preparation of responses to the several government initiatives under the National Curriculum which involve Information Technology but also in creating more classroom support materials and support for regional representatives.

The main vehicle of support, and the one which has remained most consistent throughout the ten years, has been the publishing on a regular basis of MAPE's in-house journal *MICRO-SCOPE*, and the many *MICRO-SCOPE Specials* which have also been published over this period of time. *MICRO-SCOPE* is now on issue 32. Perhaps its undoubted success has been that during those ten years it has had only two editors, the current editor, Senga Whiteman, having taken over the reins at issue 12. The journals provide an important source of support for members as well as being a valuable resource for any student wishing to trace the developing use of the technology within the primary curriculum. It provides classroom teachers with a means of being able to share ideas and concerns with their colleagues. It is perhaps a sign of technological progress and environmental awareness that from Issue 31 onwards *MICRO-SCOPE* has been printed on recycled paper – MAPE has gone green!

What of the future? The introduction, under the National Curriculum, of the five main strands of IT Capability means that many more teachers need to get to grips with the practical implementation of the statutory requirements of ERA. Many Local Authority courses are doing an excellent job in raising teachers' awareness but there is also a need for a network of teacher support which crosses county and national boundaries and which can draw on good primary practice gleaned over a period of ten years. MAPE can offer such support through a strengthened regional organisation which continues to monitor on a regular basis national needs and through the production of support materials which have direct application in the classroom.

To mark its Tenth Anniversary in 1991, MAPE has set aside a sum of money to provide a Curriculum Development Fund. It is hoped that this will enable MAPE members – either individual classroom teachers or small groups of teachers working in collaboration – to look at particular areas of the curriculum from an

Information Technology perspective, and to produce materials to help both themselves and others make effective use of IT across the primary curriculum.

It was at the beginning of the 1980s that an intrepid band of pioneers set out to blaze an IT trail on behalf of Primary Education in the UK; that same pioneering spirit is still alive and well as MAPE celebrates its tenth anniversary year and enters the next decade. The organisation has established the infrastructure needed to help ensure that whatever technological wonders lie ahead its members will be able to make full use of them within the primary curriculum so that their pupils can take full advantage of the learning opportunities presented. In this way MAPE hopes to continue to make useful contributions in the area of Information Technology to the resources of the UK, through its continued support of primary school teachers and their pupils.

MAPE – the next ten years

Lynda Woods
Headmistress, Burgess Hill School for Girls, Junior School
Committee Member, MAPE Southern Region

This year sees the tenth anniversary of Micros and Primary Education – MAPE. As a member of this organisation almost from its inception I have derived enormous benefit from the information and expertise which it disseminates from its headquarters at Newman College in Birmingham.

Looking back through the magazine '*MICRO-SCOPE*' provides continuing inspiration for ideas on using the computer in the primary classroom. It is fascinating to chart the progress of computer application from the early days when we were just a few 'computer nuts', to the modern classroom which takes the hardware available as (almost) a matter of course. I remember the early days when the only computer in the school was my own personal machine (still in use today), and the software available was confined to the tapes produced by MEP and a few drill-type programs produced at home in the evenings. What a long way we have come!

Early MAPE Conferences gave the dedicated groupies a chance to get together, swap programming ideas and review what was new on the market. Today that remains almost unchanged, though the sophistication of what is now on offer perhaps could not have been dreamed of ten years ago. Delegates who attend the conferences today still include the core of those present at the beginning, and the same faces greet each other from year to year; but how these conferences have grown!

Since 1985 I have been involved in the regional activities of MAPE as a member of the committee first in the Chiltern Region and more recently in the Southern Region of the country. Helping to organise local events has brought me closer to the needs of the classroom teacher; in any region it is important to canvass the wishes, problems and fears of the people using computers with the children. Unless the teacher is reasonably confident about using it, the hardware will remain gathering dust in the corner of the classroom, however much material there may be on offer to excite and stimulate the pupils.

There is an area of concern which is likely to be in the minds of all those who are confident about, and committed to, the use of computers in the classroom. The pace of change is so fast that there is barely time to pause and take breath. No sooner were the suspicious adults (and the adults are the ones who need to be convinced) reconciled to the appearance of a BBCB in the school, or if they were lucky – in their own classroom – when along came the Master – and it had more keys! Software they had become comfortable with was deemed out of date – and it frequently 'crashed' when they tried to use it on the updated hardware. Then we had the open-ended software in the classroom, the logo programs, word processing, desk top publishing, data bases, et al. A concept keyboard is purchased by the enthusiastic co-ordinator, but the hard-pressed teachers have to adapt their own software; and many are still not sure how to load the programs they *are* using if the 'boot' fails to work! Control becomes the 'buzz' word, but who can help them to operate the mysterious green box? And now . . . the Archimedes! A superb machine; an ideal we should all strive towards; but *Podd, Droom*, and dare I say it – *Granny's Garden* will not operate on such sophisticated machinery (what a waste of its enormous potential anyway).

The advent of the National Curriculum has increased everyone's awareness of the potential of the computer, and indeed it, or IT, is fundamental to the full implementation of the curriculum requirements. Support, advice and someone to hold our hands has never been more important. What an opportunity for MAPE! Such an organisation has never been more needed than it is now. It is the only national body with the resources to provide the back-up needed at the present time.

It is enormously important however for any organisation dealing with such a widespread but still specialist subject to remember each of its members. Even given today's increased awareness of the role of computers in the classroom there are newly-trained teachers coming out of college who have not received all the necessary exposure to computer applications. There are still teachers in the classroom who are wary, to put it mildly, of the technology which is overtaking them. There are mature teachers returning to a profession which has moved on without them. There is a constant and continuing need to keep going back to the beginning. Although progress must be made, the enthusiastic specialist must remember to make haste slowly. There is nothing more intimidating than an expert who displays impatience for the uninitiated!

MAPE, in both its national and its regional capacities, can do so much.

Time and money, however, in today's educational climate provide a sticking point. Many teachers, in the maintained sector in particular, are overloaded with paperwork and are increasingly reluctant to give yet more of their time and (often) personal money to attend courses. The onus is perhaps on MAPE to provide something that is too good to miss! In this context any conference or workshop session must appeal to people at all stages of development. If it is perfectly clear that there will be 'something for everyone' then the less confident will not be put off from attending, and the proficient will feel willing to come along to learn something new as well as share their expertise with the beginner.

There is a large potential audience for such conferences and workshops amongst the teachers in independent schools. Money is often available for hardware but teachers in the private sector are largely denied access to the INSET programmes organised by local authorities. There are opportunities, such as the Ellis Meetings, but these are few and far between, and suffer to a large extent from the familiar problem of having gone too far beyond the average classroom teacher, thus again being only suitable for the enthusiast.

Having recently organised a meeting under the umbrella of the GSA, I have been made keenly aware of the potential audience available. This one-day conference looked at computer applications for Information Technology and was attended by about 100 teachers from all over the South of England. Had it been more widely publicised (which was not within our brief at that time) I think we could have attracted twice that number of interested delegates! It is obvious that there is an enormous potential audience for a good support organisation. Given adequate funding to supply plenty of hands-on workshops, sufficient advertising, and plenty of advanced notification, MAPE can fill a gap in INSET provision for all teachers.

The members of the regional committees are only too eager to carry 'the message' to all teachers, of the fundamental role computers can play in the school curriculum. MAPE has the potential to carry it out.

Here's to the next ten years!

"

[From an article outlining experiences after the loan of a PET computer from Newman College.]
'The PET created its own problems and the first practical test – there were no programs! So one weekend and a bottle of Optrex later and no small thanks to Newman's Basic Programming Course, I emerged with a suite – be it ever so small – of working programs.'
[I wish it were that easy today.]

MICRO-SCOPE 4, page 13, David Breedon, Parkside Junior School, Sandwell

[From an article entitled 'The Software Express'.]
'The next stop is at ACORN JUNCTION, actually there's nothing there, but plenty of promises that all will be well in six months: . . .'
[We are still at the 'waiting for the programs' stage with some software houses.]

MICRO-SCOPE 9, page 14, Roger Keeling

'There has to be a grain of truth in the advice – all you need is a wordprocessor, data base and turtle graphics (plus an adventure?) If these few resources were used to the full there would be no time for ZAP-ADD SPLAT-SPELL and TABLES-ADVENTURE.'

MICRO-SCOPE 13, page 3, Mike Matson

"

MAPE news

Chiltern

We had a very successful session on 'Control' in Barnet on 17 November. Participants tackled tasks suitable for beginners through to more advanced ideas. Activation of clowns with flashing eyes, revolving bow ties, morse signals, burglar alarms, courtesy lights and joke mugs made the evening enjoyable and informative.

Our next Saturday morning session will be in Ware, Hertfordshire, on 9 March, and will concentrate on adventure programs and how they can enhance classroom practice and be used in a cross-curricular manner. If you are interested and would like to join us or indeed if you have any ideas or views on the Chiltern Region, please phone me on 081 866 0827.

Betty Lumley

Ireland

MAPE Ireland are presently involved in organising their third Regional Conference to be held in Stranmillis College, Belfast on Friday 8 and Saturday 9 March 1991. We hope to provide workshops as well as a variety of presentations for a maximum of 120 delegates from all over Ireland.

Among the presenters we hope to have Chris Robson, Keith Hemsley and Roger Keeling from the mainland as well as many local members. The Committee are looking forward to yet another highly successful Conference and ask delegates to book early as places are limited.

Mavis McKeoun

London

The first meeting of the group was held on Saturday 17 November at ILECC Educational Computing Centre, after an informal meeting to 'test the water' in September. The focus of the meeting was the MAPE Discs and the members present all found something useful and interesting in them, especially those who hadn't previously seen the Owl Pack, but it was generally agreed that a large part of the value was meeting other people and exchanging ideas and experiences.

ILECC is well supplied with RM Nimbus computers, but not with BBCs, so on Friday evening and Saturday morning BBC computers were unloaded from various schools and centres, carried upstairs and set up. People who are prepared to carry their hardware about *must* be enthusiasts!

To have a single site for the first year seemed to be a good idea and Roger Whitfield, the ILECC director, has offered the centre's hospitality to help get us started.

We have set the dates for the next two meetings, which will both be at ILECC – 2 February, when the focus will be 'Using the Concept Keyboard for Writing and Information Retrieval'; and 18 May when we hope to do some Control Technology. Details with be circulated later.

If anyone has used *Touch Explorer Plus* and/or *Display*, and has information files which could be used as examples, we would be grateful for a loan, or better still a demonstration. Also anyone with a computer-controlled model, or a 'new' way of using a robot or turtle they would like to show to a wider audience, would be most welcome to join our workshop in May.

After these dates, we will be meeting in other centres. So far Newham and Croydon are on the list.

If anyone is interested in joining the group, please contact Eileen Jaques at ILECC, John Ruskin Street, London SE5 0PQ.

Eileen Jaques

South Eastern

The latest edition of *MICRO-SCOPE* shows the position of representative of this region as vacant. There was *one* response to my request in *MICRO-SCOPE 30* for interested members to contact me.

At the last Committee meeting, on Monday 18 June, the faithful few who *always* turned up to support events reluctantly decided to disband. Teachers in this vast region do not support the MAPE events laid on for them. When teachers who work at the school where an event is being hosted are not even curious or interested enough to drop by themselves, then it is time to call a halt. Perhaps if we had charged for events, people would have turned up. Perhaps if we had engaged a 'famous' speaker as the main attraction people might have found the time to come. Perhaps if we had organised a Saturday workshop . . . Who can tell? Suffice to say that the 'drop-in' style of open computing evenings where visitors could browse, watch demonstrations, ask questions and try out programs is no longer appropriate.

The current position is that not only do we lack a Regional Representative, we also lack a regional Committee. I should like to express my appreciation to Pearl Marriage, Ruth Derby, Carol Pointer, Michael Bingham and John Lodge for attending the last Committee meeting – especially to John who had driven all the way up from South of the river expecting to see a flourishing concern. I also wish to thank the afore-mentioned plus Mary Rooney, John Bowers, Chris Curtis, Ruth Hale, Aditi Stephens and the others who always turned up to assist at our S.E. MAPE events.

Jane Sealy

West Midlands

Early Years Conference:
Saturday 10 November 1990

The West Midlands MAPE region put together and ran a most successful one day conference at Newman College for around 120 delegates with the theme 'The Early Years'.

The format for the day was as follows: two workshop/presentation sessions in the morning with a third in the afternoon concluding with a keynote speaker, lunch and tea provided.

Juliet Joy, Advisory Teacher from Dudley, looked at using the Valiant Roamer in the classroom, while Di McCann, also from Dudley, looked at introductory activities leading to using a floor turtle.

Alan Smith, Music Advisory Teacher from Hereford and Worcester, wonderfully displayed the use of the A3000 to extend music in the classroom, whilst next door Pam Waters and Sue Timms from Sandwell had the delegates leaping about with the expressive arts using *Podd* and *Letterland* for the stimulus.

Geoff Turrell, Advisory teacher for Birmingham, and Sue Stevens, Advisory Teacher for Sandwell, fired the delegates with enthusiasm to use the concept keyboard on the Nimbus and the BBC respectively.

The multilingual wordprocessor, *AllWrite*, was demonstrated in its Punjabi mode by Viv Wheatley from Birmingham, who showed how she had used it in the classroom with six- and seven-year-olds.

Steve Hartland, the special needs advisory teacher from Dudley, most ably demonstrated software and peripherals such as the touchscreen and the concept keyboard.

Anne Farr from Newman College attempted two impossibilities: 1) to get all the delegates into one room at once, and 2) cover 'An IT policy for early years' in less than one hour. (That's a day conference in itself – watch press for details!)

Janice Staines from NCET used the story book, *The Lighthouse Keeper's Lunch* as a stimulus for technology. She also demonstrated sorting and ordering activities related to a basket of clothes.

Chris Hurrell, Advisory Teacher from Shropshire, looked at the processes leading to data handling with Key stage 1 children. He used the new MAPE graph generator *Graph-It* for its first public demonstration, and it met with many favourable comments. (You will have received *Graph-It* with the *MICRO-SCOPE Christmas Special*, and by the time you read this have jetisoned all your other graph generators in favour of *Graph-It*.)

Barry Wake, the Early Years Consultant from NCET, had to work hard in the afternoon; not only did he run a workshop looking at nursery rhymes as a generator of NC Science activities, but also was immediately followed this by delivering a very full keynote speech with the title 'Technology in the early years – where do you start?'.

During the day delegates were asked to complete an evaluation/questionnaire to help WM MAPE to identify how they might meet more closely the needs of its members, and to provide valuable feed-back on the day as a whole. Thanks to all delegates who did complete and return this sheet.

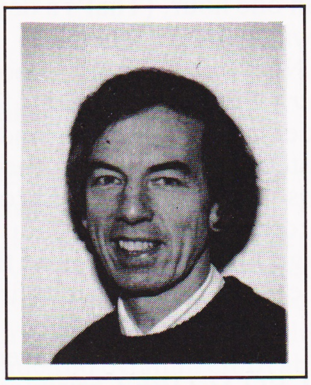
Thanks for this event must go to:

- all who attended as delegates;
- the two technicians, Terry and Matthew, who made sure that all the right equipment was in the right room at the right time and working correctly, and for smiling while they did it;
- all the presenters of the 13 different workshop/presentation sessions, many repeated twice to give a total of 23 sessions;
- the WM-MAPE members who ran the reception, information desk and did a multiplicity of other jobs before, during and after the day;
- our keynote speaker;
- the staff, both domestic and academic, of Newman College for allowing us once again to use the excellent facilities of the College and for oiling the wheels of the Conference;
- and particularly to Anne Farr who volunteered to take on the herculean task of organising the whole thing and making sure that it all fitted together.

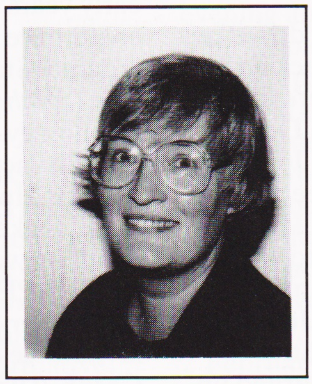
A good conference – look out for the next one.

Chris Hurrell

ROGUES'

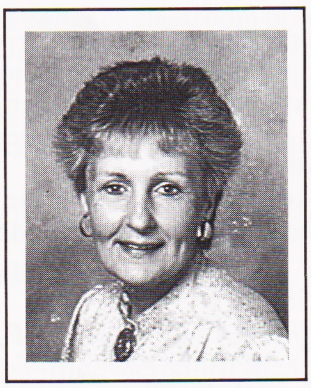


Roger Keeling
Chairman, MAPE

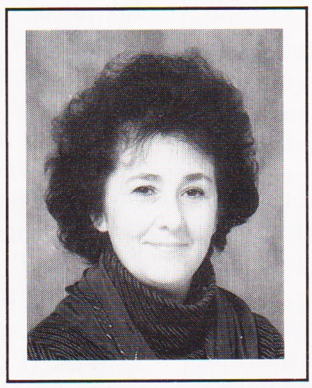


Senga Whiteman
Editor, MICRO-SCOPE

Keith Whiting
Treasurer



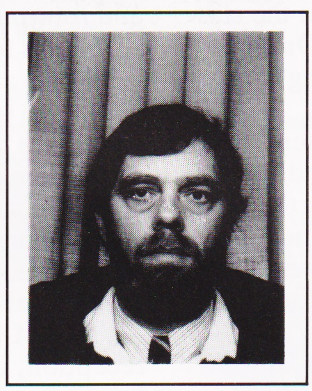
Alison Galbraith
Secretary



Anne Liddle
Publicity Officer

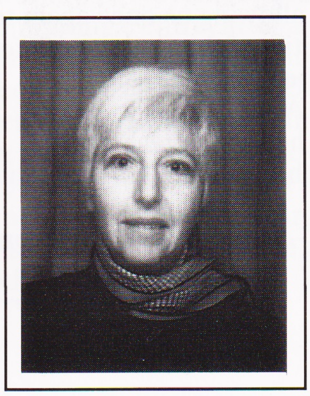
Val Siviter
MAPE Subscriptions

Chris Britten
South Wales Rep.



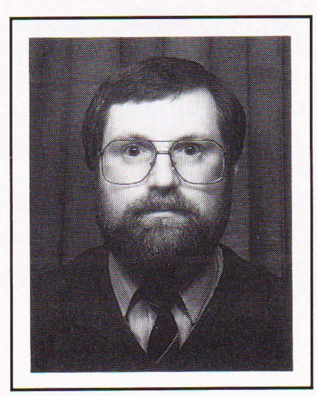
Stan Norman
East Midlands Rep.

Les Watson
Co-opted member



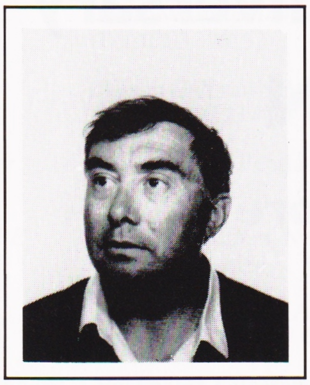
Betty Lumley
Chiltern Rep.

Peter Aitchison
Southern Rep.

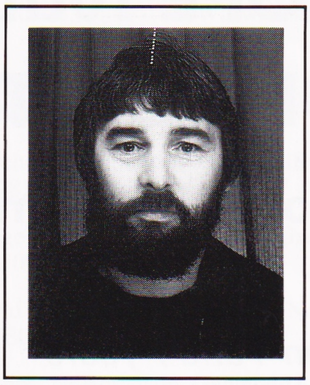


David Campbell
Northern Rep.

GALLERY

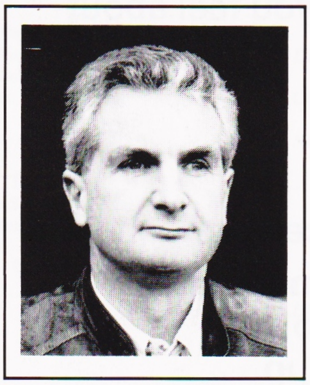


Dave Siviter
North Wales Rep.



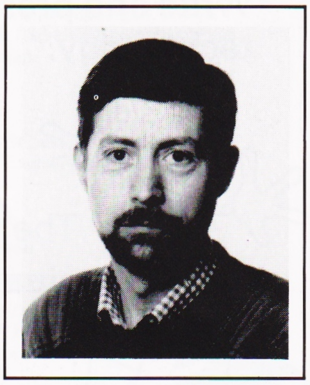
Bill Urwin
Great Western Rep.

Chris Robson
Overseas & Foreign Rep.

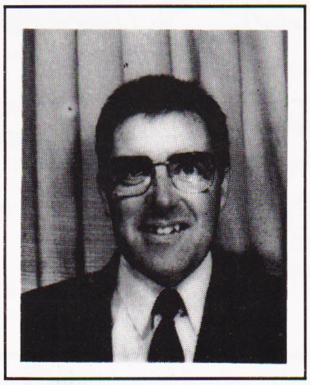


André Wagstaff
Co-opted Member

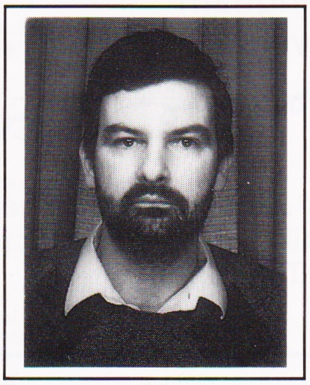
Yvonne Peers
MAPE Sales



Chris Hurrell
West Midlands Rep.



Pete Young
Ireland Rep.



Mike Faux
Castlefield Publishers

Barbara Faux
Castlefield Publishers

MICRO-SCOPE 10th Anniversary COMPETITION

Sponsored by Commodore

Category 1:

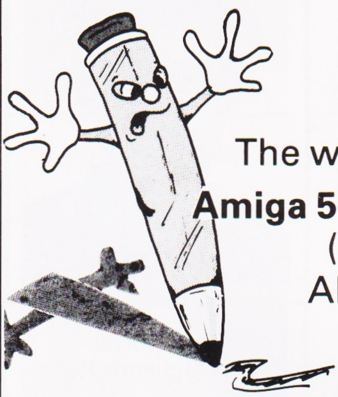
Children aged between 4 and 7 years

Design and create a greetings card using a computer as one of your tools (maximum size of card – A5).

Category 2:

Children aged between 8 and 13 years

Write and present a poem that expresses how you feel about technology.



PRIZES

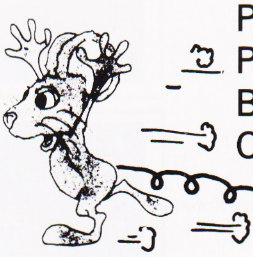
The winner for each category will receive an

Amiga 500 plus Deluxe Print and a TV modulator

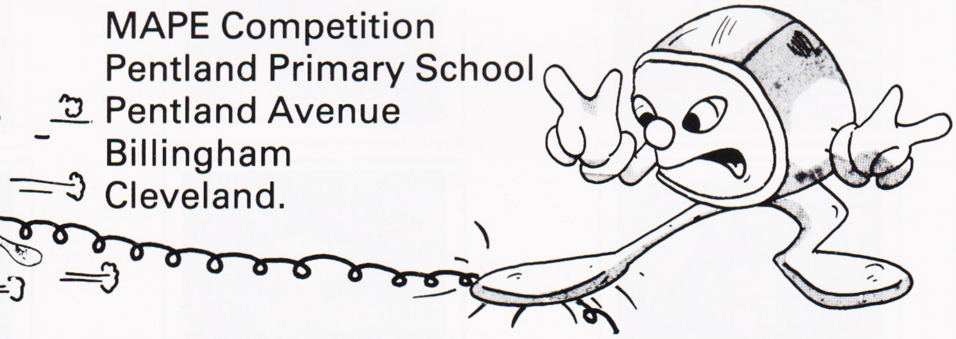
(retail price £299) for their school.

Also personal prizes for runners up.

Entries, with name, age and address on the back, to:



MAPE Competition
Pentland Primary School
Pentland Avenue
Billingham
Cleveland.



Closing date: 14 July 1991. Winners will be notified at the beginning of September. If you would like your entry back please enclose a stamped, self-addressed envelope. Thank you.

MAPE National Committee Members 1990

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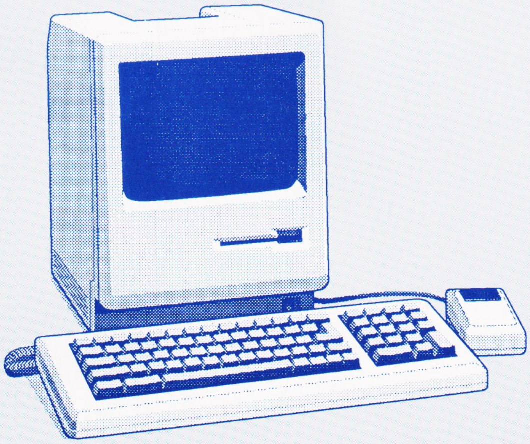

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