MICRO-SCOPE

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Infants' Number Work with Pressure Mats

Authoring Software **Using *Pond Dipping***

Microcomputers in Primary Mathematics

Special: Micros and the Under-Fives

NEWMAN COLLEGE WITH MAPE

Contents

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MICRO-SCOPE 26

The National Curriculum: Attainment targets and programmes of study

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Proposals for the National Curriculum in mathematics and in science, including primary technology, have now been published by the Department of Education and Science and the Welsh Office in reports called *Mathematics for ages 5 to 16* and *Science for ages 5 to 16*. The proposals in the two reports 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). Proposals for English and for design and technology, including information technology, have also followed but are not under discussion here.

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. On this scale, level 2 corresponds to the attainment expected of an average 7-year-old, and level 4 to the attainment expected of an average 11-year-old. In general, levels 1 to 5 cover the primary phase.

Programmes of study are described for four key stages – periods of compulsory schooling at the end of which children's performance against the attainment targets will be assessed and reported to parents and to others. The two key stages for primary schools are for children aged 5 to 7 and for children aged 7 to 11.

The proposals for mathematics and science include several references to information technology and the use of the computer. Between them these references provide a basic framework of attainment targets and programmes of study for computer use throughout the primary years. The emphasis in the framework is understandably on mathematics and science, so there are relatively few references to the use of the wordprocessor, or of painting and drawing software, or of music making programs. However, schools may like to add their own references, and to check these against the proposals for English and for design and technology.

Programmes of study

For pupils aged 5 to 7 years

Science – information transfer: Children's normal work in all areas should involve where appropriate the use of information technology.

Mathematics: The computer can be used in a variety of ways to support mathematical work in the early years. There are programs available for investigative work such as creating patterns and tiling designs. The programming languages, such as Logo, offer opportunities for children to explore shape and direction, number relationships and patterns. A database can be used to store and to process information which has been collected as part of a survey. The wordprocessor can be used by individuals or groups of children to record results and to write stories involving mathematics.

For pupils aged 7 to 11 years

Science – information transfer: Children should have the opportunity to use and investigate a range of devices for the transmission and storage of information, for example, telephone, radio, television, tape recorder, records. Children's work in a wide variety of areas should incorporate the use of information technology for storing, processing, retrieving and presenting information, and for simple control applications.

Primary technology – using forces and energy Their work should also include the use of information technology for storing and processing information and controlling energy (such as moving a buggy vehicle or working a lighting system).

Primary technology – communicating technology: They should experience the use of a computer for wordprocessing, and data handling. They should have the opportunity to use a computer to monitor aspects of change in the environment (such as temperature or animal behaviour).

Mathematics: The computer can be used in an increasing variety of ways to support mathematical work for pupils aged 7–11. For example, the programming languages, such as Logo, offer varied opportunities: for the use of mental arithmetic, for estimation, for the testing of hypotheses, for the exploration of different mathematical ideas, such as positive and negative numbers, distance, time, speed, angles, coordinates, symmetry, properties of two-dimensional shapes, enlargements, scale and variables. A database can be used to store and to process information. A variety of graphs, charts and tables can be produced, to help with the interpretation of data. Simulation programs which involve problem solving can provide a focus for extended work over a period of weeks, and for the integration of mathematical work with other aspects of the curriculum.

Attainment targets

Level 1

Give and understand instructions for moving along a line.	Shape and space

Level 2

Give and understand instructions for turning through right angles.	Shape and space
Help to design a data collection sheet.	Handling data

Level 3

Know it is possible to communicate information over long distances by a variety of means.	Information transfer
Deal with inputs and outputs from simple function machines.	Algebra
Understand a negative output on a calculator.	Number
Use Logo commands.	Algebra
Control energy flow using simple devices.	Using forces and energy
Know that computers can be used for storing information and retrieving it and selecting it rapidly.	Information transfer
Enter and access information in a simple database.	Handling data
Use a simple database to store, retrieve and use information for designing.	Communicating technology
Read digital and analogue clocks correctly.	Measures

Level 4

Be aware of aspects of calculator rounding errors, eg that 7 / 3 x 3 = 6.9999999 may occur.	Number
Create shapes by use of DRAW and MOVE commands in the appropriate graphics mode, or using Logo.	Algebra
Create a decision tree diagram.	Handling data
Know from experience that computers can store pre-programmed sets of instructions that can be used to control external devices.	Information transfer
Use a computer to store, process or control information.	Using forces and energy
Use IT techniques to help when designing.	Communicating technology

Level 5

Follow simple sets of instructions to generate sequences.	Number/Algebra
Understand programs like: 10 FOR NUMBER = 1 TO 10 20 PRINT NUMBER * NUMBER 30 NEXT NUMBER	Number/Algebra
Use and refine 'trial and improvement' methods.	Number
Design and use an observation sheet to collect data.	Handling data
Insert and interrogate data in a computer database, and draw conclusions.	Handling data
Construct, read and interpret a flow diagram without loops.	Handling data
Select and use appropriate energy sources and control them using electrical devices (including computer control).	Using forces and energy
Use a computer to monitor information about change in the environment.	Communicating technology
Know about two-state electronic devices and the application of such devices to logical decision making, binary counting and information storage.	Information transfer

Who should write the software?

It can't be that easy!

. . . OR how to author your own software

Les Watson
College of St Paul & St Mary, Cheltenham

When I sent in the article which appeared in *MICRO-SCOPE 25* describing how I had used authoring software in a primary classroom, the editor phoned me to say it was OK, but . . . I'd made it sound so easy!

Well it is!

What is not going to be easy is condensing the authoring software manual into a couple of pages for this article!

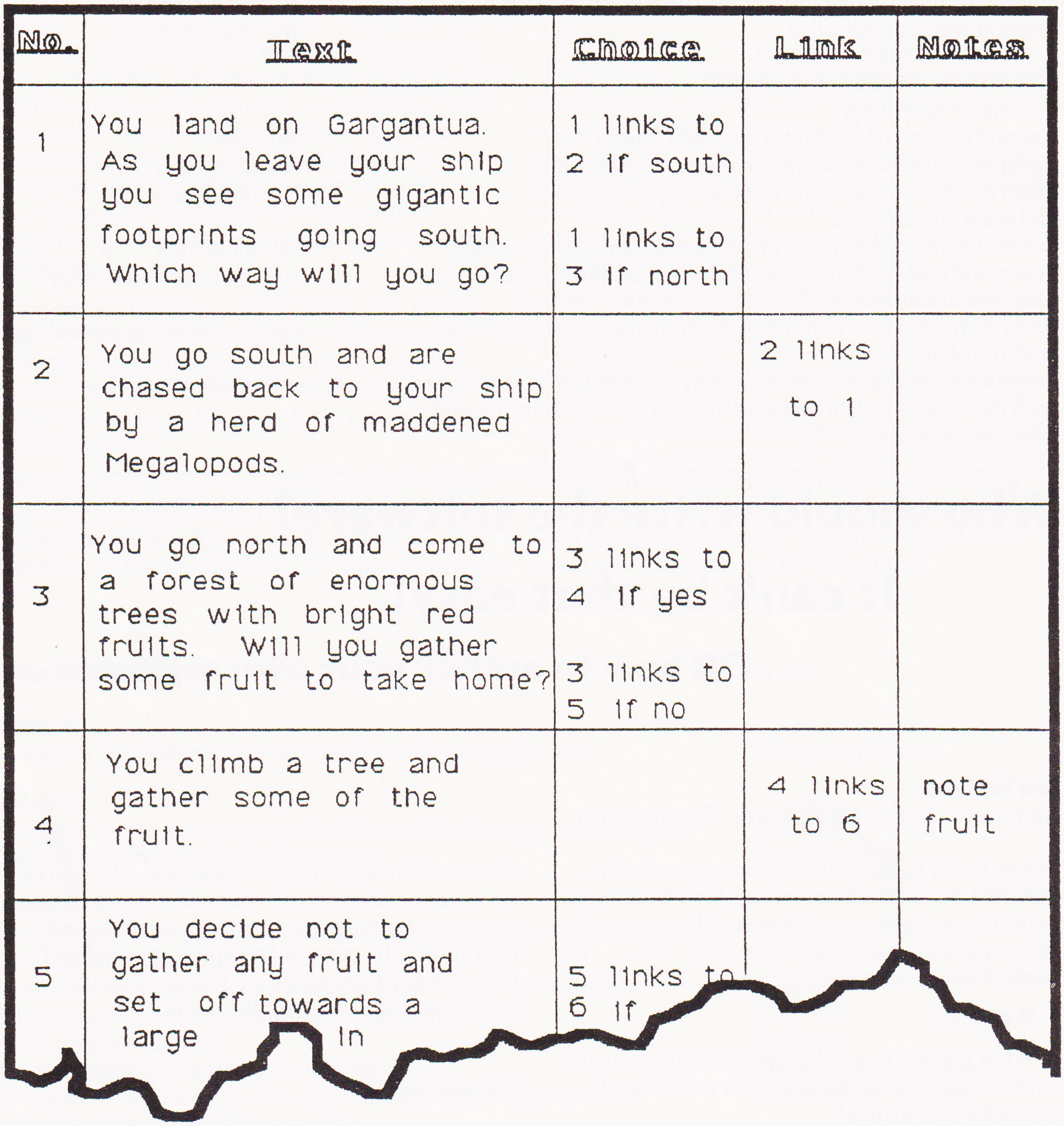
An authoring package is a piece of software which allows a person who is *not* a programmer (e.g. a teacher) to produce programs. The two authoring packages I have been using are *Linx88* and *Key88*. The two packages are very similar from a user's point of view, so in this article I will concentrate on one of them, ie *Linx88*, which is particularly suited to writing simulations.

The concept

The concept of *Linx88* is that screens of text can be linked to one another either directly or by choices. Consequences of choices can be carried forward to other events. The authoring software operates in two modes, authoring mode and user mode. In most of the applications that I have made of the software I have been the author and the children the users.

The planning

There are two stages to writing a program with *Linx88*. Stage one is the 'planning' stage and requires pencil, paper, imagination, and hard work. Stage two is the 'typing it into the computer' stage, and is easy but, with a long program, can be tedious. I generally work with the class teacher for the planning stage, but being a motor moron I can cope with the typing in bit on my own! The planning should really start with an idea (I don't have many of those!) – something like 'the children land on a planet called Gargantua and have to make decisions about where to go and what to do, and try to bring back useful items to Earth'. From here what we need is to make a detailed plan of the



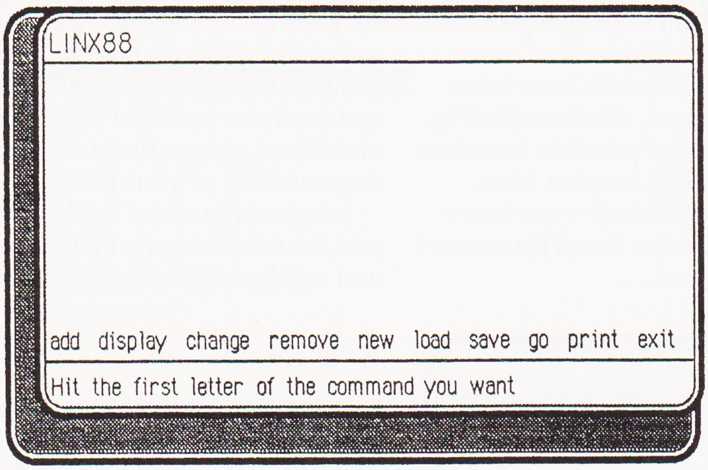
No.	Text	Choice	Link	Notes
1	You land on Gargantua. As you leave your ship you see some gigantic footprints going south. Which way will you go?	1 links to 2 if south 1 links to 3 if north		
2	You go south and are chased back to your ship by a herd of maddened Megalopods.		2 links to 1	
3	You go north and come to a forest of enormous trees with bright red fruits. Will you gather some fruit to take home?	3 links to 4 if yes 3 links to 5 if no		
4	You climb a tree and gather some of the fruit.		4 links to 6	note fruit
5	You decide not to gather any fruit and set off towards a large in	5 links to 6 if		

Fig. 1 *The planning table.*

simulation. If this is put into a format which relates to the way in which *Linx* works then typing it in is made much easier. I usually use a table (Fig. 1, above) for the planning which shows each piece of text, its number (so that the computer can recognise it!) and how it is linked to other pieces of text.

Using the computer

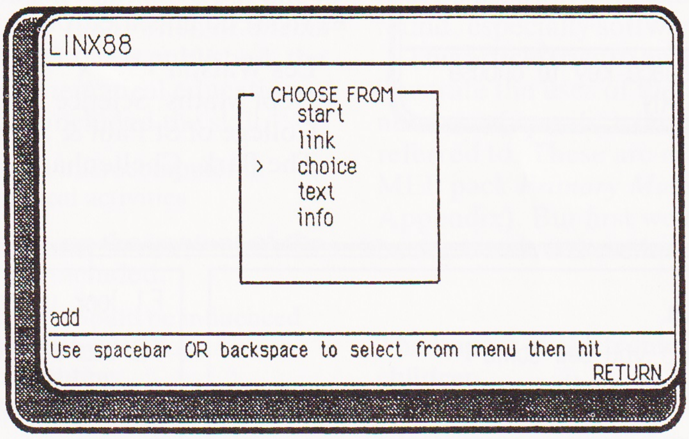
Now that we have a plan to work to we can start to use the computer! This part of the process is trivial compared to thinking up and structuring the topic. When *Linx88* loads up it presents us with a menu screen as shown in Fig. 2. Selection from this menu is made by typing the first letter of the command. Writing the simulation consists merely of 'adding' information. It does not matter in what order the information is added, except that text cannot be added if no links or choices have been added first. At each stage the input of information is prompted by menus and input boxes. The input boxes (Figs 3, 4 and 5), have a layout which requires information in the form shown in the table in Fig. 1.



Hit the first letter of the command you want

fig2. **The Menu Screen**

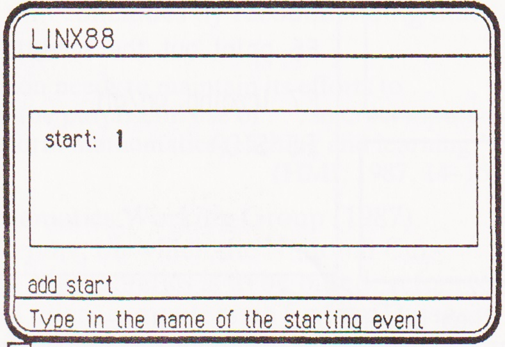
Choosing from the menu



Use spacebar OR backspace to select from menu then hit RETURN

fig 3. **The Add Menu**

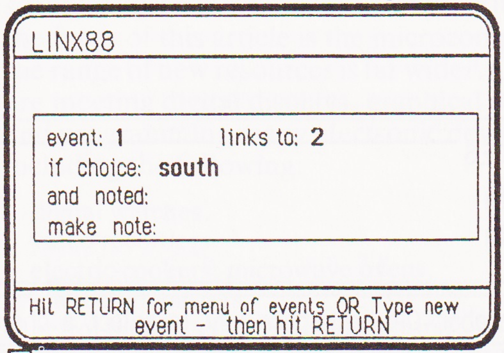
OR



start: 1

Type in the name of the starting event

fig 4. **Adding the start**



event: 1 links to: 2
if choice: south
and noted:
make note:

Hit RETURN for menu of events OR Type new event - then hit RETURN

fig 5. **Adding a Choice**

It's best to start by adding a Start! This is shown in Fig. 4. Choices and links can also be added, eg Fig. 5.

When some links and/or choices have been added, we can start to add text. As shown in Fig. 6, when text is added, a list of possible locations for the text is given, and once one has been selected the text box is available to type into – just as if you were typing into a word processor!

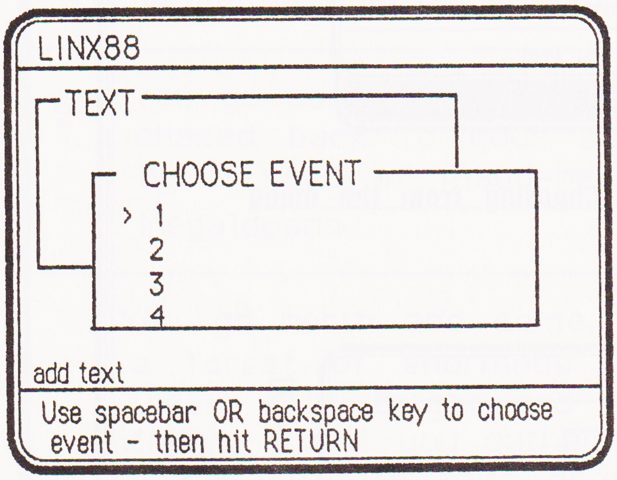

```
LINX88
TEXT
    CHOOSE EVENT
  > 1
    2
    3
    4
add text
Use spacebar OR backspace key to choose
 event - then hit RETURN
```

Fig. 6 *Adding text*

Linx88 attaches each piece of text to the correct link or choice – the order in which they are typed does not matter. From Fig. 2 you can see that any mistakes with entry of information can easily be rectified using **change** or **remove**, and if you get confused **display** will show the current state of your program.

Load and **save** are for keeping work on disc and for retrieving it. **Print** will print the screen and **exit** leaves the authoring program.

What does 'go' do?

Go puts the program into play mode, ie for the children to use. Fig. 7 shows what the screen looks like in play mode using our program shown in Fig. 1.

I hope that's given you some idea of just how *easy* authoring programs with *Linx88* is! If you have a Nimbus or IBM compatible computer and would like to know more about *Linx88* and *Key88* send an s.a.e. to:

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The Park, Cheltenham, Glos GL50 2RH.

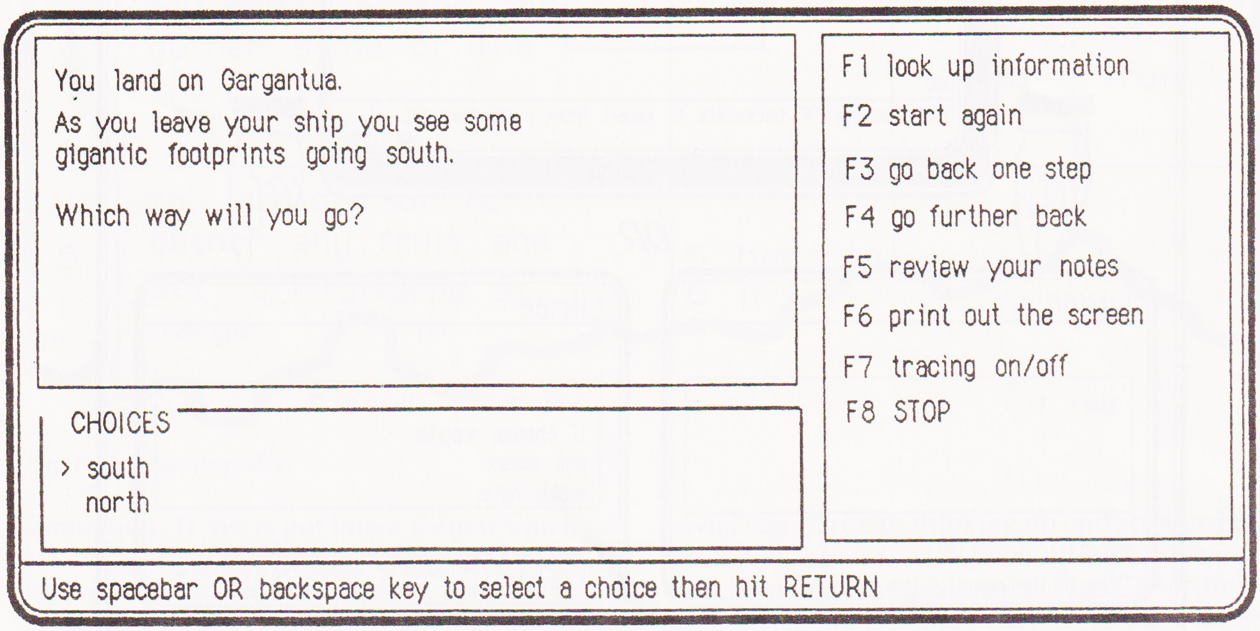
```
You land on Gargantua.                      F1 look up information
As you leave your ship you see some         F2 start again
gigantic footprints going south.            F3 go back one step
                                            F4 go further back
Which way will you go?                      F5 review your notes
                                            F6 print out the screen
                                            F7 tracing on/off
 CHOICES                                    F8 STOP
> south
  north
Use spacebar OR backspace key to select a choice then hit RETURN
```

Fig. 7 *Using the program*

The role of the microcomputer in Primary Mathematics

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Introduction

The last decade has seen the spread of a new resource with the power to radically transform the teaching and learning of mathematics in primary schools: the microcomputer. Although the Cockcroft Report (1982) on the teaching of mathematics devoted a chapter to computers and calculators, there was no widespread adoption of the microcomputer until the Department of Trade and Industry initiative put one in every primary school. By 1985, when *Mathematics from 5 to 16* (HMI; 1985) was published, the list of objectives for mathematical education from five years onwards included the skill:

> Objective 9. the use of a microcomputer in mathematical activities

and the criteria for choosing the content of the mathematics curriculum included:

> Criterion 10. the content should be influenced increasingly by developments in microcomputing.

The second edition of this document incorporates the responses of the education community, indicating a broad measure of support, and concludes by recommending that the teaching

> 'profession needs to maintain its efforts to . . . develop the purposeful use of . . . microcomputers to transform mathematics teaching and learning.'
> (HMI; 1987, 14–15)

The Mathematics Working Group (1987) *Interim Report*, on which the National Curriculum in Mathematics is to be based, refers to the role of microcomputers on 5 of its 22 pages, and states:

> 'the provision of the national mathematics curriculum should ensure . . . the use of . . . microcomputers as appropriate.' (page 5)
> 'It is the view of the working group that mathematics is learned by . . . using various resources . . . [including] . . . microcomputers.' (pages 6–7)

Thus teachers of mathematics at all levels, including primary school teachers, can expect to see a greater prominence given to the use of microcomputers in the teaching and learning of mathematics. The same is likely to be true across the whole of the National Curriculum for primary schools, but this article will deal only with mathematics.

The pressure to include more use of the microcomputer in primary mathematics raises a number of questions: What does the microcomputer offer the teaching and learning of mathematics in the primary school? How can it best be used? Where can suitable resources be found, especially software?

This article tries to answer these questions. To illustrate the uses of the microcomputer, a number of specific examples of software are referred to. These are mainly drawn from the MEP pack *Primary Maths and Micros* (see Appendix). But first we consider the background to these innovations.

The impact of electronics on primary age children

Electronic resources – modern microchip and information technologies – are impinging on schoolchildren in a number of ways. Although the focus of this article is the microcomputer, the range of new resources is far wider. Children are meeting digital displays, graphical displays and programming many electronic devices, including the following:

digital watches,
video recorders,
electric cookers, microwave ovens,
microchip toasters,
petrol pumps, electronic calculators,
electronic weighing machines,
electronic checkout tills,
hi-fi systems, telephones,
hand held video games, video arcade games,
electronic teaching aids such as 'Speak & Maths' and 'Little Professor'
programmable toys such as 'Big Trak',
microcomputers, word processors,
interactive video systems (such as with the Domesday disc),
microcomputer controlled robotics.

This list, although far from complete, begins to show the impact that the electronic revolution is having on the experience of primary school children. We can expect this impact to accelerate as the children of today approach adulthood in the 21st Century. Already this impact calls into question some aspects of the mathematics curriculum, as *Mathematics from 5 to 16* (HMI, 1985) anticipated.

How useful is telling the time on a traditional circular display? Digital displays of time now dominate the child's experience.

How useful is proficiency in operations on fractions? Decimal fractions wholly dominate commerce, industry and higher education.

How necessary are the traditional computational algorithms (the four rules)? Anywhere outside school that calculations are needed they are done mentally or with an electronic calculator, or with a computer spreadsheet.

How well are children prepared for the computer age? Are they being taught to read information in graphs and tables? Are they learning to think procedurally, in terms of sequences of operations? Are they acquiring a feel for large numbers, and for variables? Are they learning to formulate and solve problems, and to check their solutions for reasonableness?

This article will not answer these questions (but for the beginnings of an answer see Shuard, 1986). However, one thing is certain. Children will need to be familiar with the products of the electronic revolution as preparation for living and working in the world of the 21st Century. Foremost of these products is the microcomputer, which has unlimited potential to change the worlds of commerce, industry, government and education. As indicated, we will focus on only one part of this last area: the potential of the microcomputer for the teaching and learning of primary mathematics.

The microcomputer in primary mathematics

The microcomputer has the power to radically transform the teaching of mathematics in the primary school, because it offers both teacher and learner new ways to approach mathematics. Some of these new ways, such as the introduction of more problem solving, investigation and mathematical discussion, have been recommended independently of the microcomputer. The microcomputer is a powerful resource for facilitating and implementing these approaches, beyond normal classroom practice. In other ways, the micro offers the learner genuinely novel experiences: access to controllable graphics and animation, interaction with an almost infinitely variable medium, instantaneous feedback and the non-judgemental correction of mistakes, mathematical adventure gaming, the opportunity to program the computer in languages such as Logo and Basic, to name but a few of the experiences available. These teaching and learning approaches are now available to primary teachers with very little expertise and experience in Information Technology. More important are curiosity – a willingness to explore the medium – and humility – the acceptance that our students will rapidly outstrip us in knowledge and expertise.

We begin to consider the approaches that the microcomputer makes possible by classifying the different ways in which it can be used in the classroom. First of all, it can be controlled by the *teacher* or by the *learner*. The distinction is between the microcomputer being used by the teacher for demonstration and discussion purposes, or the children using it for themselves in their learning (interacting 'hands on', as it is termed). A second distinction can be drawn between two modes of use: the difference between *using software* – using ready made programs and software, and *programming* the computer. These two sets of distinctions are combined in Table 1.

Table 1 shows a sample of the more common uses of the microcomputer in primary mathematics. It is far from complete, and enthusiasts will know that there are very fruitful activities involving the creation and use of databases, spreadsheets, robotics, Prolog programming, and so on, beyond what is mentioned, which will not be discussed here. This still leaves the vast range of activities under the headings listed in the table.

The view adopted here is that each of the four categories shown – teacher led use of software, teacher programming, child led use of software, child programming – has a great deal to offer. Unlike Seymour Papert (1980), who argues that using software is 'letting the computer program the child', the present author's view is that good software can be used very fruitfully in the primary classroom. In fact, given that most primary school teachers will not initially have the interest, confidence or skills to program the microcomputer, the uses of software are likely to provide the most widespread and effective approaches to microcomputer use. Certainly they represent the more accessible ways of introducing the microcomputer into primary mathematics.

We consider each of the four main categories in turn, but for the above reasons focus mainly on the uses of software.

Table 1 *Different types of use of the micro in mathematics teaching.*

CONTROL *Mode of Use*	*TEACHER* *(Teacher demonstration)*	*LEARNER* *(Children 'hands on')*
Using software	Demonstration Simulation Posing problems Starting investigation Data display	Concept learning Problem solving Exploring, investigating Game playing Adventure gaming Data display Skills practice
Programming the computer	Short programs Calculating on the screen Graphics	Logo programming Basic programming Short programs Projects

Teacher-led use of software

There are a number of ways that a teacher can initiate class activity through the use of software including: demonstration, simulation, problem posing, starting an investigation, and data collection and display. In addition, the teacher can bring the class together during topic or project work, for example, and use the micro-computer to summarise and display the data generated by the children. We examine a number of these specific types of use.

1. Demonstration

The teacher can introduce children to an area of activity by means of a demonstration of some computer animated graphics, followed by a class discussion. An example is provided by the MEP program *Halving*, which shows the attractive and increasingly complex division of a square into a pattern of blue and red regions (of equal areas). The program can be stopped at any point (by pressing space bar) for closer examination and discussion, and the children asked, for example:

What pattern is showing? What shapes?
What mathematical ideas does it illustrate?
What fraction of the whole square is the red region?
Are you sure?
What argument could you use to convince somebody else of this?

Halving provides a stimulus for a whole class discussion which could include halves, fractions, patterns, circles, symmetry, tilings, areas, shapes, and so on. Figure 1 shows a concept web of how these ideas can be developed from a class discussion of *Halving*. It has been successfully used as an introduction to project work, with children making their own patterns, and to a discussion of how the ideas generated relate to the children's experience and environment.

Clearly the use of software for teacher demonstration is most likely to be effective if there is a full discussion, and then the children engage in related follow-up work, as is suggested in this example. Simulation software (which involves sequences of images simulating some real world events) can be used in the same way.

2. Problem posing and starting an investigation

The teacher can use software to pose a problem or to start an investigation. For example the MEP programs *Patterns 2* and *Find Me*, pose problems. In *Patterns 2* the teacher, or children, choose the size of a large equilateral triangle grid. Then they have to guess or predict the number of triangles in the bottom row. Thus if a triangle size seven is chosen, a display like that in Figure 2 is shown.

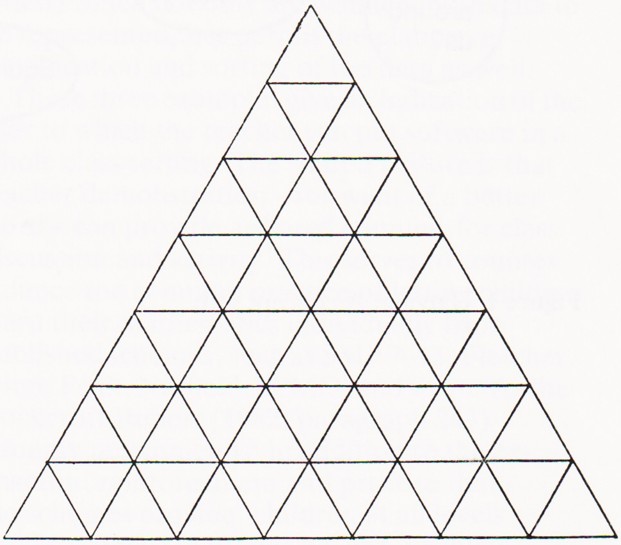


Figure 2

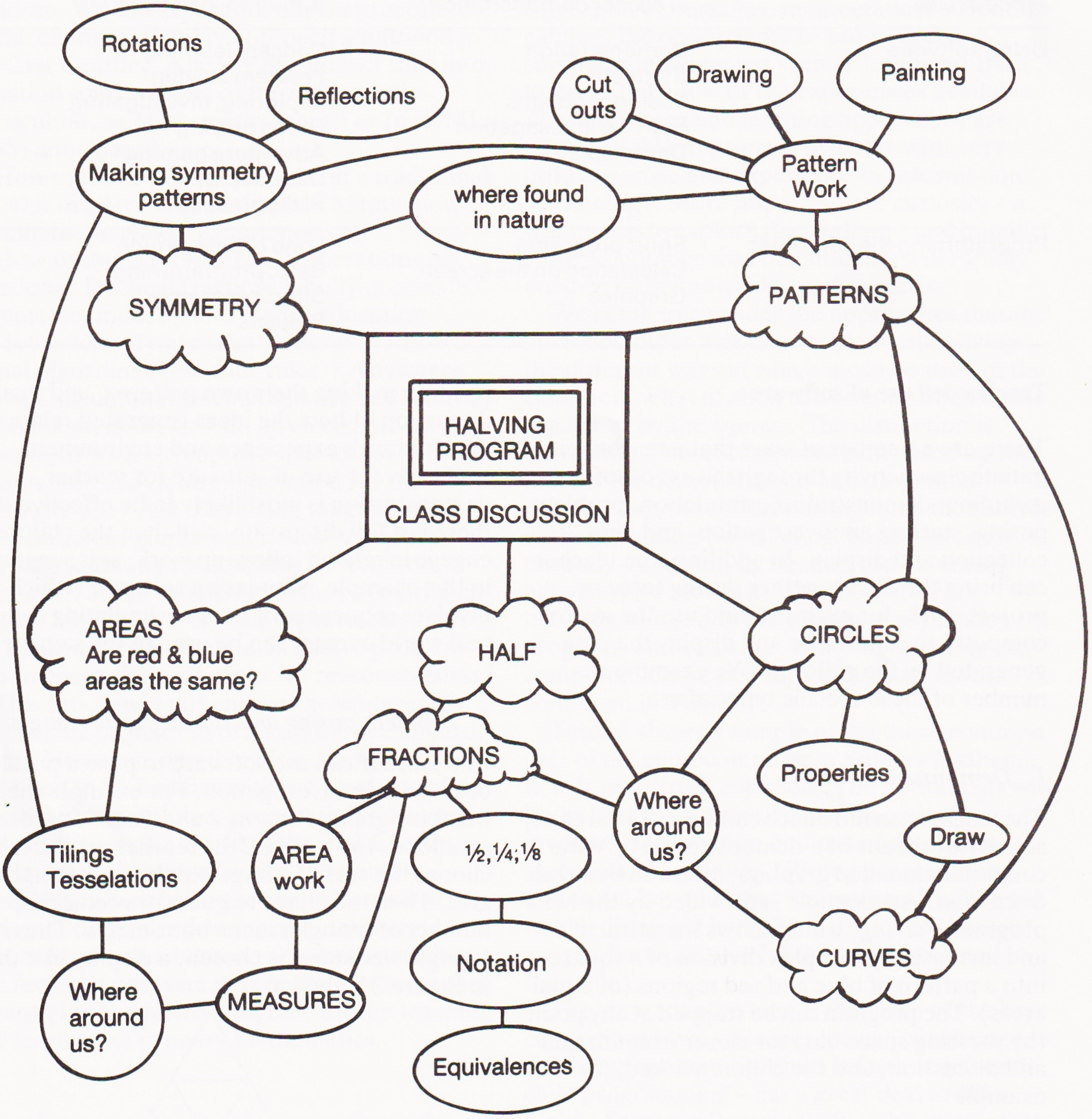


Figure 1 Halving: A concept web.

The teacher can type in children's suggested answers to as many different sized triangles as is desired. Thus, in the case of the illustration, the number of triangles in the bottom row is 13. Then the teacher can set the children the problem of trying to find a rule for predicting the number of triangles in the bottom row. They can try out further examples on isometric paper (triangular grid spotted paper). When they are ready, and think they have found the rule, the teacher can test suggestions by means of an option in the program.

The program also offers a second problem which can be approached similarly, involving the number of small triangles covering the whole of the triangular grid. (In the case of the illustrated figure, there are 49 altogether.) Naturally, this is only one way of using the software. Variations enjoyed by children include having one child (or several) key in the suggestions, or carrying out the whole exercise as a class question and answer activity.

The potential of this program, let alone this type of software, may not be clear from this brief account. What the program offers specifically is an approachable but challenging problem which provides the opportunity to utilise the following processes and strategies:

visualisation skills and visual thinking in solving the problem;
trial-and-improve strategies;
making conjectures;
testing conjectures;
generalisation from numerical and visual patterns;
applying generalisations to specific examples;
formulating and explicitly stating relationships;
for the more advanced – stating relationships abstractly in the language of algebra (in the example the rule is 2N–1).

As well as developing strategies such as these, problem solving software pose problems which can serve as starting points for investigations if, after discussion, children are encouraged to extend the ideas in them in their own directions.

Note that the programs mentioned above are included in the MEP Primary Maths and Micros Pack (see Appendix), which also contains suggestions for follow-up activities.

3. *Displaying statistical data*

A further use of the microcomputer in the mathematics classroom is for the display of statistical data in the form of graphs. A simple program of this type is *Datashow*. This allows numerical data (in up to eight categories) to be shown in the following forms:

a table of results,
a bar chart (horizontal bars),
a pie chart

and to be sorted by numerical size, or alphabetically. Data can be put in to show how many children have cats, dogs, and other pets; or how far eight children jump in a long jump contest; or how many hours a child spends sleeping, watching TV, at school, and in other activities; and so on. Displaying sets of data like these is interesting and teaches ideas of graphical representation. The facilities available in this program mean that data can be rapidly transferred from one mode of display to another, so that the class can discuss which mode best suits that set of data. All too often discussion of the meaning and the most useful ways of displaying data is treated too lightly, if at all. Software like *Datashow* facilitates class discussion of these issues. This can be followed up by a discussion of examples of the tables, graphs, facts and figures used in advertising and in the media in general. If children are to become full participants in our democratic society they need to be able to understand, discuss and critically evaluate the claims made in the media, supported with statistical displays. Software like *Datashow* provides an introduction to statistical graphs, and allows children access to pie charts, which can involve very complex calculations otherwise.

Datashow is another of the programs from the MEP Primary Mathematics and Micros Pack, like the programs discussed above. Although fairly simple, it offers quite a lot. There are, of course, far more sophisticated database programs for primary schools (eg *Grass* and *Quest*) which not only allow much more data to be represented, but permit the elaborate classification and sorting of the data as well.

These three examples give an indication of the uses to which the teacher can put software in a whole class setting. The shared feature is that teacher demonstration – for want of a better word – can provide a shared stimulus for class discussion and activity. This serves to counter balance the common practice of letting children learn their mathematics individually from published schemes, such as SMP 7–13, Fletcher, Ginn, Peak, Nuffield, SPMG, and so on. As the Cockcroft Report (1982; paragraph 243) strongly recommends: in addition to the exposition, reinforcement and practice that the schemes provide, children at all levels need to engage in practical work, problem solving, investigational work and above all else, discussion in their learning of mathematics. Teacher-led microcomputer demonstrations, leading to discussion, provide one accessible way of redressing this balance.

Learner-led use of software

Most of the classroom uses of mathematics software treated in the discussion of teacher-led computer work, are also available to children when they are working directly with, or controlling the microcomputer themselves. Programs can pose problems and provide the starting points for investigations, perhaps one of the most fruitful of all of the uses. The micro can provide simulations for children to watch, interact with, and discuss in groups. Children can use statistical data display programs, such as *Datashow*, to show the results of data gathering project work. These types of use include some of the most powerful learning experiences we can give children. But they have each been discussed and exemplified above.

In addition to these, there are a number of other worthwhile types of use, considered below. In each case, a whole class of children could work at software if a computer laboratory was available. While this can be arranged by taking the class on a visit to a local secondary school or college, the reality of the primary school is usually different. Most primary teachers have access to a single microcomputer in school (often for only one week per half term). But this can still be used to give all children in a class a chance for a hands-on experience. What is often arranged is a rota, whereby small groups of children take turns working with the microcomputer, discussing what they are doing together. Over a period of time, this can can add up to a substantial experience for each child.

1. Concept learning

Some software helps children to acquire or develop their understanding of mathematical concepts. Two examples of such software are *Subgame* and *Sizegame*, both of which help children to develop their understanding of the crucial concept of place value in number (numeration, to be more precise). *Sizegame* employs a game format, and requires children to order random digits to achieve the largest number. This leads to, or reinforces, the notion that value is not just a question of digit size, but also of placing. *Subgame* also involves random digit placing in a column subtraction to achieve the greatest difference, again teaching place value. The concept of probability is also developed by these programs, because random digits are generated, and the player has to make decisions, such as whether the occurrence of large or small digits is probable. Thus these programs help to develop the concepts of place value and probability in a motivational setting. Beyond this, the advantages of software like these two programs include the instantly self-checking feature, as well as the fact that they encourage discussion and cooperation among children.

This feature of self-checking is one of the great strengths of concept learning with the microcomputer. For it means that a child's application of a concept is immediately reinforced and guided along the intended paths. The computer is also infinitely patient, allowing the child to take his or her own time at a certain level of working. Finally the computer is non-judgemental – children do not feel the same stigma in making mistakes with a computer. There is no record of failure in their book, no series of written crosses, no sense of letting another person down, no sense of failure – experiences which have contributed to many people's feelings of failure and inability in mathematics, in the traditional classroom and often for the rest of their lives. Working with a microcomputer can help to stave off these very negative reactions felt by some.

2. Game playing

We have already seen that concept learning software can be in game format, in the case of *Subgame* and *Sizegame*. These allow different numbers of children to play together. Another example is *Teashop*, which could also be described as a simulation (since it requires the player to plan a certain number of teas for a school cricket match, and sales depend on how the weather turns out, which the computer decides). This game can be played by a single child or by several. It reinforces arithmetic skills and calculations involving money, as well as strategic thinking, and even basic ideas of probability. Since the program requires children to try to maximise their business profits, can it be said to encourage entrepreneurship and the spirit of the enterprise culture? A successful strategy involves maximising both the cost of a cup of tea as well as the number prepared for sale, provided the weather outlook is good. This could be used to raise the question of the morality of maximising consumer costs to increase business profits. Or is this too contentious an approach for the primary classroom?

Continued on page 13 (after coloured section)

While this issue can be debated by teachers, children, meanwhile, find the game most motivating and involving.

3. Adventure gaming

Adventure games both in book and software form are increasingly popular with children, many of whom love to immerse themselves in the dream world that the games involve, and to master it. A simple adventure game is *Mallory*, which resembles the commercial game 'Cluedo'. Although little of the content is explicitly mathematical, the thought processes involved in using it are problem solving strategies such as using trial-and-improve, looking for pattern, logical thought, elimination of possibilities, making conjectures, testing them, and so on. Other adventure games like *L – A Mathematical Adventure* help to develop spatial skills (using the points of the compass, mapping the imaginary land), reading skills (most information is presented in writing) and many other incidental mathematical ideas. The key strength of adventure game programs is the motivation they engender in children. They also provide a link between mathematics and the skills of reading and writing. A natural extension activity to adventure gaming is for children to write a continuation of the story. However it must be said that because of their complexity they may cause difficulties with the young or low attaining child.

4. Skills practice

Many of the programs discussed above involve the practice of skills, especially basic numerical skills. This is true of *Sizegame*, *Teashop*, and others. Another skills practice program is *Playtrain*, in which children have to distribute a number of passengers among the carriages of a train uniformly, or obeying some other numerical constraints. The program explicitly requires and develops basic number skills, but these are mental as much as written arithmetical skills, and the whole program could also be classed as problem solving. In the view of the author, there is no need for skills practice to be just a computerised page of 'sums'. This may ultimately take away children's motivation, as well as reinforcing a view of mathematics as a collection of pedestrian and routine activities. It is also a wasted opportunity to develop children's higher level thinking, which as well as the acquisition of knowledge, must be the goal of teaching mathematics.

It should be clear that software can be classified in a number of ways, according to many factors including the type of learning activity (such as skills practice, concept learning, problem solving, and investigating), the software format (eg game playing or adventure gaming), the topic involved (data display), and there are of course many other factors such as age suitability, quality of the software, the ease of accessing the ideas involved, and so on, which have not been referred to. This article has not tried to provide a taxonomy of software types, but introduced some of the more important distinctions between, and uses of, mathematics software in the primary classroom. These have been illustrated with specific examples that can be tried out with children.

Programming the computer

In addition to teacher- and child-led use of software, Table 1 shows a range of programming activities which can enhance the teaching of mathematics in the primary school. The teacher can calculate directly on the screen, write short programs in the computer languages Basic or Logo or even Prolog, and so on. The children may be able to do the same, and there is some very exciting work going on in parts of Britain with quite young (infant school) children programming in Logo. Children's use of Logo may be best started with the teacher structuring some preliminary (non-computer) activities, and then demonstrating some of the basic commands. However the key element of the Logo philosophy is that the children explore and use the language themselves. Some of what Logo programming offers the teaching and learning of mathematics is treated in Ernest (1988). The other forms of teacher and child programming listed will not be dealt with here. The enthusiast can find these areas treated well elsewhere. A final word on programming: it may be these activities are those that really unleash the full potential of the microcomputer as a learning aid in mathematics, and across the whole primary school curriculum. Currently there are signs that the government, through its various agencies, will be pressing for much more emphasis on information technology, in initial teacher training. Thus it may come to pass that all new entrants to the profession brings these skills with them into schools. Such a development may radically alter the face of primary school teaching, as visionaries such as Papert (1980) foretell. Meanwhile, the use of software offers both teachers and learners a very valuable learning experience, and serves to introduce both groups to some of the potential of the microcomputer.

Benefits of the microcomputer

Some indication of what the microcomputer offers the teaching and learning of primary mathematics, in terms of the range of uses, has been given above. Beyond this the microcomputer has tremendous classroom potential because it is:

- motivating – children find microcomputers fascinating;
- varied – the range of worthwhile learning experiences now available on the BBC B+ microcomputer, for example, is vast;
- flexible – good software (or programming languages) allow children to enter at the level that is most suitable and comfortable for them;
- interactive – it offers an almost infinitely variable learning experience within one situation or set of situations, according to the child's responses;
- self-checking – children's mistakes are diagnosed immediately, and they have the opportunity to remedy them;
- non-judgemental – children feel no stigma in making mistakes with a computer – it is infinitely patient and non-condemnatory;
- visual – it offers exciting displays which aid spatial visualisation abilities;
- powerful – it offers new learning experiences that have simply not been available before;
- learner-centred – the micro can support a shift towards a learner-centred approach, giving children more control over their learning of mathematics.

Despite all these advantages, teachers unfamiliar with the microcomputer may be reticent to try it out in the classroom, because of a lack of experience and skills. Teachers need to be made aware of the fact that every classroom may already be equipped with a readily available computer expert, in amongst the children. Every user of computers in education knows that no matter how much one knows, it is only a matter of time before at least some of the children become more proficient at using microcomputers. But then that is education at its best, is it not?

Conclusion

This article has looked at a key electronic resource for teaching mathematics, the microcomputer, which has revolutionised practice in the world outside schools, and will continue to do so increasingly as we approach the 21st Century. The microcomputer is becoming so important in modern life that 'Computer Literacy' (as familiarity and confidence with computers is called) has been classified as a basic skill which all children need to acquire.

Some indication of its immense potential for the teaching of mathematics has been given, including its possible benefits. However, the use of these resources needs to be built into our teaching programmes, so that their benefits are utilised, and not marginalised. As the reports quoted in the introduction suggest, we also need to reflect on the mathematics curriculum we are providing for the children, in the light of modern developments and thinking. Are we empowering them to be the confident problem solvers that fulfilling themselves and society requires? Will they be confident wielders of the new technology?

References

Cockcroft, W.H.J. (1982) *Mathematics Counts*, HMSO, London.

Ernest, P. (1988) 'What's the use of LOGO?', *Mathematics in School*, January, 16–20.

Her Majesty's Inspectorate (1985) *Mathematics from 5 to 16: Curriculum Matters 3*, HMSO, London.

Her Majesty's Inspectorate (1987) *Mathematics from 5 to 16: The Response to Curriculum Matters 3*, HMSO, London.

National Curriculum Mathematics Working Group (1987) *Interim Report*, DES, London.

Papert, S. (1980) *Mindstorms*, Harvester Press, Brighton.

Shuard, H. (1986) *Primary Mathematics Today and Tomorrow*, Longman, London.

Appendix: Sources of good mathematical software

MEP (Microelectronics in Education Programme):
MEP *Primary Maths and Micros*
MEP *Infant Mathematics Software*
MEP *Logo Inservice Pack*
MEP *Problem Solving with a Micro*

The first of these packs contains most of the software referred to above. The packs have been issued to every LEA.

SMILE Group, *The First 31 Programs*, and *The Next 17*, ILEA Learning Resources Unit, Kennington, London.

Association of Teachers of Mathematics, *SLIMWAM 1&2 (Some Lessons in Mathematics with a Microcomputer*, ATM, Derby.)

Straker, A., *Mathematical Games and Activities (Volume 1)*, and *Mathematical Investigations in the Classroom*, Anita Straker-Capital Media.

Three examples of mathematical adventure game software:

Association of Teachers of Mathematics, *L-A Mathemagical Adventure*, ATM, Derby.

Straker, A. *Martello Tower*, (in the MEP Problem Solving Pack.

Longman Software, *The Kingdom of Helior*, Longman, London.

Seeing patterns in cloudy water

Using *DIY Database* and *Branch* with *Pond Dipping*

G.P. Keeling
Earlesfield County Primary School, Grantham, Lincs

How did you get on with *Pond Dipping* on the MAPE 4 Disc?

My own first reaction was one of 'OK, so where do we go from here?' The children have found various creatures and gone off to the library corner to discover exactly what a whirligig beetle looks like, but what else can I do with it?

I did eventually produce work cards which asked children to try differing conditions and areas of the pond, to see if this affected the type or number of creatures found. They had to find three different creatures, draw each one and answer some simple questions along the lines of:

1. What does it eat?
2. How many legs has it got?
3. Where did you find it?

In this way I hoped that the program would stimulate the children into research, giving them a reason for investigation rather than simply doing it to please me. In fact, I argued, the program was better in some ways than actually dipping a real pond, as it presented the children with just the name of the creature. Its true identity had to be discovered from secondary sources rather than first-hand experience. (Yes, I know that first-hand experience is better, but our school pond had yet to be dug and the local dykes were full of insecticide – here speaks a man who does not wish to get his wellies wet.)

So there we were with groups of children happily zapping water skaters or dredging bloodworms from the bottom of the computer pond. They really did react as if they had caught something in their nets and they were learning to use the contents and index pages of reference books.

It was at this stage that I introduced the *Branch* program. (This is a simple inverted 'Tree of knowledge' type program; see the Appendix for more information.) We chose 14 creatures from the program and began as a class to discuss how we could divide them into groups: Do they live on the surface? Have they any legs? Do they cover themselves with stones or twigs?

Eventually a *Branch* file was produced and the children were able to test what they had learnt about the creatures in our computer pond.

A list of the 14 creatures was placed next to the computer and each group would choose one before setting off with the *Branch* program to test their knowledge. If, at the end of the run, the computer came up with a different creature, then their knowledge of that particular creature must be lacking in some respect. They were then encouraged to retrace their steps and analyse their answers to the questions posed by the program. Do pond skaters really have no legs? Perhaps that is why the computer thought you were thinking of a wandering snail.

There then followed a lay-off from *Pond Dipping* while we investigated *Spacex* and word processing, until the day when I wished to introduce simple data processing. Could *Pond Dipping* be used again?

Of course it could!

Out came the MAPE 4 Disc and a copy of *DIY Database*. I set up a pond datafile with ten fields and unlimited records. Now, as the children found a creature they had to fill in a data capture sheet to answer these questions:

1. Name of creature
2. Number of legs
3. Eats
4. Length in mm
5. Where found
6. Position in pond
7. Time of day
8. Wind conditions
9. Sunshine
10. Rain

Most of this information was clearly seen from the *Pond Dipping* screen but questions 2, 3 and 4 required research into their notes from earlier in the year.

A datafile was soon built up and we were able to usefully search it when we had only ten creatures on file. (Creatures with no legs don't live on the surface. I wonder why?)

The process of loading data was useful in itself as we discussed how we could shorten Great Diving Beetle Lava to the 22 letters allowed on the file. Did we have to agree a shortened form?

Why? Should we agree a limited number of entries for 'Eats' or let people type in what they liked? We were beginning to see exactly how a database worked. Later still worksheets were produced to see if we could find patterns of behaviour.

1. Where can you find whirligig beetles?
2. Where can you find bloodworms?
3. What do tubifex worms eat?
4. What do wandering snails eat?
5. How many legs do water measurers have?
6. Which creatures have six legs?
7. Where do most legless creatures live?
8. Which creatures have six legs but are not found at the surface?

As you may begin to see if you follow our lead, legless creatures do not like the surface of the water. I wonder why?

The very nature of searching a database throws up patterns which are not obvious when looking at films or books or even creatures in a real pond. The new technology is doing something which cannot be done better in another way. By bringing together simulation and data processing in this way I believe that my children will understand even more when then do dip in a real pond. They are being taught to question. The computer gives few answers. The true value of the machine is its ability to send children away questioning the world around them and to see patterns in what could be just a muddy pool.

Note: The above work was carried out with a class of 30 mixed ability 1st and 2nd year junior children at Long Sutton County Primary School through 1987/8.

Appendix 1

Take the following creatures:

1. Pond skater
2. Bloodworm
3. Whirligig beetle
4. Stone fly

Now ask: 'Is it usually found on the surface of the water?'

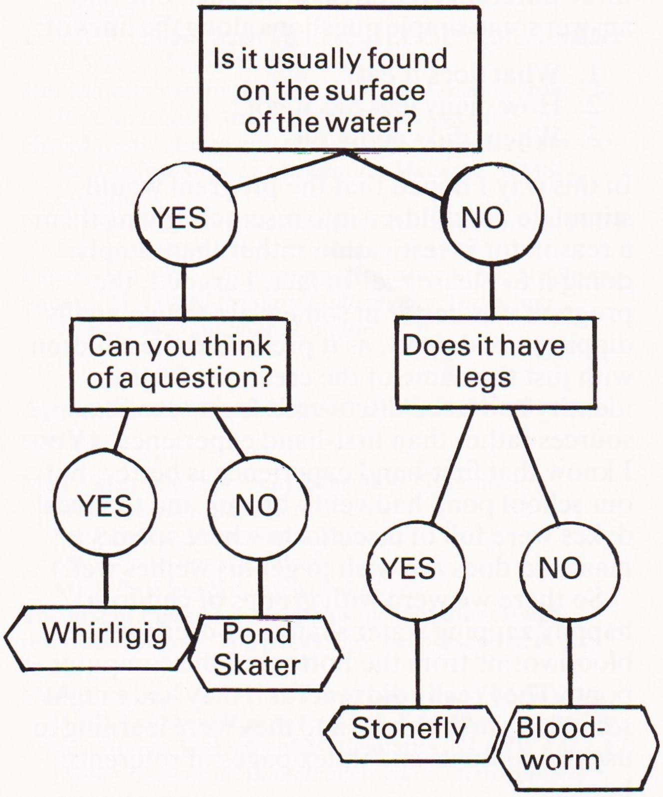
This will divide the pond skater and whirligig beetle from the stone fly and bloodworm.

The answer 'no' will tell the computer that we are thinking of either the stone fly or the bloodworm.

If the next question is: 'Does it have legs?', a negative answer will identify the bloodworm while a positive will give us the stone fly.

Had we answered 'yes' to the first question, we would then have had to think of a good question which would divide the pond skater from the whirligig.

See how it works?


Is it usually found on the surface of the water?
YES
NO
Can you think of a question?
Does it have legs
YES
NO
YES
NO
Whirligig
Pond Skater
Stonefly
Blood-worm

The beginnings of a *Branch* file

Infants' number work with pressure mats: The computer as a provider of concrete experiences?

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Concrete experiences

One frequent criticism of computers in education is that they seem to remove us from concrete experiences. Computer environments may be based on reality but they are not real. They over-protect us from the complexities of the real world and they never let us get our hands dirty. Joseph Weizenbaum in the 1983 preface to *Computer Power and Human Reason* goes further:

> 'I fear that almost all youngsters who get their formal introduction to computers in primary and secondary schools will have been given a certain facility for the creation of computational models without any corresponding knowledge of their limitations . . . an abdication of responsibility, a closing of the mind to reality . . . a psychic numbing to the ultimate consequences of one's work of the same kind as that induced in the computer arcade.'

It is tempting to dismiss Weizenbaum as a professional pessimist, but there is still a point that needs answering here. With young children we place great value on concrete experiences such as water play, sand play, and making things with glue and cardboard. By encouraging work at computers are we saying that these experiences are less important?

A lesson with top infants

Here is an account of some activities with top infants (about 7 years of age) which use a computer but still seem to offer concrete experiences.

Eight children are sitting around the computer. On the floor are two black pressure mats which are wired up to the computer. The screen displays a large number '1'.

I invite one girl to step on one of the mats. The number changes from 1 to 2. Shuffling about on the pressure mat causes the number to advance up to 4. I ask the girl to step off and step on again, taking the number a little further. A boy comes up to try and discovers that stepping on and off can move the number forward quite quickly.

Someone else discovers that jumping up and down on the mat is even more effective at moving the number forward.

We talk a little about what the numbers are doing on the screen. The number showing is 38. What will the next number be, and the one after that? What was the previous number?

'Can anyone make the counter go from 1 to 100?' I ask.

Everyone wants to try.

'Are you sure you want to try? One hundred is quite a big number. What will 100 look like on the screen?'

I set the counter back to 1 and one of the boys comes up to try. It takes him less than a minute of frantic jumping to reach 106.

A simple change puts two number counters up on the screen: one for the left mat and one for the right. I set up a competition between two of the girls to see who can get the number from 1 to 100 first. I start them off together and both are quite efficient at driving the counter forward by jumping up and down. It generates quite a lot of excitement and interest among the other six who are watching. The two girls finish almost together and no one seems too concerned about who won.

I want to go on to something different, but there are two boys who have done nothing yet and I am persuaded to let them race against each other. For variety we start at 100 and get the numbers to step down. Although I ask them to stop at 1, they inevitably overshoot and we find ourselves in the negative number region. This seems very natural and we talk about it a little but do not make much of it.

For the next activity they split into two teams of four. I want the teams to race to see who can drive the counter from 1 to 60 first. But there are two extra rules this time. Firstly, they must stop exactly on 60: 61 or 62 are no good. Secondly, everyone in the team must do some of the work, but only one child is allowed on the mat at a time. I ask the two teams to plan how they are going to do this.

On the first attempt their planning consists largely in arguing about who should go first. When both groups say they are ready, I start them off.

They set about it with their usual enthusiasm but it is clear that they have not given much thought about when to change over. On more than one occasion, the person on the mat has to be pulled off by the others in their group. Both groups forget to stop at 60 and both reach 60 before everyone in their group has had a go.

I tell them that this is no good and that neither team has won. I urge then to plan more carefully.

The second attempt is slightly less chaotic and by the third attempt both groups have managed to get everyone taking part. (I had not asked that everyone should have an equal go, but their sense of fairness makes them attempt an equal division.) However they have still not cracked the problem of stopping the number exactly on 60. We talk about what numbers come before 60 and watch the numbers on the screen slowly stepping from 40 up to 60.

On the fourth attempt one group get it completely right, while the others overstep to 62. Finally, both groups give a flawless performance.

'Teacher as Cheat'

This could be the title for our next activity. Without telling them, I alter the program settings so that one counter goes up in steps of two while the other still goes up in ones. Both are set to zero initially. I challenge one of the group to race me up to 100.

I win rather easily because, as no doubt you have guessed, it is my counter that is going up in twos. I ask them whether they are quite happy that I am the winner. They are, and a number of them want to challenge me themselves.

I take on a second child and then a third. It is only then that someone notices that something is wrong.

What is happening? Someone suggests my counter is leaving some numbers out. We run things in slow motion and someone says the numbers are going up in twos. Someone else counts in twos for us from 2 up to 30.

Was it fair? Was I really the winner? How could we make it fair?

Someone suggests we could make it fair by setting my clock back to counting in ones. But I resist this.

'Suppose the person counting in twos goes from 0 to 100. What should the person counting in ones go to, in order to make it fair?'

One child suggests 80 and the others agree this sounds reasonable. There is no shortage of volunteers to try this idea out. The child counting in twos wins this competition. We do it again with another two children, and again the child counting in twos wins easily. The same happens with a third pair of children.

I point this out to them and ask them whether they think the situation is now fair. Several of them feel it is unfair and one child suggests we try a different number from 80. There are a number of suggestions but 60 is agreed upon as a number to try. After trying the activity with 60, the group feels that this is still too high. 40 and 50 are suggested to try next. As the majority vote for 50, we try this.

'Is it fair?' I ask. They feel it is fairer than before.

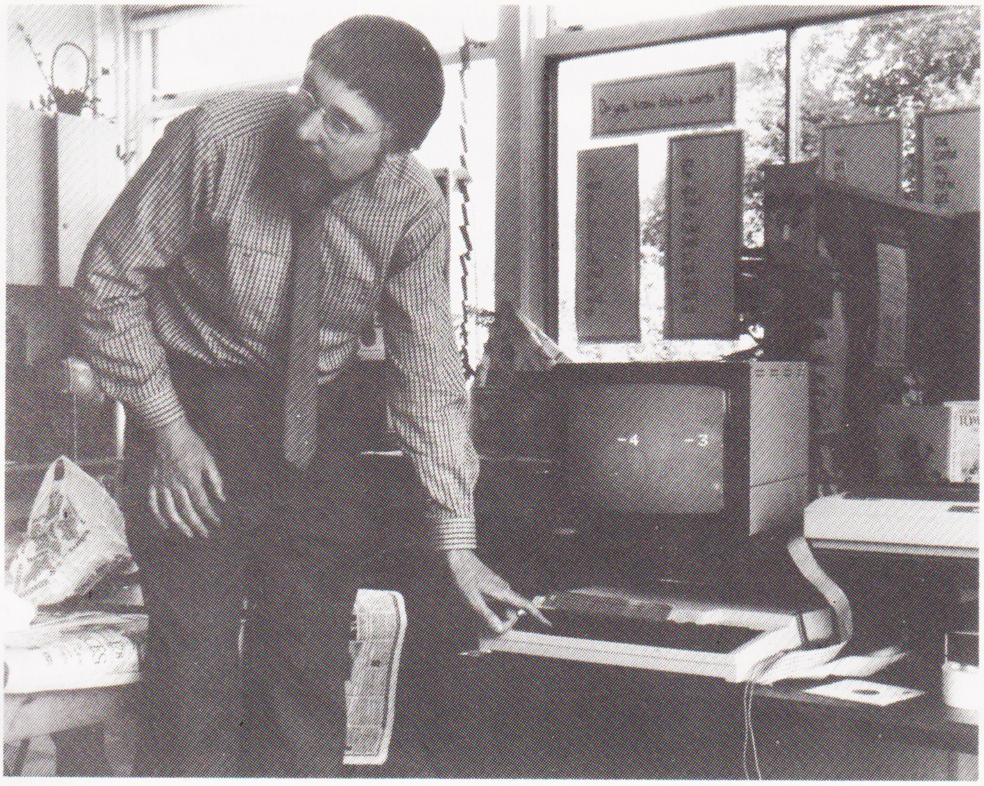
'Let's have a look at something similar,' I say. I set up the screen to display one of the numbers counting in ones and the other counting in twos, in synchrony. Starting at zero, the numbers change quite slowly at first. When 8 and 16 are displayed I freeze the numbers because a number of children want to say something. Some or them recognise the pattern and offer different explanations for it. I let it carry on and speed it up. I stop it on 50 and 100.

'Does this help us decide how to make things fair?' I ask. Perhaps two or three of the group of eight make the connection between this and the game we had been playing, although perhaps the experience was still useful to some of the others.

This lesson used a program called *Stepper* which displays one or two large number counters on the screen. Numbers may either be advanced automatically with a choice of speeds, or by jumping on the mats. *Stepper* is a similar program to Alan Wigley's *Counter* but rather simpler in concept and use.

Other Activities

I have tried activities like these with other groups of top infants and first year juniors. One value of this kind of work is that it seems to offer concrete experiences of quite large numbers. One lesson began with some discussion about large numbers, and after some introductory activities, the whole group worked as a team to drive the counter from 1 to 1000. They set a ten minute egg timer going at the start and they had finished well before the sand had run through.



At the start, this

kind of activity needs quite a lot of supervision from the teacher, but groups do learn to work independently, and are often capable of setting themselves a challenge, planning how to accomplish it, and then carrying it out.

Like many lessons with computers, this kind of work offers a rich mixture of related experiences: counting, large numbers, negative numbers, number patterns, division, group problem solving, and so on. The infants' classroom already offers a range of concrete experiences of number, but rarely is it possible to take in such large numbers, or to slip so naturally from positive into negative numbers. If there is a need to justify this kind of work (and the children's enthusiasm almost speaks for itself), perhaps it is that it makes some abstract ideas about numbers concrete, through offering direct physical experiences of them.

An isolated case?

In one instance at least the computer appears to do the reverse of what its critics fear: it takes some abstract ideas and makes them more concrete. But is this an isolated case? Perhaps it is all a question of what one means by 'concrete'. For instance, does using a word processor make the act of writing more or less concrete? It removes the physical experiences of pencils that break, or pens that leak, and all the problems of co-ordinating them. But then it offers some new experiences, such as the power to pick up large chunks of text and move them around, or to have the pleasure of handling, reading and correcting a beautifully printed page from the moment the first draft is printed out. Are these experiences really any less concrete than writing with a pencil?

The question of computers and concrete experiences must depend very much on what the non-computer alternative is. Anyone who seriously advocated computer work as an alternative to using modelling clay or feeding the class guinea pig would have a hard case to argue. But when we start with much more abstract ideas, with which mathematics teaching abounds, perhaps there are many ways in which computers can make these experiences more concrete?

Notes

I am grateful to the staff and pupils of Dunkirk Primary School, Nottingham for their support, and to Ros Foot and Terry Tiplady for their ideas and comments. The photographs were taken by John Eyett.

To support this type of work, a pressure mat pack is available consisting of two large pressure mats (about 720 x 560 mm) ready wired for connection to a BBC microcomputer, and a disc of three programs for BBC model B and Master 128 including *Stepper*. The pack costs £20 including UK postage from Panthera, 5 Cedar Avenue, Beeston, Nottingham NG9 2HA.

Software reviews

Don Walton

Acorn text processing

Text processing on Acorn machines all started with two word processors, *View* and *Wordwise*, which still have people arguing about their relative merits into the early hours of the morning. Several 'educational' word processors arrived on the scene soon afterwards, but no one seemed quite sure why and how an educational word processor should be different from the real ones. Indeed, some of them seemed to complicate the whole thing even more. Recently, however, one word processor which has made an impact in schools is *Folio* and now there is *Advanced Folio* which is reviewed in this section.

One of the first Desk Top Publishing (DTP) programs on the BBC machine which allowed pages to be set out was the ubiquitous and unsophisticated *Front Page* which was given free to all MAPE members. *Fleet Street Editor* promised much, combining graphics and text, but is so difficult to use. Now we have *Typesetter* and *Front Page Special Edition*, two DTP packages which can be used by junior and secondary school children and which are reviewed below. Somewhere in between comes *Fairy Stories*, which is useful for infants upwards and this has been reviewed by Pete Young.

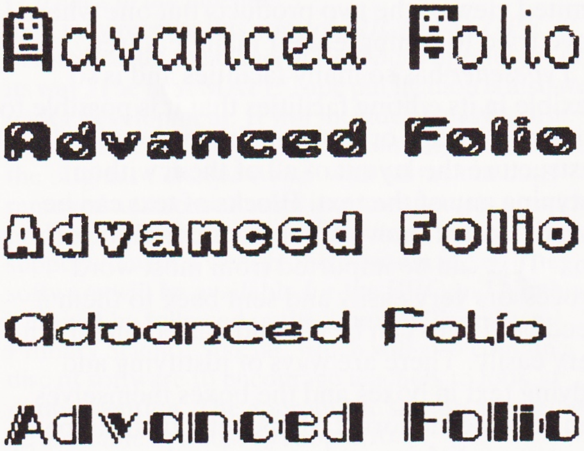
Advanced Folio

After the success of their word processor *Folio*, Tedimen have been at work developing the package. They have produced several foreign language editions of the original *Folio*, and have now published *Advanced Folio*.

Advanced Folio is a substantial rewrite of the original *Folio*. Anyone used to the original will be able to used the Advanced version as if nothing had changed but certain improvements soon become apparent, particularly if using a Master. The whole screen output is much slicker and more professional. The pen seems to be lubricated a little better and the letters appear more quickly. The accidental switching of the CAPS LOCK and SHIFT LOCK keys does not bring whole classes and INSET courses to a halt. You don't have to look around for the f1 key to LOOK UP or the f2 key to LOOK DOWN the page, just move about with the cursor keys although the f keys will still work.

This may all seem rather cosmetic are more fundamental changes too. For example you can get printout right across the page or as much of it as you want by altering the margins without recourse to a utilities disc. There are other extra printout facilities which teachers will be delighted to see such as having a choice of end of page line markings including no line at all and provision for cut sheet printing etc.

The biggest addition of all is the ability to modify old typefaces or fonts, generate new ones and put them together into font files. This has been very well implemented and should result in a whole range of third party typefaces in addition to the extra ones supplied in the package which are very good.



Two more important features are the provision of a Near Letter Quality printout for all fonts. This gives excellent quality printing in a normal printout size. The bigger sizes are of course still chunky. The other welcome feature is that the booklet, which has undergone a substantial rewrite too, has an index – every book should have one!

The bad news is that there are, unavoidably, three discs involved in running *Advanced Folio* although one of them would not be needed in ordinary everyday use, being solely used for font generation and storage.

For concept keyboard enthusiasts, and there is a growing number of them, there is no option in *Advanced Folio* for creating overlays or loading them, although tucked away on page 74 it mentions this possibility if you have the 'Extension Disc'.

For everyone using *Folio* as an everyday tool, *Advanced Folio* is worth looking at.

Typesetter v Front Page Special Edition

Both programs offer the facilities to lay out a page of text similar to that found in newspapers and magazines. Neither of them offer any facilities for inserting pictures into the text but empty boxes can be made and then you must cut and paste in the time-honoured way, and a good thing too, as it keeps things simple. Both programs go about page layouts in similar ways, ie text is entered into boxes and this text can be edited inside the boxes with most of the basic facilities of a word processor, inserting, wrap around, deleting, etc. If the dimensions of the boxes are changed, the blocks of text follow, flowing into the new shapes easily and visually fascinating to watch.

They both offer different sizes of text which can be used for major headlines, sub-headings etc as well as normal sized printing, and they both use A4 size paper or smaller. Apart from this the two programs differ in so many ways that it is beyond the scope of this article to list them all, so once again I have written a very personal and limited view of the two products but one where I have tried to compare their main features.

Typesetter has so many facilities and is so flexible in its editing facilities that it is possible to construct a page or more and then completely restructure the layout of all of them without retyping any of the text. Blocks of text can be saved, loaded, moved, copied etc from box to box. Text can be imported from most word processors very easily and sent back to them if need be. Pages can be cut and pasted on screen very easily. There are ways of justifying and tidying text in boxes and the boxes themselves can be joined to form L shapes etc. It all happens in a very satisfying and professional manner with few hitches even if the user goes astray.

Front Page Special Edition does not offer as many facilities for saving, moving and generally managing blocks of text nor can text be imported from other word processors. All text has to be typed directly into *Front Page* and once in position the page cannot be restructured easily without starting again from the beginning. There are several pages which are prestructured which give children the sort of guidance they may need when first tackling a program of this type but there is much more freedom in the poster page. All the text in *Front Page Special Edition* including the larger sizes can be edited in the same way, which is not the case with *Typesetter* where facilities for editing the larger text are very limited. Again the larger size text actually appears on the screen as it will appear when printed whereas in *Typesetter* this does not occur on the editing screen although it is dealt with in a meaningful way.

Work can be typed straight into *Typesetter*, but I think that it is best used in the way its name suggests, as a way for setting up page layouts and importing text which has already been prepared with other word processors. All the facilities make this process easy and satisfying to achieve. *Front Page Special Edition* is best for typing the text straight in and is an excellent package for teachers and children who are looking for results which may in some respects match and even exceed *Typesetter* in the variety of type faces and box edges available.

A few practical but important points may sway the decision of potential buyers:

Typesetter requires three discs, a start-up disc – which is copyright – and two others which can be copied within the buying institution. The program only requires discs to be swapped after start-up and when the printing facilities are required. Discounts are available for quantity purchase. This program can be used on all standard BBC B machines and Master machines.

Front Page Special Edition needs only one disc, so there is no disc swapping. It can be copied by the purchasing institution for its own use. There are licensing arrangements available. *This program can only be used fully on the BBC Master computer or BBC B machines with extra memory.*

Fairy Tales

Publicised as a Desk Top Publishing package for infants, this is without doubt one of the most pleasant programs to appear for some time. The publishers have taken the screen format used in such favourites as *Droom, Albert's House* and *Dust* and packaged it with a graphics dump which enables children to write and print their own Fairy Tales. To help the teacher get started there is a very attractive demonstration story called 'The Bear', which ably shows off the potential of the package. The child is provided with a library of 77 pictures each of which may be placed on the screen and positioned with arrow keys to illustrate the text of the tale. Backgrounds can also be created by building up a series of graphics icons. For example a brick wall can be made by joining several small pieces together. Printouts can be made in tones of grey which may then be coloured with any transparent felt pens or indeed printed in full colour if you are lucky enough to have a colour printer.

For further details contact:

Typesetter – Sherston Software
Front Page Special Edition – Newman College
Advanced Folio – Tedimen Software
Fairy Tales – RESOURCE Ltd.

MAPE national news

Roger Keeling

a) In the autumn term edition of *MICRO-SCOPE*, we included a copy of the submission we sent to the Design and Technology Working Group. Since then the Group has published its interim report and a number of the committee have been to the DES to give oral evidence. The MAPE document has been welcomed in many quarters and is obviously proving a useful discussion paper when schools are having to think in terms of redrafting curriculum policies in the light of the National Curriculum. The Working Group final report is due out at the end of April, and will probably not contain the amount of detail that we put into the original submission. However, it will be accompanied by a response form; please do use this opportunity to register your opinion. It will be followed later by the National Curriculum Council report which will spell out the programmes of study – it is at this stage that we will learn the real detail of what the government means by 'technology' as a foundation subject in primary schools and 'information technology across the primary curriculum'.

b) MAPE is proposing to hold a 'writing weekend' from Friday evening to Sunday afternoon, 2–4 June 1989. The aim will be to write a *MICRO-SCOPE* Special that pulls together the IT threads in the Maths, Science and English reports in the light of the attainment targets that will be spelt out in the final report of the Design and Technology Working Group. If you would like to join this weekend, probably Midlands based, and have a sound knowledge of the content of these reports, then please drop me a line and let me know. Don't be modest; we are desperately keen to establish weekends such as this one where we can draw upon the expertise and enthusiasm of members.

c) While on the subject of enthusiastic members, we are in need of a regional rep to start up an active MAPE region in the area of the South East (ie. London south of the Thames, East Sussex, Surrey, Kent etc.) If you are interested then please write to me and I can let you have more details.

d) May I remind you that this year's Conference will take place at Caerleon College, near Newport in South Wales from Wednesday 29 March to Friday 31 March. If you wish to make a last minute booking, please check with the orgainser: John Chamberlain on 0222 709035 (work).

e) With respect to the Conference AGM the secretary has received the following proposal suggesting an amendment to the constitution.

> Clauses 11.5, 11.6 and 11.7 to be added to the constitution.
>
> 11.5 The organiser of the Annual Conference shall open a Bank/Building Society Account in the name of MAPE Annual Conference for all transactions concerning the Conference.
>
> 11.6 The account mandate shall be completed to require a minimum of two out of three signatures on any cheques or withdrawal arrangements.
>
> 11.7 Fully audited accounts of the Conference shall be submitted by the Conference Organiser to the National Council at the first National Council Meeting following the annual Conference. These accounts will then be presented as part of the National Treasurer's Report.
>
> Proposed by John Chamberlain. Seconded by Mike Treadaway.

These recommendations are made simply to formalise existing practice.

f) *What's in the pipeline?*
You may receive this copy of *MICRO-SCOPE* before or after the *Concept Keyboard* Special – it's on its way. The next MAPE Tape publication is also well under development. It will include an easy to use wordprocessor called *Stylus* (a complete rewrite of the original *Concept-Writer* with all the old bugs removed and some design improvements), plus four problem solving programs (two new, two old) but supported with a wealth of classroom ideas. The software will be available for the BBC and Nimbus. This will be followed in the Summer Term by a Primary Science Special, which will also contain a disc of software to encourage teachers to look at remote sensing. The appropriate sensors needed will be available at a cost of about £10.

g) We have been very pleased with the popularity of the *Owl Pack*. 6,000 copies have been distributed and the Council have now agreed to print a further 1000 copies.

h) The insert in the next *MICRO-SCOPE* will be some advice on how to organise school-based INSET. It is particularly aimed at classroom teachers who are asked to lead a Baker Day on IT across the curriculum.

i) Finally, a plea! The editor will always welcome articles, software reviews etc for *MICRO-SCOPE*. What did you do with the Owl Pack? Don't hide your literary skills under a bush. Put pen to paper and forward the results to the editor (or preferably, put fingers to keyboard and word process your article).

Roger Keeling, February 1989

MAPE news

South East region

Since our last report in *MICRO-SCOPE 22*, we are no longer designated part of MAPE Eastern region, but have been reassigned as above. This has resulted in a natural division caused by the River Thames, but a small group of loyal members from North of the river has continued to meet regularly under the leadership of the Regional Representative, Liz Evans.

The successful Roadshow held at Odessa Infants School in Newham was repeated at Colchester Teachers' Centre on 19 May 1987. Later the same year we decided to hold a couple of roadshows based on using the micro in print: the first event was held at Redbridge Teachers' Centre on 3 November 1987 and the second at Havering Computer Centre on 1 March 1988. To cater for MAPE members in the eastern part of the region, we moved our next roadshow to Braintree and held an 'Adventures and Topic Work' evening at Great Bradfords School on 18 October last year.

Every event was enthusiastically supported by all those who attended, *but* we do need your support. Please: if you read of a MAPE event near you, do 'drop in' and bring a couple of friends. The evenings are completely informal and you will have an opportunity to discuss software and its use with real children in real classrooms.

Our most recent Roadshow was held at Hadleigh Junior School on 27 February. The theme was 'Adventure and Topic Work'.

Jane Sealy

Southern region

After 18 months of increased MAPE activities recent months have been relatively quiet. However things are happening.

In Dorset a strong MAPE group is well established and holds regular termly meetings – they even produce their own newsletter! The most recent meeting was on DTP and in the past they have had Fred Daly with *Image*, Bob Hart on *Adventures* etc. If you live in Dorset contact John Bennett, Southwell CP School, Portland; tel 0305 820794 (school) or 0305 772817 (home), for more information.

Christine Robson continues to organise the Royal Berks. (Her address is inside the back cover.)

MAPE activities in the Channel Islands are not happening. If members wanting to organise MAPE in the Islands contact me I will do my best to assist. West Sussex still needs a small group of people to volunteer to promote MAPE; again if you contact me I will try to help.

The Solent group still exists and it is still hoped to hold a meeting soon – can you help?

On a more positive note the Isle of Wight branch of MAPE is gaining strength and has held two meetings. In June Christine Robson inspired a large group of reception teachers to look again at the place of the computer in their work. Recently a workshop was held to promote the use of the computer in Christmas activities and was a great success; about 50 teachers came and shared ideas and expertise. Thanks to all at Carisbrooke CE Primary School for the hard work.

In the last six months a regional committee has been formed with representatives from the various LEAs to coordinate MAPE activities across the region. The committee's first promotion is to hold the first regional AGM. Details so far are:

MAPE SOUTHERN REGION

Annual General Meeting

Saturday 22 April 1989
10.00am to 12.30pm(ish!)

Western Primary School
near Winchester, Hampshire

Guest Speaker: Anita Straker
addressing 'Current Concerns'

Programme	10.00	Introductions
	10.15	Anita Straker
	11.00	Questions
	11.15	Coffee
	11.45	AGM: Reports, Constitution, Elections, Future

Details of this meeting will be confirmed later. All MAPE members from the Southern Region are welcome.

If any members have items to be included on the agenda, please contact me as soon as possible.

I would like to thank all those individuals who help to promote MAPE in the region and at the same time invite all other members to get involved. Like all associations MAPE will only be strong if individuals are active. If MAPE is not active in your part of the world contact me and, perhaps we can get it on the move.

Dave Kitching

MAPE Conference 1990

venue: Nottingham University
dates 6–9 April 1990

invites anyone interested in running a Theme (approx. 6 hrs in total) or a presentation (1 hr.) to submit a resume by 30 April 1989 to: Stan Norman, Bilborough Professional Centre, Birchover Road, Nottingham NG8 4BW.

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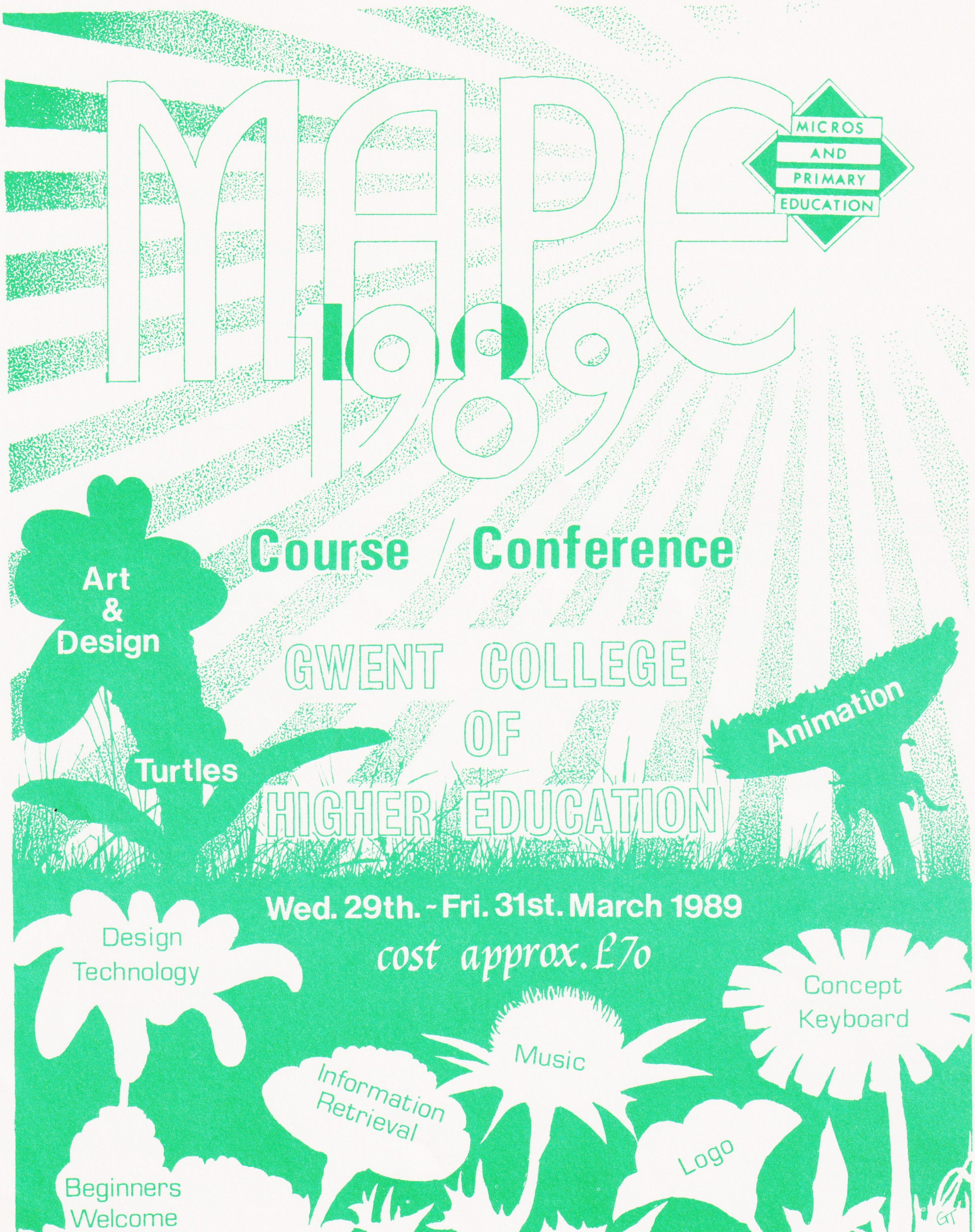

MAPE 1989

MICROS AND PRIMARY EDUCATION

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Enquiries to : - Tim Osborne. 40 Heol Sirhwi, Barry, S. Glamorgan