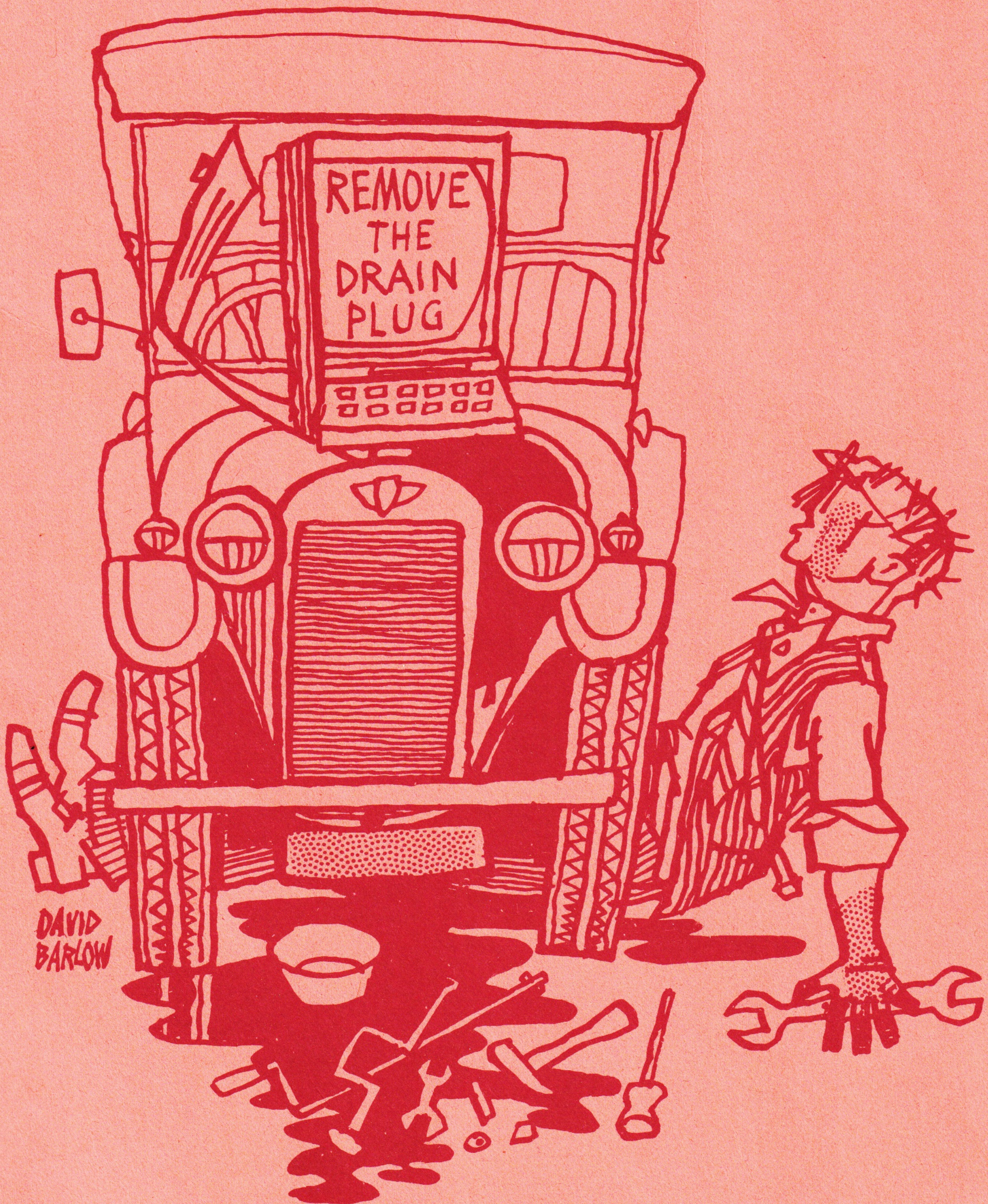
MICRO-SCOPE 7



NOVEMBER
1982

Newman College with MAPE

Contents

Editorial 1
The next steps *Roger Keeling* 2
Telesoftware and primary education *Nicola Yeates* 3
Learning social studies with the help of a microcomputer *Alistair Ross* 4
LOGO patterns *Mark Cooper* 10
Individual records of young children *Elizabeth Moore* 12
MAPE matters *Ron Jones* 14
MAPE joins the army and sees the world *Jim Thorley* 17
Software evaluation *Ian Black* 19
Resistance to using a computer in school *Mike Gibson* 20
What makes a good program? *Margaret Johnstone* 21
A primary BASIC—part 7 *John Fair* 22
Software for survival *Henry Liebling* 25
SPELL *Helen Smith* 26
A defence of the use of computers in schools *Alan Maddison* 28
Aims and objectives *David Whitehead* 30
Notebook *Roger Keeling* 31

ISBN 0 602 22636 8
Sponsored by the Department of Industry
Correspondence to the Editor: Newman College, Bartley Green, Birmingham, B32 3NT
tel: 021 476 1181

MICRO-SCOPE is mailed directly to MAPE members

Published by Heinemann Computers in Education Ltd
in partnership with Ginn and Company Ltd
Individual copies from Heinemann/Ginn at:
Prebendal House, Parson's Fee, Aylesbury, Bucks, HP20 2QZ.

Typeset by Castlefield Press, Northampton.
Printed by Woolnough Bookbinding, Wellingborough.

MICRO-SCOPE 7
November 1982

Editorial

The announcement of the DoI scheme to subsidise micros for primary schools clearly marks the beginning of a new acceleration in development. Readers will by now expect *MICRO-SCOPE* to temper its genuine enthusiasm with warning notes and awkward questions. Acceleration is fine on a good motorway with a trained driver and a map – but it also takes place when you let go blindfold on a helter-skelter.

Not that we want to propose a red light at this stage. 'No country is ever ready for independence', no institution for innovation, no school *completely* ready for new technology. But then you could wait for ever. Initiatives make things happen, and *MICRO-SCOPE* is pledged to continue to chalk up successes and follow the trail-blazers with helpful signposts.

Hardware is the easiest problem to solve. Developments in software, through MEP and the ingenuity of hundreds of dedicated teachers, are beginning to look distinctly promising. Our greatest cause for concern lies in the urgent need for adequate in-service training, and for accompanying research – the drivers and the maps.

The debate continues in our pages about the justification of current expenditure on micros when cutbacks hit books and basic materials. We wish to broaden these issues. A new 'bulge' is approaching the primary schools. Class sizes have not been cut, despite availability of unemployed teachers. In-service training still rests heavily on voluntary efforts by teachers giving up their evenings. More cuts loom. Only the most blinkered technocrat could believe in exciting advances in the use of micros within a deteriorating education system, raising the old spectre of machines replacing teachers. Now, who will subsidise *half a member of staff* for each primary school?

Acceleration throws a still greater burden on those already heavily committed. Healthy development demands a constant influx of new faces and new ideas. Late starters and spectators can sometimes see more of the game. Don't feel overshadowed by 'experts'. Regional activity is vital for the MAPE organisation to fulfil its potential.

Please write regional reports for the next *MICRO-SCOPE*. Copy date for all articles is 11 January 1983.

STOP PRESS 8/11/82

The DES today withdrew proposals which would have led to the closure of Newman College. We wish to thank the many readers and colleagues concerned with the development of micros in primary education who made representations in support of the College.

The next steps

Roger Keeling
Newman College

With typical mistiming the Government chose the very end of the summer term to announce the long-awaited Department of Industry sponsorship scheme to the primary sector. To some the scheme represents the catalyst that could see the start of a revolution in our approach to the teaching of primary children. The future is full of opportunity for imaginative teachers to use the new technology to complement existing skills and give new life to the term 'curriculum development'.

However, many other teachers are still content to hide behind phrases like 'only another bandwagon'. It is not suprising that educational innovation is generally a 20-year process.

Yet I don't believe many primary teachers are actually against the use of microcomputers: it is simply a fear bred out of ignorance. In the schools I have worked with I have been encouraged by the general willingness of primary teachers to 'have a go'. Given time to realise that the technology is not all-consuming and all-powerful, they have responded with both enthusiasm and flexibility. In many secondary schools, in contrast, subject-oriented tunnel vision militates against the integration of the micro into the school curriculum. However, the problem remains as to how to lead the staff of more than 22 000 primary schools over the first hurdle.

The problem is immense. Even when I read the computing press I feel totally inadequate to cope with the rate of technological advancement. In fact it is a full-time job just reading the press, let alone investigating the implications of the new developments to primary education. To beginners in the computing field, reading the computing press must be the ultimate deterrent (with *MICRO-SCOPE* the exception, we hope).

There is a real danger that we can fall into the trap of trying to utilise the latest developments at a faster rate than teachers are capable of assimilating them. Certainly those in the know must relate to the beginner, and showing how much you know of ROMs, RAMs and assemblers is not the way to do it. Even the Department of Industry's information sheet* describing the scheme falls into the trap of using terms such as 'RS232 interface board' and 'econet interface' without any form of explanation (the former is circuitry to allow the user to link up external devices such as a printer or the 'turtle'; the latter is circuitry to enable several machines to be linked together to share a disc drive or printer).

What then is the answer for the average teacher who may be reading this article? Firstly, don't be afraid to have a go: you will be amazed at what a difference a little confidence can make. The DoI scheme comes complete with a training package which you can look at in your own time away from any pressures of people looking over your shoulder. It includes (a) a self-study guide, designed to introduce primary teachers to all aspects of educational computing and the impact of new technology; (b) a course reader, representing a collection of articles relevant to primary schools; (c) a machine guide, to acquaint you with the particular machine you purchase; (d) audio-cassette case studies – a series of interviews illustrating how particular primary teachers have approached the use of the micro; (e) a package of 20 programs to get you started. Some of the latter are relatively easy to operate. Begin with a fairly simple program and see how you get on. To complete the induction training, LEAs should run short problem-solving courses of one or two days' duration.

The more encouragement the better. I am currently collecting a series of short papers giving the reactions of teachers who are now working with micros and who certainly wouldn't have envisaged that twelve months ago. If you would like a copy please send an s.a.e. to me at Newman College.

While on the subject of information, MEP have just produced a very good broadsheet entitled *Microcomputers in Primary Education*‡ This gives details of hardware and software related to the DoI scheme, BBC broadsheets, sources of software, booklists, journals, audio-visual aids, CET publications and supportive organisations.

The future is certainly exciting and we are about to see an escalation of activity in the primary area. The long-term aim must be to utilise the technology as a whole and not to establish a two-tier system of those schools with and those without. The attitude of the head teacher and the emphasis on induction training are the two key factors. We would be delighted to hear reports of how you are getting on, and of how you overcome particular difficulties.

*Industry/Education Unit, Department of Industry, Room 354, Ashdown House, 123,Victoria Street, London SW1E 6RB.

‡Free from your MEP Regional Information Centre – see list on p. 32.

Telesoftware and primary education

Nicola Yeates
Brighton Polytechnic

In previous issues (4 and 5) we have reported progress on the Telesoftware and Education Project at Brighton Polytechnic, anticipating that its influence would be significant. The conclusions are indeed highly encouraging. An exciting new offshoot for us is the development of a continuation project at primary level.

The Secondary School Project

The Telesoftware and Education Project was set up in September 1980 by Brighton Polytechnic, the BBC and ITA. It was a collaborative investigation into the educational value of 'broadcast telesoftware' – a form of interactive, 'intelligent' television. The 'intelligent' receivers can record computer software from Teletext broadcasts and programs are available to extract information from pages of CEEFAX and ORACLE.

The 'intelligent' television used was specially designed by Mullard Ltd and combined television, Teletext and a stand-alone microcomputer in a single unit. The software broadcast on CEEFAX and ORACLE could be recorded directly, off-air, from the television signal without any technical or programming knowledge.

Nine state secondary schools participated in the project, providing a national and varied test sample. Although the schools were very different, they all had some interest in educational computing.

The Secondary School Project found that broadcast telesoftware proved an important educational aid, particularly when considering two problems. It provides a free, fast and robust system of distributing educational software to schools, and expands the range of educational software into curricular areas which have not previously experimented widely with CAI (eg, music and domestic science).

The Primary School Project

The original project has shown that broadcast telesoftware is reliable, practical and attractive to users. Many teachers involved are highly skilled not only as programmers but also in the field of microelectronics. They were able to exploit the capabilities of the microcomputer fully.

This kind of expertise and technical proficiency may not be available to the same extent in primary schools, where computer studies is not taught. Microcomputers are still relatively new phenomena in primary education, and this presents a challenge which led to the concept of the Telesoftware and Primary Education Project.

The current project involves an expansion of the investigation into software for non-specialist use. It will involve teachers who have no previous experience of microcomputers in order to ensure that software is simple to use, self-explanatory and valuable for widespread future use.

The project involves over thirty primary schools in six Local Education Authorities. Software will be broadcast on pages of CEEFAX and any school which possesses a BBC microcomputer (one of the three types of microcomputer being subsidised in primary schools by the Government) and a Teletext adaptor will be able to download and use the programs. We would welcome comments and ideas from anybody using the broadcast telesoftware.

The current project will exploit the distinctive features of broadcast telesoftware. It will develop software over a wide range of primary school teaching situations and styles, avoiding a class-specific or a school-specific bias. Telesoftware will be coupled with BBC school broadcasts and will provide consolidating, practical back-up material for various educational series in 1983/4. Software will be 'layered' to allow for differences in skill, enthusiasm and experience in teachers and pupils. The project will also provide programs which can call up pages of CEEFAX and extract information (weather, prices, news and so on) which is regularly updated.

Finally, the project will evaluate the efficiency and effect of broadcast telesoftware on teaching and learning processes. Broadcast telesoftware can be an extremely powerful tool and the project must provide an evaluation showing how inexperienced teachers can use this tool for their own individual needs.

The number of primary schools installing microcomputers is rapidly increasing and an effective system of distributing good, tested, easily used software is becoming extremely necessary. The Telesoftware and Primary Education Project intends to investigate whether or not broadcast telesoftware is capable of providing such a service and developing the service to its fullest extent.

Learning social studies with the help of a microcomputer

Dr Alistair Ross
Fox Primary School, ILEA

An earlier article, in *MICRO-SCOPE 6*, described microcomputer work of 9–10 year olds in history, in which the local census returns for 1871 were analysed on an RML 380Z using the Micro LEEP data processing package. This article looks at data processing in another curriculum area, social studies.

Social studies is the broad area of the curriculum concerned with how people organise themselves in society. It includes the study of our own social groupings, that of other cultures, and that of societies in the past. Social studies has tended to be an untidy subject area, particularly in primary schools, and rather parochial.* Over the past decade, however, it has become better organised and more rigorously defined.† In primary schools, social studies can now be described as having three elements:

– a concern with the processes of understanding and evaluating evidence, of making and testing hypotheses, and recognising the tentative nature of conclusions about how a society works;
– a willingness to use children's own social experiences (of family, friendship groups and school, for example) both as valid evidence and as a starting point for wider enquiry;
– an overriding concern that children develop social concepts that will enable them to understand and compare the underlying social structures of groups and societies.

The Inner London Education Authority has developed classroom materials and teacher guidelines in primary school social studies over the past five years to help develop the curriculum.‡ They sought to help children establish for themselves concepts of the division of labour, power and authority, tradition, social change, social control, conflict, co-operation and interdependence. The social studies use of the microcomputer described in this article arose out of the use of one of these class units, *People Around Us: Work*. This unit encourages children to think about their own perceptions of the adult concept of work, and then to examine the organisation and hierarchy of a factory, and the changes that occur in people's working lives. One suggestion in this unit was to make a street survey of local people's attitudes to their work, and it was the analysis of such a survey that lent itself to data processing.

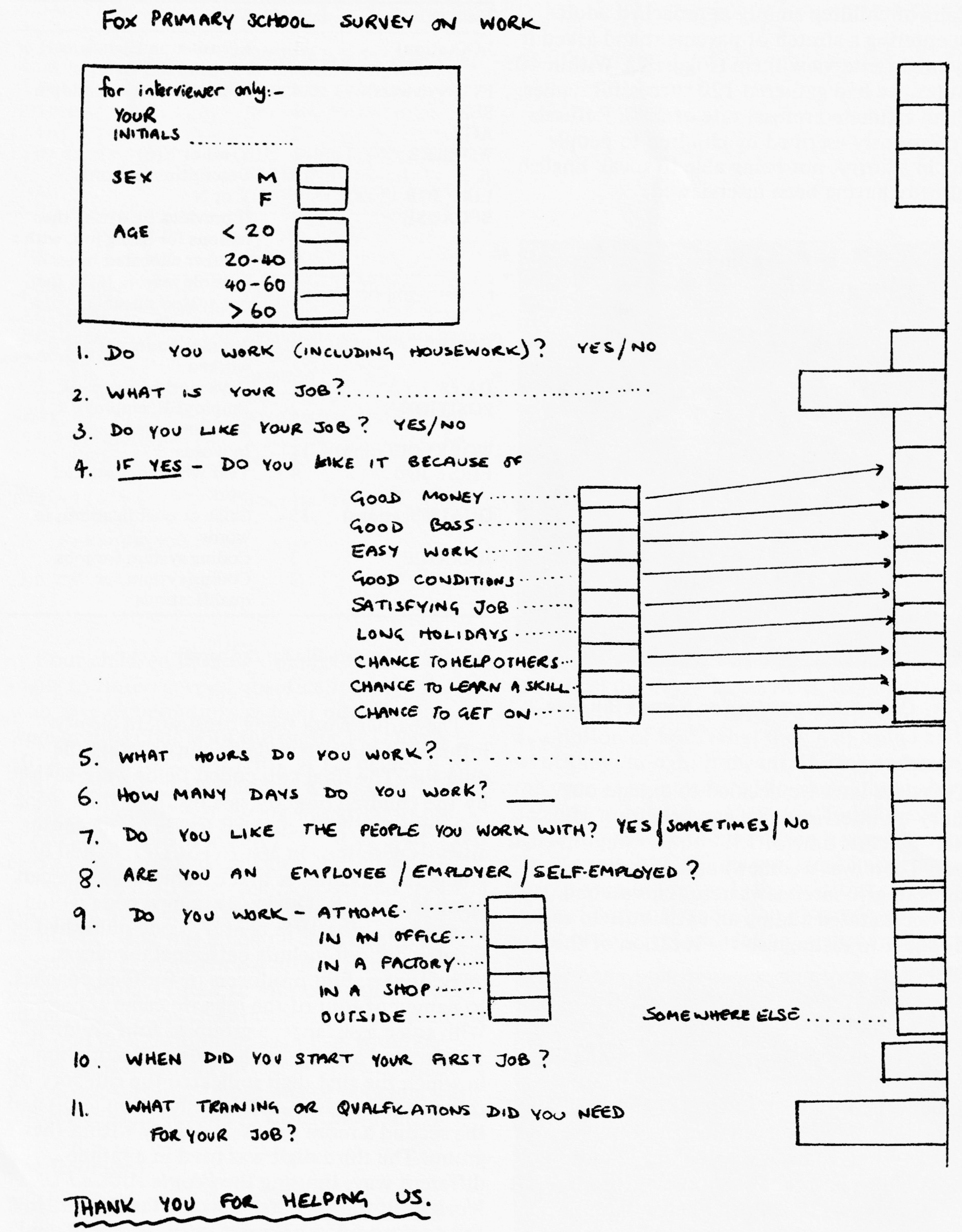
The approach to social studies described above, although well matched to children's cognitive development, nevertheless presents certain problems for teachers in organising children's learning. For example, one of the objectives is to encourage children to generalise from specific data, rather than presenting them with other people's conclusions: it is in this very process of creating generalised statements that abstract concepts are formed and understood. Some generalisation can take place from very limited experience, but if one wishes to extend children's ability to generalise beyond a few individuals, some problems of coping with statistics and relatively large numbers arise. Another aim is to encourage children to make speculations, and to test these, hypothesising yet further from their findings: but to do this with the results of a street survey can be very time consuming and lead to much repetitive work which masks the intellectual enquiry. Discussion between children, and between teacher and children, is an essential part of building up ideas: but organising this around a large mass of data is not always easy. We found that the Micro LEEP programs helped us with all this, developed other general educational skills (particularly in mathematics) and gave children further insight into the potential of the microcomputer itself.

The specific tasks in which the class were engaged were to examine adult perceptions of work, and to learn how to handle a social survey.

The survey

We started by dividing the class into five groups, each of which was asked to discuss the sort of information they thought they might like to have (and could possibly find out) from a survey of people in the street about their experience of work. One child in each group listed the

*See, for example, the comments by Vincent Rogers in *Social Studies in English Education*, Heinemann (1968), pp. 25–52.
†In particular owing to the work of Dennis Lawton, *Social Studies 8–13* (Schools Council Working Party 39), Methuen (1971), and of Alan Blyth and the History, Geography and Social Studies 8–13 Schools Council project team, *Curriculum Planning*, Collins ESL (1976).
‡Pupil materials: *People Around Us: Social Studies 8–11*, 3 units (*Families, Friends* and *Work*) from ILEA Learning materials service/A. & C. Black (1978–80); Teacher guidelines: *Social Studies in the Primary School*, ILEA (1980).


FOX PRIMARY SCHOOL SURVEY ON WORK

for interviewer only:-
YOUR INITIALS ....
SEX M F
AGE < 20, 20-40, 40-60, > 60

1. DO YOU WORK (INCLUDING HOUSEWORK)? YES/NO
2. WHAT IS YOUR JOB? ....
3. DO YOU LIKE YOUR JOB? YES/NO
4. IF YES - DO YOU LIKE IT BECAUSE OF
GOOD MONEY
GOOD BOSS
EASY WORK
GOOD CONDITIONS
SATISFYING JOB
LONG HOLIDAYS
CHANCE TO HELP OTHERS
CHANCE TO LEARN A SKILL
CHANCE TO GET ON
5. WHAT HOURS DO YOU WORK? ....
6. HOW MANY DAYS DO YOU WORK? ____
7. DO YOU LIKE THE PEOPLE YOU WORK WITH? YES / SOMETIMES / NO
8. ARE YOU AN EMPLOYEE / EMPLOYER / SELF-EMPLOYED?
9. DO YOU WORK - AT HOME, IN AN OFFICE, IN A FACTORY, IN A SHOP, OUTSIDE, SOMEWHERE ELSE ....
10. WHEN DID YOU START YOUR FIRST JOB?
11. WHAT TRAINING OR QUALIFICATIONS DID YOU NEED FOR YOUR JOB?

THANK YOU FOR HELPING US.

Fig. 1 The questionnaire devised by the class.

suggestions, and this list became the basis of a subsequent class discussion to select the topics for the final questionnaire.

A lot of important talking went into this. If a question required a long answer, how much could an interviewer be expected to write down? If multiple choice questions were given, how much would this restrict the interviewee's freedom to reply? Eventually, a mixture of open-ended and closed questions was decided upon, and also three questions that I had in part to prompt: the age and sex of the interviewee, and the names of the interviewers. The children decided not to ask directly how old people were, but instead to estimate and mark an age range (in practice, this appeared to be quite accurate). The final questionnaire was duplicated, with spaces left for subsequent coding (Figure 1), and we went out into Notting Hill Gate the next morning.

Pairs of children simply approached adults seen entering a stretch of pavement and asked if they might interview them (Figure 2). Within 40 minutes, we had gathered 120 successful replies, with an estimated refusal rate of 25%. Refusals were variously ascribed by children to people being in a hurry, not being able to speak English, or already having been interviewed.

Fig. 2 Conducting interviews on Notting Hill Gate.

Two days later we decided to extend our enquiry by interviewing a parallel group of passers-by (this time of 152) on Kensington High Street. There was a somewhat higher rate of refusals to give interviews here. This second day's work necessitated adding an extra note to each reply sheet to distinguish the location of the interview.

The analysis

Back in the classroom we looked at our findings, and were able to make several quick paper counts of the information we had gathered – how many non-workers there had been, for example – and to discuss some of the more elaborate questions about people's attitudes that we might be able to answer when a data file had been constructed. Why did people like their jobs? Who had we actually interviewed, by age and by sex? Who liked their jobs best? What sorts of job were there? How had people trained for their work? Were there differences between those interviewed in Kensington High Street and those in Notting Hill Gate?

Before these questions could be answered, the data file had to be constructed and compiled. Having already used the 1871 Census data file described in the previous article, many children in the class were now able to help devise a suitable file for their survey results (see Table 1).

Field name	*Length*	*Notes*
LOC(ation)	1	K(ensington High Street) or N(otting Hill Gate)
INT(erviewers)	4	Initials of pair of children
SEX	1	
AGE	2	
WORKER	1	Y(es) or N(o)
JOB	18	Description in words
LIKE JOB	1	Y or N
BECAUSE	9	If previous field = Y, then reasons for liking job, with a number allocated to each possible reason. More than one reason possible. *Not* a numeric file.
HOURS	2	Average hours per day worked.
DAYS	1	Days worked per week
POSITION	2	Employ**EE**, employ**ER**, or **S**elf **E**mployed
WORKLOC(ation)	11	In words
FIRST JOB	4	Year when they started work
QUALI(fications)	15	Skills or qualifications, in words
JOBCODE	3	Coding system for jobs
QCODE	2	Coding system for qualifications

Table 1 The data file for the survey

The earlier work using census data clearly influenced their attitude to constructing the data file. The final two coded fields were devised by the children directly as a result of their using the coding of 19th century trades in the census analysis described in *MICRO-SCOPE 6*, and of seeing the advantages that a numerical code can bring to analysis. Obviously, a new code would be needed – the 19th century code published in Wrigley did not include personnel managers, lorry drivers, film producers or football coaches, to name but four of the jobs we came across! With some assistance, a group of four children constructed a three-figure code of occupations, in which the first digit indicated the category of trade (e.g. domestic, selling, education, etc.) and the second a more precise category within that group. The third digit was used in a rather different way. In using the *People Around Us: Work* unit, the class had become familiar with the concept of an organisational hierarchy, and the final digit of the JOBCODE was used to denote (where possible) the worker's position within the hierarchy. Thus, for example, 'owners' had a code ending with 0, 'directors' one ending with 1, 'supervisors' one ending with 5, etc. The Micro LEEP program allows the specification of a final part of a field as a characteristic for enquiry, so that, for example, an enquiry JOBCODE ENDS 2 should list all those surveyed who were in managerial positions. A printout of a search made using these JOBCODES is shown in Figure 3.

```
Micro LEEP   Enquiry

Filename...........WORK82
Your Enquiry.......JOBCODE>710 AND
                   JOBCODE<740
OUTPUT to..........Screen Printer
Print Format.......3
Fields for Output..JOB QUALI AGE SEX
                   FIRSTJOB WORKLOC
                   LIKEJOB PEOPLE
```

JOB	QUALI	AGE	SEX	FIRSTJOB	WORKLOC	LIKEJOB	PEOPLE
PROFESSOR	GRADUATE COURSE	50	M	1969	UNIVERSITY	Y	Y
LECTURER	DEGREE	30	M	1969	LABORATORY	Y	Y
LECTURER	DEGREE	30	M	1967	UNIVERSITY	Y	Y
TEACHER	DEGREE	30	M	1966	SCHOOL	Y	Y
TEACHER	DEGREE	30	M	1966	SCHOOL	Y	Y
LECTURER	DEGREE	30	M	1963	OFFICE	Y	Y
LAWYER	STUDYING	30	F	1965	HOME OFFICE	Y	Y
TEACHER HOUSEWIFE	COLLEGE	30	F	1963	HOME SCHOOL	Y	Y
TEACHER	DEGREE	30	M	1978	SCHOOL	Y	Y

```
The file is  272  records long

 9  Records matched

END OF Micro LEEP
```

Fig. 3 Printout showing the results of an enquiry to list people involved in education.

Four children devised a similar code of two digits for interviewees' qualifications. All those who gave examinations as their qualification were given a code with the prefix 1: O levels = 10; A levels = 11; ONC/HNC = 12; degree = 13; and so on. 'No qualifications' was coded 40.

Much thought and testing was given to the construction and application of these codes, and also a considerable degree of library research. After the first 80 or so jobs had been analysed, two code booklets were made by the groups for each code. One was based on the structure of the code (i.e. in numerical order), while the parallel booklet listed all jobs or qualifications alphabetically. As classification of the remaining 200-odd jobs continued, both lists could be added to as necessary. When all were completed, a printout version of both sets of booklets was produced using the Micro LEEP program.

The findings

When the data files were complete, we had a further discussion in class on what we might find out about the attitudes of the people we had interviewed. For example, had we actually interviewed enough men and women to make valid comparisons between them? Or enough people of different ages? Which jobs were most liked, and which most disliked? Who worked the longest hours? Did people with different jobs have different trainings or qualifications?

Groups of two and three children took on particular questions, and attempted to use the Micro LEEP program to extract some meaningful answers from the database. I asked them to display their findings in some visual statistical display – histograms, bar charts, pie charts, etc. – as well as give a written description of both what they had found and what they thought it meant. Having earlier in the year been introduced to percentages and decimal calculations, they now found much scope to exercise these skills in a relevant way. Using printout facilities was most important. As can be seen in Figure 4, the printout can be marked and analysed with coloured pens in an attempt to select and define relevant categories

Fig. 4 Using a printout was an important part of classifying and analysing the findings.

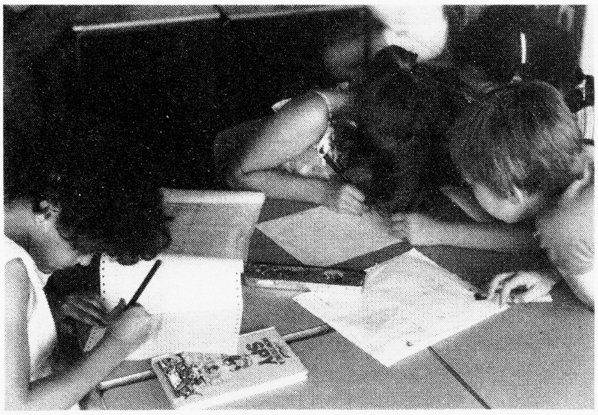


Fig. 5 Small group discussion was often centred around how to analyse and display findings.

for analysis. There was also an enormous amount of very useful intra-group discussion on the best way to proceed at each stage (Figure 5). I had hoped for more inter-group discussion to emerge than did so in practice. As each group came to some sort of a conclusion, a new enquiry arose out of the findings. Sometimes the paths taken by different groups converged, and results had to be exchanged. At other times a group would work on alone in a direction of their own choosing. Although I attempted to monitor what was going on, in the end I lost track of some of the lines of enquiry. There must have been some 60 or 70 enquiries made by the class over a three-week period.

Some enquiries came to a dead end. One group, for example, found that the information contained in the field POSITION was not very useful. They thought that this was because many of the people who had been interviewed had given contradictory answers to this question. Another group found that we had a very skewed sample as far as age was concerned, with 65% of our interviewees between 20 and 40 years old. Was this because older people were less in evidence on the streets at the time of the survey? Several children suggested this: others thought that many older people might already be at work, or that older people were avoiding the rush on the streets, or that members of the class had chosen to interview younger rather than older passers-by.

The same problem came up, with even more fruitful results, with a group looking at the sex distribution of our sample. A quick and straightforward enquiry showed that 158 males were interviewed, compared with 114 females. Some further calculation converted this into a pie chart with 58% males, 42% females. Comparing this to a 'normal' population, in which there are slightly more females than males, one group concluded:

> 'There are two possible reasons why [our class] interviewed more males than females. The first is that more women might stay at home to do the housework or cook the dinner. But that is only one reason. The other is more complicated. It is that more people wanted to interview more men. This is because they're biased. We used the computer to find out which groups [of interviewers] were biased.'

They then drew a series of pie charts, one for each of the 14 groups of interviewers. Four groups showed a marked bias towards selecting male subjects (choosing between 63% and 87% males). Only one group showed a bias towards female subjects (of 62%).

> 'We then asked people [in these groups] why they were biased and got some quite interesting results . . .
> *Trevor*: thought males might have more interesting jobs. He thought he was biased.
> *Andrew and Walter*: thought that men looked [as if they had] more interesting jobs, and women looked a bit more grumpy. They thought they were biased.
> *Katherine*: thought that there were more men on the street. She didn't think that she was biased.
> *Alice*: not sure.
> *Priscilla* (in the only group biased towards female subjects): thought most men had already been interviewed and a lot of men didn't understand her when she tried to interview them. She didn't think she was biased.
> *Anthony*: went for people who looked young. Charles [his partner] said they went for interesting-looking people, but Anthony disagreed with that.'
> [All children's names are fictitious.]

Another group looked at an issue that turned out to be related to this: who had liked or disliked their jobs? 'We found out', they wrote, 'that 4% of the working men disliked their job, and 96% liked their job. Then we found out that 11% of the working women disliked their job, and only 89% liked their job. We think that the reason is that men have more different jobs than women have, and the women who dislike their job would be perfectly happy with some of the men's jobs.' This conclusion was partly based on one of another group's findings: that the men interviewed gave 89 different kinds of job, compared with only 45 different female occupations.

One group analysed the categories of jobs in the working population of our sample (using the first digit of the JOBCODE). Their distribution charts and graphs showed a range from 15% of the sample working in each of the two categories manufacturing and retail dealing to 2% in agriculture. ('That's not surprising, you wouldn't find many of them round here', one said in discussion later.) Jobs in education and the professions were also strongly represented (32 people, 14%). I asked why there were relatively so many people involved in the three largest categories: 'Because we asked the questions in London, and these are the kind of jobs people are likely to do in London'.

Work places were also investigated. 'More people worked in offices than anywhere else', they reported. 'Older people tended to work in offices, and more younger people in shops. We think that this is because the people who work in offices need more skills than people who work in shops' (i.e. older people would have more skills). They drew a complex bar chart to show this relationship. Meanwhile, a parallel group had been testing not the relationship of age to work place, but of interview location to work place. They found marked differences between the two places. Although office-based workers were the largest group in each location, the proportions were different – 40% of workers in Kensington High Street were office based, compared with 28% in Notting Hill Gate. 'We found more office workers in Kensington High Street because offices need more facilities', they concluded. On the other hand, there were more than twice as many shop workers in Notting Hill Gate (15%) as in Kensington High Street (7%). 'We were rather surprised . . . because on Kensington High Street they have bigger shops so they need more people to work there. But it is possible that at the certain time we interviewed people in Kensington most of them were working.'

Conclusion

There was a great deal of social studies learning going on in the classroom. In addition, this work was of a high level of sophistication, and evidently was promoting much abstract thinking. The discussions on how reliable the evidence was, for example, showed that the children had doubts about their own sampling techniques, or suspicion of the data they collected (Had they been told the truth? Were their categories the most useful?), and an awareness of the size and peculiarities of the sample (Who would you *expect* to find on a London pavement at 10 am?). These critical skills are most important in the development of thinking skills. I am convinced that this attitude developed because the class themselves had collected the data, and loaded it themselves onto the disc. The microcomputer was not the omniscient possessor of recondite or infinite knowledge: they knew that it could only report on what they themselves had already told it. I think it important that, wherever possible, data bases are compiled by the children who will use them.

Fig. 6 Larger discussions between groups shared (and criticised) each other's conclusions.

Most of the children's time was spent away from the microcomputer, talking about findings and methods in groups (Figure 6). The classroom was arranged so that the microcomputer was available for making enquiries when necessary. I found that it was possible (and indeed desirable) for each group to decide for themselves when additional enquiries were necessary, and to make them without prior reference to me. Indeed, sometimes the computer was not used for long periods of the day: it no longer possessed any novelty value. It had become, like an encyclopedia or an atlas, a useful reference source, though one with particular advantages. I asked them at the end if they could have done this work without the computer.

– 'Without the computer, it would have involved searching through piles of papers and stuff.'
– 'But could you have done that?'
– 'No.'
– 'We could have done it – it would have taken a lot more time . . .'
– 'Every single question instead of taking a couple of minutes would have taken a couple of hours.'
– 'Couple of days!'

LOGO patterns

Mark Cooper
Old Oak Primary School, London W12

Towards the end of the summer term I was working with LOGO with a class of third and fourth year juniors. They had been making simple shapes and pictures and were quite happy with those until we bought a copy of *Turtle Graphics*, by Harold Abelson and Andrea di Sessa, for the teachers' reference library.

The book sat on my desk, occasionally perused by me at playtimes and lunch hours until, one day, one of the boys who had been staying in to finish some work with LOGO saw me reading it and asked what it was about. He left his robot picture and we flicked through the pages together till we found some patterns made by rotating simple shapes around one vertex.

'How do you do that?' he had asked.

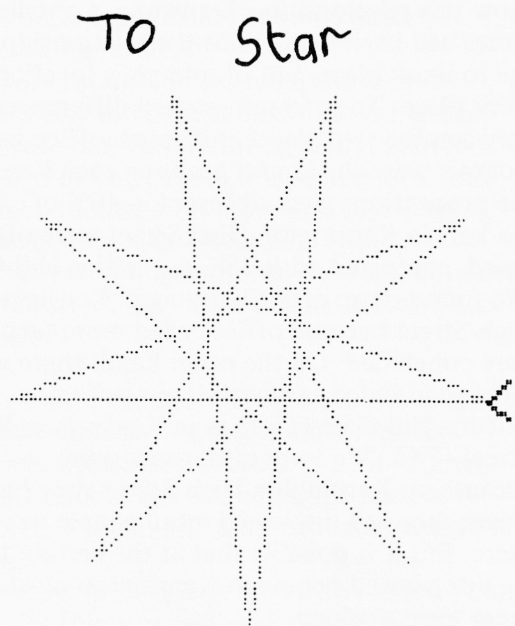
My answer, at that point, could only be: 'I don't know.'

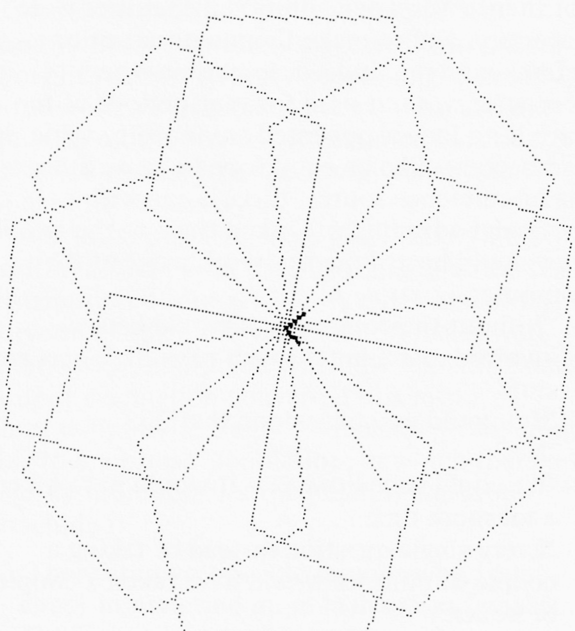
I saw the sparkle in the boy's eyes. His mind was already savouring the possibility of doing something that teacher could not do. He took the book away with him to the computer and, some hours later, produced the first rotational pattern, using a square and a rotation of 45 degrees.

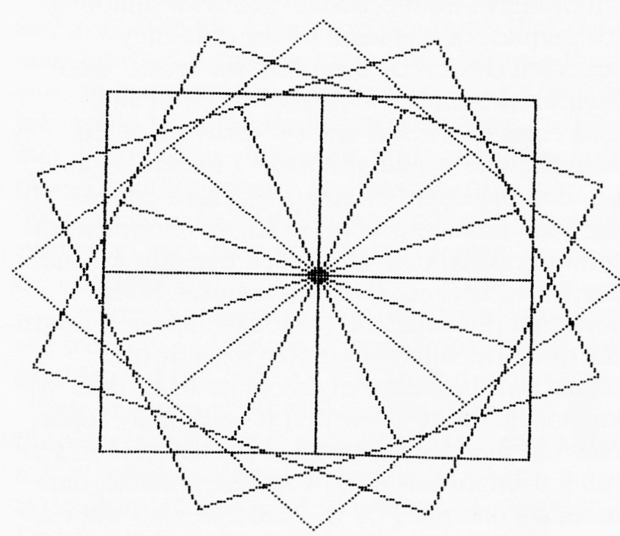
Not to be outsmarted I stayed on after school and made my own pattern using a pentagon and twelve rotations of 30 degrees. The following morning I triumphantly displayed my pattern to the boy's group before erasing the procedure from the file and issuing a challenge to re-create it.

My self-satisfaction was short-lived, for the group rebuilt the pattern and several more like it in slightly less time than it had taken me to invent my pattern.

From that point on there was an explosion of rotational patterns. Children's patterns became more and more complicated as the basic shapes they used became more complex or less regular.







One morning I was watching a group of girls at work on rotational patterns when one of them asked me if it was possible to make the shape bigger each time it was repeated. She thought it must be possible to make a shape 'like a snail's shell', by starting off very small and getting bigger each time.

Somewhat chastened by my previous experiences I said that we would have to find out how to do it. I grasped the manual and we discovered how to alter a variable inside a REPEAT loop in our particular version of LOGO. I was no longer the teacher, but an active participant in the learning process of the group.

We completed our first spiral pattern and I left the group alone to experiment with the new process we had discovered. That morning the group went on to make spirals using squares, pentagons, hexagons and irregular closed shapes of their own. One girl asked if it was possible to use the name of a procedure within itself and go on making the shape bigger until the largest shape just fitted on the screen. She wrote down:

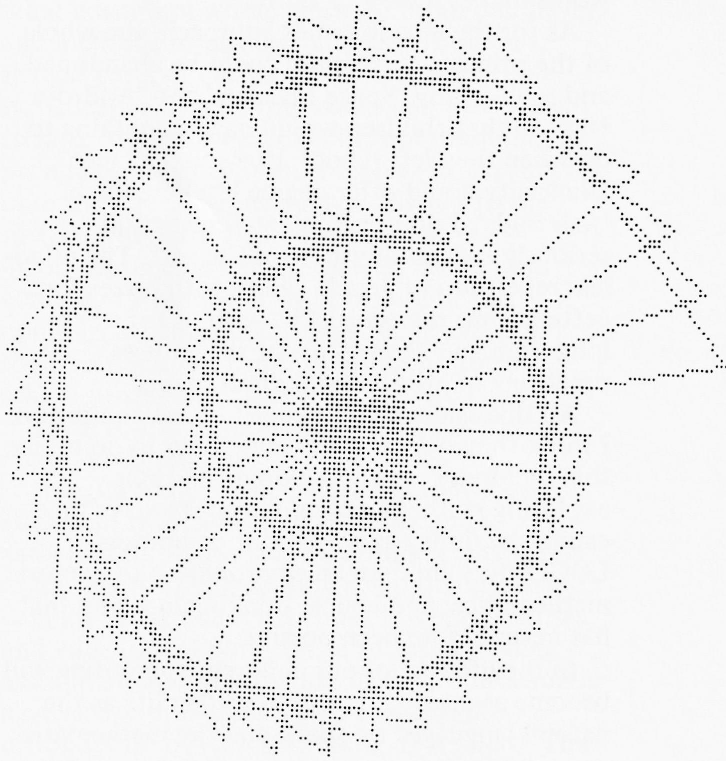
```
TO SQUARE
 RP4
   FD SIZE
   LT90
 NX

TO SPIRALSIX
 SQUARE
 SIZE=SIZE+2
 RIGHT 10
 SPIRALSIX
 UNTIL SIZE (is the biggest square that fits
 on the screen)
```

and

```
TO FIVESPIRAL
 SIZE=5
 SPIRALSIX
END
```

Unfortunately recursion is not possible with the version of LOGO we were using. It is interesting though that she worked out the logical possibility of recursion for herself.

I have learnt a great deal from using LOGO in the classroom. The child who first worked out how to make rotational patterns had quite severe learning difficulties and took part in activities provided by a support group of Educational Welfare Officers and Remedial Teachers. The little girl who saw the possibility of recursion was normally quite a defeatist and found it difficult to live up to her own expectations of a child of her age. The success these children had in something totally new spilled over into their other work and they became able to use mathematical and logical



concepts that had been quite unattainable using other methods.

I have learnt the magic of offering children 'secret knowledge' that even teacher does not know, and the pleasure of being not just a provider of opportunities to discover, but a part of that discovery process. Above all I have had my belief re-affirmed, that teachers have at least as much to learn from children as they have to teach them.

On computers in general and LOGO in particular

I cannot end without a word about our philosophy regarding the use of computers in primary schools in general. I believe that computer education is like any of the other basic skills: it needs to be taught, at an appropriate level, as early as possible. If the world of information technology were static, it would be right to wait until secondary school to introduce children to the computer. The age of computing is, however, nearer to its birth than to its maturity.

I agree wholeheartedly with those who say we should not be teaching young children BASIC or using endless 'educational' adaptations of arcade games to teach 'the basic skills'. BASIC, as we know it, is nearing the final phase of its life; each new version brings it closer to structured programming languages. If the computer education of young children develops the way I believe it should, the special place of BASIC, as a language for adults with no previous experience of computer languages, will vanish. It is not an easy language to use, especially for young children, even though its small set of key words makes it easy to learn.

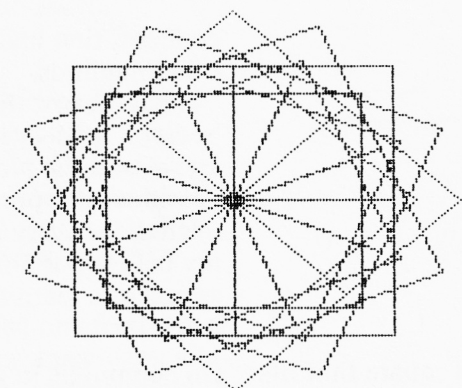
As for the arcade games approach, the whole of the primary curriculum could be abandoned and replaced by 'Space Invaders' and 'Android Nim' so that children would have something to do when they left school. Perhaps the Open University could offer degree level credits in 'Asteroids'. I do not think anyone would seriously suggest anything of the sort. The mindless repetition of arcade games with prizes for getting sums right might be with us for a very long time, but then so might the endless practising of arithmetic skills on paper.

All this aside, children need to use computers. I think they ought to be using them to do things that children ought to be doing (such as exploring mathematics and logic) in ways that cannot be done easily without computers. LOGO gives children an environment to explore mathematical and logical thinking in a way that has never before been possible.

In the lifetime of our children, computing will become as much a part of everyday life as the natural languages we speak and the mathematics we use to model our world. Skills like reading and computing take many years to acquire: both have subskills that must become second nature if effective use is to be made of them in later life. I am very much aware that, so far as computing is concerned, I am semi-literate. Like the adult non-reader, I have struggled to acquire skills that would have been easier to master earlier in my life.

We could all bury our heads in the sand and hope that computers will go away. We could pretend that computers were not computers, and treat them like super teaching machines, but I feel that we should be educating children in the use of computers as computers: tools for discovery and the manipulation of information. Other, minor, uses might be valid in addition but neglecting the real use of computers is waste that schools cannot afford.

At Old Oak we do not use computers because we are bewitched by the technology. We use them, with discretion, because we have seen what happens when children interact with the right software.



Individual records of young children

Elizabeth Moore
Early Education Research Group, Faculty of Educational Studies, The Open University, Milton Keynes

Micros in the nursery school? The style of the project reported here – record-keeping and the use of micros in nurseries and first schools – fits well with its originality and opens up some fascinating prospects.

History

This exploratory project (1980–3) is investigating the use of the micro as a record-keeping tool. Preliminary studies that led to this work included a Feasibility Study (1977–8) and a more practical Possibility Study (1979–80) that involved collaboration with staff (nursery nurses, nursery teachers and students) in a nursery school and a nursery class. The project is now being funded for three years by the Open University, where the author works as a research student in the Faculty of Educational Studies. If you read the rest of this article and would like a free copy of the latest project newsletter please write to the address given above. Any comments, ideas and suggestions would be welcome.

Nursery fieldwork

The project is collaborative and is made possible because the nursery assistants and teachers themselves take an active part in the task of systems analysis. Although the project title includes reference to first schools, the main bulk of the fieldwork is with nurseries. So investigating how first schools might implement micro-based record-keeping is by discussion and speculation. Seven nursery classes and schools have participated in practical phases of the project so far, and it is planned that eight more will participate during the rest of 1982 and early 1983.

This is what happens in each nursery. The micro system (which has dual disc drives, full-size keyboard, thermal printer, and 48K RAM storage) is brought into school for one week. The nursery nurses and nursery teachers consider the machine and look at its possibilities in the light of the records they already keep and records they would like to keep about individual children. The project also provides a set of materials on record-keeping, gathered from various sources. The nursery staff look at these and the two packages on the micro: the first is a purpose-built checklist/questionnaire package called CML (for historical reasons, as individual record-keeping came under the umbrella term Computer-assisted Management of Learning); and the second is a commercial text-editing package.

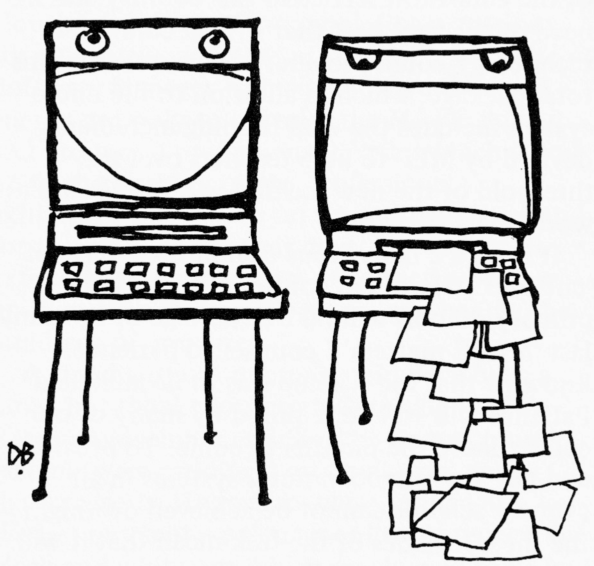
Obviously schools and classes keep working records that are individual to themselves, their particular specialities, the local environment and intake of children. The micro seems to be an exceptionally flexible and adaptable tool for keeping records about the progress and development of a child. With the help of nursery staff, sets of record-keeping templates (or frameworks) are produced. By the end of week one, the nursery staff have all operated the machine and systematically analysed what it could do to help them monitor the progress of each child. They have worked towards the production of micro-based record-keeping simulation sheets. These sheets are used (as a substitute for the machine) until phase two of the project (half a school term later). The micro is then brought back into the school for a week. A working micro-based system is rapidly set up. All the staff are involved in evaluation and appraisal of the system. Modifications of their micro-based recording method can be made during week two of the nursery's involvement with the project. Again simulation sheets are used beyond week two when the micro is no longer in school.

Context

An aim of the project is to gather ideas from the nursery staff themselves. So far, we have considered means of input (How long does it take to find one's way round a QWERTY keyboard? How would a light pen adaptation help? What advantage would a special input pad have?); and methods of display (graphs, histograms, shaded parts of circles, 3D simulations); and statistical analyses (from totals and percentages to rank orders). The project is not intending to produce a set of solutions. Rather it is trying to raise the relevant questions and issues to the surface where they can be discussed. By incorporating several approaches to the data collection a rich bank of information and opinions is being constructed. Concepts from the latest Schools Council work on primary school record-keeping* are considered in relation to the introduction of the micro as a record-keeping tool.

Integral parts of the project include case-studies of record-keeping in LEAs and a gathering of the available record-keeping forms in the 125 LEAs. Qualitative and quantitative data are being collected about the practicalities and educational purposes of record-keeping, assessment and observation in early education as a necessary preliminary step towards the introduction of record-keeping on a micro. The art possibilities of the micro are also being investigated as part of the work. For all concerned, the time spent in school with the micro is both demanding and fun.

*Clift, P., Weiner, G. and Wilson, E. (1981) *Record Keeping in Primary Schools* (Macmillan Educational for the Schools Council)



'I don't bother with record cards, I keep it all in my head.'

MAPE matters

Ron Jones
Chairman of MAPE, Upwood County Primary School, Cambs

The numerical change from 6 to 7 appears quite insignificant unless applied to the changes which have occurred in the primary micros scene between Issues 6 and 7 of *MICRO-SCOPE*. They include the DoI scheme, software development and the PCW show. 'MAPE matters' concentrates on the effect a number of these changes and developments have on our Association.

The DoI/DES Micros in Primary Schools scheme

It was almost at the end of the summer term that the Prime Minister officially announced the long-awaited details of the DoI/DES scheme; it started on 1 October 1982 and will continue until 31 December 1984. The DoI 'glossy' describing the scheme proved so popular during the summer that the pamphlet was 'out of print' by September – rather frustrating for the many enquirers at MAPE's PCW stand (an enormously successful event, but more of that later).

The Government's offer to primary schools is very generous. I would like to think that our Association has had a hand in helping the decision-makers realise that the primary sector of the education service in this country was in need of the very best that British computer technology could provide. I believe that in this total package, which in addition to the micro system includes the vital training ingredients devised by MEP to help teachers over the threshold of the new technology, Britain has a world market leader.

It is such a marvellous deal in these days of 'cut-backs' that I am confident that most primary schools will take advantage of it. In my last 'MAPE matters' I counselled patience, knowing that the scheme was to be launched. Patience will still be required by many of our colleagues in the months to come. To provide and pay for microcomputer systems in all primary schools cannot be achieved overnight – the sheer logistics of the task mean that it will have to be staggered. Hence the extension to 31 December 1984. Many schools will be tempted by the 'goodies' being independently offered by some manufacturers: beware – take advice from your LEA who will be administering the scheme – **do not** be tempted to go out and buy independently at this stage.

MAPE will have quite an important part to play in helping to support the scheme, especially during the early stages as more teachers begin to get to grips with the problems and excitement of introducing sophisticated technology into the classroom.

MICRO PRIMER

It is one thing to supply the hardware – but making full use of the hardware demands a massive training programme and the support of good quality educational software. Fortunately, as mentioned in *MICRO-SCOPE 6*, the Government scheme includes a foundation course for teachers. This is indeed one of the changes referred to in the opening paragraph – the working title *PRINT* (Primary Induction for Teachers) has now given way to the published title of *MICRO PRIMER – a foundation for teachers*. It has been specially designed to help colleagues who are newcomers to the micro scene to become competent and confident users. Very important parts of the distance-learning scheme are the software packages, which contain 30 programs for use with infants through to top juniors. The programs range over several areas of the curriculum and cross subject boundaries to concentrate on skills development. There will be a further option to purchase 20 more programs which will be published early next year.

(Whilst on the subject of software, I notice that 150 programs are mentioned in the latest Sinclair offer to schools – how I wish that were true! I am afraid the Sinclair publicity machine has misinterpreted the *MICRO PRIMER* package: MEP has produced 50 programs for each of the three machines offered under the scheme – hence the magic number of 150!)

A great deal of effort and energy has been spent in converting programs to run on each of the machines – what a pity that they are so incompatible! The hardware manufacturers still turn their minds to more micros – I just wish that they would realise that the choice from three is enough for schools, and concentrate on cheaper, reliable disc drives and printers to suit the machines available – that indeed would be a real service to schools, and what a market!

That's hardware – I was writing about software. I do so hope that when the *MICRO PRIMER* programs begin to circulate, teachers and software houses will accept the challenge to write to high standards and supply programs along the lines set by the packages. A massive supply of good educational software will be needed to sustain and satisfy the demand. The main source will be a combination of all three elements working in close liaison. The teacher can provide 'grass roots' ideas, which meet a real need within the curriculum; the University/College Departments contribute their curriculum development expertise; and the software/publishing houses take over the professional design, packaging and marketing of the finished product. MAPE membership includes all three elements, and the Association should be at the forefront of the much-needed program development teams, writing to standards laid down by MEP. The potential for growth is enormous – the exciting part is that elements within the educational service could begin to work together as teams for the first time in many a long year.

MAPE does not intend to produce its own software, but it does intend to play a very positive role in objectively reviewing educational software from software houses. Such reviews would be based on the evaluation profile mentioned in *MICRO-SCOPE 6*. (This profile has been adopted by MEP and will be part of the two-day Tutor Course to be offered by LEAs as part of *MICRO PRIMER*.) Producers of software interested in having their software reviewed should send copies to me – these will be passed to the appropriate MAPE Review Panel. Such reviews would then be made available to members as a service towards helping teachers select software which may be of benefit to their schools – after all, software is the life blood of the computer system.

Group/Area Activities

For these national initiatives to be fully implemented, it will require a great deal of effort at area and group level. The coming months will provide ideal opportunities for MAPE. Moving into a new area such as micro technology can pose a threat to many colleagues. I am suggesting that you look down the list of MAPE members in your own area – and organise a group or small area meeting to discuss any problems, or exchange ideas and experiences. We are preparing a small booklet on how to organise such meetings, with a suggested list of activities. Groups which already exist and are active in helping colleagues might also like to share their experiences – make contact as soon as possible through a letter either to *MICRO-SCOPE* or to any of your MAPE council members. It is essential that we begin to network throughout the country in order to lend support to the idea of a technological infrastructure which will enable groups to share experiences and expertise. Primary teachers are renowned for their innovative approaches to education – **you** prove it in **your area**.

PCW Show at the Barbican Centre

The microcomputer world is full of acronyms – PCW is one which many will know, especially If they attend this year's *Personal Computer World's* show at the Barbican. The magazine very generously donated Stand 413 to MAPE for the four days of the show – and what a show! I've never seen so many people outside a major football match! MAPE provided the only educational input for the show and, judging from the enormous number of enquiries we had, especially from parents, there is a need for far more. Perhaps next year the DoI, DES, MEP and software development houses could be persuaded to take up exhibition space. To return to parents – many were very keen for their children to use the technology as soon as possible and showed a good deal of interest in the 3 systems which we exhibited under the DoI scheme, as well as the samples of programs from *MICRO PRIMER* which we had up and running. I can see that at Conference '83 we shall have to cater for a strong contingent of parents.

I want to take this opportunity through 'MAPE matters' of thanking the management of PCW for providing MAPE with its stand – a very generous gesture, and one I hope we repaid through the educational input we gave to the show. I would also like to thank MAPE's Exhibition Manager, Don Walton, who, before settling back into his Deputy Headship at Houghton School after completing a gruelling six months secondment as the *MICRO PRIMER* Software Manager, managed to find time and energy not only to organise the MAPE stand, and produce a professional display which stood up to the scrutiny of the professional exhibitors, but also to set up and man the stand for three out of the four days. My thanks also extend to those members of council who gave up their time to man the stand, and handle the hundreds of enquiries.

A stand without micros would have been a farce, but thanks to Acorn, Commodore, Research Machines and Sinclair Research the systems were produced on time – oh, and thanks also to Microvitec who supplied at the last moment a colour monitor to replace the black and white one which was loaned to us by one of the 'Big Three'. Those who visited the stand might have noticed that the monitor was fitted with a 5″ angled plinth, available as an extra from Microvitec -- one well worth buying. Many thanks also to Store Stock Systems Ltd of Hale, Cheshire, for providing us with the 'workstation' on which we mounted a complete BBC micro system. It enabled all those cables to be safely stored as well as displaying the monitor at a comfortable viewing height – a boon for the busy teacher who wants to plug in just one 13 amp plug into a socket and have the whole system up and running. It is these developments which MAPE members, who are the educational users of the system, should be encouraging. It could give rise to a whole generation of new industries and, providing the prices are kept reasonable in view of the large market potential, education as well as British industry could benefit. Perhaps several 'micro accessory' manufacturers could be persuaded to display their wares at next year's PCW show, which has, I believe, already outgrown both Exhibition Halls at the Barbican!

Training

How the micro will be used depends a great deal upon the training teachers receive in the next two years. If the training is inadequate then this sophisticated piece of high technology, with its enormous potential for development by the teaching profession, could be reduced to an electronic blackboard – a rival to the OHP, or even an electronic work-card in full colour. It would be a lost opportunity if that's all it were used as. All of us need to explore its uses on a much broader front, especially within Information Technology and in creating problem-solving situations through simulations and games. Such was the theme of a course which Don Walton and myself ran in Germany during the first week of the summer holidays, for 42 teachers who work within the Service Childrens' Education Authority (see the report on p. 17). On returning to their various schools they are hoping to form MAPE groups to lend mutual support to the types of developments which emerged from the course. Any help which you might be able to offer such groups will be gladly received – an extension to the all-important network!

'MAPE matters' seems to be growing alarmingly – but it seems a reasonable way to keep you informed about what is happening centrally. To try to give it some sort of form I intend to add two regular headings: 'Postbag' and 'Bookshelf'. Sometimes the two might merge, but not this time.

Postbag

In addition to lots of your letters asking for help and information, which I hope I have been able to answer as fully as possible in spite of some inevitable delays because of *MICRO PRIMER* pressures, I also get information leaflets which I personally find of use – it's these which I will mention briefly in this section, in case you too will find them of benefit.

USPECs These 'USER SPECIFICATIONS' published free of charge by the Council for Education Technology, 3 Devonshire Street, London W1N 2BA, are of particular use because they are backed by thorough research, and are written in an easy style.
USPEC 32a A guide to the selection of printers for microcomputers (published in April 1982) is an essential pre-purchase read for schools contemplating buying a printer.
USPEC 32b Word Processing Systems in Education: A guide to the application and selection of suitable equipment (published in April 1982) is important for those staffs ahead of the game, who are exploring this important use of the technology.
BP Resources Catalogue Supplement Published free of charge by one of our main sponsors, British Petroleum, it is available from BP Education Service, Britannic House, Moor Lane, London EC27 9BU, and contains many useful addresses.
CAL News 20 (September 1982) The latest *CAL News* is available free of charge from CEDAR, Imperial College Computer Centre, Exhibition Road, London SW7 2BY. A very useful guide and newsletter on CAL affairs.
MEP Information Sheet *Microcomputers in Education* is available free of charge from your MEP Regional Information Centre. MEP welcomes additional material and this should be forwarded to Lynn Craig, MEP, Cheviot House, Coach Lane Campus, Newcastle upon Tyne NE7 7XA. A very useful document which will lead you into a whole range of further sources – a 'must' on the reading list of every primary teacher engaged in the use of micros.
The Banks and Information Technology Published free of charge by the Banking Information Service, 10 Lombard Street, London EC3, this is a useful booklet for schools anxious to illustrate the use of computers in the real world. The Banking Information Service is keen to co-operate with MAPE on the production of a simulation which will help children of primary age come to terms with some of the concepts behind money management – a real challenge to those of you with interests in this field. BIS are offering a prize as part of their trawling operation, so put on your thinking caps – get the ideas flowing and write to BIS at the above address.
Manchester SEMERC A newsletter produced by its manager, Bob Dyke, at the City of Manchester College of Higher Education Hathersage Road, Manchester M13 0JA. Bob has

collated lots of useful information for those of you with particular interests in Special Education. There is such an overlap with work in primary schools that close contact with all four SEMERCs should be maintained. I do hope that the managers of the other centres will also send me their newsletters.

Bookshelf

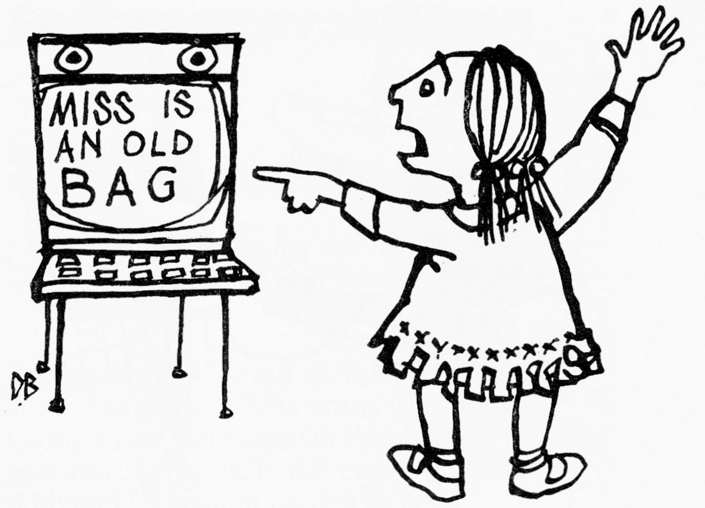
Like many of you engaged in Information Technology I am finding it increasingly difficult to maintain a reading schedule – but I have dipped into the following:

Byte (the small systems journal) The August '82 edition (Vol. 7, no. 8) is devoted to LOGO – 10 articles of mixed use for our age group, but a useful source of information. (McGraw Hill, £1.85.)

Microcomputers and Children in the Primary School A collection of articles partly inspired by MAPE's first Exeter Conference, edited by Roy Garland. An unusual title – it refers to 'children' – makes you think, doesn't it! (Falmer Press, £5.50 pb.)

NUT Primary Education Review: Microcomputers in Primary Education Contains several useful articles covering selection of equipment, curriculum matters and development of thinking skills through quite advanced simulations. (Summer 1982, No. 14, 75p from the Assistant Editor, Primary Education Review, Hamilton House, Mabledon Place, London WC1 9BD.

Teaching History A special issue of the Historical Association Journal devoted to the use of microcomputers. (June 1982, No. 33 available from the Association Secretary, The Historical Association, 590 Kennington Park Road, London SE11 4JH.)



'I'm tellin'!'

I hope that you will continue to fill my postbag, and that I can continue to find time to dip into the books/magazines which I find useful. Meanwhile, the most important contribution that MAPE can make in the next few months is in helping to create a technological infrastructure through which the imaginative and creative use of the new technology might flourish in primary schools.

MAPE joins the army and sees the world

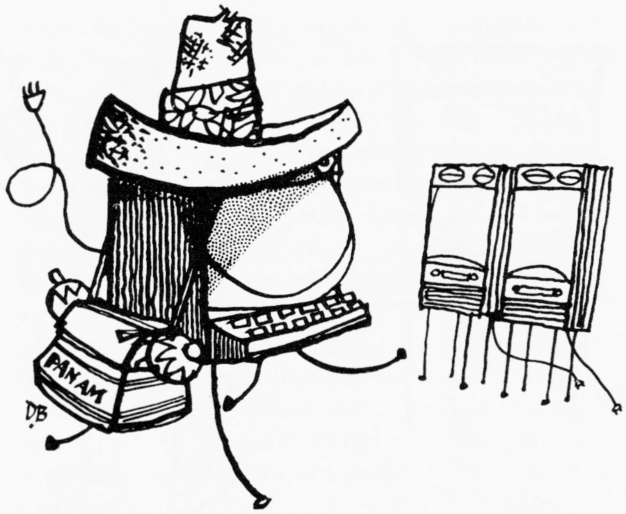
Jim Thorley
Head of Mathematics, The Havel School, Berlin (soon to become the Advisory Teacher for Computers and Mathematics in Rheinahlen)

A report on 'Microcomputers in the Primary School', held at Gutersloh SCS Teachers' Centre for Service Children's Education Authority (SCEA) Primary Headteachers and their staff.

It must be rare to find primary teachers gathering from as far afield as Hong Kong, Cyprus, Naples and Berlin. They came to learn about the impact that micros are having in primary education from two founder members of MAPE, Ron Jones and Don Walton. The course was made possible through the good offices of SCEA, the Service Children's Education Authority. This organisation provides schooling for the children of servicemen and those of attached civilians overseas.

The course for thirty primary teachers was a mixture of background information, planning, application, crystal ball gazing and practical workshop sessions. This was possible because, as well as Ron and Don, there were gathered at the centre 15 BBC Model B Microcomputers.

Ron explained what a micro was and what it was not. He had to convince the assembled Heads, who had all made some financial contribution to the purchase of the 15 BBC micros, that when they got back to their various schools they could find a place for their

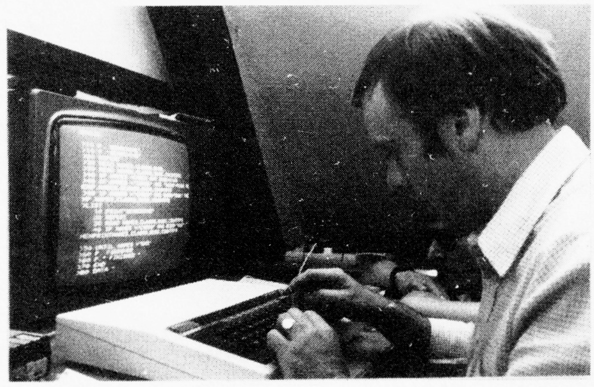


'He's back from another lecture tour in the Caribbean.'

purchase in the classroom. He pointed out that a computer was not an electronic brain, it was not infallible, it could not think, it was not very expensive and it was not difficult to use. Most primary children were not over-awed by them and were quite happy to communicate with them after very little practice. Many older children already had one at home – if education was not to be left behind in relation to Information Technology, then the ordinary teacher must come to grips with this newest teaching aid. Ron explained that the systems were essentially very simple but possessed great potential for teachers and learners alike. Some teachers had already got caught up in the exciting work of exploring and developing these potentials; he showed examples of teacher initiated programs that were to form part of the pack soon to be released.

This software package contained some of the best examples of potential micro application, as identified by Duncan Sledge in his Durham Microcomputer Project Report, including:

1. *Simulations and games*: these could have scientific, mathematical, historical, geographical or other contents, and could model systems, processes, experiments, apparatus or events.
2. *Reference source*: involving putting data into a data bank followed by the simpler task of assessing it in a variety of ways.
3. *Problem solving*: employing the computer to calculate answers to programmed problems.
4. *Demonstrations*: concepts, principles and techniques displayed or illustrated.
5. *Consolidation*: drill and practice exercises, revision material, testing and performance summaries are possible.
6. *Computer-Aided Instruction*: course material can be imparted through the medium of the computer – development is involved and requires more effort than most schools can provide.
7. *Computer-Managed Learning*: pupils can be tested and directed to the appropriate level of study in a course – development too involved for most schools.
8. *Computer-Assisted Learning*: this term could really cover most of the previous terms.
9. *Control device*: the computer could be used to take readings from or control the operation of scientific equipment if sufficient expertise were available.
10. *Programming tool*: the machine could be used as a practical aid to pupils and staff who are learning a programming language like BASIC.



Students type in BASIC program

During the week's course, all these aspects were explored. There were software examples of most of them, and the course members were given 'hands on' experience using this software. They were encouraged to assess the programs that they used and their comments were noted for future development. Don Walton ran a short introductory course on programming the BBC micro. The success of this part of the course and the lure of the machine can be judged by the fact that every evening members gave up the comforts of the Station Officers Mess at Gutersloh to sit at a keyboard in front of the blinking screen until 21.30.

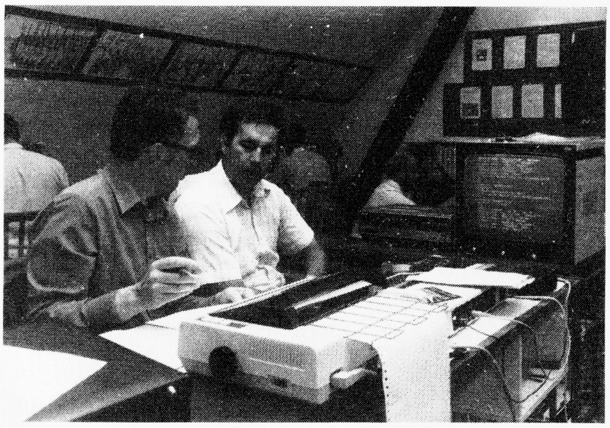
Perhaps the most important part of the course was the awareness training that went on. A one-week course was not enough. Each head would have to establish in the minds of *all* the school staff the urgent *need* for the introduction of new technology:

- to establish in the minds of teachers a positive attitude towards computers and micro-based technology;
- to teach both the capabilities and the limitations of the microcomputer;
- to provide for a deeper knowledge and understanding of microcomputers for those teachers who wish to pursue the subject further;
- to create a will amongst individual teachers at least to explore the microcomputer's possibilities as a classroom tool.

In order that some of these aims can be realised, it will be necessary to have access to good, classroom-orientated, flexible software. If this is really to serve the teacher then he or she must have a hand in the writing of it. The teacher is the expert who can evaluate where there is a need and which of the many advantages of the computer can be used. The course members were therefore encouraged to form themselves into teams to write program specifications. The course leaders, being practising teachers, knew of the pressures already exerted on teachers' time and hence did not think that it was a teacher's part to write the actual program. The more far-sighted LEAs had employed full-time programmers to convert specifications into a coded program. However, the teachers in the team needed some knowledge of the language and perhaps the inclusion of a graphics specialist to take full advantage of the new micros.

If the software seen on the course is a sample of this new approach, then it is to be welcomed. Most of the course members would have been very happy to use it in their classrooms, and those with experience of the computer programs available for the secondary age range thought these much better. It was suggested that here was a role for some YOP youngsters, since, as was pointed out, some of the best programmers are young sixth-formers who cannot get a job as yet.

After five very hard days the course members left, tired, excited and full of enthusiasm, indebted to Ron and Don for a stimulating course held during the first week of the summer holiday. I hope that Ron and Don left Germany with a satisfied feeling of the MAPE word spread around the globe, and having enjoyed typical forces hospitality. I hope we have forged a friendship that can grow and prosper in this, the age of the chip.



Course leader Don Walton (left) lending a hand

Photographs by **John Bastable**, Swinton School, West Germany.

Software evaluation

Ian Black
Headmaster, Sek Kong School, Hong Kong

Reflections following the SCEA sponsored course on 'Micros and Primary Education' reported above.

Enthusiasm and indeed excitement were high at the end of the course at the prospect of having a new sophisticated learning and teaching tool available to us. It will bring together the skills and techniques needed to meet successfully the challenge of the new technology. This enthusiasm however is tempered with a degree of caution when one considers the quality and quantity of software currently available to us.

The purpose of this footnote is, through the pages of your magazine, to draw to the attention of the major publishing houses some of the questions, concerns and anxieties likely to be expressed by thinking teachers in the coming months and years when considering the purchase of software.

I would respectfully suggest that publishers consider some of the following points when designing a program.

* It must be easy to use.
* The material should be well presented with excellent graphics.
* It must be relevant to the environment and experiential background of the children it is designed for.
* Does it provide experiences which cannot be provided by the teacher within the normal classroom environment?
* Will it capture the interest of the child and extend his involvement beyond the limits of the program?
* Will it come complete with resource packs and support materials?
* It must have appropriate language content.
* It should be readily adaptable.
* It must be crash proof and child proof.
* Has it been tested in schools?
* Above all, is it teacher bases, i.e. has it been researched, written and evaluated by teachers?

Inspection tapes, books or packs should ideally detail the program layout, give examples of graphics and language, list objectives and skills and outline how it approaches evaluation and assessment.

Teachers within SCEA will certainly welcome this new technology and, since it will force us to re-think all areas of the curriculum, pupils, teachers and education in general must all benefit.

Resistance to using a computer in school

Mike Gibson
St Mary's Middle School, Northampton

Buying a computer for your school is one thing but trying to encourage members of staff to use it is quite another matter! Last year a colleague and I duly attended the required three-day induction course before being let loose on our new RML 380Z.

After much initial excitement and expectation the computer was eventually unveiled at a special staff meeting called to examine the machine and see a demonstration of its power and versatility. Unfortunately this enthusiasm was relatively short lived since afterwards, out of a total of twenty-two staff, only four teachers including myself expressed serious interest in its use.

Not undaunted we continued to encourage individuals to 'have a go', having first prepared a number of suitably 'attractive' programs which were copied onto an autostarted disc complete with menu program just to make things easy. Alas, this ploy also failed to capture interest or arouse curiosity amongst the rest. At this point I was naturally anxious to discover the reasons for this apparent indifference. Eventually, after much informal discussion, several factors emerged which matched very closely the forms of rejection of audio-visual aids identified by Eicholz and Rogers* nearly twenty years ago! (See Table 1.)

Many of the teachers felt that the computer was too complicated or were anxious about their ability to acquire the necessary expertise to use it successfully with groups of children. Others, although not openly hostile to its use in school, felt that they could not spare the time necessary to become familiar with its operation. However, what seemed to be most significant was that the majority of reasons expressed for *not* using the computer were either *situational* or *personal* and did not necessarily reflect lack of information. Situational and personal factors were to some extent beyond our control, as they related to the feelings, personalities and experiences of the staff concerned.

Providing information is clearly not sufficient in itself to encourage the fainthearted. Other methods of persuasion, for instance having children in the class trained in the use of the computer and with an ability to set things up, have to be tried. Reluctant teachers need to be gently and slowly helped to overcome their own prejudices and doubts with regard to the new technology. In our own case, only time will tell but happily there does now seem to be a 'climate of acceptance' slowly emerging and a lowering of resistance which augurs well for the future.

Table 1 Resistance to using a computer in school: identification of forms of rejection (after Eicholz & Rogers, 1964).*

Form of rejection	*Cause of rejection*	*State of subject*	*Anticipated rejection responses*
1. Ignorance	Lack of information	Uninformed	'It's too complicated.'
2. Suspended judgement	Data not logically compelling	Doubtful	'I want to wait and see how good it is before buying/trying it.'
3. Situational	Data not materially compelling	(a) Comparing	'Other things, e.g. the blackboard, are just as good if not better.'
		(b) Defensive	'I can't possibly use this with the whole class.'
		(c) Deprived	'It costs too much to use in time/money.'
4. Personal	Data not psychologically compelling	(d) Anxious	'I don't know if I can operate the machine.'
		(e) Guilty	'I know I should use it but I just don't have the time.'
		(f) Alienated	'Computers will never replace teachers.' 'If we use these machines they might replace us.'
5. Experimental	Present or past experience	Convinced	'I've tried them and they aren't any good.'

*Eicholz, G. and Rogers, E. (1964) 'Resistance to the adoption of audio-visual aids by elementary school teachers', in Matthews, D (ed.) *Innovation in Education*, Teachers College, Columbia University, New York, p. 310.

What makes a good program?

M. Johnstone
Dundee College of Education, Gardyne Road, Broughty Ferry, Dundee

The obvious definition of a 'good' program is one which does not jump or scroll up the screen; is bug free (no 'undefined statement error in 67520'); is easily run through; and is educationally sound. That's all?! Of course you can actually see if a program scrolls or not. With any luck, the latent bug hidden in the most robust program will not pop out just as you're demonstrating the miracles of modern technology to sceptical colleagues.

But – what is an 'attractive' program? My idea of attractive may not be yours. Even the most hilarious snazzy response may pall after the hundredth repetition. The pupils may prefer the hanged man to the polite 'Well done!' when they get the answer correct, in any case. Being involved with teacher groups writing software (to be programmed within Dundee College of Education), I am aware of the teachers' desire to make the right more attractive than the path of error. In general, this is done by graphics where possible, or by the simple device of giant ticks, or by the selection of an approving statement from a bank of possibilities. Where possible, the latter is accompanied by the pupil's name. Some responses flash – at the risk of being misunderstood, it can be said that most programmers go through a flashing period – some come up letter by letter, some come in reverse field, etc.

In other words, anything to look snazzy and get the pupil's attention. Does this motivate the pupil – or does it simply reinforce the pupil's perennial desire to hunt the one, single, right answer to the question? The technique is stimulus–response, as advocated by (among others) Skinner, and it is a familiar one to behaviourists. It is also dismissed as taking a very limited view of what constitutes human motivation, being based on animal work with food as reward. Furthermore, in its most successful form, it seems that the reinforcement ought to be intermittent. Has anyone tried this? Intermittent reinforcement might perhaps counteract the situation where the child learns that *correct answer = good*, instead of *wrong answer = what went wrong? what can I do?* – which seems a more useful lesson. Any reader of John Holt's work will be aware of the lengths children will go to to be right, to the extent of cutting off learning altogether.

Moving on to the ease with which the program can be handled, everyone must have seen at least one of those hand-knitted programs which work if you stand on one foot, only read every second instruction, and try every key at least twice. Some of us have written these programs, and love them dearly. While such old bangers may work happily for the man who knows their little ways, they're not really fit for public consumption, especially by the critical assassins who staff other schools. Nevertheless, in the effort to make programs comprehensible, the programmers can easily go overboard into pages of dense text. The skilled user may prefer terse screen instructions – after all, he can get out of any trap he falls into – but what about the novice teacher user, or the pupil? Pages of text may suit the teacher, although he's liable to say that a computer screen makes a pretty expensive sheet of paper. Pages of text do not necessarily enhance pupil reading skills, or concentration. Both pupils and teachers get fed up, read the bottom line on the screen and dash forward into disaster. On the other hand, terse instructions sometimes seem to verge on the cryptic, like some secret message.

Program standards are a red herring – or a mirage, to mix metaphors. Desired in the abstract, they are incredibly tedious to adhere to, especially if you have to go back over past work. Can anybody even find an agreed definition of program standards? Likewise, documentation is an honourable concept but a practical non-reality. In my experience, documentation can be kept to one sheet per program, with useful points on pupil pre-knowledge, ancillary materials, etc. Even this is lost, or ignored, often for the best of motives, 'to let them see *all* the programs I've got'. Besides, it seems peculiarly perverse to write a computer program which depends for its actual ease of use on a piece of paper. Programs which involve work on paper are another matter, as is technical documentation, although the latter could be carried in the REMs.

The main trouble with trying to make programs easy to use is the inbuilt ambiguity of the English language, plus the tendency of the intelligent adult to see several meanings where only one is intended. Sheer carelessness in reading doesn't help, either. To go to the other extreme, ease of use might be ensured by 'teacher-proof' packages in 'difficult' areas like science, where only the simplest of instructions are used, and the pupil works in relation only to the computer. This futuristic mode (or anachronistic, for those who recollect programmed learning) underestimates the ability of pupils and teachers to find problems where none (apparently) exist. It is also insulting to the teacher's professional competence, wasteful of computer access, and educationally sterile. The computer is not a cheap device – is it worth squandering it on teachers who expect the whole thing to come on a plate? Ease of use increases according to teacher effort which depends entirely on teacher goodwill. At the missionary stage, programs with grammatical errors (the ubiquitous 'it's' for the possessive case) or misspellings or repetitious instructions are totally counterproductive – but have we not now passed that stage? Can we not move on to considering the educational implications and demands of the computer instead of fussing over things which may be relatively easily mended by a competent amateur programmer?

Of course, this raised the most difficult question of all, what *is* an educationally sound program? For many teachers, it is a program which replicates a tried and tested classroom approach. But if it already works on pencil and paper or whatever, why replicate it? And if it doesn't work, why should the computer's reservoir of novelty, interest and pupil motivation be drained off by dreary drill? The impression seems to be that since the computer can sugar the pill we need not bother to change the prescription. Before various people write to demand new, creative ideas, it must be admitted that it's far easier to criticise than be creative! Nevertheless, games-type formats, programs which encourage pupil discussion of the input, simulations and interactive concept-teaching programs all seem to offer more than the kind of program which tests the pupil's multiplication skills. A pencil and paper test would probably give the same result. Better still, conversation with the child, or watching the child work through some examples either on paper or on the screen, would clarify where the difficulties lie.

Perhaps it is a curiously Scottish phenomenon that teachers feel they ought to be teaching more basic skills, basic grammar, number work? Perhaps it is a Calvinist dislike of logic games as 'just' a game? Work is serious stuff in school. 'I let them use (the computer) when they've finished their work' is not an uncommon attitude for the inexperienced user. The experienced user is presumably more committed to the idea of the computer as valuable in itself. What sort of program does he or she want? Is it true that the computer buff knows little or nothing about curriculum development, and happily programs material that was mainstream when he was a lad? Does the curriculum expert know or care about the computer, or does he belong to the 'I can hardly handle the tape-recorder' school? Perhaps readers would like to discuss these topics! To the skilled teacher/computer user virtually anything has 'educational' mileage – ought the micro to be reserved for teachers of proven skill?

A primary BASIC—part 7

John Fair
Newman College

The time has come to reflect upon this BASIC series: to restate its intended purpose and begin to set it in a wider context. *MICRO-SCOPE* is *not* the place for teachers to learn to program in BASIC! But teachers do need to develop a comprehension of what computers can and cannot do. We have selected certain general concepts of programming for illustration, and indicated promising and realistic areas of application in the curriculum.

First, though, we continue with the theme of data handling from *MICRO-SCOPE 6*. This example uses a football league table to illustrate ideas of updating and sorting. Figure 1 shows last week's table.

	P	W	D	L	F	A	PTS
ARSENAL	7	4	1	2	12	4	13
BIRMINGHAM	7	3	3	1	20	11	12
COVENTRY	7	4	0	3	16	9	12
DERBY	7	3	2	2	15	7	11

Fig. 1 Last week's table.

Now look at the listing (Figure 2). First each team is given a coded location – Arsenal is TEAM$(1), etc. Line 40 READS DATA from lines 370 to 400.

Today's results are announced: *Birmingham 2, Arsenal 0; Coventry 1, Derby 1*. They are INPUT in the loop 70 to 190. Within this loop,

```
LIST

10 REM **** UPDATING FOOTBALL LEAGUE TABLE ****
20 REM --- Enter previous table ----
30 FOR N=1TO4
40 READ TEAM$(N),W(N),D(N),L(N),F(N),A(N)
50 NEXT N
60 PRINT
70 REM *** GET THIS WEEK'S RESULTS ***
80 FOR G=1TO2
90 INPUT HTEAM$,F,ATEAM$,A
100 FORN=1TO4
110 IF TEAM$(N)=HTEAM$ THEN R=N
120 IF TEAM$(N)=ATEAM$ THEN S=N
130 NEXT N
140 IF F>A THEN W(R)=W(R)+1:L(S)=L(S)+1
150 IF F=A THEN D(R)=D(R)+1:D(S)=D(S)+1
160 IF F<A THEN L(R)=L(R)+1:W(S)=W(S)+1
170 F(R)=F(R)+F:A(R)=A(R)+A
180 F(S)=F(S)+A:A(S)=A(S)+F
190 NEXT G
200 REM --- Calculate total points ----
210 FOR N=1TO4
220 P(N)=W(N)+D(N)+L(N)
230 PTS(N)=3*W(N)+D(N)
240 T(N)=1000*PTS(N)+F(N)-A(N)
250 NEXT N
260 REM ********* SORTING ROUTINE ***********
270 PRINT TAB(16);"P  ";"W  ";"D  ";"L  ";"F   ";"A  ";"PTS  "
280 FOR J=1TO4
290 B=-1
300 FOR N=1TO4
310 IF T(N)>B THEN B=T(N):K=N
320 NEXT N
330 PRINT TEAM$(K);TAB(15);P(K);W(K);D(K);L(K);F(K);A(K);PTS(K)
340 T(K)=-1
350 NEXT J
360 REM  TEAM          W D L  F  A
370 DATA  "ARSENAL"   ,4,1,2 ,12, 4
380 DATA "BIRMINGHAM",3,3,1 ,20,11
390 DATA  "COVENTRY" ,4,0,3 ,16, 9
400 DATA  "DERBY"    ,3,2,2 ,15, 7
410 END
```

Fig. 2

lines 140 to 180 analyse the results into wins, draws and losses and update the records accordingly, including the 'Goals For' and 'Against' columns.

Now lines 200 to 250 calculate for each team the new numbers of games played and points scored, and also an artificial number T defined as 1000 x (number of points) + goal difference (F – A). League order is decided first by points gained: if two or more teams have the same number of points, goal difference decides the placing. The weighting factor of 1000 on points allows one sorting routine to consider both criteria as necessary. Lines 260 to 350 contain the sorting routine and print out the records in the new league order (Figure 3). Note that Birmingham overtakes Arsenal on points, while Coventry does so on goal difference.

	P	W	D	L	F	A	PTS
BIRMINGHAM	8	4	3	1	22	11	15
COVENTRY	8	4	1	3	17	10	13
ARSENAL	8	4	1	3	12	6	13
DERBY	8	3	3	2	16	8	12

Fig. 3 This week's table.

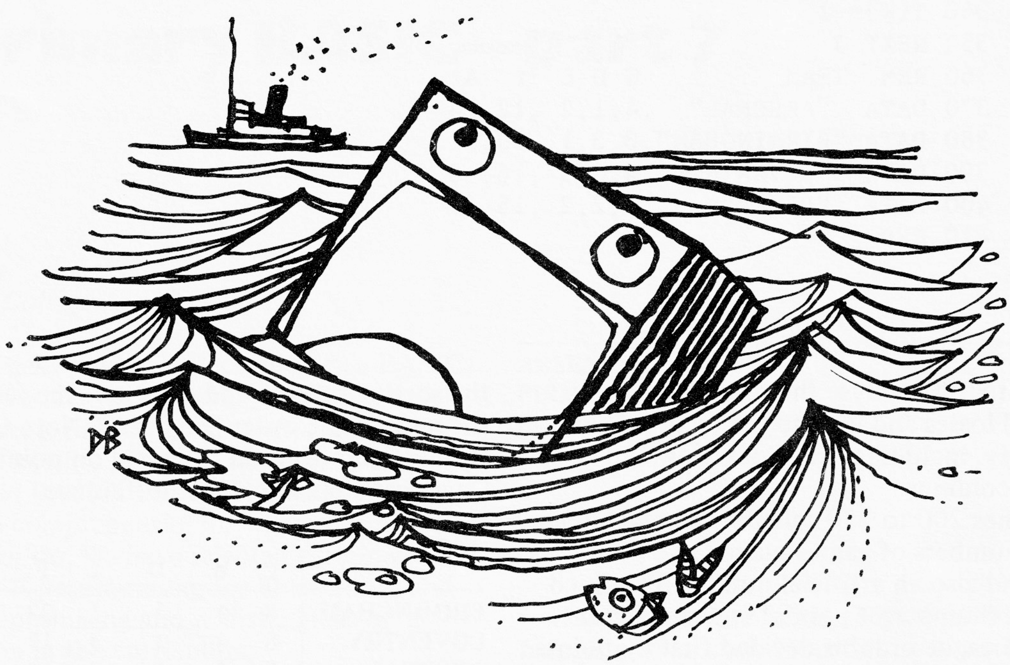
* * * * *

In this gentle introduction, we have limited ourselves to a few of the more accessible aspects of BASIC and omitted many vital features. We have only used the *TEXT mode,* in which each line is printed as on a typewriter. Far more versatile is the *GRAPHICS mode* in which pictures or graphs can be drawn at any position on the screen. Similarly we have not dealt with *file handling*. Also, robust programs have to cater for unexpected responses at the keyboard, like the attempted entry of a word into a numerical store – but we see this sort of error trapping as a programmer's job, not a teacher's.

Deliberately, we have not specified the machine used. The DoI offer covers three models – each with its own version of BASIC! They differ in many important details. *Print format* varies in tabulation and punctuation. *String handling* is not uniform – the Spectrum uses A$(7 to 9) instead of the more common MID$(A$,7,3). The BBC uses *location names* of any length, so HOME and HO are distinct and not, as usual, identical. With the 480Z we must be careful not to embed *keywords* in a location name – 'TOTAL' would be unacceptable because 'TO' is a keyword. More serious and systemic differences occur in *GRAPHICS mode* – the grids used are not even the same – and in *file handling*. Also, programs stored on one machine will not normally transfer to another.

Finally, and most fundamentally, BASIC is not the only computer language and may not be the best one for our purposes in primary education. There are languages for 'turtle' graphics like LOGO and for recursive logic like PROLOG, as well as extensive programs like Micro LEEP and QUERY for information retrieval. The use of subroutines in BASIC is clumsy and outmoded. Instead of using GOSUB for frequently used routines, some languages define 'procedures' which are given names and are then transferable by name to other programs. This gives great power and flexibility. PASCAL and COMAL are examples of this structured (or 'top down') approach. Indeed, newer BASICs (e.g. BBC BASIC) include some of these ideas.

Such developments must affect teachers, and hopefully teachers will affect the developments. Surely teachers in the classroom should be able to specify the kind of use and hence the kind of programming language they need. At the moment the one-eyed man is king – hence the necessity for a massive in-service programme for teachers in the use of computers in the classroom. If the program, the programmer, or the language rules then the computer's usefulness as an educational aid ought to be seriously questioned.



Terms explained: Floating point

Software for survival

Henry Liebling
Teachers' Diploma Course, Newman College

Nearly a decade has passed since *Limits to Growth** and *Small is Beautiful: A study of economics as if people mattered*† were published. We have had time to reflect.

Now we are over the edge. The technological revolution is irreversible.

- The Earth's resources are being used up faster than ever before; yet for the bulk of the Earth's population life becomes even more precarious.
- With rising unemployment, potential further civil unrest and possible shortages, there is a great need to restructure society.
- A need to rethink the validity of our way of life so that we may at least optimise those resources still available to us.
- A need for prevention rather than cure.

I see a great potential in using the micro-computer to provide simulations within a teaching package, so that the new generations may have the chance of gaining understanding and insight into the causes and possible solutions to the great problems facing our world.

Barry Holmes of MAPE has given a positive lead with some excellent teaching material of this type (see *MICRO-SCOPE 5*). But as yet I can find little evidence of software good enough to counter the mighty Klingons, Invaders, Mazogs and other rulers of the escapist software scene. The production of good software is notoriously time-consuming, is not essentially lucrative (is it?) and demands a considerable array of skills. I envisage a team of like-minded people, in this case 'idealists', who could bring together their imaginative ideas, experience and expertise in the fields of programming, art and design, and educational psychology under the common theme of *Survival*. A useful model is Bruner's *Man: A course of study*‡. Below are listed some possible areas which could generate intellectually honest simulation or database programs to be part of a teaching package.

Recycling Waste, paper, glass, metals, used engine oil. Local/National study.
Structure and function Do we really make useful, well designed goods?
Economy of scale Are the days of giantism over? Small-scale local production and its advantages.
Energy sources Renewable and non-renewable. Alternatives (CEGB, BNF and oil companies need not reply). Driving a car on a limited fuel supply.
Land tenure; land use Deforestation, soil erosion, floods and famine. How 'natural' are some disasters?
Society Changing patterns of employment, housing, transport, leisure . . .
Local ecology Animal life cycles, the road to extinction.
Food production Farm animals or people?

Simulation programs can stimulate children to discuss, co-operate, role play, think, and make decisions as well as drawing together many areas of the curriculum. Database programs could bring the handling of much information, statistics, sorting and searching within the grasp of every primary school child.

In two years' time, will now blank discs and cassettes be filled with junk software or with tools for survival? I should be pleased to hear from individuals or groups interested in 'Software for Survival', and to receive any comments, positive or negative.

*Meadows *et al.* (1972) *Limits to Growth*, Angus & Robertson.
†Schumacher (1973) *Small is Beautiful: A study of economics as if people mattered*, Blond Briggs.

‡J. S. Bruner (1968) in *Towards a Theory of Instruction*, W. Norton

SPELL

Helen Smith
Newman College

As a departure from our regular featured program listing, I intend to look at how one of Newman College's earliest programs has evolved during the course of our Primary Schools Project. This makes an interesting study due to the many changes, all resulting from feedback from the project, which have been wrought in the three main areas of program structure, educational content and graphic design. The latest version of the program is available, with colour graphics, for both 480Z and BBC Model B machines.*

There is a growing temptation to look at original versions of primary programs and point out their glaring deficiencies, rather than analyse their potential. Standards of good practice for the educational programmer, the writer of specifications and the graphic designer are now becoming established. The writers of the earliest primary software, however, had no precedents to influence their approach, nor experience to draw on. But their programs provided a starting point, and a means of getting primary computing off the ground.

The earliest version of SPELL was one of the first programs to be written with infants and lower juniors in mind. It was also notable for being produced at a time of threatened mathematical domination. Its main feature was its set of large lower-case letters, clearly drawn in high-resolution graphics. A list of words was read in from data. One was chosen at random and displayed on the screen with one letter, its position again selected at random, missing. A numbered sheet of pictorial clues accompanied the program. The corresponding number was displayed in the upper right-hand corner of the screen. Children had to type the missing letter, and were rewarded by a smiley face.

Teachers reacted favourably to the program, feeling that the lower-case alphabet was a most useful development. They were encouraged to change the data in the program to suit their purposes, and several teachers went ahead and made their own versions. At this point, a number of programming aims had been fulfilled. The program was robust and easily used by small children who had had some prior experience of the keyboard. The graphics were judged to be highly satisfactory. It became obvious, however, that the next stage was to consider the program as just one aspect of an overall approach to teaching and reinforcing spelling. The tactic employed by the program, that of omitting a letter at random, did not allow any control to the teacher who wished children to be aware of particular components of words in spelling. Teachers using the 'look, cover, write' approach to spelling felt that it would be of greater benefit for the child to be expected to type the whole word.

At this stage, it was also considered better from the programming point of view to maximise the usefulness of the program by integrating various options, so that the same program could be used in different ways. A second program, SELECT, had been written at the request of local infant teachers. This program was combined with SPELL, as Option 1. In this option, the position of the missing letter could be specified within the program data. A selection of letters was displayed below, and a bar moved beneath them. Children were expected to press the space bar when the screen bar was below the required letter. Teachers found this especially useful with reversals. It became evident that timing was very important. The bar had to move beneath the letters at a rate to suit the child's thought processes and reactions. The completed word should remain on the screen long enough for the child to look at it and pronounce it.

The program structure thus became increasingly complex. A second option allowed for the omission of two or more consecutive letters from each word. If a third option was selected, the entire word appeared briefly on the screen. The child then had to type it in, aided by the pictorial clue. Throughout, the number of the appropriate clue remained on the screen. To cater for these options, the format of data had to be changed. The missing letters of Option 1 had to be entered first. Each word followed, accompanied by two numbers. *BRICK, 4, 5* would be interpreted as 'display the word "brick", omitting from the 4th to the 5th letter'. To omit only one letter, however, as required by Option 1, the position of the letter had to be entered twice, as, for example, in *DOG,1, 1.*

By now, we at college were feeling satisfied that we had developed a far more versatile program. On my visits to the project schools, however, I noticed that the new version had been greeted with reserved enthusiasm. Teachers were unhappy to let children, working on their own, be confronted with a list of options. A

*The BBC version of SPELL has been written by Sue Stevens, at Charlemont Teachers' Centre, Connor Road, West Bromwich. Her telephone number is 021-588 2387 and she will be pleased to deal with enquiries.

more worrying trend was that teachers were now far less ready to change the data themselves. You may indeed be able to perceive why! It was suggested that a far greater range of words be included, and that a choice from a variety of structured levels be added to the list of options. A default mode could be set within the program. Once the teacher had adjusted this, the program could be used at the same level over and over again, without any child seeing the options.

I adopted this suggestion and decided to structure the program phonically. 140 words were included, grouped in levels, and picture sheets were produced. If a child pressed the space bar to start, the program defaulted to a fixed level. The teacher could, however, call up a screen display giving details of the levels: initial blends, vowel digraphs and so on. I had arranged a weekly session with a class of 8-year olds, which gave me the opportunity to try out the program. With a mixed-ability class, the facility to set different levels was very useful. However, had I been teaching a particular sound, I would have had to change the data further, as there were insufficient words in each level to reinforce every step in teaching phonics.

I discovered many other points that needed attention. One of the greatest weaknesses was that, once a letter had been typed, there was no way of deleting it from the screen. This led to great difficulties with Options 2 and 3. Another frustration was that the same word might appear several times in a run, while some might not appear at all. A routine was adopted which selects words randomly, but presents each one once only. Then some eagle-eyed teachers spotted one or two letters from the special graphics alphabet which could be seen drawing themselves in the wrong direction. As there is a likelihood that children unconsciously absorb patterns of letter formation while watching the words appear on the screen, it was felt important that this should be put right.

The next stage was, therefore, to improve the graphics alphabet. The original method of drawing the letters has been retained, although it now occupies less space within the program. The letters have been precisely proportioned and spaced, and can be seen drawing themselves in the correct way. Reorganisation of the graphics allowed the opportunity to incorporate the DELETE key. A number of other improvements were made, all arising from practical experience with the program. If, for example, a child using Option 3 had been distracted, he might have missed the brief screen display. Typing a question mark now causes the word to reappear for a few seconds.

I was now beginning to feel satisfied with the 'final' version of SPELL. Then an opportunity arose to have it re-written for the BBC machine. To employ colour and high resolution graphics in Mode 1 means a substantial reduction in free memory. It was evident that the program would have to be slimmed down to fit. We had to think again about the program structure. Many teachers now feel that it is better to have a set of separate programs, each with one aim, rather than one extensive program which tries to do a lot of things. In the case of SPELL, Option 1 is clearly a different exercise altogether from Options 2 and 3, with their 'whole word' approach. We therefore decided to resurrect SELECT, and remove Option 1 from SPELL.

It had become clear that the phonic levels in SPELL were not everyone's ideal solution. Instead of flexibility, they served to dictate a phonic approach to reinforcing spelling, which is far from universally appropriate. There seems no better way than for teachers to supply their own data for this type of program. There remains that thorn in the flesh, the problem of changing data statements. It is quite a daunting task to a complete non-programmer, and one that few teachers, in practice, are prepared to undertake on a regular basis.

I had already written a file creation program, allowing teachers to set up files of words and any necessary numerical data. This was designed for programs similar to SPELL, and it seemed a good idea to incorporate it in SPELL itself. Full instructions, written in a reassuring vein, are shown on the screen. Comprehensive data validation checks are incorporated so that it is impossible to type in anything that will cause the program to crash. The file is recorded on cassette tape and may be read into the main program whenever required. On the 480Z there is room for this facility within the program; on the BBC it has been written separately.

I would hesitate to label 'final' any future version of this program, let alone the current one. I still feel there are improvements to be made. The original 'smiley face' still gapes inanely at us; he is becoming, I fear, a rather hackneyed symbol. But I think that there is a far greater chance of getting the program used widely, in its current form, and that is what we must now aim to do. There is a need for support material; many teachers will require suggested word lists for their files, and pictorial or contextual clues will still be necessary. We make no claims that the program represents an ideal approach. There may be better spelling programs around. However, I hope that this case study has shown the degree of involvement and communication that is necessary to produce a reasonably good educational program. Without the close link that exists between the program's originators and its users within the Newman Primary Project, the program in its present form would never have been developed.

A defence of the use of computers in schools

Alan Maddison
Thames Polytechnic

Anyone interested in the use of computers in education should feel the need for articles like that of L. McGinty in *MICRO-SCOPE 6* and believe that the questions he raises should be answered. Even the current Government scheme for aiding the purchase of one machine per school requires schools to spend significant sums of money, and there will be further running costs. Schools should only buy computers if the money required could not be more usefully spent in other ways.

When considering whether or not to buy some equipment, a school must consider its educational cost-effectiveness. Something that is of high educational value but rarely used can be roughly equated with something of lesser value that is used more frequently. The computer scores well on quantity of use; not only can it be used for a wide range of teaching tasks, but it can be used, possibly outside school hours, to aid teaching by preparing teaching material and performing administrative tasks.

There are obvious advantages when an item of equipment can be used simultaneously by more than one person. I was surprised that Mr McGinty had problems in using a computer with pairs of pupils; this may be due to the actual programs used. Hartley and others have long ago shown that programmed learning works better with pairs of pupils than with individuals, at least in some circumstances. (In passing – does this suggest that teaching machines would have been more successful if they had been used with groups rather than individuals?) I have seen video tapes of groups working, apparently successfully, with computers; admittedly this has included Pam Fiddy's class, and her results might not be replicable by all teachers. Some programs, such as *Jane* (*Jane Plus*), are designed for group use.

I suspect that some problems have arisen from attempts to copy more or less successful existing educational practices on the computer. This approach can work, but is liable to lead to inferior copies of existing methods. It is better to start from scratch, decide on educational aims, then consider how the qualities of the computer can be used to achieve them.

I agree with Mr McGinty that there is little educational value in teaching BASIC, though any programming does emphasise the importance of precision in communication. However, working with languages such as LOGO or PROLOG, especially the latter, would have a distinct educational value (see, for example, Papert's invigorating book *Mindstorms* and Richard Ennals' forthcoming book *Beginning Micro-PROLOG*.)

Papert also discusses how the computer can serve to expand the pupils' range of experience. Obviously experience gained in this way is not as real as the real thing, but it is at least as real as experience gained through books. Where changes over time are important, it is more so, and often it is impossible to be given 'real' experience. Ersatz experience can be very effective; the aviation world relies on it, and armed forces have nothing else to help them prepare for battle.

Computers differ from other teaching aids in their flexibility and ability to interact with the user, far exceeding the limited abilities of teaching machines. They can remember, or be provided with, information about individual pupils and their performance, including details of past mistakes and problems. They may be seen as intermediate in many ways between teachers and conventional teaching aids, and can provide individual attention in circumstances which do not require the full skills of the teacher. In some such cases pupils can work together, one as 'teacher' and one as 'learner', but for some purposes computers are preferable: they can, without fatigue, ask precise questions, avoiding undesirable repetition, and keep going as long as required. In addition, the computer can be programmed to return to problems that have apparently been solved, either later that session or in a later one, to check that the matter has been mastered. The computer can also be programmed to behave in a random fashion, something humans find hard to do. It can remember, and draw on, large quantities of information, and also carry out long and complex calculations quickly.

The successful use of computers in schools will require the exploitation of all these abilities, and it will be a long time before all possibilities can be explored. It would be interesting to consider the particular matters discussed in Mr McGinty's article. He lists, as examples, six alternative ways of spending money. These include buying scientific equipment and mathematical apparatus: in both these cases many children, especially in primary schools, will have problems in co-ordination when using such equipment; such problems will be less with computers. (Though again it is desirable to design programs from first principles rather than to duplicate existing equipment.) The increased pressure for the integration of handicapped children will lead to an increasing number of children with severe motor problems in ordinary schools: the computer can be the only way of giving them any form of mathematical apparatus.

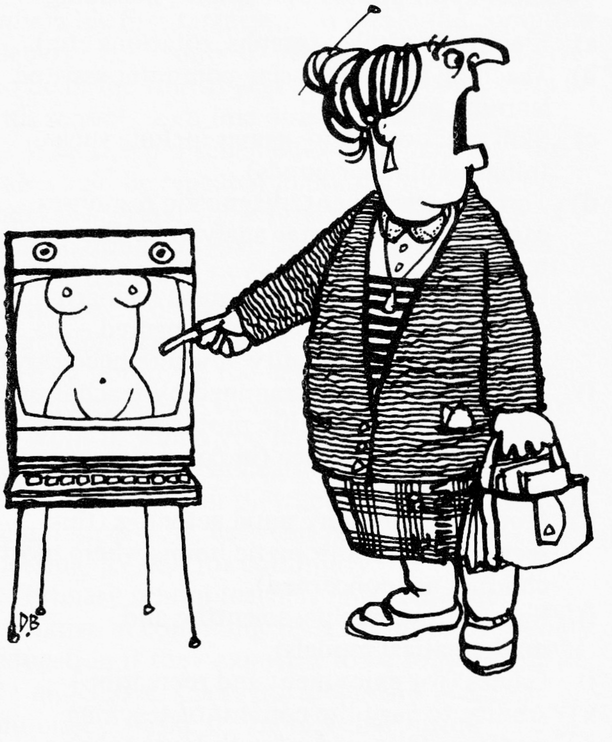
The article pointed out that many programs effectively do no more than play Hangman or Battleships. I cannot suggest how the computer can add an extra dimension to Battleships, probably because I can see little educational value in the game, but Hangman is another matter. Often a teacher would want two pupils to play the game together, quite possibly to develop social skills. However, the computer can offer advantages: it is less restricted in its vocabulary, and can be told to concentrate on particular sets of words or letter patterns. Such abilities are likely to be particularly useful with second language work, and with pupils who fail to appreciate letter patterns and frequencies. This includes children with certain forms of reading disorder.

The article begins with an imagined discussion between a boy and his mother on what he had done at school that day. What he had done was maths practice, but what he said he had learned was that monsters burped after eating. Does it matter that he had this misconception? The practice had been done, and enjoyed, and so the educational benefit had been obtained. Too many children leave school with a negative attitude to mathematics, often at least partially due to getting too many sums wrong. If they can learn to get sums right while having fun, they will become more confident and this will lead both to improved performance in, and greater enjoyment of, mathematics.

I do have some doubts about the hypothetical program described. From the description it seems that pupils were given sums to try, and the penalty for wrong answers was to be 'eaten' by the monster. For some children, at least, the excitement will be in the eating; and so the main reinforcement will be for getting sums wrong! The Newman College *Trains* program, which is less likely to reinforce errors, would seem preferable. (In this program correct answers are rewarded by the addition to the screen of a number of trains: errors are penalised by the loss of existing trains. Pupils can compete against their previous performance.)

This raises the question of what makes a good teaching program. There is little experience to draw on, especially at primary level, and even if there were it would not remove the need for systematic experiments. Some people are dubious about the use of experimental research, feeling that common sense, experience and intuition are enough. But if we relied on them, we would still believe that teaching machines should be used for individual working. A headlong rush into Computer Assisted Learning will lead to disillusionment unless teachers remember that the tools available are still in an early stage of development. Failures in the classroom must be used to provide guidance for designing new programs, not as an excuse for rejecting computers.

Postscript: After finishing this article I watched the BBC television production of *An Inspector Calls*, which was originally prepared as a schools' programme. How much money and effort have gone into television in schools? How does it compare, at constant prices, with the expenditure on computers? How does it compare in educational value?



'Tarquin, have you been fiddling with the micro?'

Aims and objectives

David M. Whitehead

The author, Deputy Head of Smallbridge St Johns C.E. Primary School, Rochdale, is currently on a one-year full-time Diploma course at Newman College.

One summer's day I went to the City of Manchester College of Higher Education for a full day session as part of my Diploma in Mathematical Education course, little suspecting that I was about to succumb to a new disease of the 1980s – Computer Mania!

A relatively short introduction to the computer and programming as part of the course was enough to enthral me and to open my eyes to the possible uses of the computer in primary schools. I arranged for a member of staff from a local secondary school to bring a computer to school for my fourth-year juniors to work with. Their subsequent reaction and strong motivation to use the computer to play games and work through educational programs determined me to study the applications of the computer in the primary school. I decided therefore to try to detail my aims and objectives before obtaining a computer for school.

Aims and objectives for teachers in using a computer with a class/group/individual

To select appropriate applications, including:

a) Electronic display (graphs, rotations etc.).
b) Teaching machine (using computer assisted learning programs).
c) Skill practice (many games include such things as number bonds).
d) Testing (attainment: diagnostic responses can be stored for later analysis by the teacher).
e) Record keeping (if hardware is regularly available, and limited access ensured – to maintain confidentiality – where necessary).
f) As a computer (programmed by teacher or pupil to solve a specific problem).
g) Demonstration device (in computer awareness context).
h) Motivator for many pupil activities (this seems to be an automatic bonus where most children are concerned).
i) Simulation (graphic, scientific and mathematical models).
j) Games (for enjoyment and recreation).
k) Ability to vary the content of teaching materials (not evident with textbooks).
l) Data storage (quick recall and revision).

Aims for pupils using a computer

a) To enjoy working with a computer.
b) To develop their understanding of the systems and information controlled by a computer.
c) To be able to use programs produced by others.
d) To be able to analyse problems and design programs to solve these problems.
e) To encourage adaptability in coping with the rapid changes brought about by developing technology.
f) To provide situations where discussion between members of a group develops understanding of the problems involved and strategies to solve the problem. It is also possible that hypotheses to solve future similar problems may evolve.
g) To have some understanding of the growth in the use of computers (educational, commercial, domestic etc.).

Objectives for pupils using a computer

a) To be aware that he/she is in control of the computer, not vice versa.
b) To be aware that the control of the computer is by a program and the relationship of input/output to that program.
c) To recognise that a program consists of step-by-step instructions.
d) To recognise that a program is written by people using a programming language, e.g. BASIC, and that different languages are used by different machines and for different purposes.
e) To be aware of the storage capabilities, for programs and data, provided by a computer and its peripherals.
f) Collectively (or individually) to write a program to perform a specific task.
g) To modify existing programs to solve own problems.

One could add more specific behavioural objectives (e.g. ability to use keyboard, understand and use terms such as input, output etc.) but I think these are more useful set in the unique circumstances of a particular classroom.

These aims and objectives are not listed in any order of priority, and have not been validated in any way. They are the hopes of an enthusiastic classroom teacher who is about to learn by experience whether or not his hopes are to be fulfilled.

Notebook

Roger Keeling
Newman College

Inventing words

If your pupils have access to a 480Z, BBC/Acorn or a Spectrum, they may like to type in one of the listings below.

The first aim is to study the list of words produced. Are any of them familiar? What percentage are familiar? Run the program several times. What percentage are familiar on average? Can you alter the program, without adding additional data, to increase this percentage? If you consider the 'word' PCMM, one helpful alteration should be obvious. Is the result affected if MICROSCOPE is input in reverse? Can you replace MICROSCOPE by another 10-letter word to increase the frequency of recognisable words still further? Can you replace MICROSCOPE by a 10-letter combination that increases the percentage of recognisable words yet again?

If anyone can better 25% recognisable words, please let us see your listings and data.

480Z

```
 10 CLEAR 100 : READ A$
 20 RANDOMIZE
 30 FOR J = 1 to 50
 40 C$ = " "
 50 FOR K = 1 to 4
 60 Y = INT(RND(1)*10) +1
 70 B$ = MID$(A$,Y,1)
 80 C$ = C$ + B$
 90 NEXT K
100 PRINT C$
110 NEXT J
120 DATA "MICROSCOPE"
130 END
```

BBC/Acorn

```
 10 CLEAR : READ A$
 20 X = RND (– TIME)
 30 FOR J% = 1 TO 50
 40 C$ = " "
 50 FOR K% = 1 to 4
 60 Y = INT(RND(10))
 70 B$ = MID$(A$,Y,1)
 80 C$ = C$ + B$
 90 NEXT K%
100 PRINT C$
110 NEXT J%
120 DATA "MICROSCOPE"
130 END
```

Spectrum

```
 10 CLEAR : READ A$
 20 RANDOMIZE
 30 FOR J = 1 TO 50
 40 LET C$ = " "
 50 FOR K = 1 TO 4
 60 LET Y = INT(RND*10) + 1
 70 LET B$ = A$(Y TO Y)
 80 LET C$ = C$ + B$
 90 NEXT K
100 PRINT C$
110 NEXT J
120 DATA "MICROSCOPE"
```

Across the great divide

David's primary school has had a micro for the past two years. The staff have learnt to integrate it into the curriculum and to use it effectively as a teaching aid. They also run the club after school to cater for pupils who wish to learn more about the micro itself.

David has shown tremendous enthusiasm for the micro during his last two years at the school, and has really begun to get to grips with programming and simple control experiments. Now he has left to go to the local comprehensive where his first target was to locate the computer department – only to be told: 'Sorry, you have to be in the fourth year to use the computers in this school.' Exit one disillusioned pupil.

With the DoI scheme now in operation, this tale could be repeated many times over in the next few years. Some primary school teachers will no doubt observe that secondary schools have often failed to follow up primary school initiatives. However, responsibility at the age of transition lies with *both* schools.

Why not invite the head and teachers of your secondary school to visit? Show them the type of work to which you have been applying the micro, give some indication of the pupils' expectations when they get to the upper school, and discuss how, between you, it may be possible to plan for continuity.

Primary school teachers must take the initiative in communicating the spirit of primary education if they expect it to be followed up at 11 and above. Likewise, secondary teachers should be awake to the fact that future generations of first-years will be far more technologically aware than ever before.

Computers data day

Blackwood Middle School in Streetly has recently staged a maths week. The timetable was put aside as pupils engaged in all types of mathematical projects, from simple games involving strategic thinking to traffic surveys and a trip to the local supermarket. Inevitably computers played a significant part in the week's activities and teachers from Newman's Diploma Course taught a number of computer-oriented lessons during the week.

The fourth-years spent nearly two days analysing every type of newspaper that they could get their hands on. They categorised the information under such headings as price, number of pages, proportion of photographs to text, circulation, etc., and then used PEDIT to build up a database of this information. Using PQUERY, a thorough analysis was then possible. Some of the comments from the pupils follow:

'When I heard that during the project week we were going on the computers I didn't really think anything about it. Then when we started to have a go on them I thought it was very good. It was amazing that by just typing a few facts about the newspaper into the computers in a data form, you could ask it questions and it could give you the answer back in a flash.'

Marta Knight

'Before we had been using these computers, I thought, that the computers did all of the work, but after the lesson I had a completely different attitude. I realised that someone had to programme the computer before you used it to give you the information that you wanted.'

Carol Loveridge

'I think the computers are very helpful because they can store information. We asked the computers questions about our newspapers, the computers answerd us correctly because it had all the answers stored in the memory. If we didn't use the computers to get the answers to our questions we would have had to go round the classrooms and look at the boards and find the answers manualy.'

Robert Ball

MEP Regional Information Centres

MEP Regional Information Centres

CAPITAL: Sandra Crapper, Kennington Computer Centre, Bethwin Road, London SE5 0PQ (tel. 01-735 1895).

CHILTERN: Sue Jones, AUCBE, Endymion Road, Hatfield, Herts, AL10 8AU (tel. 07072 66121/74518).

EASTERN: Ann Goddard, Chelmer Institute of Higher Education, Victoria Road South, Chelmsford, Essex (tel. 0245 356940).

EAST MIDLANDS: Lisa Blunt, MEP Regional Centre, Towers Library, Loughborough University of Technology, Loughborough, Leics., LE11 34TU (tel. 0509 37398).

GREATER MANCHESTER AND LANCASHIRE: Bet Griffith, Manchester Polytechnic, Didsbury School of Education, 799 Wilmslow Road, Manchester M20 8RR (tel. 061-445 0780).

MERSEYSIDE WITH CHESHIRE: Neil Stanley, Merseyside Computer Centre, Liverpool Polytechnic, Rodney House, 70 Mount Pleasant, Liverpool L3 5UX (tel. 051-708 6620, ext. 27).

THE NORTH: Roger Edwardson, Resources Centre, Newcastle Polytechnic, Coach Lane Campus, Newcastle-upon-Tyne, NE7 7AX (tel. 0632 700424).

NORTHERN IRELAND: Marilyn Lento, Micronet Centre, South Building, New University of Ulster, Coleraine, N. Ireland (tel. 0265 4141, ext. 341).

SOUTHERN COUNTIES: Peter Neate, Southern Region Microelectronics Centre, Furness Drive, Furness Green, Crawley, Sussex, RH10 6JB (tel. 0293 546216)

SOUTH WEST: Kim O'Driscoll, Computer Centre, Plymouth Polytechnic, Drakes Circus, Plymouth, PL4 8AA (tel. 0752 21098)

SOUTH YORKSHIRE AND HUMBERSIDE: Andrew Parry, Educational Development Centre, Chequer Road, Doncaster, DN1 2AF (tel. 0302 68935, ext. 53)

WALES: Mrs M. Hopkin, Welsh Joint Education Committee, 4th floor, Arlbee House, Greyfriars Road, Cardiff, CF1 3AE (tel. 0222 25511)

WEST MIDLANDS: Chris Pedley, MACE, Four Dwellings School, Dwellings Lane, Quinton, Birmingham B32 1RJ (tel. 021-421 6361)

WEST AND NORTH YORKSHIRE: Ray Leigh, Queenswood House, Leeds Polytechnic, Becketts Park Site, Leeds LS6 3QS (tel. 0532 783437/8)

Notices

Diploma

in

Computer Applications to Education

(5–13 age range)

Applications are invited from Primary Teachers for a Diploma course on the use of the microcomputer as a teaching aid in the education of children 5–13 years. The course is designed to help teachers make the most effective use of the new technology in primary teaching and to prepare them to act as leaders within their own schools or LEA's.

The course starts in September 1983 and is full-time for one year. Residential accommodation is available on campus if required.

Further details can be obtained from:

The Registrar,
Newman College,
Bartley Green,
Birmingham, B32 3NT.

Telephone 021 476 1181.

Users' Groups

J. A. Sheard would like to hear from teachers with ideas or programs for using BBC micros in primary schools: s.a.e. to 31 Glen Court, Avenue Road, Wolverhampton, W. Midlands WV3 9JW.

The West Midlands Branch of the

Computer Education Group

in conjunction with

MAPE

presents on 8 February 1983

The Microcomputer in Primary Education

Speaker: Don Walton

Venue: Faculty of Education, Birmingham University

Time: 7.30 p.m.

Entrance: 50p, FREE to CEG and MAPE members

Coffee and biscuits available

MAPE Conference

The next annual conference will be held at

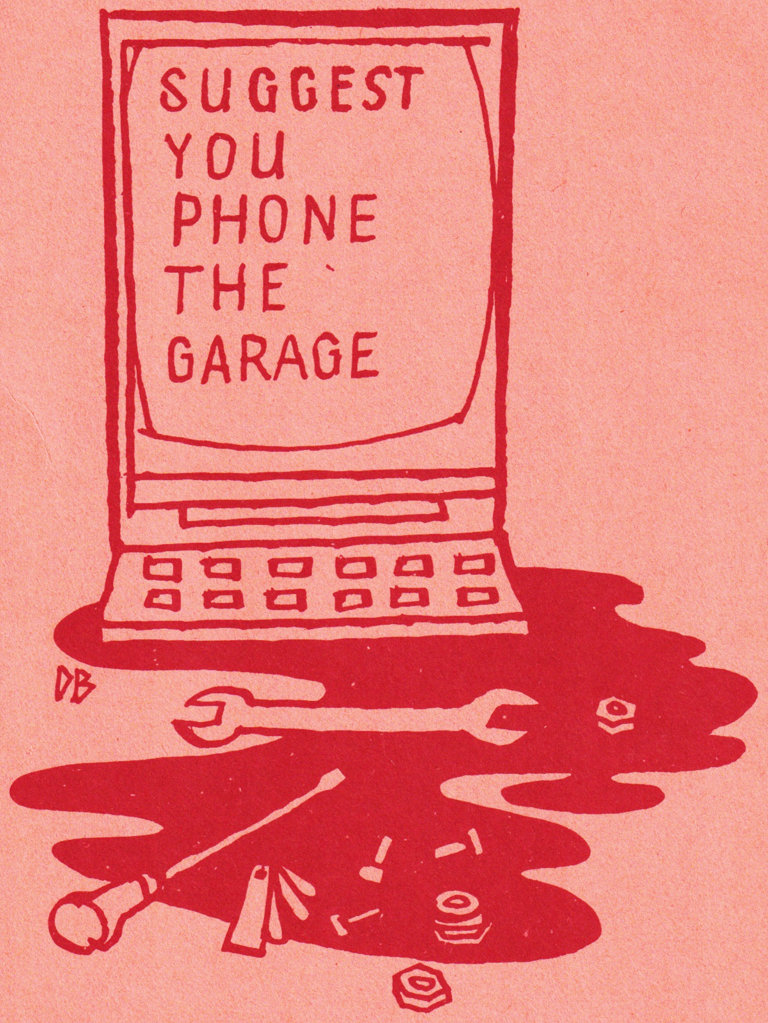
Loughborough University

8–10 April 1983

Inclusive cost: £50 (approx) to MAPE members
£60 (approx) to non-members

Full details and application forms will be available from mid-December. Please send a stamped addressed envelope as soon as possible to:

Tony Gray
Education Department
Matthew Arnold Building
Loughborough University
Leicestershire
LE11 3TU



Jointly published by

Ginn and Company Ltd
Prebendal House
Parson's Fee
Aylesbury
Bucks, HP20 2QZ

Heinemann Computers in Education
22 Bedford Square
London WC1B 3HH

ISBN 0 602 22636 8