



The Haves and the Have Nots - Helen Wright

Micromath

I look through *Micromath* with optimism. It records so many positive uses of IT to develop mathematical understanding. Over the years the articles have described the use of logo and *small* software, then the emphasis was on *generic* software such as spreadsheets and databases. Now the emphasis is on *complex*, content-based software, such dynamic geometry packages. These give a positive view of what is possible when there is good access to IT and commitment to the integration of IT in mathematics lessons.

My optimism is maintained when I look through glossy leaflets such as 'Mathematics and IT - a pupil's entitlement', which provides a very positive and thoughtful vision of the learning opportunities created when IT is successfully used within mathematics lessons.

But my optimism is shaken when I remember the reality of the situation for many mathematics teachers. As a member of the SMILE Team, I meet a wide range of mathematics teachers in my day to day work, and I find that, whilst a small group of teachers are successfully integrating IT into their mathematics lessons, a far larger group are not. I would like to begin to explore why this is.

Where mathematics teachers have excellent access to hardware and mathematical software (both of which are working and are compatible with each other), teachers are able to enrich the mathematical learning opportunities and develop the mathematical understanding of their pupils through IT. Their pupils develop confidence with a wide range of IT, making sensible choices about what form of technology to use and when.

What is noticeable is that most of the teachers who are managing to integrate IT into maths, are doing so as a result of being successfully involved with longitudinal university research projects or as a result of funding through GEST in the last couple of years or both. It is also noticeable that these teachers are very committed to making IT work within their mathematics lessons. Even without external support, they would be likely, through the force of their arguments, to win sufficient funding from within their schools. They would also prioritise their time to include the development of their personal IT competence even if support were not provided through school-based and external INSET.

However, apart from commitment and dedication, there are other ingredients that seem to be necessary for successful integration of IT into mathematics. In longitudinal pilot studies there is normally an 'expert' who has the time and knowledge to ensure that, for each school involved, the hardware and software will be compatible. Money is normally available to buy additional computers or software to enable pupils to have the necessary access. Time is provided (off timetable) with expert help, for the

teachers involved to familiarise themselves with the new software and to devise activities to accompany the software. There are follow up sessions for schools to share what they have been doing and to continue development of support materials. At the end of the project, schools (rightly) keep the hardware and software. All of this is excellent practice.

The problem is that the schools that have not taken part in the projects are also expected to provide their pupils with the same entitlement to IT within mathematics, *without* having the ingredients that make the pilot projects successful. Teachers in these schools are expected to be able to 'get IT going' without the support that the 'pilot' schools have had. In most cases they do not have easy access to hardware and software that is compatible; they do not have access to expert advice, time to develop support materials or time to share what they have been doing with other teachers.

There are many hurdles in the way of these teachers and pupils; I would like to illustrate these through the following three examples.

1. At the SMILE Centre we have an Editing group, made up of teachers who trial new materials in their classrooms and then report back on how successful or not the materials are. The materials are then amended and some eventually become new SMILE activities. There are a number of new activities involving technology of one sort or another: some access *small* software such as MicroSMILE; some use logo or a spreadsheet or a database; just occasionally there is something that encourages the use of a dynamic geometry package.

Recently we tried to trial two activities to be used with the MicroSMILE program *Transform*. *Transform* is a fairly simple program to install and uses little memory. We lent teachers the software (either stand-alone or network versions for RM Nimbus or IBM and PC compatibles running under DOS) to ensure that access to the program could not be a problem. Even then, out of a group of eight teachers, only one was able to trial the activities, and when the activities went out for retrial, no one was able to trial them. The difficulties described by teachers included:

- 'the network hasn't worked for weeks/months';
- 'the IT co-ordinator hasn't got round to installing it yet';
- 'the network keeps crashing';
- 'the network's so slow it's unusable';
- 'I've tried but haven't been able to book time in the computer room';
- 'I have access to one Nimbus machine but its on a different floor';
- 'I used to have a computer in my classroom but it was stolen';
- 'We haven't got any computers in the department and the computer room is always booked up'...

The above shows the difficulty that can be encountered when trying to make use of a *small* piece of software. The

problems with either *generic* software or more *complex* pieces of software are far worse. The only way that we can be sure that the software and activities can be trialled is to lend or donate compatible hardware. While it is sometimes possible to lend a '186' for use with a *small* program, the cost of lending hardware suitable for using with *generic* or more *complex* software is totally prohibitive.

2. This leaves SMILE in a 'Catch 22' position. Developing learning materials that encourage a wide range of IT within mathematics provides additional ammunition for Heads of Mathematics to use when negotiating funding for hardware and software. But if schools do not have the hardware and software first, the learning materials cannot be developed.
3. My second example is from a school with which I was working as part of the Maths and IT GEST funding for 1994-95. The maths department had access to a fairly old computer network, with one computer terminal in each classroom and was able to book the network room on a regular basis. A major focus of their bid for GEST funding was to develop the use of the database *Pinpoint* in their maths scheme of work. They had used this software at a SMILE conference and liked it. Their bid was successful, and it was only when I made a first visit as the appointed advisory support that it was realised that the software (which needs Windows 3.1 or better) was not suitable for their computer network (which used Windows 3). This is not the sort of thing that maths teachers could possibly be expected to know. The school would probably have produced a very different bid for funding if they had realised that mathematics software that they wanted to use would not run on their available network, and the allocation of the funds via the LEA would have been distributed differently.

As there was funding for support and software, we persisted with the development of a database activity, but we were forced to use *Grass* instead of *Pinpoint*. This was disappointing for the department, who were keen to develop in new areas and saw *Grass* as a backward step.

However, this was not the only problem; the network continued to run slowly and crash at regular intervals, leading to INSET sessions being abandoned and advisory visits being cancelled. In the case of the database activity, what was intended for the summer term in Year 7, became an activity for the spring term of Year 8. This was frustrating for the teachers and the pupils involved, and did nothing to develop their confidence with IT (hardware or software).

This experience suggests the need for schools to have time and support when they make bids for funding. Those making bids need to be able to discuss their plans with someone who has knowledge of the compatibility between software and hardware, or who can at least find out before a bid is made.

4. My third example comes from a recent questionnaire, which we sent to teachers. We wanted feedback about which of the original MicroSMILE programs they would next like to have re-versioned to run under MS Windows.

Here are some of the replies we received:

5.
 - We've had 4 computer thefts over the last two years with thousands of pounds of damage done so computer use is virtually non-existent.
 - Can't afford to buy any new programs at the moment, so it makes no difference to us.
 - We are still using BBC floppy disks. We will be unable to buy anything else in the foreseeable future.
 - We only have 186s

The above do not paint the same rosy picture that I often see in Micromath. There are obviously many different issues and reasons why many maths departments are having difficulty using IT, and why their pupils will not be getting their 'entitlement'

- hardware problems
- software problems
- incompatibility between software and hardware in a period of rapid development
- poor relationships between hardware manager and maths department
- lack of confidence in software, hardware, and own IT knowledge
- lack of funds for new hardware, software and training
- inability for any of the above reasons to keep up with the rate of development

What worries me is that the gulf between the 'haves' and 'have-nots' is getting greater all the time, and there is little sign that things are likely to change. The 'have-not' teachers and pupils in these schools are losing their enthusiasm for trying to use IT in mathematics; they do not expect the IT available (if any) to work, and the pupils are far from being able to make choices about which IT to use and when. Thankfully some pupils have far better computer facilities at home than at school, but many do not!

The amount of money allocated to Maths and IT GEST funding for 1995-96 was significantly less than the previous year, and the money is being used

- a. for dissemination from 1994-95 and
- b. for a smaller project on dynamic geometry packages.

I feel I must question this decision on the allocation of funding.

The 'have-not' teachers need more than dissemination documents and one day courses; they need financial support for hardware and software, clear jargon-free advice to enable them to make sensible purchases, time to develop their own confidence with the particular varieties of IT that they have in their own school and support to develop activities that enable IT to be successfully integrated in their own mathematics lessons.

The schools chosen to be involved in the geometry project are, to my knowledge, a subset of those which were successful in the 1994-95 round of GEST funding. It is understandable that project leaders will want to select from schools that have proven themselves capable of taking on new initiatives. They can then be sure that the maximum progress will be made and the smaller pot of money will not be 'wasted' re-visiting old ground. However, for most maths departments in the wider range of schools, the powerful hardware required and the complex software involved are too expensive (and are likely to remain so for the foreseeable future) for the experiences of this geometry project to be transferable.

6. Leaflets, such as 'Mathematics and IT - a pupil's entitlement', may be a start in changing the situation of total inequality of opportunity for pupils. I understand that it has been produced to support teachers in their negotiations about resourcing and with the IT co-ordinator as well as to provide suggestions on the range of learning that may be possible using IT.

However, a glossy leaflet cannot be enough to create change. It is time we had open debate about what support is required by the majority of maths departments to enable them to catch up with the 'pilot maths departments', and how to provide it. Until the gulf between the 'haves' and 'have-nots' is reduced, GEST funding (however small the amount) should be targeted at providing constructive help to the many schools that have not yet successfully integrated IT into mathematics.

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