School report

An understanding of technology and the ability to use it are now considered to be essential parts of the National Curriculum, backing up that traditional knowledge-base, the Three Rs. Here, in this special report, we investigate how computers are being used at school

The foundation of a good education used to consist of the Three Rs: reading, writing and arithmetic. For the generation of children now at school, a fourth skill is being added: an understanding of technology, and the ability to use it.

Asked why children use computers in class, Patricia Griffin, deputy head of Marion Richardson Primary School in Tower Hamlets, East London, says: 'It's for the same reason we teach them English, maths or history. It's part of the knowledge-base of society.'

Children of all abilities can benefit from using computers. 'The most able can leap on ahead because it's individualised,' says Grahame Leon-Smith, a retired headteacher and director of the Tele-School Online project. 'The less able benefit enormously. One of the biggest problems for them is embarrassment. They're afraid to answer a question in case they're laughed at. A computer has infinite patience and never scolds you.'

For difficult children, computers can be the only thing which stops them dropping out of school altogether. A study at Keele University found two-thirds of children who were 'totally bored' by school found computers interesting.

Computers can take some of the drudgery out of other subjects, such as the mechanics of handwriting in English, or mathematical calculations in physics, and allow the chil-

dren to concentrate on the subject itself. 'With powerful computing tools, less able children find it easy to produce something that looks good. It makes them feel good about themselves,' says Roger Distill, head of IT at Bishopshalt School, a comprehensive in Hillingdon, West London.
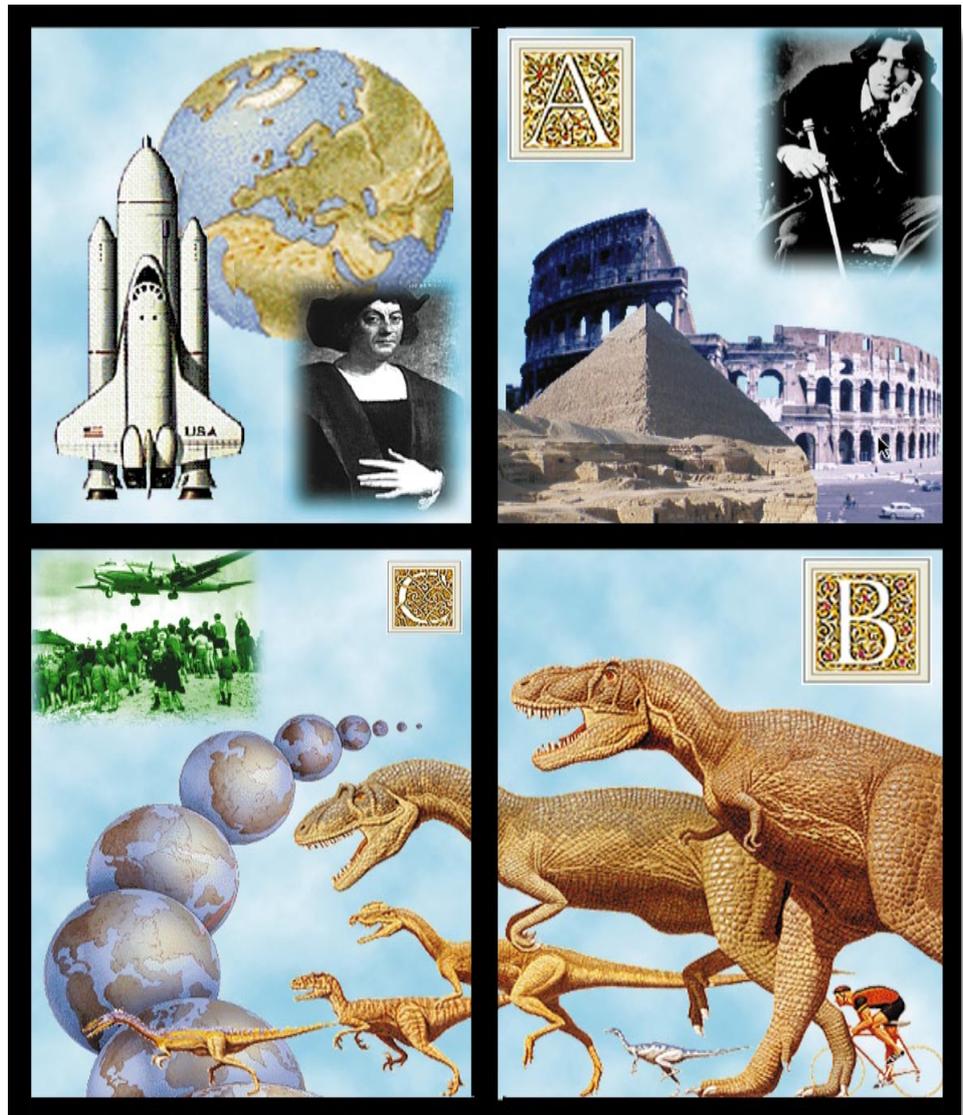
Multimedia CD-Roms and the Internet let children learn in an entirely different way, following links from one topic to another via keywords, indexes and hot-links.

On-demand multimedia aids are equally valuable to A-level or NVQ students. 'They can drop into it whenever it suits them,' says David Collinson, academic network manager at North Hertfordshire College of Further Education. 'With a chemistry CD-Rom they can replay an experiment they didn't understand, or see something you couldn't demonstrate in a classroom. They can study on their own and at their own pace, which they enjoy.'

Computers can be especially useful for children with special needs. A dyslexic child may use a word processor and spell-checker, or speech-recognition software, to produce 'correct' writing for the first time. An autistic child may be able to relate better to a computer than to other people. Blind and partially-sighted children can drive software by speech, or using special colour schemes and large characters and icons (a feature of Windows 95). And physically disabled children can use speech-recognition or specially-adapted keyboards or trackballs.

Begin at the beginning

Children begin using computers as soon as they start primary school, and the National Curriculum stipulates that 4-11-year-olds should use a computer for a minimum of five per cent of curriculum time. It says children should become familiar with technology, and use it to support learning in all other areas of the curriculum (except PE). There are IT attainment targets for each core subject.

This may not sound much, but it goes further than most other European countries, and the IT-minded teachers we asked seemed satisfied with the National Curriculum's stance.

The National Curriculum specifies two general IT areas: communicating and handling information, and controlling, measuring and modelling. Communicating and handling information means anything traditionally done using books and paper, with maybe some speech and music thrown in. For primary

school children this might begin with basic letter and number recognition, or using a snooker game to learn about angles, followed by writing and drawing a story or graphing figures. CD-Roms may be used for reference, if the school has the equipment.

At secondary school, children are encouraged to use a computer as a tool, just like an adult at work. History essays may be researched using multimedia CD-Roms, and written up using a word processor. In geography, spreadsheets may help analyse climate data or environmental damage.

The older they are, the more 'autonomous' children are expected to be in their use of computers, deciding for themselves whether and how to use them.

Controlling, measuring and modelling involves understanding how technology interfaces with the real world. It may begin in primary school with programmable moving toys (such as Roamer or Pip), which help teach concepts of distance, direction and scale.

In secondary school, children could be writing programs to control lathes or traffic lights, or collect and process complex data from a remote weather station. By the sixth form, A-level students may be using languages like Logo to produce complex 3D models and simulations.

Individual schools vary in the way they use computers, so don't panic if your children aren't doing all the things mentioned above. Though perhaps you should panic if they aren't doing any of them.

The third element of IT education, learning about technology, tends to peak in the first two or three years of secondary school, where children may get up to an hour or two a week on how computers work, how to use and write standard software, and what computers can do for us.

When children start GCSEs, A-levels and equivalents, the amount of computing can vary from a lot to nothing. At Evelyns Community School, a comprehensive in West Drayton, Middlesex, the ten A-level computer science students have a PC each. There is a GCSE course in computer science, but Evelyns does not teach it, preferring the GCSE in business studies, which includes a lot of practical computer use. The A-level computer science syllabus also covers business analysis, systems analysis, data protection and so on. It is usually taken in combination with science-oriented subjects such as maths and physics, or with business studies and maths or English for budding economics undergraduates.

Most exam boards allow course-work to be submitted in computer-output form, though you should check first. But children are often expected to draw the first map, chart, diagram, etc, manually, to show that they know how.

How many computers?

Although all schools have computers, the number varies hugely. The Free Computers for Education project carried out a survey of 15 schools in the Inner London Borough of Tower Hamlets, and found that the ratio of computers to pupils varied from 1:7 and 1:9 in the best-equipped schools, to 1:100 and 1:220 in the worst-equipped.

An acceptable ratio is reckoned to be 1:10, but even this would allow little more than an average of two hours a week per child, and most teachers would like more equipment.

According to the government-funded National Council for Educational Technology (NCET), there is little difference between grant-maintained and local authority-controlled schools. In the London Borough of Hillingdon, grant-maintained Bishopshalt and local-authority-funded Evelyns both achieve ratios of about 1:10.

Independent schools may fare no better, despite having deeper pockets. 'Last year I saw two independent schools where the IT was dreadful,' says the NCET's software programme manager, David Hassall. 'This was not through lack of money, but lack of commitment.'

Some schools, especially primary schools, try to distribute their computers in classrooms so they can be integrated into as many lessons as possible. Others prefer to kit out two or three 'IT rooms', which individual teachers can pre-book so that the whole class can use computers at once, and locate any remaining machines in public areas such as the library and subject areas. Other schools combine both approaches.

The type of personal computer used in schools varies. The NCET estimates that 40-45 percent of school computers are Acorns, another 40 percent IBM PC-compatibles (many supplied by Research Machines), and most of the remainder Apple Macintoshes, with a few old word-processing systems and BBC Micros.

Many are old machines with outdated specifications and relatively few can play CD-Roms. However, even old hardware can be used for many educational tasks.

For pure educational work, many teachers prefer the user-friendliness and superior graphics of the Acorn and Macintosh. Bishopshalt has mostly the former, Evelyns the latter. But they realise the PC is

most common in businesses, and both also have PCs, especially for older children gaining work skills or doing business studies. 'We feel quite strongly that it's no use bringing pupils up in an artificial environment,' says Martin Hickman, deputy head at Evelyns. 'By and large they're going to come into contact with PCs and standard packages.'

For 'personal productivity' tasks, such as word processing, databases and spreadsheets, secondary and older primary school children tend to use standard packages, usually in suites like Microsoft Office, or good-value integrated packages such as Clarisworks (which has extra educational templates).

Purpose-written 'educational' software is more often used for younger children, before they have learned to read and write fluently. These may include talking word processors; predictive spelling (where the child types in the first few letters and the computer offers a list of words); and ready-made vocabularies which children combine to write their own stories.

There are also special 'drill and practice' programs designed to be used for short periods and teach or reinforce one thing, such as letter-recognition or addition.

Computers at home

Some schools allow sixth formers to borrow school PCs over the holidays. Schools are notoriously vulnerable to burglary, so as well as benefitting the pupils, it reduces the risk of equipment being stolen.

But with so few computers in schools, and with more children having computers at home, many parents are worrying that their children will lose out if they don't buy their own machine. Anecdotal evidence suggests that children with home computers do have an advantage at school, and that children themselves believe this.

Peter and Bridget Taylor bought a PC for their daughters, aged 12 and 8, in January. 'Going to see their school work, we noticed ours were some of the few who weren't doing their homework on a PC,' says Peter.

Buying the same type of computer as the child uses at school may help if they want to transfer work on disk between home and school. Otherwise, it does not really matter, as most children can switch easily between two machines. The same is true of software. 'One of the things we try to avoid is teaching them button-pressing,' says Bishopshalt's Distill. 'We try to teach them concepts so they can easily switch packages.' He suggests that, if anything, parents should choose software they themselves are familiar with, so they can help if the children get stuck.

School and home use of computers can be entirely different. Trying to replicate the school environment at home is a mistake. Children can soon tell when software is really homework in disguise. 'At home you've got more quality time,' says Maggie Holgate, organiser of pressure group

Parents Information Network. 'You don't need software that's so task-focused. Children can spend time and experiment. They don't want to go home and feel they're still at school.' She advises against 'drill and practice' software, and instead suggests reference software, talking books or 'edutainment' titles.

Not all plain sailing

Of course, IT in school is not all plain sailing. It is estimated that as many as two-thirds of teachers are not yet up to speed on IT, through either technophobia or lack of training opportunities.

And there are worries that overuse of technology will undermine the Three Rs, and cause children to assume anything that comes out of a computer must be right.

At Evelyns School, 11-16-year-olds are still taught multiplication tables and mental arithmetic, and techniques such as estimation so they can double-check what the computer is telling them. 'You have to steer a middle course,' says deputy head Hickman. 'Not teaching children to spell is a mistake.'

Often, the issue is simply curbing the children's enthusiasm. 'One of the things I increasingly have to teach is when the computer is the proper tool to use,' says Distill. 'A lot of kids think the computer is a tool for all problems; they need to be taught to be discerning.'   **Paul Bray**
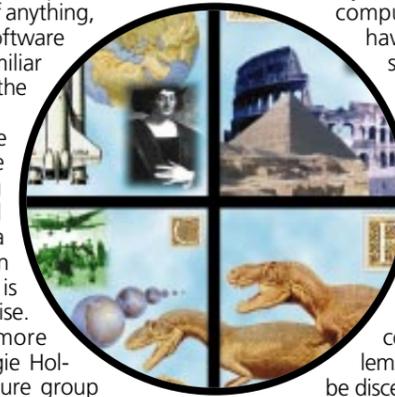
Free computers for your school

Several supermarkets give away vouchers allowing schools to claim free computers and other educational supplies. Sainsbury's School Bag scheme runs until September. You get one voucher for every £10 spent and for every carrier bag you re-use (they don't have to be Sainsbury's bags). An ICL multimedia PC 'costs' 22,000 vouchers.

Tesco's Computers for Schools scheme runs for about 10 weeks every spring. You get one voucher for every £25 spent, and a Pentium/75 PC costs 4,500 vouchers. Tesco says it gave away 21,000 PCs between 1992 and 1995.

Asda's Great Computer Challenge ended in April, but the company hopes to run it again next year. You get a voucher when you spend £25, recycle 0.5kg of aluminium (about 30 cans), or

participate in certain Asda incentive schemes. Multimedia computers cost 3,000 vouchers for a 486, 4,000 for a Pentium.

Even second-hand computers can be valuable. Two schemes aim to collect unwanted PCs and give them to schools. Free Computers for Education operates nationwide. It wants any PC that can run Windows 3 or Windows 95, plus modems, scanners and printers, or cash. PCs are collected by the school, safety-checked and applications software removed (for copyright reasons). Priority is given to

schools with the lowest ratio of PCs to pupils. *Call 0181 251 0296.*

A smaller scheme, run by International Systems' Research Institute, wants any 286, 386, 486 or Pentium PCs, peripherals or cash. Schools must submit details of a project for which they wish to use the computer, and make a £45 donation towards transport costs and safety checks. *Call 01273 766781.*