

The RM G7 Report 1998

ICT Provision in Schools



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The RM G7 Report 1998:
ICT Provision in Schools

Research carried out by
The Advisory Unit:
Computers in Education

INTRODUCTION



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Chief Executive, RM plc

The RM G7 Report 1996 clearly established that the UK led the G7 nations in the provision of Information and Communications Technology (ICT) in schools. The RM G7 Report 1998 revisits the countries of the initial report and looks at how the situation has developed in the intervening two years.

Since we produced the RM G7 Report 1996, the UK Government's commitment to lifelong learning has pushed ICT to the forefront of educational priorities and policies. In 1997 the Government launched the National Grid for Learning (NGfL), an ambitious programme to expand the use of ICT in education. There is clear commitment to the concept that new technology is vital for educational and, therefore, economic success.

With this commitment has come a change in focus from questions about the provision of ICT, to a closer examination of how the equipment, software and systems are being used to deliver national curricula. Also under examination is whether teachers have the support and confidence to integrate ICT into classroom teaching and learning.

Other countries have developed their own schemes to harness the educational opportunities that technology can deliver. This report examines how the UK's policies and ICT provision compare to other leading countries and asks the question: as one of the pioneers, is the UK winning the race to equip our pupils, teachers and LEAs with the ICT tools needed for the new millennium?

I believe the findings of this report are encouraging and show that the UK is well placed to move forward and set world standards for ICT in education. The effects of the NGfL have not filtered through to the findings of this study, but by the next report in 2000 I am sure we will have a commanding position that other countries will hope to emulate.

The overriding message from this study is that only with support, commitment and long-term funding from central government will the transformation that ICT can make to teaching and learning become a reality.

EXECUTIVE SUMMARY

This report shows that over the past two years the UK has maintained a world leading position in ICT educational policies and in the provision of ICT in the secondary school sector.

- The UK is unique among G7 countries in that it defines a student's entitlement to ICT from ages five to sixteen across the curriculum. In comparison, other countries notably lack provision for primary school children in their policies.
- Network access to the Internet has dramatically improved for UK secondary schools, rising from 29% to 75% since the last report.
- Out of those G7 countries that have any formal national curriculum, the UK is the only one to include ICT as a curriculum tool as well as a subject in its own right.
- The UK is the only G7 nation to have all schools equipped with at least one computer.
- The UK leads in the percentage of secondary schools (95%) with one or more multimedia systems.

However, comparisons with other countries also reveal some areas of concern which must be addressed if the UK is not to fall behind countries like Canada and the USA. The UK will also need to safeguard its position against countries outside the G7, such as Sweden and Singapore, both of which have high percentages of largely new networked computers in their schools and government policy to back this up. Provision of ICT in UK primary schools lags behind that in UK secondary schools. It also suffers in comparison with primary schools in Canada and the USA, although the age of computers in the USA's primary schools should be taken into consideration here.

- While provision has improved in UK primary schools since the last report, only 6% of schools have a local area network. In addition, only 30% of the UK's primary schools have access to the Internet.
- UK primary schools are currently falling behind in the provision of multimedia machines, with access in 42% of schools compared to the USA, which now leads with 85%.
- The UK has lost its lead to Canada in secondary school student/computer ratio. Canada returns a ratio of seven students per computer (10 in 1996) in comparison to the UK's figure of 7.7 students (8.5 in 1996).

These are certainly areas of concern, but through initiatives such as the NGfL, the UK Government should do much to address these issues. Together with Canada and the USA, the UK remains a leading innovator and maintains a significant lead over its European counterparts. France in particular has fallen behind due to an apparent lack of investment in new technology although plans are in progress to address this. The critical issue for all pioneering countries is that of ageing equipment. Canada in particular is already taking steps to tackle this problem and has undertaken a national computer replacement scheme.

A key conclusion from this report is that those countries with a consistent and comprehensive approach to developing ICT in education are leading the field, both in terms of providing better access to ICT, through the Internet and networks, and also in terms of providing online content and resources for teachers. The UK is certainly out ahead in its broad approach to ICT provision in education and in its policy initiatives, which range from the development of infrastructure to improving ICT skills and the confidence of teachers - all backed by a commitment to fund the delivery of these measures.

This report shows there can be no room for complacency, and demonstrates just how important future investment will be if the UK is to maintain and improve its position. Other G7 countries also have similar initiatives to the UK's NGfL programme in place, and in many cases the government is actually working with commercial suppliers. For example, Germany, France and Italy all have major agreements with international software developers and France Telecom is working with the French government to connect every school to the Internet. The French government is also stimulating multimedia content by providing risk capital. Much of this investment is designed to catch up with the UK, Canada and the USA and is not just about providing equipment for schools; it is also targeted at both developing educational software content and the confidence of teachers.

The challenge for the UK is not only to maintain its leading position in the areas where it is already ahead, but also to catch up with Canada and the USA in areas such as primary school provision and the replacement of old equipment. RM believes that this will happen through the current initiatives in ICT and education. In two years time we should expect to see a report that shows the UK leading the world in the most critical aspects of ICT provision in education. These aspects will include the provision of innovative curriculum materials through the NGfL, the widespread use of the Internet as a resource and a communications tool, and teachers, confident to use ICT to deliver the curriculum.

AIMS OF THE G7 REPORT

This report follows on from the findings of the RM G7 Report 1996. The 1996 report provided valuable insight into the most important areas surrounding the provision of ICT in the G7 countries. Using this as a baseline we have tracked progress across the G7 countries to find out how much has changed. The research also examined developments in some non-G7 countries, including Singapore and Malaysia, which are beginning to invest heavily in ICT for their education sectors. References to these countries are made where appropriate.

Using the data available from these countries, this report compares progress in ICT in education since 1995 and also includes new categories which reflect the dramatic development of computer networks, in particular the Internet, as an educational tool. Schools now need access to more powerful, networked computers to enable them to take advantage of the Internet and more sophisticated multimedia software. Given these rapid changes, policymakers from all countries have begun to implement plans to modernise their ICT structure in education. This second report from RM aims to provide all those involved in ICT and education with an assessment of the relative success of each country in delivering these ICT needs for their schools.

The research looked at five key areas:

- How national curriculum and education policies have responded to the increasing opportunities provided by ICT in education.
- Access to computers at primary and secondary level, including computer to student ratios, and how many schools have computers.
- The extent to which countries are replacing ageing equipment.
- Whether countries are adopting new technologies, including the Internet, networks and multimedia - again comparing success at primary and secondary levels.
- Whether countries are providing adequate training for teachers and how they are building teacher confidence in using ICT.

A HISTORY OF ICT IN EDUCATION IN THE UK

ICT in UK schools has its origins in the 1960s. In 1967, the Council for Educational Technology (now BECTa) was constituted to explore the application of computers in education. Two years later, a working paper was produced entitled 'Computers for Education' which distinguished between 'computers for education' and 'education about computing'.

By the late 1960s a Computer Science 'A' Level Course was being piloted by the Associated Examining Board, and the first 'A' level was awarded in 1969. To complete this course, students had to perform practical work using 'remote' terminals to mainframe systems usually housed in higher education institutions.

At around the same time, some independent schools, notably Oundle and St. Albans, were building and using computers as extensions to the science curriculum. In the State sector, a number of Local Education Authorities (including Birmingham, Hertfordshire, Kent and the now defunct ILEA) were starting to link schools to mainframe computers by various means including the public telephone network, leased lines and even, using punched cards, the postal system.

The first microcomputers arrived in schools in 1977, just at the end of a five year National Development Programme in Computer Assisted Learning (NDPCAL), sponsored by the then Department of Education and Science. The NDPCAL had incubated a variety of application ideas for education and, as a result, software development for microcomputers in schools gained significant momentum.

Recognition of the importance of computing in the educational context by the DES, the DTI, the BBC, British Telecom and a number of other influential agencies, resulted in a succession of national initiatives. These included the Microelectronics Education Programme (1981-86), the Micros in Schools Scheme, and an attempt to offer all secondary schools the chance to join wide area networks offering information provision and electronic mail.

An important indication of the UK's commitment to IT was its inclusion as a core element in the National Curriculum for England and Wales. The major revision to the National Curriculum in 1995 has given further impetus to computing both as a learning methodology, and as a core skill for all students.

In October 1997 the Government announced its intention to build a National Grid for Learning. This initiative, backed by over £700 million of new funding and supported by a major teacher training programme, is intended to allow every school in England to benefit from connection to the Internet. Similar schemes are in place in Wales, Scotland and Northern Ireland.

REPORT FINDINGS

Educational Policies

The UK is one of the few countries to have a clearly defined role and objectives for ICT within a national educational policy, and is unique amongst G7 countries in that it defines a student's entitlement to ICT from ages five to sixteen, across both the primary and secondary sector.

Out of the G7 countries, only two others, France and Canada, also include specific reference to ICT in the primary curriculum. In Canada, entitlement varies from province to province whereas in France new policies aim to ensure that all primary school children will learn to manage text and be able to draw electronically.

Not all G7 countries have a national curriculum; instead some have national or state guidelines. Out of those countries that have a national curriculum, the UK is the only one to specify the use of ICT as a curriculum tool and as a subject in its own right.

Many of the countries examined in this report recognise that the full potential of ICT will only be realised if teachers are given the means to deliver the full range of curriculum subjects. Italy, Germany and France all have initiatives under way to involve teachers in the development of subject software content. In the UK the government is committed to encouraging the development of the educational software market under the NGfL initiative.

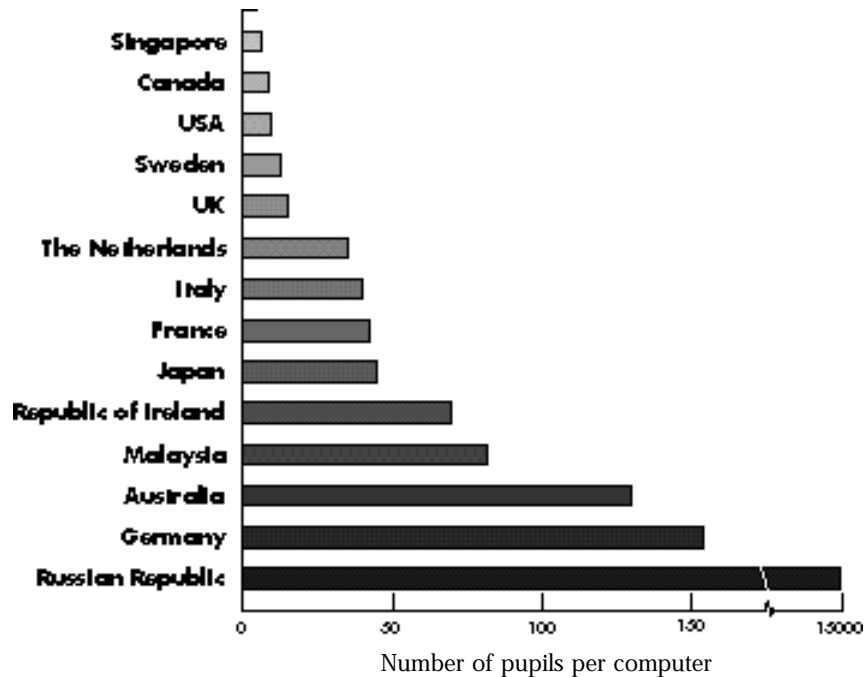
Information and Communications Technology in Education Policies

Australia	Many ICT in education policy documents published at Federal, State and Territorial levels.
Canada	Yes.
France	Yes.
Germany	The basic documents for ICT teaching in Germany are the publications of the Kultusministerkonferenz (Conference of Education Ministers). Some länder e.g. Hamburg, Hesse, Bavaria, Saxony and Mecklenburg-Western Pomerania, have produced ICT policy documents for regional implementation.
Ireland, Republic of	Currently there is no mention of ICT in education policy.
Italy	A number of new ICT related projects are being started this year.
Japan	The Ministry is planning to reform the national curriculum to include ICT amongst other changes. This is now very close to happening.
Malaysia	Yes, ICT will become a compulsory subject in due course.
Netherlands, The	Yes.
Russian Republic	None.
Singapore	The Government has recently published 'The Master Plan for ICT in Education'. Implementation has just commenced.
Sweden	The national computer policy for schools is determined by the National Agency for Education.
UK	ICT is clearly defined as an integral part of the national curricula in all four of the UK's constituent parts.
USA	No federal curriculum but states have a state curriculum for guidance.

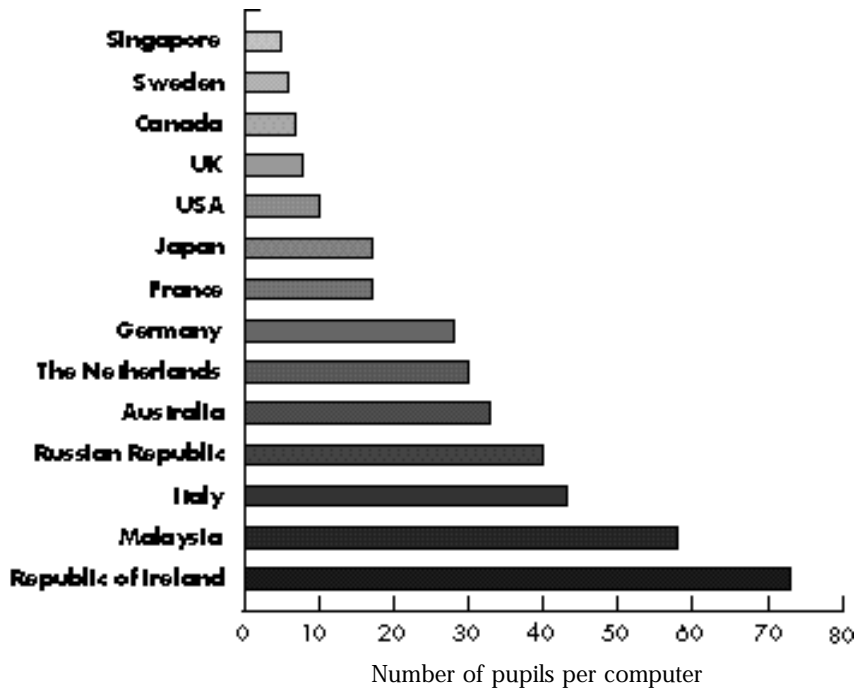
Access to Computers

Out of the G7 countries only Canada, the UK and the USA are seriously involving primary school children in computer usage, although France does have plans to extend its provision in this area. Canada has maintained its lead in computer access with the USA and UK seeing steady improvement. In the secondary sector, Canada has taken the lead from the UK which now falls into second place ahead of the US. However, the UK is the only G7 nation to have all schools equipped with at least one computer. It is important to note that the timing of this survey means that it does not show the full impact of the investment in primary schools that has resulted from the NGfL. The UK should have significantly better provision of ICT in another six to twelve months.

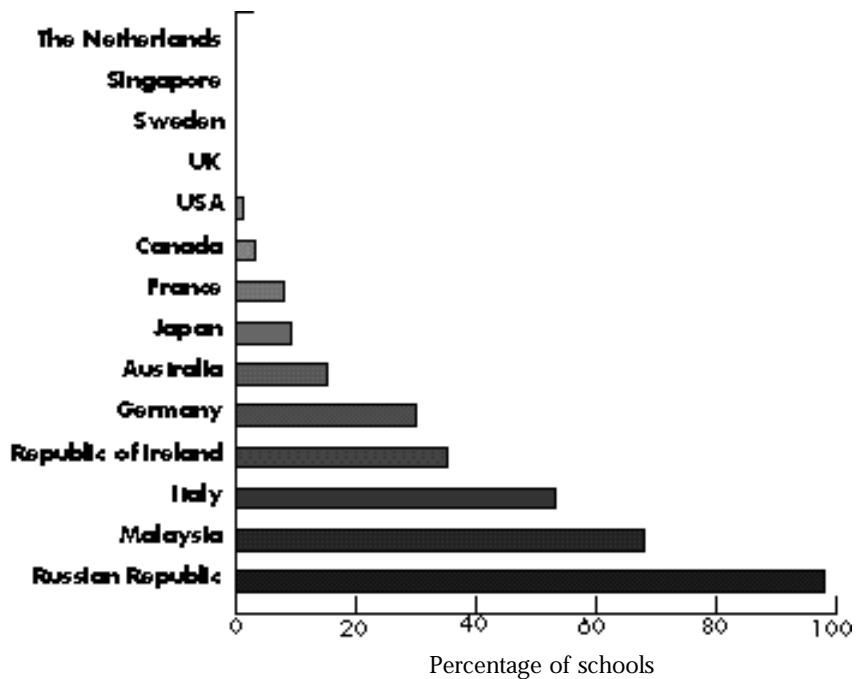
PUPIL: COMPUTER RATIOS (PRIMARY SCHOOLS)



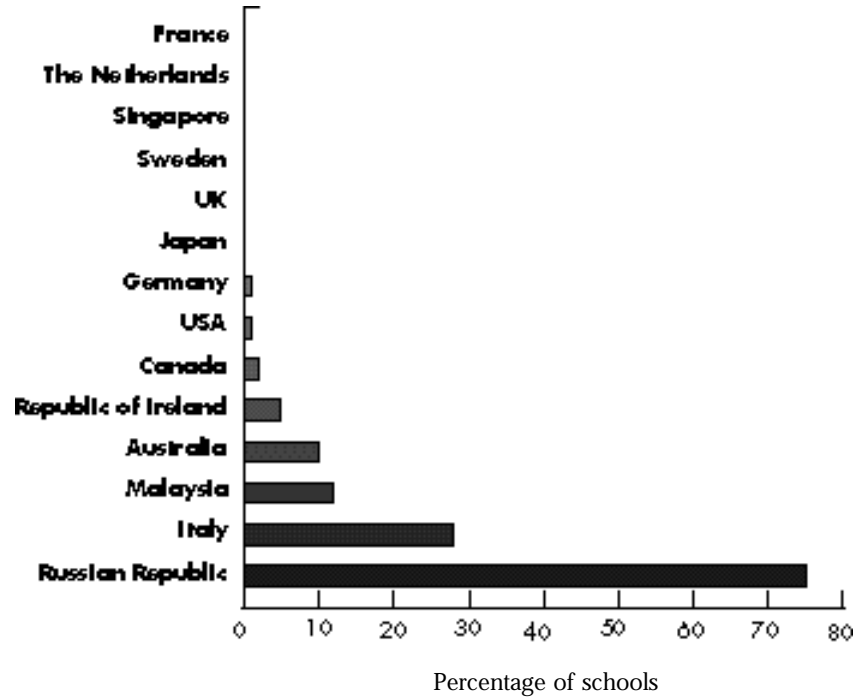
PUPIL: COMPUTER RATIOS (SECONDARY SCHOOLS)



SCHOOLS WITH NO COMPUTERS (PRIMARY SCHOOLS)



SCHOOLS WITH NO COMPUTERS (SECONDARY SCHOOLS)



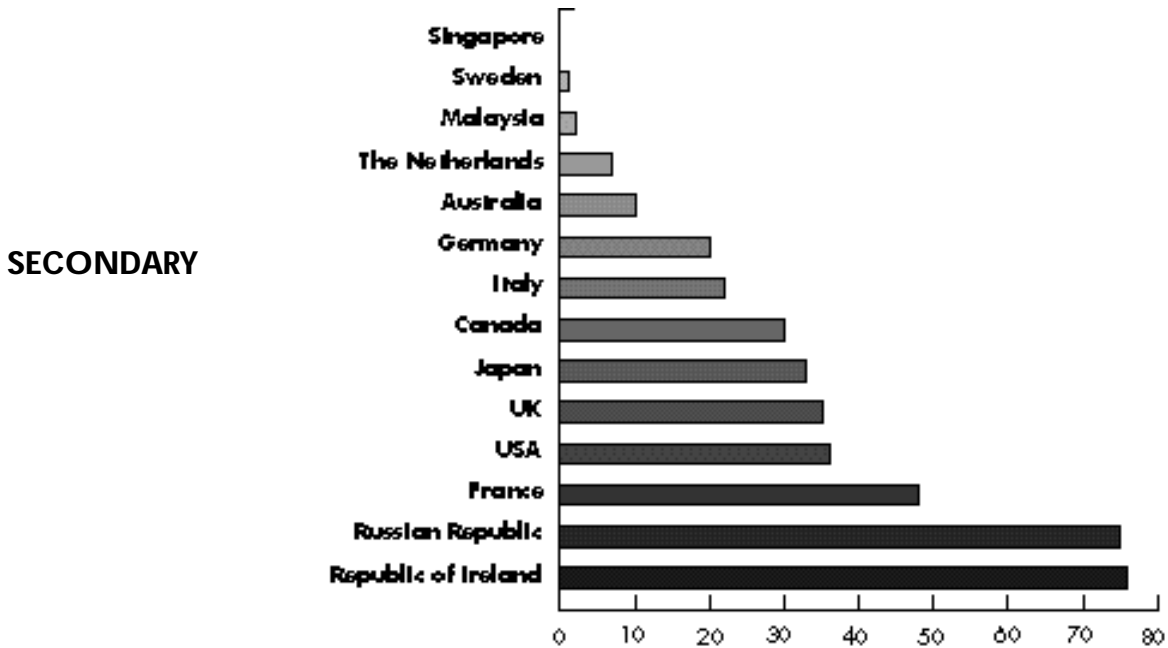
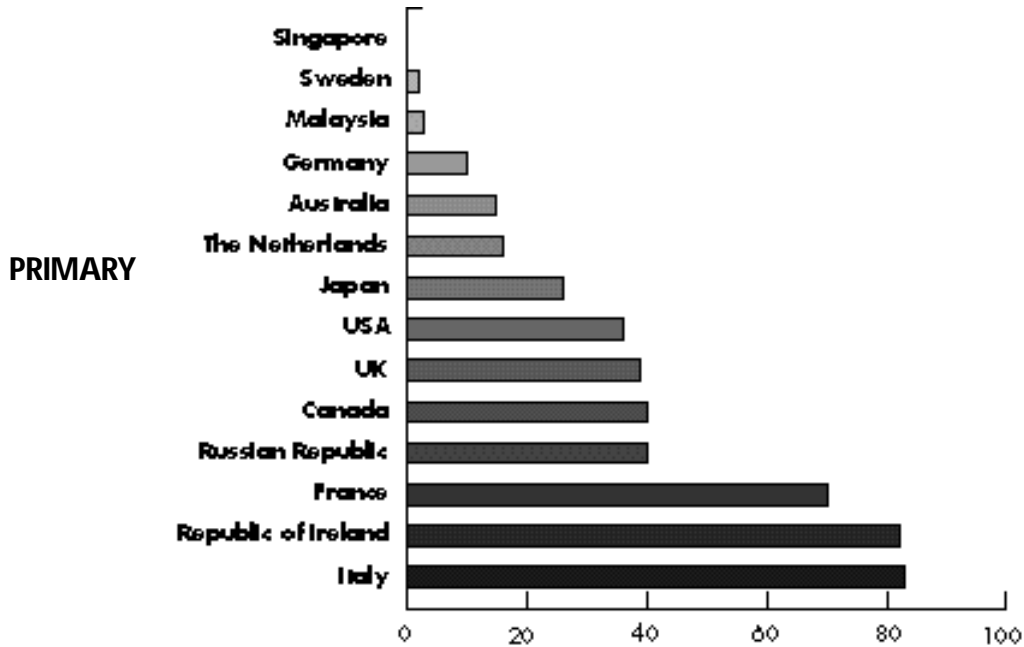
Obsolete Computers

The most pressing problem for those countries that invested in ICT early on is how to replace ageing equipment that cannot cope with the new demands of multimedia software and networked computing. The 1996 G7 report showed that some pioneering countries were already experiencing problems replacing old technology, and there is evidence in the current report that this is becoming more of an issue. The report shows that nations are having varying degrees of success in upgrading their ICT.

Canada, through a nationwide replacement scheme, has shown a dramatic reduction in computers more than five years old in both the primary and secondary sectors. France, Italy and Germany, on the other hand, do not seem to be replacing ageing computers. France still has a significant number of Thomson computers and early PCs in all three phases of education. The UK and USA are making steady progress; however there are still a significant number of old Apple II computers in USA schools, limiting access to more powerful modern software.

By comparison, non-G7 countries such as Malaysia and Singapore, whose ICT strategies for education are still in their relative infancy, demonstrate low percentages of old computers. However, in five to ten years time these countries are likely to find themselves with ageing, obsolete computers and will have to tackle the same replacement issues that countries like France now face. Japan, for example, suddenly has great numbers of schools with computers over five years old in comparison to very few in 1996.

PERCENTAGE OF COMPUTERS MORE THAN FIVE YEARS OLD



Again, it is worth noting that the benefits of extra funding from the UK government under the NGfL initiative are not captured by this research data. The UK should see a dramatic reduction in the age of school computer equipment as the NGfL solutions roll out. The NGfL initiative will also see more schools adopting a managed service approach, including an option to renew outdated equipment. Ultimately this may provide a solution for the problem of replacing ageing technology.

Network Access and Multimedia Systems

Since the last report, the adoption of the Internet and of networked computing has enabled schools to communicate both within the school and with other schools and organisations in the UK and overseas. Most of the G7 countries now have ambitious plans to connect schools to the Internet. At the same time virtually all innovative educational based software, such as Integrated Learning Systems, has become CD ROM based, requiring multimedia systems, with fast processor speeds, that will support sound and video. This development means multimedia systems will be essential if pupils are to benefit from relevant curriculum based software.

Multimedia

The UK leads all nations in the provision of multimedia in the secondary sector, with 95% of schools having access to a multimedia computer. In the primary sector the UK has only 42% of schools with access, behind Canada with 48% and the USA which leads with 85%. It should be noted that multimedia provision in UK primary schools will grow significantly as a result of investment through the NGfL. Other G7 countries provide very little access to multimedia machines in primary education, due to a combination of lack of investment and the absence of suitable multimedia content. However, recognising the growing importance of curriculum relevant content, both on the Internet and also on CD ROM, France, Germany and Italy all have major initiatives underway to develop multimedia content for their schools.

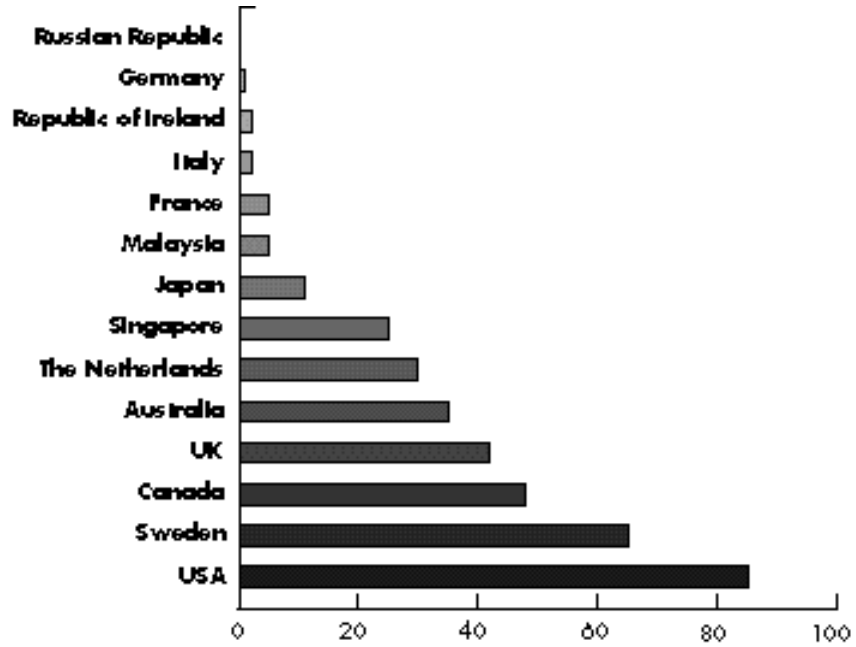
Network and Internet Access

Only Canada and the USA have made significant progress with the installation of local area networks in primary schools. At present, penetration in the UK remains low at 6%. The secondary sector has seen higher levels of investment across all countries, with the UK, Canada, USA and Japan all achieving above 50% penetration. The general level of networked Internet access is significantly higher than the previous report, except in Italy and Japan. Since the last report, France has also significantly dropped its investment in networks whilst the UK, USA and Canada have shown dramatic increases in Internet and network provision. In comparison with the USA and Canada, the level of Internet access at primary level in the UK (30%) significantly lags behind that at secondary level (75%).

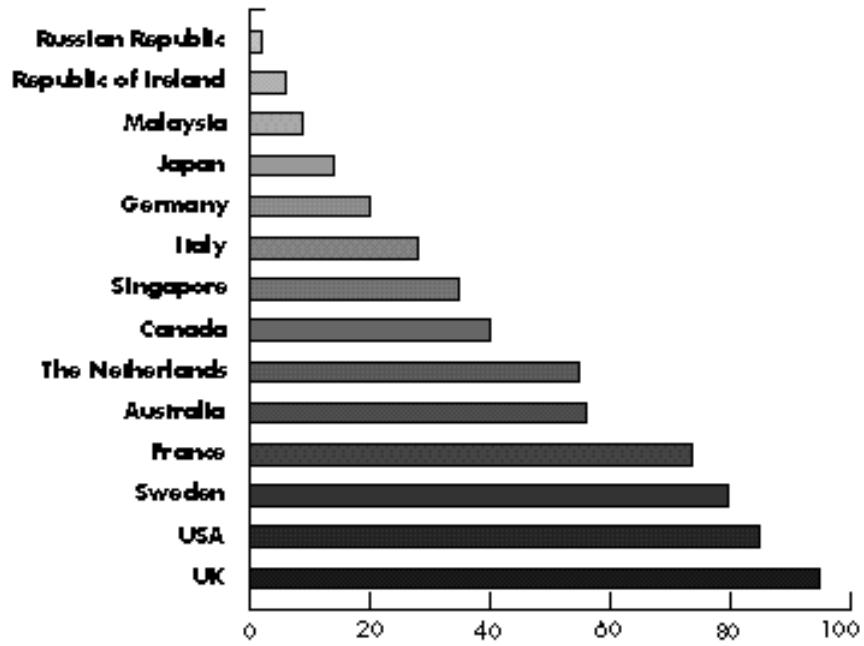
Again, the NGfL programme will play a major role in improving multimedia provision and network installation in the UK's primary school sector. Similarly, continued investment in the secondary sector will help ensure that all UK schools can benefit fully from rich educational content through the NGfL.

PERCENTAGE OF SCHOOLS WITH ONE OR MORE MULTIMEDIA SYSTEMS

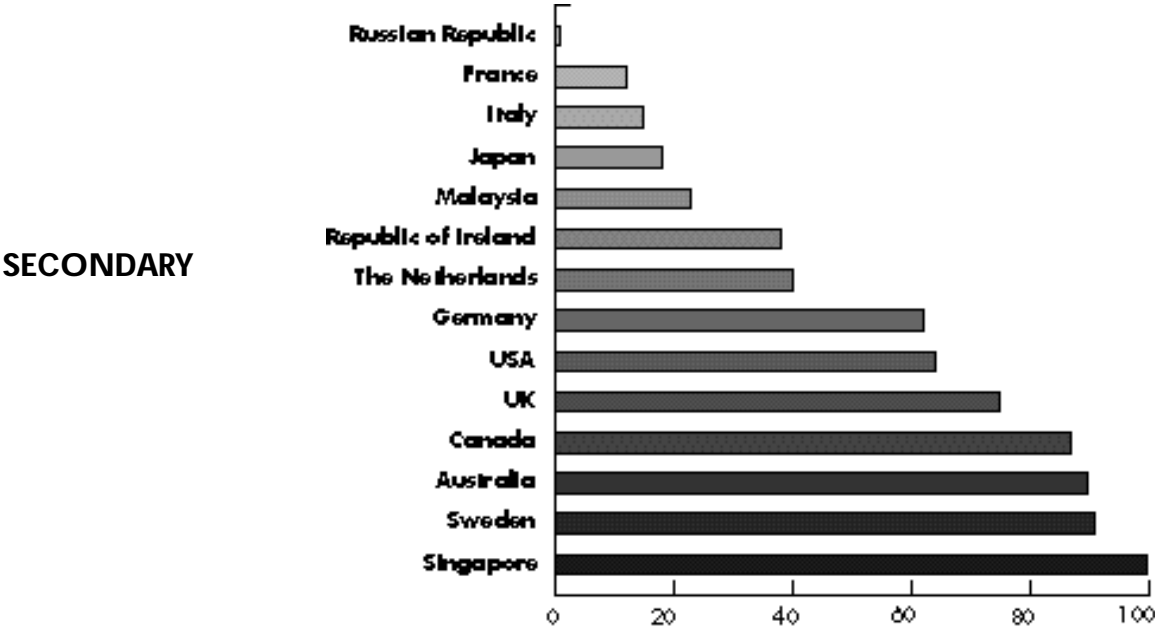
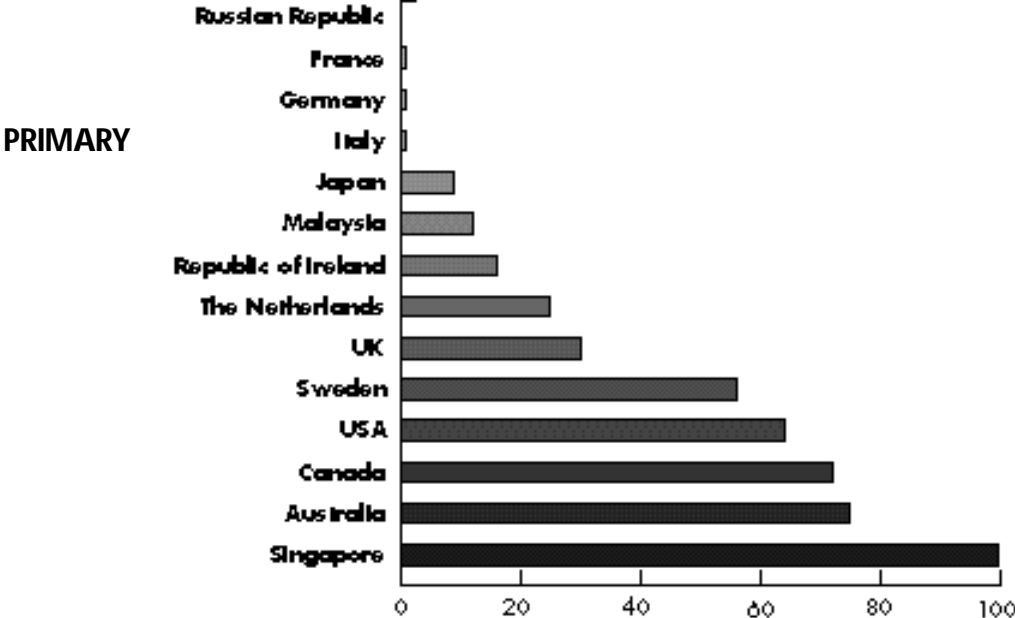
PRIMARY



SECONDARY



PERCENTAGE OF SCHOOLS WITH INTERNET ACCESS



Teacher Training and Confidence in Using ICT

Teacher confidence in the use of ICT remains generally low and is a major issue for all the G7 countries. As in the last report, raising teacher capability with ICT remains problematic and many teachers only achieve a level of confidence and proficiency through their own efforts.

According to RM's research, only the UK and Japan have more than 50% of secondary teachers who are confident in using ICT. In the primary sector the UK is the only country to show a majority of teachers who are confident with ICT. Confidence in Germany and France remains particularly low, while Canadian teachers have a surprising lack of confidence given Canada's leading position in ICT provision.

The need for professional development of teachers has now been recognised, but remains in the early stages of development. In France the training of teachers and their professional development was not seen as a high priority until a new training programme for teachers was introduced in 1997. Some Canadian states have compulsory ICT training as part of their teacher training. However the percentage of teachers attending courses in ICT has changed very little since the 1996 report. The UK government is taking a lead in professional development by investing £230 million of lottery money in a programme of training with the intention that all teachers feel confident to use ICT in the curriculum by 2002.

Establishing and maintaining teachers' confidence and capability with ICT will be vital as the transformation of learning through ICT will only take place if teachers have the ability to delivery it every day in the classroom.

METHODOLOGY

The RM G7 Report 1998: ICT and Provision in Schools was commissioned by RM plc. The report was researched and written by The Advisory Unit: Computers in Education, based on data collected in the report countries, from interviews, questionnaires, local government statistics, ministerial documents and personal contacts. The research was carried out over three months. Much of the data is a collection of existing research, in some cases anecdotal, but no less useful as a result.

A number of the G7 countries have regional structures for education. In these countries sampling techniques were used to produce nationwide estimates of statistics in the report. Clearly, a survey of this nature can only provide a snapshot of trends and comparative results in this rapidly changing field.

In many cases it was extremely difficult to obtain 'official' ministry figures. There were also times when different views were expressed on the same topic from different institutions within a country. The views were aggregated to produce as accurate a picture as possible. Estimates were made for some countries in areas where official figures were scarce. This applies particularly to the Russian Republic.

A note should be added here on the Russian Republic, which was included in the initial research to reflect political developments since the last report was carried out. However, although data has been included on the Russian findings, it was decided to retain the basic structure of the original report, hence the title G7 Report 1998 rather than G8. Research showed that the Russian Republic lagged significantly behind the original G7 countries and, therefore, it was not possible to make a meaningful comparison.

The G7 countries are:

Canada
France
Germany
Italy
Japan
United Kingdom
USA

Data also collected on:

Russian Republic (G8)
Australia
Republic of Ireland
Malaysia
The Netherlands
Singapore
Sweden

SOURCES

The sources of the data and information for this report include:

- interviews
- questionnaires
- local government statistics
- national government statistics
- ministerial documents
- internet
- personal contacts
- extended visits to several Ministries of Education, such as Singapore, France and The Netherlands

Canada

Local Education Boards
National Ministry of Education
Territorial Education Boards
Provincial Education Boards
Hardware manufacturers
Educational software publishers

France

National Ministry of Education
Local Education Boards
The National Centre for RDP
Hardware manufacturers
Educational software publishers

Germany

Federal Commission for Education
Länder Educational Ministries
Hardware manufacturers
IPN, University of Kiel
National Centre for R&D in Science and Information Technology
Educational software publishers
Teacher training institutions

Italy

National Ministry of Education
Science, Maths and Technology Inspectorate
Hardware manufacturers
Educational software publishers
Teacher training institutions

Japan

National Ministry of Education (MONBUSHO)
Government National Computing Commission
The National Teacher Training University
Hardware manufacturers
Educational software publishers
Teacher training institutions

United Kingdom

Department for Education and Employment
The Scottish Office
The Welsh Office
The Northern Ireland Office
Hardware manufacturers
Educational software publishers
Teacher training institutions and universities
School advisers and inspectors

USA

The Department of Education
The Department of Education and education boards in a sample of states
Hardware manufacturers
Educational software publishers
Teacher training institutions
Universities

Similar sources consulted for non-G7 countries

Data collected by:

The Advisory Unit: Computers in Education
126 Great North Road
Hatfield
Hertfordshire AL9 5JZ

The Advisory Unit: Computers in Education

The Advisory Unit: Computers in Education is established to fulfil the needs of teachers, schools, colleges, education authorities and education ministries in realising the full potential of IT and responding to the challenges and opportunities posed by the new technologies. Staff at the Advisory Unit have a very long pedigree in the field of educational computing and have many contacts throughout the world with computer educationalists, ministry advisers and school inspectors. The centre in Hatfield has been host to many delegates from overseas who wish to get an informed view of educational computing in the UK. The Unit has run many courses both in the UK and overseas, some of which have been sponsored by the British Council. The Advisory Unit keeps a watching brief on world developments in educational computing and holds resource material on over 90 countries.

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