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Exploring the Secret Garden: the growing importance of ICT in the home

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Abstract

The use of ICT (information and communication technology) in homes is growing faster than its use in schools and colleges—and there are already more systems in homes than in educational settings. This article argues that we should attempt to enter the area which most research on ICT in education tends to ignore: the secret garden of the learner at home. It is based partly on two pilot case-studies of secondary schools and a small sample of their students. Given the paucity of research in this area the article poses more questions than it answers. What are the implications of ICT use at home for teachers in schools? Do home systems interfere with school education or can they be used to enhance it? How should teachers respond to, and assess, work done using home ICT? Is the home situation widening the gap between one set of pupils (the "haves" of ICT) and another? Suggestions for school policies and action research for the future are put forward.

Keywords: ICT; Home learning; Classroom learning; National curriculum; Case-study.

Why consider the home with ICT?

The lasting home influence

"Technological change is likely to be even more important in bringing about the movement of education out of institutions and into individual homes." (Baroness Blackstone, *Times Higher Educational Supplement*, 17.10.97)

Baroness Blackstone's comment, and her suggestion that future ICT may make feasible the early 1970s de-schooling movement led by Ivan Illich, may be considered pie-in-the-sky by those with a healthy scepticism. But one of the lasting "truths" in educational research of the last three decades is that the influence of the home and family background on a child's ability and achievement is at least as great as that of the school.

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For example, Schibeci writes, in reporting a review of a number of studies of relative influence that:

> "factors outside of schools have a strong influence on students'educational outcomes, perhaps strong enough to 'swamp' the effects of variations in educational practices." (Schibeci, 1989, p. 13)

More recently, several researchers have gone further by claiming that home influence is indeed strong enough to question whether schools can in fact "make a difference" (for example, Gray and Wilcox, 1995 and Gray *et al.*, 1983); and further back, many will remember Basil Bernstein's famous quote in the 1970s that "schools cannot compensate for society"(see Bernstein, 1971, and many other works by the same author). I cannot enter that debate here, but I do start from the premise that, although there is no substitute for properly structured teaching in schools, the home has a major influence on student attitude and attainment.

Resources in homes—the latest (fuzzy) picture

Facts and figures on how many computer systems there are in homes are unreliable to say the least. In one of the few books in this field, Sanger *et al.* (1997, p. 5) cite a range of surveys, one of which indicated in 1995 that 39% of British households had home computers. The survey also suggested that "most middle-class parents see home computers as an educational tool", while "fewer than a quarter of working class parents agree, seeing computers as mainly for games playing". Sanger also cites an Inteco forecast which predicted in 1995 that by 1998, 47% of UK households would have personal computers with 66% of those having CD-ROM drives and 9% of them connected on-line. That forecast suggests that although 86% of high income families will possess a PC, 53% of homes are currently without access to computers—an issue we return to later.

One more recent survey on personal computers which on the face of it seems reliable was conducted and published by Olivetti in 1997. This indicates that Britain is "top of the home computer league" (see Figure 1).

These figures seem plausible, suggesting that one-third of all households in the UK owned a computer in 1997. This figure, according to the report, rises to 45% for households with schoolchildren.

More recent figures have been collected by Facer *et al.* (2000) based on a survey of 855 schoolchildren in South-West England and Wales. This study reports that 69.9% of the children in that sample had a computer at home with 20% of the children having exclusive access.

Generally, data on home computing are usually interesting and eye-catching but rarely reliable or verifiable—in itself, a poignant comment on the so-called information age in which we allegedly have data at our fingertips. However, a few crude calculations show the magnitude of ICT at home when compared with schools. If we take a very

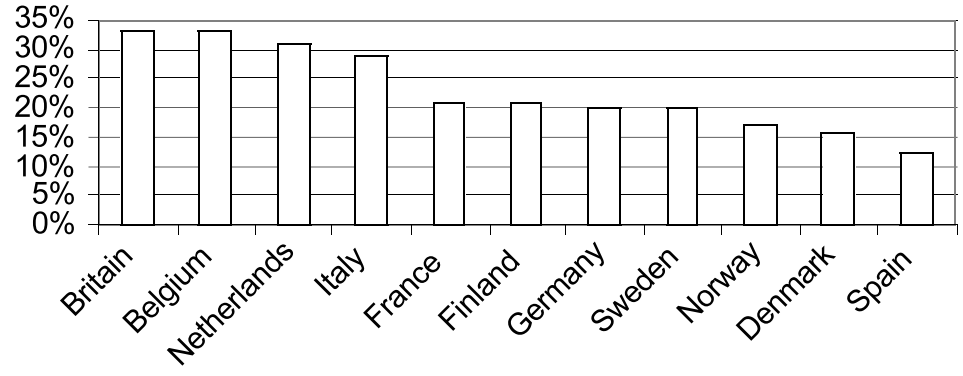

Figure 1: Percentages of households in Europe with a home computer

conservative estimate of one-third of all households with a computer, there would be over five million machines in the UK (c.f. the figure in the Olivetti report of 5.8 million in Italian homes). Now compare this with schools. There are about 23,000 primary schools and 4,500 secondary in the UK. Based on DfEE statistics we can put a rough figure of 100 computers per secondary school and 12 per primary (although DfEE figures suggest that nearly a quarter of these may be used for administrative purposes). Crudely then, the UK has about 750,000 computer systems in its schools compared with the very conservative estimate of 5 million in homes—that represents a ratio of almost one to seven.

Classroom learning compared with the home learning environment: which best matches the use of ICT?

Another argument for focusing on ICT in the home rather than the school concerns the huge contrast in the nature of the learning environment in the two contexts. It has often been said that if someone returned from a 50-year visit to outer space and walked into a secondary school classroom they would infer that little had changed since they left Planet Earth. Similarly, if all the computers in a school used for teaching and learning (as opposed to administration) were to "go down" on a given day there would be virtually no impact on the life of many a school. This observation has been contrasted with the situation when computers "go down" in banking, retail or the travel industry.

Resource and skills levels for ICT in schools are still extremely low and this must be a major factor in inhibiting its use. But there are several other factors which act against the use of ICT in teaching and learning in a school setting:

1. Control: secondary teachers, especially subject specialists, are reluctant to relinquish control over children's learning—quite rightly too, given the external pressures on them.

2. Supervision/intervention: past studies of ICT use show that teachers are prepared to allow unsupervised use of technology, but still want to intervene by imposing some structure on it eg, time limits; guided activity (worksheets). The instance I found (reported in Collins *et al.*, 1997) of a hand written "banda" worksheet being used to structure and guide pupils' use of a CD-ROM may be ironic but not uncommon.
3. Curriculum dominance: the power of the centralised, subject-based curriculum and the need for ICT to have a clear curriculum "fit" still dominate as much as ever.
4. Classroom and school organisation: fitting IT into the typical secondary school classroom is still a problem. Similarly with school organisation: how should teachers connect pupils to ICT? In a secondary school, should it be achieved by taking computers to the class (on a trolley!) ...or classes to the computer room? Often, access can only be achieved by taking small groups to the library during lesson time or by the use of breaks and before/after school hours.
5. The "logistics" of the school: split sites, stairs, subject blocks, separate buildings, subject boundaries and divisions—all these act as a constraint on the use of ICT.
6. Teacher practices and teacher attitude: this is the most complex issue of all; we cannot simply assume "deficit models" of teachers and blame them for not using ICT. We must look at the institution as a whole.

The fact is, there are fundamental differences between learning in an institution which we know as a "school" or "college", and learning which does not take place under institutional constraints. I have summarised, in a fairly stark and polarised way to make my point, some of these contrasts in Table 1.

McFarlane (1997) highlights a similar conflict between the culture of the classroom and the culture of the computer (see also Loveless,1996). Multimedia can provide access to vast quantities of information, give learners the power to explore and manipulate information, and enable individuals to construct their own "knowledge base". In contrast, the culture of the classroom is governed by the need for teachers to control learning outcomes, to maintain authority, to meet the demands of content laden syllabi, and at the same time moderate the behaviour of a large group of young people. The strategies which teachers have necessarily developed for achieving the latter set of aims have clashed with their role in allowing or even nurturing the former. As Tyack and Cuban (1995) put it, "computer meets classroom—classroom wins".

Yet few people would doubt the value of ICT and multimedia systems in teaching and learning. If one observes students of any age working with them (including one's own children) their potential for active learning, exploration and motivation is apparent. But when this marvellous platform for learning meets the institution, strange things happen. Innovations seem to die on contact with the inertia and "institutional reality" of the school. Computers, video discs, IT and now ICT have generally (with a few important and fascinating exceptions) had little impact on life in the secondary classroom. Computers have not radically altered classroom activity; they are typically used to add to existing practices rather than replace them. For many teachers, ICT is seen as just

Table 1: Characteristics of learning in different settings

Characteristics of Classroom and School Learning	*Characteristics of Learning with ICT*	*Characteristics of Home Learning*
conformity, order is central; compulsory	personal empowerment is central	voluntary
collective	individual (usually)	individual (often)
keeping people "together", "on track", on course; directed	exploring, having a "free rein", going their own way	free range, un-directed
staged, sequenced, paced learning	free access to information	haphazard, un-structured, unsequenced
measurable learning outcomes	free-ranging learning outcomes	many unintended outcomes (outcomes more difficult to measure)
timetabled, "forced" access	flexible access, when it suits them	free access
teacher control	learner or teacher control	learner (or parent) control
clear boundaries and targets eg, times, deadlines, subject divisions	unclear boundaries and targets	open-ended
teacher led, teacher-centred	learner led	learner centred
teacher filtered, distilled, vetted; legislated for	unfiltered, not always vetted or censored	not legislated for

"another thing they have to do" (discussed in Scaife and Wellington, chapter 13). Rather than schools and teaching patterns adapting to accommodate the change, the innovation becomes assimilated to existing, unchanging patterns of schooling. Teachers will continue to use technologies that "fit familiar routines and classroom procedures"; teachers will use technologies to "enhance their regular instruction but rarely to transform their teaching" (Tyack and Cuban, 1995, p.122). This is perfectly understandable given the management, curricular and societal constraints within which they work. The classroom itself has proved to be the hardest thing to change—I wonder what our alien from outer space will observe if she, or he, returns 50 years hence. Will the institution still have the upper hand?

Home use and external pressures: The National Curriculum (NC) for England and Wales, the new ITT curriculum for ICT, and other factors

Many of the NC programmes of study and attainment targets for IT can be fulfilled by the access and availability of ICT in homes. For example, at key stage 3, pupils are expected to "become critical and largely autonomous users of IT, aware of the ways in which IT tools and information sources can help them in their work". As Sanger points out (1997, p.37) "this is a forlorn requirement"—in the school context. At an earlier stage (KS1) pupils should be given opportunities to "examine and discuss their experiences of IT"—again, home use could be brought in here, but as discussed later this would need sensitive handling to be equitable. At all stages, pupils are expected to use IT to "communicate their ideas"(KS1) and to "create good quality presentations" (KS3 onwards). To achieve level 7 of the attainment targets, they must "identify the advantages and limitations of different data-handling applications, and select and use suitable information systems". All these, and indeed most of the other statutory requirements of the NC, can be fulfilled by home use. Probably the most important is that they should become "critical and autonomous users of IT"—the case studies carried out for this article indicate that some children are moving closer to this target through their home use of ICT. However, to achieve this objective fully requires good teaching at school—an important example of the need for home-school liaison.

Another very good reason for diverting our attention more towards the home in future planning for ICT in education can be found in elements of the new national curriculum for initial teacher training (ITT) in England and Wales (DfEE, 1998). Several statements in the standards document refer to ICT in the home. For example, "trainees must be taught to identify in their planning ... the fact that some pupils may already be very competent *eg, because of home access...".* The same document talks of trainees "structuring pupils work to ... maximise use of time and resource rather than, for example, allowing pupils to search freely on the internet or CD-ROM". Later statements are equally important to home use of ICT. For example, trainees are "to ensure that assessment of ICT based work is based on the quality of their work within the subject and is not just based on the quality of the presentation or the complexity of the technology used". In addition, trainees must be taught to "ensure that all pupils have opportunities to use ICT, and that their experience takes account of any home use or other previous experience of ICT".

Finally, it is clear that there will be increasing external pressures acting to increase the presence of ICT in homes and to increase the use of that ICT in education for young people and adults. All the political rhetoric of the last 20 years has referred to the vocational significance of IT in schools from Kenneth Baker's launch of the "Micros. in Schools scheme" onwards (see Wellington, 1989). The early vocational rhetoric was largely misplaced, in that many believed in the power of activities such as BASIC programming to develop the programmers and computer scientists of the future. But the alleged vocational importance of IT has been continually fuelled by advertising and political hype. The kind of rhetoric we now frequently hear and read refers to the importance of preparing our children for the information age or "the information society", or of giving them "the skills for the jobs of the new century" (Battle, 1997). This rhetoric may be optimistic and even unfounded on the real world, but it is certainly influential, both on the home and the school.

What do we know about home use of ICT?

There is already a large and growing literature on ICT in schools but in contrast there is surprisingly little published work on home use of ICT and its links with schooling.

The Sanger study of young children (aged 4 to 9), videos and computer games (Sanger *et al.,* 1997) is one notable exception. Sanger *et al.* themselves admit the difficulty of doing research in this area. It is "messy"; interviews with parents and children may not always be reliable, so first- hand observation is needed ; access is difficult eg, into homes, private rooms, even bedrooms; data is difficult to categorise; it is impossible to construct a statistical sample. Despite these complications, Sanger and his team produced some fascinating data and reported it in a fair and honest way (an earlier edited collection of chapters raised similar issues: see Silverstone and Hirsch, 1992). Another exception is the valuable survey of Year 9 pupils' use of computers at home carried out by Susan Harris (1999). She showed that the majority of pupils (in her sample) had access to computers in the home. Most commonly, the machines were used for games and for word processing. Her survey also revealed some important gender differences in home use (see also Facer *et al.*, 2000).

How can we probe further?

Clearly, there are difficulties in probing home use of ICT and the home school link (what Sanger has described as the "air lock" between home and school). But, despite the difficulties and the "messiness", it is essential to investigate further in this area for the benefit of the future of ICT in learning. Quantitative data, based on carefully constructed statistical samples will be difficult to gather, but they could reveal some interesting correlations eg, between home computer use and examination results (although the number of influential variables here will need careful analysis).

My own view is that we should begin with in-depth *qualitative* studies on: pupils' views on ICT at home and school; teachers' reactions to ICT work at home and its implications for their role at school; examples of "good practice" in developing home-school links; case studies of individual children and their use of ICT at home; difficulties and issues

presented by home use of ICT ie, equity, lack of critical faculties, the role of the parent, gender differences. There is a lot of research to be done—it is too important to be neglected just because it is messy and time-consuming. One of the saving graces, however, is that teachers can become involved in it, as active agents for researching and developing their own practice.

A case-study approach

How can we begin to enter the "secret garden" of home use of ICT? The entrance I have chosen is to carry out two pilot case-studies of comprehensive schools, working with committed and enthusiastic teachers who want to explore this area more fully with me. One school from the North of England was chosen and one from the South. One teacher in each school agreed to monitor carefully, over a period of two terms, the ICT-based work carried out by the pupils in her tutor-group of Year 9 pupils. The studies also involved interviewing pupils and teachers, observations, and the collection of exemplars of pupils' work. The approach produced cameos of individual pupils, some written by the pupils themselves, with some written by a teacher who had interviewed pupils and one written by a parent. (further details and material can be obtained by writing to the author but cannot be included here for reasons of space).

The case studies raise interesting points including: family "status", the role of parents, the attitudes and reactions of teachers, the potential of home computers to fulfil many of the requirements of the National Curriculum, and the lack of knowledge by teachers of the excellent resources which pupils have at their fingertips at home.

Studies of this kind might lead the way to a wider, more quantitative approach, giving us a broader overview of what is happening, how and why (Wellington, 2000). We can then move on to collect more quantitative data, giving us (for example) an overview of home-school links, the extent of home use of ICT, regional differences, differences resulting from class or economic status, and (given even more resources) international comparisons.

Difficulties, issues and ways forward—for research and practice

In this section the key issues emerging from the two case studies and from existing research and publication in this area are raised. Practical strategies for addressing each issue are briefly presented. These strategies can only be developed and put into practice by a process of action research—the final section suggests some of the questions which practical, action research in this area could address in the future.

Access and inequality

As with so many issues in education, the problems of equity and access with ICT are perennial and recurrent. The problem of equity occurs in 3 areas, all of which feature prominently in home use of ICT: the areas of gender, social class , and economic status. Even in the very early days of micros. in schools (and homes) Hannon and Wooler (in Wellington, 1985, p 93) warned that "the gulf between children of different classes will widen". Huge differences continue in home access, and use. The pilot studies for this

article reveal large differences even between pupils in the same class, let alone from the same school. The teachers interviewed all felt concern about the range of access and opportunity open to their pupils in ICT at home. It can be argued that this inequity has always existed—with books, pencils, a quiet room and a desk to work on. Most teachers felt this to be true, but that the use of ICT can exaggerate these differences.

The issue of equal opportunity needs to be addressed both at school level (eg, by the IT co-ordinator) and by individual classroom teachers. Are homeworks set which rely on IT use? For those without home access, should the school policy on access favour them—or will this create stigma? How should access to IT outside of timetabled hours be shared out and managed?

Control and guidance

A second issue for teachers in considering ICT use at home concerns the degree of control and guidance which they can and should exert over pupils' learning. The very nature of home learning ie, free rein, uncontrolled, un-structured, can be both a virtue and a vice. One of Sanger's (1997) most barbed findings was that "significant adults" (and this included parents and teachers) were unable to discern what elements of ICT would be beneficial for children's learning. He reports a laissez-faire attitude amongst parents when it comes to new technology. Given the uncontrolled, unfiltered and un-checked nature of much of the material on the Internet, this can be a dangerous stance to take—much of the material that young people encounter may be educationally inaccurate and inappropriate as well as being morally dubious. Again the pilot studies reveal that some teachers attempt to make use of and exploit children's access to ICT at home, while others prefer to ignore it.

Schools need to audit, in a sensitive way, the extent and nature of home use of ICT. Without this information they cannot begin to improve or exploit it, or develop a school policy towards it. Action research needs to recognise that home and family life is as complex and varied as school and school life. For example, we cannot always assume that parents are willing participants in introducing and using ICT in the home. Nor can we assume that school pupils have unlimited, uncontrolled access to the home ICT system: other family members may be in direct competition; access and use may also be controlled and constrained for other reasons, such as the phone bill!

Given these qualifications and cautions, parents do need, and will probably welcome, guidance on improving and developing the educational use of ICT at home. One suggestion from a teacher is that a small leaflet could be produced, perhaps by an IT co-ordinator, giving ideas, guidance and encouragement to parents, with concrete examples of the kind of work which can be expected and accepted.

By-passing the brain and plagiarism: whose work is it?

A third issue is concerned with the obvious fact that material on a computer, a CD-ROM or the Internet can find its way straight from the machine (or cyberspace) onto a piece

of paper with no cerebral intervention by the student whatsoever. We have all heard the cliché about the marvel of the information age when, at the press of a button, we have a "world of information" at our fingertips. Well, at the press of another button or a click on the mouse, the same information can go straight from the CD-ROM or the Internet onto a piece of paper, into a plastic wallet and be handed to the teacher. The brain has been by-passed. We have all seen the huge, unfiltered chunks of text and illustrations printed straight from ENCARTA (but, as some teachers have asked me in discussion, is this any different from copying from a book? Yes, I would answer, in some ways). More seriously, some students in these pilot studies are handing in such work and claiming it as their own.

The first stage is for teachers to foster and develop a critical outlook in pupils (a sort of "healthy scepticism") towards IT. When is it appropriate to use IT and when not? What are the problems, dangers even, of using IT at home? For example, is the Internet material they are using accurate? where did it come from? Is it biased? The same healthy scepticism needs to be applied to use of multimedia on (say) CD-ROM, although such material has usually been filtered, checked and vetted before being "packaged" onto a disc. The aim of educating pupils to become critical users of ICT should be at the centre of the school's role.

The more contentious issue concerns teachers' reactions to pupils' work on computer. The case studies suggest that some teachers are more favourably disposed to work which has been (say) desk-top published or simply word-processed—while others react negatively and with (sometimes justifiable) suspicion towards courseware or homework presented via ICT. Above all, a school policy needs to be researched and developed relating to home use of IT. For example: is word-processed or desk-top published homework acceptable: always, sometimes or never? How should it be judged and marked eg, in comparison with hand written work? Should teamwork at home around one pupils' system be encouraged and how should it be assessed? Where is the line to be drawn on plagiarism in formally examined coursework?

A threat to the teacher?

Finally, and more fundamentally, the teachers' role is brought into question as a result of home use of ICT. Some teachers do feel vulnerable in the presence of the "pupil classroom expert" when using IT in their lessons. Home use of ICT can create students who genuinely know far more about a topic than a teacher, as a result (perhaps) of long hours on the Internet or other focused (even obsessive) study of a subject at home—whether it be the dinosaurs, the solar system, the human body, UFOs, Roman History, or the economy of Brazil. The potential for young people to become genuine "experts" on specific topics has always been there, but has been greatly enhanced by the spread of ICT. These issues may not be a problem for some teachers, but my discussions suggest that they are a real concern for many. In short, the presence of ICT in homes may threaten the teacher's authority both as a "subject expert" and as someone in authority or control over the learning situation.

This points to the need to research and implement a programme of staff development in the area of "the Changing role of the teacher". This could happen at school level, for example in departmental and whole staff meetings and discussion or as a theme for in-service training days. But it could also be researched and developed at a National level, leading perhaps to non-statutory guidance from the national curriculum authority of the time. It could also lead to a programme of in-service development nationally or as part of initial teacher training.

In summary

The use of ICT at home is an important aspect of practice and an area ripe for further research. It can provide the possibility of quality time for the individual learner—which (as Sanger *et al.,* 1997 point out) not every classroom can. It can help to fulfil some of the requirements of the national curriculum, in IT and in other subject areas. But there are also plenty of issues and difficulties to be resolved—not least those of access, equity, and the links between home and school in the use of ICT.

A long list of questions remain to be answered. For example:

- what is "appropriate use" of ICT at home?
- what relevant experiences do children bring to the classroom from home?
- what kind of training (both ITT and in-service) do teachers need in order to take advantage of the opportunities which ICT can offer at home?
- how should teachers design learning tasks for individuals at home?
- how should work done with ICT , perhaps involving small groups of pupils working together at someone's home, be assessed?
- more generally, do the sorts of ICT being promoted at home emphasise certain models of thinking and what are the educational strengths and weaknesses of these models?
- Finally, what might be the long-term effects of growing ICT use in the home on the school curriculum, and on pupils' general orientation to learning and the world around them?

What is needed now is action research into home school links in the use of ICT, in order to inform and develop good practice. The best people to involve in this research are the practitioners themselves. To mix a few metaphors: school use of ICT is just the tip of the iceberg—we need to explore the other nine-tenths, even if it means jumping into murky waters. We need , through action research, to define a role for the school which suggests practical ways for making best use of the home.

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