

FAMILIES, SCHOOLS AND THE INTERNET

Sonia Livingstone

Moira Bovill

London School of Economics and Political Science

This report is derived from a wider study of internet usage by children and young people commissioned by BTextact Technologies and carried out by the London School of Economics and Political Science (LSE) in 2000-2001. Whilst this report focuses on learning and education, the wider study discusses the nature and significance of internet-based communication, gaming, e-commerce and content production by this age group. The team at LSE have benefited throughout from the advice and support of Ben Anderson and Di Holm at BTextact.

Contents

1	CHILDREN AND THE INTERNET	3
1.1	INTRODUCTION	3
1.2	THE RESEARCH PROJECT	4
2	THE INTERNET AT HOME.....	5
2.1	UK FAMILIES GO ONLINE	5
2.2	UNDERSTANDING THE INTERNET	6
2.3	SEARCHING.....	8
2.4	LEARNING.....	9
2.5	LIFE IN FRONT OF THE SCREEN	11
3	THE INTERNET AT SCHOOL.....	13
3.1	SETTING THE SCENE	13
3.2	PRIMARY SCHOOLS	13
3.3	ACCESS AND USE IN SECONDARY SCHOOL.....	14
3.4	FUTURE USES	16
4	CONCLUSIONS.....	18
4.1	BARRIERS AND GATEWAYS	18
4.2	INTERNET LITERACY	18
4.3	THE WAY FORWARD.....	19
4.4	RECOMMENDATIONS FOR ACTION	21
5	BIBLIOGRAPHY.....	23

1 Children and the Internet

1.1 Introduction

Information and communication technologies (ICT) are playing an ever-greater role in the economy, the workplace, in education and in our daily leisure. Children in the world's developed countries are spending ever-greater amounts of time working on and playing with computers of various descriptions.

The number of UK households with domestic access has grown rapidly, reaching some 9.2 million households by the last quarter of 2000. However this access is not evenly distributed as Figure 1-1 clearly demonstrates. Internet access in schools has also grown rapidly.¹

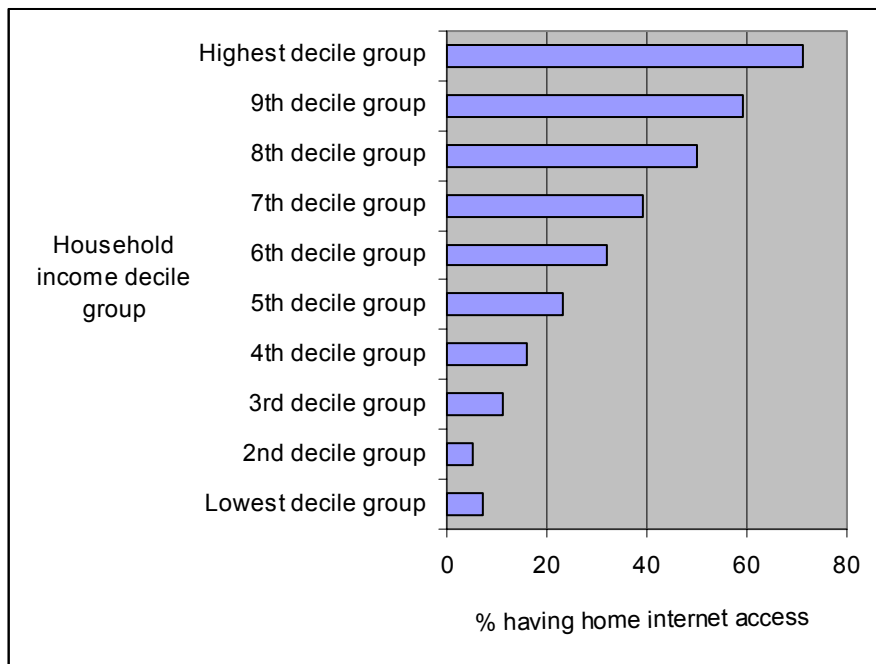


Figure 1-1: UK Households with home internet access to the Internet in March 2001 by gross income decile group.
Source = ONS/Family Expenditure Survey²

However, most statistics concerning children and young people's experience with the Internet concern access rather than use. Knowing how young people are *making use* of the Internet is crucial in a number of domains, including the development of commercial strategy and public policy in relation to education, safety, entertainment, communication, consumption and social exclusion.

Such knowledge is elusive because the Internet is being appropriated into young people's lives as part of larger hypothesised trends towards, first, the individualisation (by contrast to the communal nature) of media use and second, privatisation (meaning both the use of media in private spaces and the commercialisation of the symbolic realm more generally).³

¹ For household information see *Family Expenditure Survey* data on Internet access, available at <http://www.statistics.gov.uk/pdfdir/int0601.pdf> . For schools information see *Statistics of Education: Survey of Information and Communications Technology in Schools, England 2000* on www.statistics.gov.uk and available from Her Majesty's Stationary Office.

² See <http://www.statistics.gov.uk/pdfdir/int0601.pdf>

³ See Sonia Livingstone, chapter 14 in Livingstone, S. and Bovill, M (Eds.) (2001) *Children and their Changing Media Environment*.

As media come to occupy more and more of children's everyday lives,⁴ framing their use of time and space and mediating their social relations, what are the consequences of introducing yet another, highly interactive medium?

1.2 *The research project*

1.2.1 Aims

The present research set out to explore the nature and quality of children and young people's experience with the Internet. An in-depth, observational research approach was adopted, seeking to contextualise Internet use both symbolically and materially within the domestic routines and family interactions of everyday life in the UK in 2000-2001.

The aims of the research were:

- To develop an understanding of the *nature of Internet use* among children, young people and their families in the different contexts in which the Internet is currently used.
- To identify the *barriers and gateways* to acquisition and acceptance of the Internet among young users and their parents.

1.2.2 Methods

The researchers made a series of visits to each of 30 families at home, interviewing both parents and children, observing children using the Internet in a variety of contexts and for a variety of reasons, using quasi-ethnographic techniques of interviews, diaries and, most important, naturalistic and participant observation.

The 30 target children in these families varied by socio-economic status, age, gender, ethnicity and geographic location. More specifically, the homes of 16 boys and 14 girls, divided more or less evenly between sociodemographic categories AB, C1 and C2DE, were visited. The children ranged in age from 8 to 16, 12 being of primary school age and 18 of secondary school age.

In addition, the researchers visited 10 schools, both primary and secondary, chosen to vary in their strategies and success in adopting ICT. The school visits combined interviews with head-teachers and/or heads of ICT, observations of classroom use of the Internet, observations of computer clubs and other informal Internet uses, and discussions with pupils.

In seeking to flesh out the experiences of young people lying behind the facts and figures of market research surveys, this report does not offer generalisable claims but rather a rich, qualitative account of the emerging place of the Internet in family life which draws heavily on the experiences of young people themselves.

⁴ See Livingstone and Bovill (1999).

2 The Internet at Home

2.1 UK families go online

2.1.1 Decisions under uncertainty

Key to understanding the impact of the Internet is the current *rapidity* with which the technology is both diffusing and, simultaneously, changing. The Internet has moved only very recently from being confined to the workplaces of the professional middle-classes to take its place beside the television as a family resource in the homes of the majority of schoolchildren.⁵

The rapidity of these changes is accompanied by considerable *uncertainty* regarding both the nature of the technology and the benefits of the Internet for children, its place within the family and the home and, very practically, where to put it and how to make it work as desired. Thus this report is being written at the moment when families are still working out ways of using this new technology.

In short, whether to get the Internet, where to put it, how to make it work, and what to do with it are the key first steps, and even these are proving somewhat challenging for many families.

2.1.2 Perceived educational benefits

In most families, notwithstanding considerable interest generated by commercial interests and also by governmental promotion (and considerable doubts regarding costs and dangers) the potential benefits to children and, particularly, to their *education*, were central to parents' justification for Internet adoption.

Parents saw the Internet as offering the opportunity to increase their children's life chances by giving them an educational advantage and an edge in the job market. Yet parents and many teachers were unclear about the Internet's educational role and the majority of children used it for fun.

'Dad's work' was the next most common reason for going online, except in working-class families, where 'keeping up' and perceptions of the Internet as bound up with 'the future' and 'progress' figure more highly.⁶

However, a widespread *ignorance* about computer hardware and software, difficulties in making the technology work properly, and a lack of clarity about the Internet's educational applications meant that access did not always guarantee use. As we shall argue in this report, both symbolic and practical factors are resulting in the under-exploitation of the Internet's potential.

2.1.3 Location and use

Access to the Internet in the homes we studied was still tied to the PC, and the 'right' place for this to be was not at all obvious. Computers migrated around the home depending on the values of the parents, the interests of the children, and how its role within the family developed.

In the affluent and well-educated families in our sample, it was more likely to be in a quiet place such as a study, or in a separate dining room if this was not available. In lower middle-class and working class homes, the PC was more likely to be found in a room in the mainstream of family life. Within the home the physical location of the PC influenced the *type*

⁵ In April 2001 a survey of 53,803 pupils in England Wales and Northern Ireland showed that 60% of pupils had access to the Internet at home. See <http://censusatschool.ntu.ac.uk/table2-1.asp>.

⁶ Previous research shows striking differences in the way in which television and computers have been integrated into family life: see Dominique Pasquier, chapter 4 'Media at home' in Livingstone, S. and Bovill, M. (Eds.) (2001) *Children and Their Changing Media Environment*. At the earlier stages of diffusion, computers and the Internet are often first encountered by fathers at work and the decision to purchase a PC or go on line is commonly associated with 'dad's work'.

of use made of it. Putting it in a study reinforced perceptions of the PC as a work tool and secured privacy and freedom from distraction. Location in the hurly-burly of family life encouraged more casual, social use, which could benefit younger children, who could learn from watching their siblings and parents.

Once acquired, located and made to work, young people's narrative of gaining the Internet suggested an initial honeymoon period after which Internet use declined somewhat. Most significantly, we found little evidence to suggest that the Internet kindles new interests. Children only became engaged when they found something on the web which touched on an already established interest, or when they could use it to keep in touch with people they already knew.

2.2 Understanding the Internet

2.2.1 Why understanding matters

Although people do not need a thorough understanding of a technology in order to be able to use it, the way an object is conceptualised by the user is important.

- Expectations influence use and may to explain why access does not necessarily indicate use.
- Being able to represent a medium to one's self and to others is the first step to becoming a competent or literate user of that medium
- Early expectations and uses tend to influence future developments, both technological and cultural.⁷

2.2.2 Images and metaphors

Asked to 'draw a picture of the Internet', younger children tended to draw their home page or a frequently visited site, underlining the importance to them of visual presentation and of the search process. Older children focused on the diversity of the Internet's functions and content, in keeping with their widening experience of use.

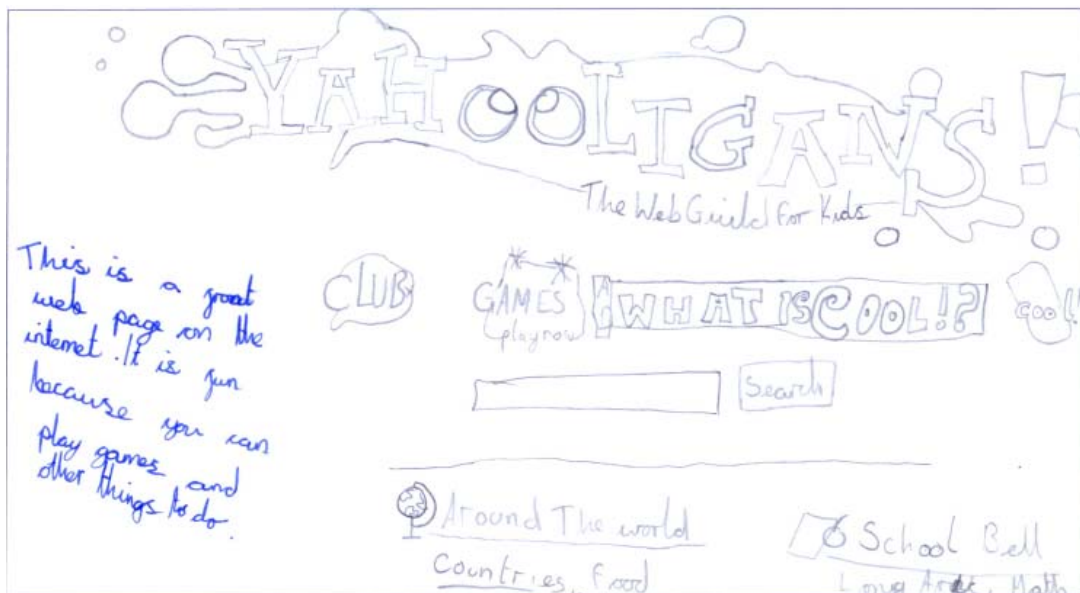


Figure 2-1: Drawing of the Internet by a boy aged 8 1/2

⁷ See McKenzie and Wajcman (1999).

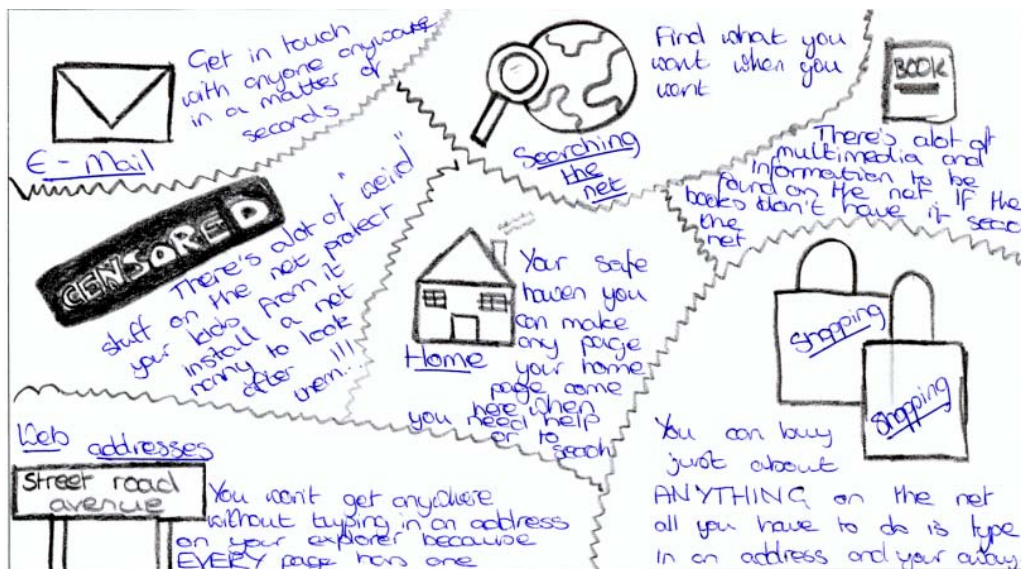


Figure 2-2: Drawing of the Internet by a boy aged 14

Many children, although they used it, did not know what the Internet was or how it worked. When they talked about it, *metaphors from familiar domains* helped make it comprehensible and stable.

- Younger children tended to describe the Internet as a 'place', a spatial anchor that was comfortably familiar, and which was appropriate to their 'walled garden' experience as users.
- Older children, who had begun to appreciate the use of email and chat rooms, used more complex metaphors such as 'a link' or 'a system' which explained its function or organisation in terms of networks and communication.
- The single most common metaphor was that of a reference book – a 'directory', 'giant book about everything', 'encyclopaedia', 'dictionary'. This was not always helpful in providing a model of how information storage and retrieval works in the context of the world wide web.
- Some descriptions revealed extravagant expectations – 'it's just like life... you can do anything really', it is 'a world of opportunities' or 'the future'.

2.2.2.1 Talk

When asked to describe the Internet, young people often focused first on *two-way communication*. Communication on the Internet was equated with 'talk', revealing that children regarded the Internet as sharing some of the strengths of real-time, face-to-face communication, making things more natural, spontaneous and fun. The frequent shifts between use of the words 'talk' and 'write' (or even 'phone') when children discussed what they were doing online, were very noticeable.

2.2.2.2 Doing things

Further, children strongly associated the Internet with 'doing things' - finding out about things, communicating with people and having fun. It was about being *an active user*, not a passive receiver of information or communication, and was heavily centred on 'having fun'.⁸

⁸ Similarly, despite fears about television turning viewers into 'couch potatoes', researchers increasingly recognize the active engagement of television audiences. See Livingstone (1998).

2.2.2.3 *Visual interest*

Despite the analogy with books, young people gave higher priority to the visual aspect of the Internet than to its text-based content. The youngest trawled web sites looking for pictures and even teenagers prioritised the visual dimension of web site design.

2.2.2.4 *Communicating online*

Perhaps because of these perceptions of the Internet as communicative, active and visual (rather than informative, passive and print-based), computer-related skills were no longer seen as alien or 'geekish'; instead they were admired as 'cool'. Only those who were obsessive in their attachment to computers were still seen negatively.

Parents, teachers and policy makers alike, while recognising the liberating and empowering possibilities of the Internet, were also deeply concerned about how this new resource should be managed and controlled. Children, on the other hand, were not interested in the wider issues which preoccupy adults, such as the role of commercial interests, or the potential for democratic participation. Nor were they fazed by adult fears about the anarchic nature of the Internet and how it could be used for criminal or exploitative purposes. They had a more egocentric and light-hearted perspective and tended to see the Internet, and its communicative possibilities in particular, as offering them new freedoms and opportunities for control and self-expression.

2.3 **Searching**

The Internet is much discussed, by contrast with the mass media which dominated the twentieth century, as a fundamentally *interactive* medium (or set of media). While communication and playing are forms of interactivity already familiar to young people, searching a vast array of globally accessible information is perhaps the most notable new form of interactive engagement on offer to, and warmly welcomed by, young people.

2.3.1 Searching styles

Searching the Internet can be accomplished in various ways:

- using an address (URL)
- net surfing (starting with a good page and following links that look interesting)
- using search engines
- using subject (or search) directories

Of these options, children preferred the first two, and often did not understand the distinction between the second two.

When *using a URL*, they tended to rely on word of mouth recommendations for good sites, and then memorise the address for 4 or 5 sites rather than making use of bookmarks. Addresses were not always used effectively, being incorrectly remembered and/or typed into search (rather than address) boxes. Parents were often as much at sea as children in the effectiveness of their searches and search strategies.

When starting from a favoured *homepage*, sometimes established for children by their parents or recommended by the school, searching was sometimes more satisfactory.

As for *search engines and search directories*, children experienced a number of pitfalls, primarily concerned with the difficulties of using key words effectively, or of translating ordinary language questions into search terms. Moreover, children's reluctance to read the text on web sites meant that they also did not realise just where a search had taken them and what kind of information they were receiving in consequence.

2.3.2 Searching preferences

Favourite sites tended to be visited over and over again, the number of these being small for young children, with some broadening of range for teenagers. Boys typically preferred games, sports or music sites, while girls were more likely to select music or fan sites. Both liked sites related to favourite television programmes.

Children's preoccupations with pictures and interactivity affected their judgements about 'a good web site', for they valued the *visual aspects* of web design, the opportunities available to do things and, unless specifically hunting for text (for a school assignment, for example), they paid little attention to words.

When asked what made for a *good web site* in their view, it seemed that most children and young people preferred:

- Entertainment sites more than educational sites
- Commercial/ fan sites more than public/ disinterested sites
- Communication more than information
- Pictures rather than printed text
- Games/interactivity rather than passive reception
- Local rather than global content and contacts

2.4 Learning

2.4.1 Opportunities for learning

The Internet provides opportunities both for school-related and more informal and/or incidental learning experiences.

2.4.1.5 *School-related learning*

A common trajectory was from use of the Internet as a source of illustrative pictures in primary school, to use as a source of pictures and information for projects and for exam revision in secondary school.

However, while many older children with access to the Internet at home used it for homework, the sophistication and success of such use varied widely, as did the influence and attitudes of teachers and parents.

Young people's attitudes to study dictated their type of use, with serious students using the Internet as a learning tool while the less motivated used it to avoid the necessity of spending too much time on homework assignments.

2.4.1.6 *Informal learning*

The importance of informal learning experiences should not be underestimated. Surfing and entertainment use can teach children a great deal, and they are usually motivated to learn if interested in the subject matter. Such learning did lead to the discovery of information of educational value but it appeared largely to improve the kinds of navigational skills discussed above.

However, although flexible searching skills and the ability to evaluate content are prerequisites for the informal use of the Internet as an educational resource, many young people used less than optimal search techniques and did not know how to evaluate the material they found. Knowing how to evaluate library resources is not such a necessary skill, as there are well-established traditions which ensure the quality of texts. This is not the case with Internet materials and children need guidance about how to assess them.

2.4.2 Learning styles

2.4.2.7 *Trial and error*

Young people themselves believed that they learnt best if they were allowed to explore the Internet for themselves and learn through trial and error, and that friends and siblings could teach them more than parents or teachers. Indeed, peer involvement in learning, whether in front of the screen or using Instant Messaging for example, was often highly motivating though perhaps also distracting.

2.4.2.8 *Being netwise*

The association with entertainment, interactivity and communication underpinned the kinds of skills that young people themselves valued, influencing their ideas of what it was to be netwise. These included being able to personalise the screen, use different fonts, colours, emoticons etc to personalise one's screen presence, find good pictures, find fun web sites, use up-to-date game cheats, operate multiple windows (to monitor email/fool parents and teachers), communicate using chat room shorthand, establish a wide circle of Internet contacts, see one's own name in a public place (e.g. have own web site), and develop a 'cool' Internet identity (as in chat room ID's such as IcecreamJanie/ 'Shadowman'/ 'Whataguyiam' and funky email addresses).

As children's interests and their emerging criteria for Net Literacy illustrate, the coming of the PC and now Internet into the home, with their triple capacity to provide entertainment, communication and education, has to a certain extent eroded the boundary between school and leisure (and information and entertainment content). The desirable outcome is that learning becomes more pleasurable, a view with which many young people concurred. They argued that use of the Internet *per se* was enjoyable, that it could provide virtual company while you worked through Instant Messaging and email, and that it made homework easier or more fun to do.

2.4.3 Problems and challenges

However, there are downsides. The Internet cannot be approached as an unproblematic educational tool.

- The mind-set implicit in 'fun' use may undermine educational outcomes, as children tended to select sites which looked good/ provided things to do/were fun to use, not because of the quality of their content. There is a challenge here for educational providers to make their sites visually appealing, interactively engaging and entertaining.
- Young users found it difficult to disengage from their own perspective and critically *evaluate* content. Sites which fitted their interests tended to be assumed to be trustworthy. Indeed, young people showed little curiosity about the motivations of content producers, treating material promoting commercial interests as if it were made available for the public good, rarely considering the quality or source of the information provided. There is a challenge here for teachers to develop their pupils' ability to judge the quality of online information.⁹
- The Internet can also be seen as blurring the boundaries between the public and private spheres, by bringing 'the world' into the living room. Yet, in the main, young people approached the vast potential of the Internet rather conservatively, communicating with people they already knew and accessing a modest range of sites connected with interests they already had. In view of the 'hype' surrounding the Internet and its opportunities for cheap global communication, this may seem surprising. However when it is remembered

⁹ The Internet blurs the boundaries between information and advertising. Regulatory efforts have so far clearly separated programme content from advertising on TV: however the coming of sponsorship on television introduces a new dimension. As a result, critical literacy is likely to become increasingly important for all media in the future.

that young people are embedded in a predominantly local social network (school) it seems rather predictable.

2.4.4 Multimodal learning

Young people were more innovative, perhaps, in the *manner* of their Internet use, for they typically *multi-tasked*, combining homework with listening to the radio or CDs or 'talking' to friends on Instant Messenger or email.

Within the *multiple modalities* of the Internet itself, they focused on the visual and auditory dimensions, tending to undervalue textual material. Even when their goal was to access text (for use in a school project for example) they shunned densely presented textual material unalleviated by pictures or graphics. Instead they looked for well-presented text in shorter, if not 'bitesize', pieces. Thus, even when processing textual information, Internet use was strongly associated with making aesthetic judgements.¹⁰ This may pose particular challenges for those trying to promote educational use of the Internet.

If they are to establish an effective, *informal learning context* at home, parents need more guidance in developing their own skills so as to enable them, in turn, to support their children and reinforce what they learn in schools about the key skills of Internet use. Finances permitting, there is much to be said for allowing children free access in a relaxed climate where they can explore the opportunities for learning by trial and error.

2.5 Life in front of the screen

Through the influence of parents and through young people's pursuit of their pre-existing interests, the domestic context encourages the *reproduction* online of many of the practices that already frame everyday life within the home.

2.5.1 Online and offline

In various different ways, we found the online and offline worlds of young people to be closely interwoven. Most routinely, the two were *mutually supportive*, with interaction in front of the screen contributing greatly to the fun of communicating or playing on the Internet. Indeed, it may appear that these onscreen interactions were essentially a backdrop for the interaction among friends face to face, it being the banter, sharing and laughter which remained once the computer was turned off.

While friends and occasionally siblings shared activities online, Internet use by parents and children together was far more the occasion for regulation than for sharing a leisure activity (unlike for television).

2.5.2 Regulating Internet use

Regulating Internet use was generally managed in two ways:

- through the location of the computer
- through domestic rules

As we have discussed, the relative affluence of professional/middle-class families made it more likely that they had a dedicated study room, tending to maximise privacy and convenience at the expense of supervision. In less privileged families, the situation was typically reversed, resulting in a less private, more communal, potentially more supervisable use of the Internet.

Parents applied *domestic rules* and regulatory practices in several ways, some of which stimulated their children to devise counter tactics of their own:

- *Restrictive practices* included restricting time spent, installing filtering software, keeping the password secret, so that the parent had to be called if the child wanted to go online, and banning (or blocking) certain activities, most commonly email and chat.

¹⁰ This can be seen as another aspect of the 'aestheticization' of life in late modernity (see Ziehe, 1994).

- *Unobtrusive monitoring* practices included positioning the PC in a public place, spot checking from time to time what the child was doing and checking 'history' (or, rarely, the cache) for sites visited.
- Far fewer parental strategies appeared to be devoted to *optimising* or improving the quality of their child's experience of the Internet. It may be that parents lack the necessary competencies and confidence. It is also however the case that most of the advice to parents given both in the media and online, is slanted towards defensive measures.¹¹

However, in many cases parents, while often meaning well, followed a policy of *benign neglect*. They showed little monitoring or engagement with their child over their Internet use, claiming a comparative lack of expertise: in practice they paid little attention to what their children did or what sites they accessed.

2.5.3 The digital divide

Perhaps the greatest concern over the relation between off and online worlds concerns the so-called digital divide. Several conclusions regarding social differences within and between households can be tentatively drawn:

- Most obviously, *financial circumstances* limited the quality of Internet access parents could provide, for it seemed that children and young people used the Internet more successfully if they had a reliable up-to-date computer and a speedy Internet connection. Most of the families we studied were at that time paying by the minute for time online, adding an additional pressure. However financial disparities are likely to continue to be important, as long as the cost of the necessary hardware and software remains high (see also Figure 1-1).
- Variation in knowing how to make the technology work and to encourage young people's 'Internet literacy' can be attributed to inequalities in '*cultural capital*'. Variation in levels of education and knowledge of parents affected their children's ability to use the Internet constructively.
- Middle-class children were also advantaged in terms of what is often termed '*social capital*' or social support (having friends and neighbours to help and advise).
- Among our small sample of families from *ethnic minorities*, we found something of a disjunction between the educational and financial circumstances in a number of these homes. In these families, particularly those with well-educated parents living in deprived areas with many social problems and poor local schools, the parents appeared particularly motivated to provide their children at home with all the support they could – including access to PCs and the Internet. A similar situation was apparent in some single-parent families.
- *Family dynamics* and family composition also affected children's Internet use in diverse ways. We saw busy, middle-class children with demanding social schedules preferring to relax mindlessly with television and simple Internet games, pitched well below their intellectual capacity; we saw isolated, lonely children valuing the Internet for its social contacts; and we saw younger siblings learning about the Internet by watching older brothers or sisters.
- Contrary to popular stereotypes, we found *few gender differences* in amount and type of use, but there were some gender differences in content interests, and teachers were inclined to believe in differences in girls' and boys' style of engagement with the Internet.
- Lastly, we noted that even children of the same gender, living in the same family, and with very similar intellectual endowments showed marked differences in their enthusiasm for new technology: *individual differences* also matter.

¹¹ Thus on the Department for Education and Employment web site (www.dfes.gov.uk) a search using the keyword 'Internet' predominantly produces sites which focus on Internet safety. On the NCA web site (www.nca.gov.uk/internet/index.html) being NetSmart is defined as 'Being aware of the potential pitfalls of the Internet'. *The Parents' Guide to the Internet* on this site outlines NetSmart rules. These focus on how to protect children from the dangers of the Internet, not on how to make the most of the opportunities it opens up for them.

3 The Internet at school

3.1 *Setting the scene*

As set out in the 1997 consultation paper, the Government's objective is to connect all schools to the Internet by 2002. By 2000, 98% of secondary schools and 86% of primary schools were already online¹². However, on average, only 60 PCs in secondary schools and 6 in primary schools were linked to the Internet, making access for individual pupils still strictly limited.

Use of the Internet, both as a source of information and a way to communicate with others, is built into the *National Curriculum* guidelines.

- At 7-11 pupils are expected to be able to use email, and talk about how they would find information on the Internet as well as in books and through talking to people.
- By 11-14, children should be able to share/exchange information using email/webpublishing and know how to evaluate a web site.
- At 14-16, pupils are to be taught the more complex skills of how to reflect critically on the impact of e-commerce and to use their initiative to exploit the potential of new sites on the Internet.

3.2 *Primary schools*

3.2.1 A cautious optimism

Most Heads and ICT coordinators reported that their fellow teachers had accepted the importance of ICT and agreed that using it was motivational for their pupils, particularly the less able. It was also seen as an invaluable resource for teaching-support materials.

Teachers were largely confident that primary school children were unlikely to come across unsuitable web sites in school time. Filtering by educational servers was thought to be effective. Use was always monitored and, perhaps naively, few young children were thought to have much interest in accessing such sites.

3.2.2 Access and provision

Government funding has been essential to kick-start the process, but there were real fears that support would not be adequate for the on-going costs of paying for telephone connections, service providers, up-dating machines and technical support. Teachers stressed that on-going lifecycle/ service costs were just as significant as initial purchase costs.

Thus equipping a school to enter the digital age was not seen as merely a matter of how much money was available to spend. Teachers felt they needed help with decisions about what to buy and software was increasingly seen as an important and problematic issue. Some were dissatisfied with the choice of available educational software but were restricted in their ability to change suppliers.

3.2.3 Enthusiastic champion

Above all, the success of ICT initiatives depended on the support of the Head teacher and on having at least one staff member who was enthusiastic and knowledgeable and who could act as a 'champion', supporting both staff and pupils as they learnt to use this new resource.

The limited time ICT coordinators in primary school had to spend on ICT and the lack of readily available additional technical support were major difficulties.

Recent surveys show a third of primary school teachers reporting that they do not 'feel confident' about teaching ICT.¹³ Teacher training schemes, such as those provided through

¹² See earlier reference to ONS statistics.

¹³ See www.dfes.gov.uk/statistics/DB/SBU/b0197/index.html

the New Opportunities Fund (NOF) were welcomed. Networking between local schools could be inspirational and could maximise the impact of knowledgeable ICT 'champions' through the sharing of expertise.

3.2.4 Variation in the classroom

Computer suites in the primary schools studied varied considerably: some had no Internet connections, in others every PC was online. Use also varied (from up to two hours a week to only occasional use). Timetabling pressures, because of the precedence accorded Literacy and Numeracy hours, were often cited as limiting potential use.

Observation showed the Internet to be a very flexible teaching resource. It was used to support 'whole class' teaching methods, as well as independent, and peer-oriented learning styles. Thus, as one would expect, teachers adapted its use to fit their needs rather than it necessarily initiating innovations.

- Good ICT coordinators in primary school made a point of introducing their pupils to key Internet skills, such as how to look for information using key word searching as well as category-based searching. Records were kept of what had been learned and pupils encouraged to assess their own progress.
- Some teachers tried to discuss how to evaluate sites. However, less skilled teachers may not always be able to do this as competently. Most agreed that with children of this age, such subjects cannot be fully explored.
- Moreover, to save time, most teachers encouraged children to use a small number of pre-selected sites, thus obviating the need for a critical approach to content.
- Web sites appealed to, and were judged by, children largely on visual criteria and their contribution to projects was often limited to the provision of pictures.
- Most primary school children were not yet interested in emailing, having an insufficient number of potential correspondents.
- Beyond the classroom, after school clubs and access during lunch times placed an additional burden on teachers, as access had to be monitored.

To conclude, the National Curriculum guidelines should perhaps attach less importance to introducing children to email at this stage, and emphasise more the importance of teaching them the basics of good searching and about the necessity of knowing how to evaluate the information they find online.¹⁴ These are of course complex and difficult issues which will need to be explored in greater depth as children get older. However, we have seen examples of best practice where teachers found no difficulty in introducing children as young as eight or nine to such issues. After school clubs have an important function, as the opportunity to explore the Internet in a relaxed informal atmosphere is likely to have particular value for those children who have no access at home.

3.3 *Access and use in secondary school*

3.3.1 Commitment from the Head

As in primary schools, committed leadership from the Head teacher seemed all important. Once again, it was clear that money to set up computer suites with Internet connections was not sufficient to guarantee good outcomes. In schools with disciplinary problems for example, the Internet posed an additional burden on already stressed (and over-stretched) staff.

3.3.2 Access and provision

Although the initial Government funding was much appreciated, there were many on-going problems and frustrations. Heads may felt they were given too little say in how moneys were

¹⁴ In any case, teachers are increasingly wary of giving children their own email addresses because of safety issues.

spent and, once again, there were concerns about on-going and future needs. Successful incorporation of ICT increases demand, and even in the best equipped schools, teachers would have liked more computers and faster connections. As the scale of use develops, so too does the call for updates leading to spiralling costs.

3.3.3 The curriculum

The goal in secondary school is to integrate ICT into the curriculum. This is more problematic than in primary school because of the number of different subject areas and teachers involved. Many teachers were already experiencing enormous pressures at work and simply did not see how they could find the time for the necessary experimentation with new techniques. The need for training was generally recognised, but the need for time and space to experiment and develop this new resource was much more rarely appreciated. Having readily available and efficient technical support was crucial. Once again the NOF initiatives were seen as helpful.

ICT was fitted into the curriculum in a variety of ways. The Internet and email had to find their place in an ICT agenda which included the use of many important software packages – usually Word, Publisher, Excel and PowerPoint. In the first few years at secondary school ICT lessons were typically once a week and often for little over half an hour. Thereafter, integration across the curriculum was more common, with ICT a specialist subject choice. Often the brevity of lessons was a real drawback, particularly for Internet use, if connections were slow with little achievable in the allotted 40-45 minutes.

3.3.4 Challenges for the classroom

Teachers were feeling their way through trial and error towards constructive use of this new resource. However, much of what we did see suggested that use usually failed to live up to much of the hype surrounding the educational potential of the Internet. Often use was hampered by slow or failing Internet connections. Even in well equipped schools we found considerable evidence of such problems. These were greeted with a surprising degree of equanimity by pupils, which suggested that they were fairly commonplace.

Moreover, most teachers were in favour of strict control of the type of educational use made of the Internet. Free searching was rarely allowed. Rather it was a question of setting up, within the school, vetted web-based learning resources and directing pupils to these. This not only saved precious time, but more or less guaranteed productive use. It did, of course, have significant implications for staff time.

In addition, pupils were encouraged to use the Internet (as an adjunct to the PC) as a presentational tool, which they enjoyed. Thus a great deal of the 'serious' use made of the Internet in school time could seem light-weight, the emphasis being not on content but on visual presentation.

Pupils associated the Internet with 'fun' use and most of the unstructured use in schools was of this type. Teachers were understandably uneasy about this aspect of Internet use and tried to make strict demarcations between use in and out of school time.

3.3.5 Encouraging signs

However, in schools where heads had been supportive, and teachers given the opportunity and time to develop web-based resources, much had already been achieved. School web sites where pupils could find reliable information and specially designed resources for self-testing had been constructed. In the most innovative schools, international projects using Internet links and communication projects using email had been established. Research is needed to assess the educational value of such initiatives, but signs are encouraging since such exercises are undoubtedly motivating for pupils.

It was however noticeable that in the more successful schools, attitudes were more tolerant, both towards when and where ICT was used and, in a sense, towards what counts as learning.

Interestingly, teachers noted the shift in emphasis from textual to iconic representation which computers and the Internet have brought. This had repercussions both for how people, including children, 'read' the computer screen and what children were taught. Where the emphasis in a paper-based written assignment was on the clarity of verbal expression, the emphasis in computer presentations was much more on the visual aspect. The challenge for

teachers was to keep a proper balance between the two. Increasingly, children were being taught in school how to present information in pleasing graphic form, which is not merely a useful skill in itself, but aids the communicative process and may even help the producer to clarify his or her argument.

3.3.6 Internet skills

Although a recognised part of the National Curriculum, basic Internet skills, such as how to search or evaluate sites, can fall between the two stools of ICT and subject teaching. ICT teachers did not often see it as in their remit to deal with such matters as the evaluation of content. Subject teachers could equally well abrogate responsibility, especially if they had already put a lot of work into preparing a data bank of educationally valuable web sites.

As a result, although teachers had ideas about the necessary basic skills, they had not articulated these into any general concept of what it means to be Net Literate. Many seemed to feel that Net Literacy would 'emerge' provided people were given enough hands-on experience. The apparent ease with which young people took to the computing environment was also sometimes taken as a sign that there was little need for formal instruction.

Given the amount of ground to be covered in a limited time, in most schools there was little emphasis on teaching keyboard skills (surprisingly, in view of the attention paid to repetitive strain injuries in the work place). Although some schools had included a few lessons on keyboard skills or intended to do so, none in our small sample had been entirely successful. Attempts typically seemed to have taken place well after bad keyboard habits had already been established.

3.4 Future uses

3.4.1 A concern for practicalities

Even the most innovative teachers cautioned against hype about the future use of the Internet in education, and even the most apparently successful were still feeling their way. There were considered to be certain proven advantages – the motivational potential of ICT for example. However, if more is to be expected, teachers must be given the time and resources necessary to explore and develop the potential of the new technologies.

Head teachers and class teachers spoke from different perspectives and had different interests. Some head teachers foresaw the Internet as likely to have profound effects on the way educational institutions are run in the future. They envisaged computers in a central role in the classroom and teachers acting as support, rather than the other way around. Classroom teachers on the other hand were often more doubtful: they stressed, for example, that evaluation of individuals' online work is not feasible at present.

Many teachers reported that the Internet was increasingly becoming the primary source for project work. This was viewed as a cause for concern if it superseded other forms of research, such as use of the library. Children need to be able to evaluate and collate information from a variety of sources not just one, as noted in the National Curriculum guidelines, and particularly one where little critical appraisal of the reliability of content (i.e. *provenance*) exists.

3.4.2 The home/school link

The Internet (and email) may have great potential for bridging the school-home divide. However, the full potential of the Internet for fostering home-school links remains largely untapped. Sometimes teachers felt that they could not take home access for granted, nor make routine use of the opportunities it would provide. Even schools with good ICT facilities did not always have their own web site. Those that did sometimes made restricted use of its possibilities. If pupils contributed, it was usually to showcase examples of work for the benefit of interested adults and, possibly, prospective parents.

In our admittedly small sample we found school web sites were comparatively rarely used to further on-going projects or to communicate regularly between home and school. Designing online lessons/ homework exercises for pupils to work on at home takes time and expertise which many subject teachers lack.

Schools in the forefront of ICT development said that email- and Internet-based links between home and school were difficult to set up. There was as yet no established social culture to support such initiatives. Thus, for example, parents with email access often failed to take up the offer of being sent weekly newsletters etc via email. The French teacher in one school had found that once the novelty value wore off, pupils had little enthusiasm for emailing homework. This may be seen as invading their space at home with school-related demands. For further discussion of these issues in a specific trial context see Tracey et al (1999).

3.4.3 A supportive community

The Heads in both of the schools where ICT initiatives had proved most successful made the point that the process of adoption must have its roots in the community of users. Neither of them believed initiatives were likely to prosper if they were introduced as a top-down process, relying on government intervention. This emphasis on the bottom-up approach was mirrored at the level of the individual lesson in the preference for 'half-baked' software, which allows the teacher to put in his or her own material and change it as need dictates rather than have to make do with material not specifically tailored to the needs of particular classes.

4 Conclusions

4.1 Barriers and gateways

From the foregoing discussion, we can identify a series of requirements, each encountered in turn as part of the temporal narrative of 'going online', which must be met at least to some degree if young people are to have a fair chance at making an effective and empowering use of the Internet at home and school. The absence of each requirement constitutes a barrier, its presence opens a gateway.

- *Household finances* matter considerably at several points: in affording the initial outlay of hardware and software, in having space in the home to locate the computer conveniently and disposable time to guide children in its use, in affording un-metered access to the Internet without worrying overly much and in affording the continued maintenance and upgrading of ICT facilities at home. Household income, in short, remains a major source of inequality between households, and is not simply a matter of access but also of meeting the conditions for continued use.
- As long-standing conceptions of social class break down in the UK, with income and education having independent effects, comparative advantages, elusive as they may be to characterise, are experienced in those households where *parents are more educated*, more comfortable in the world of high culture and elite activities.

Middle class, or more educated, or more professional parents are passing on a range of advantages to their children. They are able to go beyond the generalised 'support' for their children's education to which all strata of society are committed to provide knowledge, informed guidance, alternative reference sources, and so forth. As these parents are themselves more often expert in the use of ICT, while their children lose the advantage of being 'family experts', they may nonetheless stand to gain more by having informed and confident parents.

- We also note the very considerable reliance that many families place on varieties of *community support*. This may take the form of a community project to make ICT available or a local school opening its computer centre to parents on Saturdays. But, important for many families, it also includes the neighbour who pops round to deal with a computer crash or who will take the time to show you how to send an email, the friend who knows which software one should buy or whether it is worth investing in a scanner, the friendship group who swap CD-Roms to maximise software at minimum expense, not to mention useful URLs or surfing tips, and so on. Crucially, those without a supportive social or community network are often undermined in their use of the Internet at home.¹⁵
- Parents' attitudes may be a barrier if they fail to appreciate their children's perspective. Much discussion of the potential of the Internet is framed by *adult conceptions of value*, neglecting the possibility that children and young people may, also with validity, see things differently. It is thus important to recognise that while young people's use of the Internet is often not outcome-centred or product-oriented, they are not necessarily simply wasting time; the process of engaging with online content and communication can be useful and it is often fun.
- Both at home and at school (for at least some of the time), a relaxed and flexible *informal learning environment* can be hugely beneficial. The big unknown, however, on which neither parents and teachers on the one hand, nor research and policy on the other, are able yet to enlighten us, is whether in fact significant learning is taking place and thus whether the scale of public investment is justified.

4.2 Internet literacy

How, then, should we characterise young people's competence with the Internet? What indeed are we, as a society, hoping to achieve in relation to young people's use of the Internet? We

¹⁵ See Tracey et al (1999)

here outline four dimensions of what can be termed 'Internet literacy' in order to characterise the knowledge and skills being gained by, or expected of, young people as they become experienced with the Internet.

- *Analytical Competence* requires an understanding the formal qualities of the Internet - recognising how web sites are constructed (e.g. the home page, non-linear hypertext links, narrative pages versus informational pages, the appeal to niche interest groups) as well as a knowledge of Internet/Web symbolic codes and the ability to search productively and interpret the effect of page design on a perceived web audience.
- *Contextual Knowledge* requires an awareness of the broader social, cultural, economic and historical contexts in which Internet information is produced and consumed, including the recognition that information from search engines and web sites is not necessarily neutral, but may be biased or developed from one particular cultural, commercial or political perspective.
- *Canonical Knowledge* requires a knowledge of 'classic' web sites and an understanding of why they may be considered to be important or useful – e.g. BBC (www.bbc.co.uk), CNN (www.cnn.com), Houses of Parliament (www.parliament.uk), Yahoo (www.yahoo.com), Lycos (www.lycos.com), Ten Downing Street (www.number-10.gov.uk). Clearly, the nature of canonical sites is constantly shifting.
- *Production Competence* requires the ability to produce Internet media as well as consume it, make sense of it and use it to enhance enjoyment. This includes various levels of production - from the creation of web pages, to participating in mailing lists and chat groups, and the use of email. Production competence may also include the ability to reflect and explore the user's own identity through the media.

From our observations of actual use of the Internet, it seems that there are considerable discrepancies between what children claim to know and what they can actually do in the domain of 'analytic competence'. Adults should beware of assuming that children only know what they can articulate, but also of assuming that children can do what they describe themselves as being able to do.

Further, the Internet literacy of most children and young people at present simply does not extend to cover 'contextual knowledge' (or 'critical evaluation'), their 'canonical knowledge' is narrowly delimited, and their skills include 'production competence' only in certain specific domains. Children cannot be expected to acquire these skills without adult guidance.

4.3 The way forward

To contemplate the way forward, we must shift from rich description and analysis to offer a more evaluative account of what might be done to develop these emerging norms or ideals of Internet use. Such development will be taken forward by a variety of different agents – parents, schools, designers and producers of Internet content, government, etc – all of whom may foster Internet literacy among young people for different reasons.

Thus we end by asking how can these different agents contribute? Doubtless, many of the activities identified for the various agents below are indeed already being pursued. But on the basis of our observations, these seemed worth stressing further.

4.3.1 Parents

While 'letting them get on with it' generally supports an atmosphere of exploration, there are some specific things which many parents could do further. These might include:

- customising the computer environment for the younger child in particular (for example by setting up the computer to accept multiple users) so that the child uses his/her own password to access his/her own individual settings (including a preferred homepage, email account, bookmarked 'favourite' sites, screensaver and desktop etc.)
- ensuring that appropriate filtering software has been installed and that children know the rules of Internet safety
- guiding them in the use of the Favourites or Bookmarking options

- demonstrating how to download collections of content/web pages so as to be able to access them at greater convenience offline
- learning and reinforcing a basic technical language for discussing computers and the Internet in order to be able to benefit from Help facilities and to explain such difficulties as they are experiencing
- occasionally joining in, sharing or talking to their children about their Internet use (rather than assuming that as a parent one has little to contribute)
- encouraging enjoyable, relaxed, independent use of the Internet
- avoiding passing on parental myths or misconceptions regarding the Internet (e.g. concerning the supposed workings of the computer or the dangers of downloading, viruses and, even, stranger danger)
- providing a context for informal learning through watching more skilled family members
- as informal learning becomes more significant, ensuring children have alternative sources of information (e.g. an encyclopaedia) rather than assume that the Internet suffices.

4.3.2 Schools

The brief for teachers is already laid out in the DfEE's National Curriculum Guidelines for Information Technology. Nonetheless, we propose some additions as follows:

- address the fact that, whatever one may plan for, children are arriving at secondary school without all the ICT skills expected at Key Stage 2
- don't underestimate or despise the teaching at secondary school level of such apparently mundane technical skills as searching
- give greater prominence to the evaluation of web site material and decide in the context of which lessons such issues are most fittingly addressed
- given that information available on the Web is fallible, lay more stress on teaching pupils to check information across multiple sources and different media
- teach children keyboard skills or, at a minimum, point children and parents in the direction of computer-based typing programmes and reinforce such activity (although some of the older children we met could type reasonably fast, none had adequate keyboard skills)
- address the health and safety issues related to computer use (many children sit badly, type awkwardly, know little of RSI, etc)
- where practicable, encourage the non-judgmental, flexible and entertaining use of Internet and email in lunch hours, after school, etc.
- provide guidance for pupils when they go home (leaving the 'safe' environment of the school) in relation to safety and pornography
- develop community initiatives further (opening school ICT facilities to parents is well-intentioned but not yet fully effective, and could perhaps include some technical support and training for parents) with associated support for the costs of doing so
- develop more explicit policy on the home-school link and inform parents of the school's expectations. After all, parents invest in PCs and Internet connections because they believe in their educational potential and they have a right to be informed and involved.

4.3.3 Legal and Regulatory frameworks

Given the difficulties of regulating the Internet nationally, or globally, and given the complex issues of censorship, some organisations advocate policies of *parental responsibility* rather than sole reliance on a legal framework.¹⁶ Our research suggests that, in view of the levels of

¹⁶ See Childnet International (www.childnet-int.org); Internet Watch Foundation (www.iwf.org.uk); Center for Media Education (cme.org/children/); NCH Action for Children (www.nchafc.org.uk/internet/).

uncertainty and ignorance that parents claim for themselves, this approach may not be practical at this point in time.

In addition the debate over the regulation of young people's use of the Internet, and thus its media portrayal, is overwhelmingly oriented towards the avoidance of harm. After observing young people's Internet use, a conclusion of this report is that far more effort could be put into *positive regulation* to enable and encourage positive uses, and that particular efforts are required for those currently on 'the wrong side' of the digital divide.

4.4 Recommendations for Action

In this report we have observed and interviewed in depth a variety of children and their parents, in order to understand their experience of the Internet at this relatively early stage in its diffusion throughout UK households and schools.

In looking to the future, we end by noting that current nature of Internet use in the home leads us to identify three areas in which further developments are needed.

4.4.1 Action to control or regulate content

Parents are strongly in favour of public initiatives to regulate and control Internet content. They wish to have their own interests as consumers protected, and most lack the necessary expertise to safeguard their children from dubious material. At present, children's use of the Internet is fairly haphazard, directed by their interest in entertainment, need to complete homework, and fandom for various entertainment topics. In their pursuit of these interests, they receive comparatively little guidance or monitoring from parents, for often children are more knowledgeable than their parents about the Internet. Parents tend to gloss their inability or lack of commitment to regulating Internet access by either using crude blocking techniques (e.g. banning chat/email) and/or informal monitoring (locating the PC in the living room) or by expressing faith in the good sense of their child. As a result, many children have, inadvertently and/or deliberately, accessed pornographic and other 'undesirable' sites, although it has to be said that most expressed a lack of concern about it.

Most public initiatives, however, still rely on parents shouldering the major responsibility for controlling their children's access to the Internet. Thus in May 2001 Jack Straw announced a new kitemark scheme which will provide parents with clear and independent advice about what they can expect from different ISPs. Star ratings will show which ISPs provide software which will make it easy for parents to block unsuitable chat rooms and web sites, and conversely which sites provide easy access to areas of the web where child pornography can be found. The Government also proposes to challenge all companies selling PCs to families to preinstall child safety software. They are also working with the industry to develop a guidance pack on safe Internet use which can be distributed with every computer sold.

However our research suggests a consensus amongst parents that the provision of 'kitemarks' and rating systems, although desirable, are insufficient. They believe that there should be legal requirements for ISPs to safeguard users, particularly children, and this is driven by parents' own admissions about their current lack of knowledge about appropriate and effective monitoring techniques.¹⁷

On the other hand abdication of responsibility by parents is also not considered a viable option. Given their own current lack of knowledge it seems obvious that providing parents with appropriate knowledge of the kind mentioned must go hand in hand with policy or regulatory developments.

¹⁷ Children's charities are combining to offer advice to parents and to set guidelines for government, ISPs, retailers and hardware manufacturers and software houses. In particular the NCH Children's Charities for Internet Safety (see www.net-consumers.org/connected.htm) recommends that ISPs should be required to: prominently advertise the availability of child-friendly search engines and should have good signposting to any areas specially designed for children: establish and promote "walled garden" services specially for legal minors: bar all access to telephone lines that have blocked Caller Line Identification. There are also specific recommendations for the regulation and control of chat rooms.

4.4.2 Action to promote universal access

In Europe, most countries are dealing with socio-economic inequalities in ICT access through education policies, thus raising the challenge of the relation between provision at home and at school.¹⁸ Undoubtedly, British schools have led the way in compensating for inequalities in domestic access to computers and the Internet.¹⁹ However, the frequency of computer use in school remains relatively low at around once or twice a week. It seems unlikely, therefore, that access to the Internet in school will ever compensate those who are without access at home for the unstructured leisure time use which allows for learning through exploration. Moreover, as access to the Internet spreads throughout all sectors of society, it must not be assumed that having a PC/modem at home eliminates the 'digital divide'. Rather, inequalities in access will continue, for maintaining and upgrading Internet access to keep up with developments and ensure adequate quality of use is resource-intensive, in terms of money, space, time and know-how. The more Internet access at home comes to be taken for granted by society (whether through education policy, access to commercial products, community participation, etc) the more inadequate levels of access will serve to exclude some children and their families. The issue of unequal access at home needs to be addressed, especially as the government is committed to a policy of lifelong learning. More attention needs to be directed to policies which will encourage the growth of home-ownership of PCs, upgrading/maintenance and links with educational institutions.

4.4.3 Action to promote informed use

Access of course, is not enough. Having access does not necessarily lead to informed use and we have outlined some of the reasons for this above. We need action to promote the skills and competencies of children (and their parents and teachers)

While children are generally able to locate sites of interest to them, their use of the Internet tends to remain within narrowly drawn parameters, visiting a few favourite sites, repeating tried-and-tested search strategies, etc. Branching out to discover new sites is more rare, as is any creative use of the Internet (beyond teenagers' extensive use of email, instant message and chat for communication with peers). Also significantly, we find few children with a sufficiently critical awareness of the Internet for them to grasp how and why sites are available, to distinguish public from commercial purposes, or to determine creative or challenging opportunities. In the report we offer a broad definition of Internet literacy, and in fostering this among children much work is still needed. Thus we would argue that while the regulation of content and use will remain of concern, at least as much if not more attention should now be given to maximising the positive opportunities the Internet offers to children.

Clearly many organisations are actively engaged in promoting and supporting children's use of the Internet, including Government, schools, industry, children's organisations, libraries, and so forth. Together it is hoped that these three areas of action will be successfully developed in order to ensure that children and young people make the best use of the Internet, transforming it from a new and unfamiliar technology to which they have access, into a meaningful and valued part of their everyday lives.

¹⁸ See Süß (2001)

¹⁹ See Livingstone and Bovill (1999); Süß, (2001).

5 Bibliography

- Lacohee, H., and Anderson, B., (2001) 'Interacting With The Telephone' in Kraut, R and Monk, A. (2001) (Eds.) *Special Issue of the International Journal of Human-Computer Studies on 'Home Use of Information and Communications Technology'*. Volume **54**, Number 5, May 2001, pp 665-699.
- Anderson, B., McWilliam, A., Lacohee, H., Clucas, E. and Gershuny, J. (1999) Family life in the digital home - domestic telecommunications at the end of the 20th century. *BT Technology Journal* Vol **17** No 1. p 85-97.
- Family Expenditure Survey (www.statistics.gov.uk/pdffdir/Internet0700.pdf).
- Livingstone, S. (1998). *Making Sense of Television: The Psychology of Audience Interpretation*. (Second ed.). London: Routledge.
- Livingstone, S., & Bovill, M. (1999). *Young people, new media: Final report of the project, 'Children, young people and the changing media environment'*. London: London School of Economics. See http://www.psych.lse.ac.uk/young_people.
- Livingstone, S., and Bovill, M (2001). (Eds.) *Children and Their Changing Media Environment: A European Comparative Study*. Lawrence Erlbaum Associates, Mahway, New Jersey and London.
- MacKenzie, D, & Wajcman, J. (Eds.). (1999). *The Social Shaping of Technology* (Second ed.). Buckingham: Open University Press.
- Süss, D. (2001). Computers and the Internet in School: Closing the Knowledge Gap? In S. Livingstone & M. Bovill (Eds.), *Children and Their Changing Media Environment: A European Comparative Study* (pp. 221-242). Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Tracey, K., Fowler, C.J.H. and Penn, C. (1999) Developing an infrastructure to support communities of learning. In *BT Technol Journal*, Vol. 17, No 1, pp. 98-110
- Ziehe, T. (1994). From living standard to life style. *Young: Nordic Journal of Youth Research*, 2(2), 2-16.