Harnessing Technology: The Learner and their Context

Increasingly autonomous: learners using technology in the context of their family lives and beyond

Analysis of a series of case studies conducted with learners in their homes

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Summary findings and recommendations

This report presents findings from the second phase of data gathering during the initial year of the Learner and their Context research project being carried out at the Oxford University Department of Education in association with Becta.

The aim of the Learner and their Context research is to gain up-to-date understandings about how a wide range of learners experience new technologies in their lives outside formal education, and the learning made possible by those experiences. The research is being conducted in support of the Government's Harnessing Technology strategy.

This second phase of data gathering consisted of case studies in their homes of learners aged from 8 to over 18. The case studies focus on what learners actually do when using technologies in their homes, and on how those learners and their parents (in the case of school-age learners) feel about the benefits for learning resulting from those uses.

The findings of the case studies provide rich and diverse examples of how many of the Harnessing Technology outcomes that relate to engaging and empowering learners and delivering improved personalised learning experiences are being realised in a range of learners' own contexts.

Engaged and empowered learners

Despite a number of concerns raised by some parents about the dangers of time-wasting activities using technologies, and about risks when online, these case studies show learners across the age range, in a wide range of family and personal settings, who are for the most part capable and positive technology users, and who are generally adept at integrating a range of learning activities into their wider technology activities.

Learner entitlement is met with all vulnerable groups supported

This phase of the research focused on the behaviours of mainstream learners and did not seek to engage with members of vulnerable groups. The learners we studied generally have good levels of access. We were struck by the accumulation of technologies in many homes, and by the problems many families face in providing suitable conditions for their use.

Technology adds value to family and informal learning

We encountered many cases where the presence of technology appears to add value to family and informal learning. The family context proved to be very influential on the ways learners use technologies, both in terms of how parents make

technology available and through parents maintaining a close involvement in their children's work. A number of parents told us that they are keen to have greater information about their children's progress and work assignments through the school's virtual learning environment (VLE).

Learners use technology confidently and safely to support their learning

Parents expressed a number of anxieties about using technology in the home, which fall into three categories; these are concerns about:

- safety when online
- what they perceive as their children's lack of discrimination when using Internet information-seeking resources
- children spending too much time in front of a computer screen.

As a result of these concerns, some parents choose to spend time alongside their children when using computers, and attempt to restrict the amount of time their children spend in front of a computer screen.

Improved personalised learning experiences

Many learners are developing a range of personalised learning practices. Learners generally tend to develop these practices on their own initiative – parents are often unaware of the effective methods their children have developed for organising their work and other aspects of their lives and interests.

Learners able to exercise choice among flexible learning options

Because of the opportunity and freedom to use technology in the home that many learners experience, some have developed their own personalised means of managing their learning – storing and transferring files, keeping track of work, transferring work from home to school or vice versa – and gain satisfaction from keeping things in order. A small number of students are beginning to make regular use of their school's VLE for these purposes.

Other learners prefer to use less highly ordered approaches, in more dynamic ways that suit a multi-tasking approach to their work and interests, often moving rapidly between a range of software and web applications, gaining satisfaction and, on occasion, access to useful learning tools in the process.

Engaging learning experiences which support deep and higher order learning

While nearly every case study learner appears to gain some degree of benefit from using technology to support his or her learning, only a fairly small number can be confidently described as engaging in learning experiences that support deep and

higher order learning. Those who do so tend to make little distinction between uses of technology for recreation, social and work purposes. There is some evidence that such students chose directions for their academic study in higher education that make strong use of technology, such as photography, journalism and music technology.

Recommendations

The key recommendations from this stage of the research concern parents and those looking after learners, more than anyone else. Some of these findings inevitably also have implications for those working in schools, further education and universities, as well as for potential employers. The recommendations are:

- Parents need to be supported with advice and practical suggestions designed to help children use technologies in environments that are ergonomically favourable for continued use of computers with keyboards, screens, cables and so on.
- Schools should ensure that the benefits and usability of their VLEs are explained and promoted strongly both to parents and learners, and that teachers are given sufficient time and support to ensure confidence in this crucial means of helping learners in their own contexts.
- Ways should be explored of informing parents – such as through schools' VLEs – about the benefits for their children in using technologies for learning in the home, so that parents can support and encourage positive behaviours to as great an extent as they try to prevent negative behaviours.
- Thought should be given to providing appropriate software for supporting learners in managing their studies and other related interests in creative and flexible ways. This could involve developments within VLEs, exploration of existing open source applications on the Internet, or purpose-made software.
- Further and higher education institutions should explore ways of responding to the increasing technological sophistication of the next generation of learners. Institutions should provide sufficient connectivity and support during learners' studies, and should review the content of courses to ensure that these are developing to meet the needs both of the workplace and future learners.

Introduction

This report presents findings from the second phase of data gathering during the initial year of the Learner and their Context research project being carried out at the Oxford University Department of Education in association with Becta.

The aim of the Learner and their Context research is to gain up-to-date understandings about how a wide range of learners experience new technologies in their lives outside formal education, and the learning made possible by those experiences. The research is being conducted in support of the Government's Harnessing Technology strategy.

During the first phase of data gathering, we interviewed, mostly in their schools or colleges, young people who have some degree of access to technologies away from formal education.[1] This second phase of data gathering consisted of a number of case studies of learners in their homes. Learners came from primary and secondary schools, further education and higher education. The sample of learners was selected – mainly from the group of over 100 young people interviewed in their places of learning for the first phase of data gathering – to provide a good spread of ages, genders and levels of technology interest. We chose some additional cases to maintain the desired range of learners. (Details of the distribution and numbers of learners interviewed are provided in Appendix A.) All learners interviewed came from the Reading and Oxford areas.

The aim in this first year of the research has been to explore the experiences of learners who do, to some extent, use technologies in their lives; therefore this sample was not intended to be fully representative of the full population of UK learners. Neither does this sample cover the full spectrum of socio-economic status: the work was conducted in the relatively prosperous south-east of England, and also received a proportionately poor response rate from families with low socio-economic status. Nonetheless, the young people we spoke to came from a wide range of homes and social situations, and belong within the 80 per cent or more of the population of learners who live in Internet-connected homes.

In practical terms, the aim of the case studies was two-fold: first, we wanted to see how learners work with technology in their homes, and gain insight into their thinking about what they do; secondly, we wanted to locate our observations of the learners within the wider context of the family and the home by talking to at least one of the adults who looks after each young person (except in the case of the further education (FE) and higher education (HE) students, who were the sole respondents for their cases). Thus many of these case studies concern, above all, learners within

[1] Phase 1 report: Becta (2009) *The Learner and their Context. Report of Phase 1 of the qualitative data gathering: Interviews with learners*

the family context – the parental dimension adds depth and richness to our understanding of the learners' technology-related activities and attitudes.

In the course of data analysis, we identified a number of common themes (see Appendix B for detailed illustration) that reflect issues that appear to be of some importance across many households, although in slightly different ways from family to family. These themes divide into two broad sections: the first relates to how parents and the wider family shape and influence learners' uses of technology; the second focuses on how learners develop their own personalised, independent technology-related behaviours.

1. Family context of learners' technology uses:

    i. Impact on learners of family beliefs and values

    ii. Children's access to technology

    iii. Concerns about safe and effective uses of the Internet

    iv. Extent and nature of parental engagement in children's uses of technologies for learning.

2. Learners' technology-related practices:

    i. Self-directing and self-organising behaviours

    ii. Innovative and/or intensive users

    iii. Formation of future learning careers through personalised home technology activities.

We developed 15 full-length case studies from the case study interviews; these are presented in the case study document.[2] Each case study is discussed in relation to one main theme, with references to other sub-themes as relevant. The themes map closely onto the Harnessing Technology outcomes that are most relevant to the focus of the Learner and their Context project; each case study is also tagged with the relevant Harnessing Technology outcome, as follows (each of the analytic themes, numbered as above, is given in brackets):

[2] Davies, Good and Cranmer (2009). *Harnessing Technology: The Learner and their Context – Increasingly autonomous: learners using technology in the context of their family lives and beyond. 14 Individual Case Studies*

Harnessing Technology outcomes:

- Engaged and empowered learners:
  - Learner entitlement is met with all vulnerable groups supported (1ii)
  - Technology adds value to family and informal learning (1i, 1iv)
  - Learners use technology confidently and safely to support their learning (1i, 1iii, 1iv)
- Improved personalised learning experiences:
  - Learners able to exercise choice among flexible learning options (2i, 2ii)
  - Engaging learning experiences which support deep and higher order learning (2ii, 2iii).

The next section of this report presents an overview of the case studies in relation to these Harnessing Technology outcomes. This is followed by conclusions and recommendations.

Discussion of case study findings in relation to Harnessing Technology outcomes

Engaged and empowered learners

The families who generously allowed us to visit their homes to conduct case study interviews and observations form a self-selecting group of people interested in how technologies in the home affect the learning that takes place there. These case studies predominantly concern learners who actively use technologies in their homes for a variety of purposes, including learning, and who broadly belong in the category of engaged and empowered learners. (This stage of the research did not attempt to engage with the important question of what goes on in households where no technologies are available.) We do not claim that this case study research is representative or generalisable: our aim was to capture the unique character of each engaged and empowered learner to learn something of the diverse ways in which families engage with technologies in their homes, and the ways in which a family's particular beliefs and practices may have an impact on learners.

When talking to learners in their homes, we tended to hear about technology within the learner's own context; the key points of reference were generally family members and the primary home. It was, though, evident that each home that we visited did not necessarily represent the full scope of a learner's technology world: a number of young people have one parent living elsewhere, often providing a significant additional dimension to their technology experiences, and of course older learners may have partially or completely moved out to go to college or university. In addition to the second home that many learners spend time in, the learner's technology world away from school may also include the home of a close friend, the homes of relatives (cousins are frequently referred to by learners as sources of new knowledge or expertise), a specialist club (such as the Air Cadets), a church community and, increasingly important as learners move through secondary school and beyond, an online community. Each of these contexts potentially influences how learners think about and use technologies in their lives.

The evidence of these case studies suggests, though, that the determining factor in how these learners shaped their own uses of technology out of all these influences was how parents support, regulate and attempt to steer their child's technology uses. Each family's engagement with technologies reflects core family values and is marked by shared achievements and sometimes crises that shape the family's technology narrative. Although the range of issues confronted within families is fairly consistent across households – coping with the costs of equipment, deciding where to place it, learning how to make it work, trying to ensure that it enhances rather than hinders learning, balancing aspirations about long-term benefits with anxieties about

present dangers, setting boundaries regarding its use – the ways in which these are confronted and resolved vary considerably from home to home.

The parents that we spoke to expressed different perspectives on whether, in their dealings with their children, to embrace technology or hold it at bay. However, in the cases that we visited, no parents decided to withhold technology completely, although one parent did use a buzzer to signal to her 9- and 12-year-old daughters to stop after 30 minutes on the computer (Case 6: TU).[3] In all the homes that we visited, parents had made a clear commitment to provide technology resources for their children, to use for their learning, and there was consistent evidence in all homes that learners are taking advantage of these opportunities.

Learner entitlement is met with all vulnerable groups supported

This first year of our research deals primarily with mainstream learners; therefore at this stage we are not attempting to assess the situation of vulnerable groups. However, the issue of access to technology, in terms of hardware and opportunity – a key aspect of learner entitlement – did arise in our case studies.

One factor that was common across all our case studies was the extent to which parents allow their children to have sufficient and free access to technology (theme 1ii). Unsurprisingly (given the relatively prosperous population that we were drawing from), the learners that we spoke to all have fair to good access to computers and the Internet, often with more than one machine to choose from; some learners such as Natalie, a Year 5 student, and Gareth, an HE student, benefit from quite sophisticated home networks, set up by parents who work in the field of technology.

Case 4 (YU) provides an example of a Year 5 learner, Yadav, who is developing strong computer skills (for his age) – learning, for instance, how to make PowerPoint animations for which he writes his own stories, and for which he was, on one occasion, allowed a whole day's access to the computer. Yadav's parents also support his uses of the Internet for searching, at which they think he is making very good progress. As quite heavy users of the Internet, and as relatively liberal parents compared with many with whom we spoke, Yadav's parents are confident in the necessity of allowing him such free access.

Access frequently involves quite complicated arrangements within houses that often do not possess convenient spaces for machines. For example, Elliott (Case 9: EM) likes to work with two linked screens at one time, but the only convenient space in his house is at the end of a landing between two bedroom doors. The main computer

[3] Case studies identified in brackets can be found in full in Davies, Good and Cranmer (2009). *Harnessing Technology: The Learner and their Context – Increasingly autonomous: learners using technology in the context of their family lives and beyond. 14 Individual Case Studies*

in Callum's house (Case 7: CE) is kept on the dining-room table and has to be removed when guests come. A number of learners such as Callum and Tasha prefer to work with a laptop on their knees while sitting on a soft chair or sofa.

These makeshift arrangements reflect the fact that houses and the furniture in them are not designed to accommodate the often large and often multiple pieces of hardware that are now common: big desktop machines, large old monitors, printers, servers, games machines and, of course, endless cables, which all create their own problems. The inconvenience undoubtedly caused within many homes demonstrates how far families will go to support their children's learning opportunities.

Technology adds value to family and informal learning

The notion of technology adding value to family and informal learning is central to these case studies, and is one aspect of the considerable diversity between families. The case studies show that in some cases technology is a highly significant factor in enabling and stimulating learning – both formal and informal – within the family. We also identified a number of ways in which technology has become a source of tension and negative experiences, both for learners and their parents. The ways in which parents and children negotiate the house rules for using technology potentially has a big impact on how children use these resources for their learning. Some parents fear they are being too liberal, while others wonder whether they are being too strict.

We have classified the two main themes to emerge from our analysis in relation to parental impact, under the overall theme of family context of learners' technology uses, as:

i. Impact on learners of family beliefs and values

iv. Extent and nature of parental engagement in children's uses of technologies for learning.

There is of course some degree of overlap between these two, but the different emphasis is important. In some cases, such as Case 1 (CO), family beliefs and values – the conviction that technology was crucial for the children's future success in the world – influenced the decision to make technology available to the four children of the family. This belief in the importance of using technology for learning in the home did not appear to result in actual engagement between parents and children in learning activities around that technology. The father set a strong standard of the importance of learning but tended to leave it to the children to put this into action; as a result, the children sometimes engaged, unknown to him, in activities that he strongly disapproved of, such as game playing.

In other cases, the family values dictate virtually everything the learner does with technology. This is most vividly the case with Francesca (Case 3: FR), who is actively committed to the strong Christian values of her parents, and who appears to have decided to adhere to her parents' preferred practices. This was similarly the case with Emma (Case 2: ED). In both cases, it appears that family values and beliefs about how to behave in all aspects of life are articulated and shared to an unusually high extent, and are reinforced within the local church communities. The learners appear to embrace their family's values to the extent that there is no evidence of conflict over how they use computers and, in particular, the Internet. Inevitably, Francesca and Emma do not share the broader popular culture of their peers, for good or ill, although this was not something they complained about. Emma, for instance, remarked on how little she knows about the music that other people of her age listen to, and neither Francesca nor Emma watches television regularly, except through occasional family use of BBC iPlayer. Emma does use Facebook quite regularly to keep in touch with friends in other countries, especially those from her religious community. Francesca, on the other hand, is keen not to waste her time on the Internet: her social networking is limited to participating in a religious discussion forum, and she plays computer games only in school, at the end of lessons if the opportunity arises. In their own distinct ways, neither of these children conforms to popular stereotypes of digital natives, although they are at ease with more or less the same range of applications as other young people.

Tasha's experience of the highly regulated family is markedly different (Case 6: TU) because it is not based so clearly on an explicit and frequently articulated set of values. Tasha's mother – the dominant figure in regulating Tasha's activities – appears to consistently articulate and enforce a cautious engagement with technology, resulting in Tasha and her older sister being allowed only a very strictly limited amount of time (30 minutes) per day on the computer. This limitation reflects a view of education expressed by many parents, in which books are viewed as more authentic sources of learning than what is available from modern technology. (On the other hand, Nathan's mother expressed the opinion that the Internet is an excellent source of knowledge in homes where there are not many books.) It is worth noting that both Tasha's parents use computers regularly for their work but are sceptical about the value of technology for learning. Tasha, as far as we can tell, is not particularly discouraged by this viewpoint and continues to enjoy her time on the Internet, visiting Club Penguin and enjoying finding new things out. Nonetheless, the fact that a buzzer rings when her 30 minutes are up may begin to colour her uses of the computer in ways that would be interesting to observe in the longer term.

Tasha's parents, like those of Francesca and Emma, mainly engage in their child's learning by setting and enforcing general standards of behaviour. On occasions, Tasha's mother sits alongside her daughter while she makes Internet searches.

Callum's mother (Case 7: CE), on the other hand, demonstrates well how a parent can engage in a child's learning. She is strongly involved in the learning of both her children in a variety of ways: keeping in touch with her older son during his first term at university via Skype, and providing him with moral support and encouragement (and keeping the whole family in touch); working closely with Callum on his projects, sometimes encouraging him to read books instead of depending solely on Internet sources; nagging Callum (by her own admission) to spend less time playing games and more time on school work; taking an interest in Callum's uses of music software, to the extent that she began to recognise that this might provide his future direction of study and perhaps employment; and monitoring, as far as possible, Callum's progress and work requirements over the school's VLE. Callum's mother has ensured from the start of the family's engagement with technology that computers are always placed where their use can be viewed easily; in addition, as a single parent, she thinks she has a major responsibility to participate actively in her children's learning.

Callum co-operates with his mother and appears to recognise and appreciate the commitment to his own development that his mother's interest demonstrates. At the same time, Callum appears to very skilfully organise a range of online activities, at which he is generally competent; activities include a great deal of interactive games play. (Callum demonstrates self-directing and self-organising behaviours, discussed below with respect to the Harnessing Technology 'personalised learning experiences' outcome.) In Callum's household, the computer constitutes the nexus of a wide range of core family activities; it both represents a potential danger in the eyes of Callum's mother (in terms of distraction and risk) and a powerful learning medium. Callum's mother recognised that if she could not stop him, then she should join him in what he does with technology. As a result, they successfully co-constructed a wide range of learning activities that might not otherwise have occurred; these activities do not appear to hinder Callum's more independent technology-based activities.

Colin's parents (Case 8: CL), like Callum's mother, also combine a clear set of values and beliefs about computer usage with an active engagement in their child's learning. Colin is somewhat younger than Callum, and therefore does not appear to be actively carving out an independent path of computer use. His parents are less ambivalent than Callum's mother about technology: they see it as crucial to Colin's future success, and they are comfortable about working with him to help develop appropriate skills and talents, including doing creative activities. Colin's father initiates activities regularly with him, such as designing a simple website to display his online Lego creations, and encouraging him to explore a range of applications, including Excel. Colin's parents are also keen to ensure that he maintains a sensible balance between his technology usage and other activities, prioritising school work when on the computer, and not spending excessive time in front of the screen.

Learners use technology confidently and safely to support their learning

To an extent, virtually all parents expressed concerns about issues of safe and effective uses of the computer. Callum's mother (see previous section) has clearly been driven to some extent to involve herself more than she expected in her son's online activities, partly in order to monitor and guard against any dangers that her son, whom she considered more careless and naïve than perhaps was the case, might stumble upon. Issues of safe and effective use came up therefore in relation to all of the themes around the family context of learning that emerged from our data analysis:

i. Impact on learners of family beliefs and values

ii. Children's access to technology

iii. Parental concerns about safe and effective uses of Internet

iv. Extent and nature of parental engagement in children's uses of technologies for learning.

Values such as religious beliefs, negative feelings about the modern world, and anxieties arising from issues in the press (for instance, the publication of the Byron Review) all influence the extent to which parents intervene in and regulate computer usage. It is striking that almost without exception, we came across no homes where it appears that the parents do not attempt to exercise control over their children's computer use. For the most part, parents have a fairly high degree of success in moderating, as a minimum, how much time children spend on various activities, and ensuring that care is taken with regard to giving away personal information online. It is, of course, possible that parents in homes where the online behaviour of children is unknown or uncontrolled are unlikely to invite outsiders to view what is going on, so our sample may not be representative. However, the examples show many parents who have learnt, and are operating, a wide range of strategies for safeguarding their children when using computers and the Internet.

The issue that concerned parents most was not being able to keep an eye on what happens when their children are online. The most concerned of all the parents we spoke to was Year 5 learner Erin's mother (Case 5: EC), who perceived a number of risks: her daughter coming across unacceptable content on the Internet, giving away information to predatory paedophiles, or participating on any kind of social networking website. Erin's mother regulates Erin's use of technology; for instance, Erin is not allowed to view YouTube on her own (her mother was shocked to learn from Erin, during the case study visit, that Erin's father allows Erin to view YouTube when spending time at his house). Erin's mother admits to exercising total control, at least when Erin is at home, to the extent that she allows Erin on the Internet only via

a laptop in the kitchen when she is around to keep an eye on what her daughter does. She also regularly checks Erin's browsing history and her contacts list on MSN.

Erin manages this high level of regulation, it appears, by accepting that use of the computer in her primary home is mainly for educational activities, and that use in her father's home is more for fun and entertainment. It does appear that Erin has become skilful at educational activities and is able at using the Internet to find information. Therefore, although Erin occasionally has problems (including being banned from using the Internet for six months for involvement with friends in viewing unsuitable material on the Internet), Erin currently appears to be willing to accept and adhere to her mother's restrictions.

When it comes to issues of safety, all the parents we spoke to seem to be conscious of, and active with regard to, the following three issues:

- Internet safety and security
- the need to use the Internet sensibly and with discrimination when searching for information
- the need to do other things away from the computer screen, such as reading books and spending time outside.

Few parents are as strict as Erin's mother, but we did encounter a general (and probably disproportionately high) level of concern and engagement with these issues.

Improved personalised learning experiences

In this second half of this section, we look more closely at what the case studies tell us about how the learners we talked to manage their own learning using technologies, and what this might mean for their future development as learners and on into work. Our analysis of data suggested the overall analytic category relevant to this section of learners' technology-related practices; three areas emerged from the data:

i. Self-directing and self-organising behaviours

ii. Innovative and/or intensive users

iii. Formation of future learning careers through personalised home technology activities.

All of the above are addressed in this section.

Self-directing and self-organising behaviour concerns the ways in which learners use technologies to personalise their management of learning. One potential benefit of new technologies that has been cited a great deal in the past relates to how new technologies enable learners to construct and carry out their own learning projects. Many of the learners we spoke to take computers for granted as powerful devices for bringing together and organising personal information, taking for granted the fact that the nternet is the primary (and often sole) medium for finding information. We talked to a number of learners who appear to be highly adept at using technology as a means for both managing their own learning and for accessing knowledge resources in structured ways. In all cases, the learners choose their own (sometimes quite varied) means of using technologies; in many cases, these constitute striking instances of personalised learning experiences that have been improved by a growing level of access to and control over new technologies.

A smaller but still substantial portion of case study learners go beyond a focus on the organisational and structuring benefits of new technologies to engage with technologies at a level of intensive usage that may determine major choices about future study and careers. In these cases, what start out as personal and essentially hobby-based interests in things like game playing, music and photography turn into areas of personal expertise which, with the help of the Internet, learners are able to deepen and extend. These behaviours relate to the second and third of our analytic categories listed above.

Learners able to exercise choice among flexible learning options

Our data analysis reveals a number of cases in which self-directing and self-organising behaviours were found among learners. These behaviours mainly involved learners choosing among flexible learning options and using computers and the Internet to provide structure, order and accessibility to school or college work and out-of-school interests – school work starts to accumulate for learners as they move through secondary school (especially as they move into Key Stage 4) and on towards further and higher education.

Emma (Case 2: ED) was one of many whom we observed who made considerable, highly personalised use of the organisational resources of Windows Explorer and folders. Emma is in Year 10 and clearly values the capacity to order every aspect of her learning so that she knows where everything is and can see at a glance what that she currently has to deal with. Emma makes considerable use of her own USB memory stick to transfer her learning activities, essays and Internet-derived content between school and home.

Interestingly it is not only at the secondary level that we saw a learner organising her learning, interests and recreation in highly structured ways in Explorer: Year 5 learner NJ also demonstrated a very similar approach to that of Emma. Although NJ

does not have a large volume of learning-related material to organise at this stage, she clearly values the power to place and retrieve what she wants in these ways.

Nathan (Case 11: NO), a Year 9 pupil, is notable in that he has quietly achieved a great deal, working steadily and independently, in terms of managing his own learning. Nathan's mother thinks that he mostly spends his time online either social networking or playing games, but in fact he appears to spend a good deal of time using the Internet to support his school work, making particularly good use of his school's learning platform. Nathan both retrieves details of and submits his school work this way, and follows up suggested areas of investigation on the Internet at the same time. Nathan sustains many other interests such as Boys' Brigade, Air Cadets, occasional DJing, and playing a strategy game on the Internet, and does so by using the organisational resources of his computer. He makes skilful use of Bebo to organise his social and leisure life – also keeping on top of his school work commitments in a way that his mother is not aware of, perhaps because of the extent of his self-directed approach.

UI, a first-year undergraduate at a post-1992 university, is adept at using the organisational capacities of his Internet browser, setting up elaborate systems of tabs and RSS feeds to ensure that he keeps up with his interests. UI also makes considerable use – as did all the HE students we spoke to – of his university's virtual learning environment (VLE). UI uses his laptop in his small student room at the university for these various organisational processes: it appears that the computer screen is where the full variety of interests and work commitments come together. In taking control of these resources and personalising them quite extensively, these learners seem to find their technology resources empowering as a means of managing both their personal and their learning lives.

Some of the older learners, both in FE and HE, have developed their own approaches to managing the full array of their computer and online experiences, weaving in their learning activities and future professional interests into activities that constantly cross the boundaries between personal and study interests. Peter, a woodwork student in FE (Case 12: PU), has developed a complex array of methods for enhancing his learning, which are self-directed, highly organised and extensively personalised. Although Peter does not have good or consistent access to the Internet where he lives, he sustains extensive use of resources such as a 3D rendering package to create models on the computer for his course, the Internet for design ideas for contemporary furniture and architecture, Wikipedia for information, Photoshop to adapt the images he finds on the Internet for his coursework, iTunes and, occasionally, Facebook. While he is at college (where he generally finds the Internet connectivity inadequate for his requirements), Peter maintains his personalised approach by using his mobile phone as a calculator to work out measurements for his woodworking design plans. When working outside college on

a brief (a plan of what a customer would like, which reflects the kind of commission he might get professionally), Peter often takes a digital camera to capture ideas. He edits the photographs as needed, zooming and cropping, and prints some on large A3 sheets. In line with the course requirements, Peter has also put together an electronic portfolio in the form of a website.

Ruth, a student in HE (Case 10: RV), manages her learning through Blackboard. In the evenings, Ruth accesses her required reading online and, at the same time, maintains a complex network of online connections with the Russian community in London and family and friends back home, which provides the context within which her studies are possible and sustainable. To achieve these high levels of communication, Ruth has chosen different options as the result of ongoing experimentation; currently she prefers to use email for some friends, and Skype or LiveJournal for others.

In a different way from Ruth, Rosalie (Case 13: RU) also manages multiple dimensions of communication, self-expression and profile building (with a view to her future career as a journalist) through a complex range of activities online, including the simultaneous upkeep of up to five blogs. Like Ruth, Rosalie makes extensive use of Blackboard for her university work and of a range of resources such as Photoshop, Skype, Facebook, Gmail and different blogging applications and sites. These activities, as is the case to a slightly lesser extent with Ruth, lead towards classification at the higher engagement level of intensive and innovative user, which we discuss below, but it would be a mistake not to recognise the levels of control and organisation that have gone into creating and personalising these online worlds, in which their learning takes equal place alongside all the other favoured activities.

Figure 1 shows some of the computer-based activities that learners use within different forms of learning.

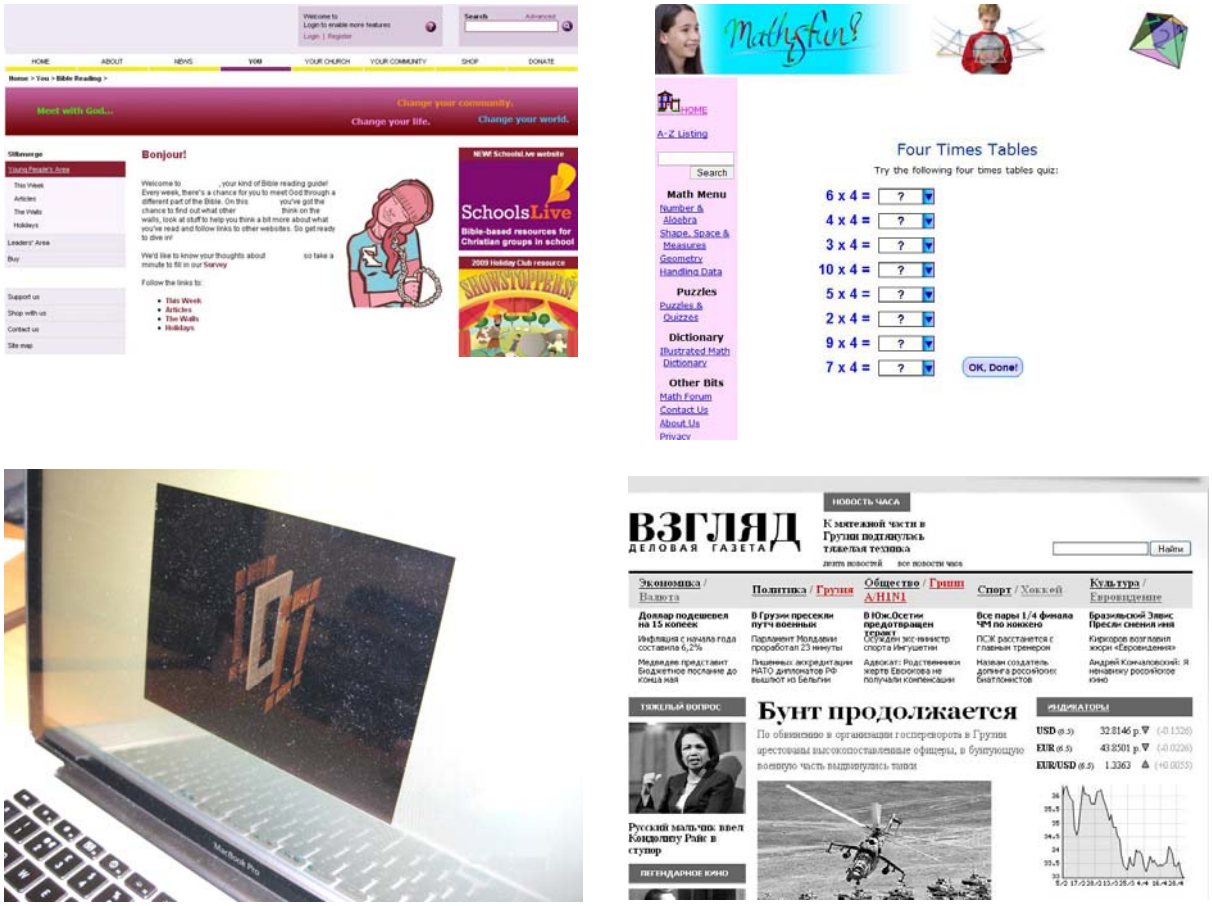

Figure 1: Examples of flexible learning options demonstrated within case studies

Clockwise from top left: a religious discussion forum, a mathematics revision website, a Russian news portal, digital photography and 3D rendering software

Engaging learning experiences which support deep and higher order learning

As indicated above, our analysis revealed evidence of the themes that we believe are closely related to engaging learning experiences – what may be referred to as deep and higher order learning. These themes are:

ii. Innovative and/or intensive users

iii. Formation of future learning careers through personalised home technology activities.

The two themes seem to be related: learners' innovative and intensive technology activities seem to lead them towards future areas of study and employment. Unsurprisingly, this was more evidently the case with older learners than those still at school, for whom future trajectories of study and employment were only beginning to take shape.

A number of the older learners mentioned above (in the section 'Learners able to exercise choice among flexible learning options') provide striking evidence of behaviours that go beyond self-directed and highly organised uses of technologies for learning.

Peter, the woodworking FE student, has devised an array of uses which he sees as directly relevant to his future career. These uses are not just for practical needs – Peter appeared to take considerable satisfaction in finding novel and creative ways of using the technology available to him – although Peter did insist that he does not want to use technology for its own sake, but rather as a means of creating tools that he would not otherwise have access to.

Rosalie expressed a similar focus to Peter, using a variety of Internet tools to create the kind of presence and profile that would eventually gain her work in journalism.

Peter and Rosalie were not the only intensive and innovative users. Gareth, an HE student, told of how he was, in effect, connected 24/7, even sleeping with his laptop beside his bed should he have an idea for some aspect of his work in the middle of the night. Gareth's main area of interest is music technology, something he developed an intensive interest in at 12; he has developed this interest ever since, and is now coming to the end of a long period of FE and HE and trying to connect with future employers. Although technology generally, including Internet provision, was not adequate for his needs in FE college, Gareth has directed his extensive technology and Internet skills towards a wide range of study- and work-related practices. These involved music composition, recording, video making and more academic work for his course. All of this was blended with his personal interest in

music, which prompted him to visit a wide range of music sites and discussion forums.

Gareth's interest in music technology has continued from age 12 to his present situation as someone about to enter the world of work. It is possible to see the beginnings of a similar trajectory in Callum (discussed in the first half of this section), whose growing enthusiasm for music technology is crystallising into a possible choice at A level (with the growing approval of his highly involved mother). Looking at a learner at an even earlier stage, it is possible to the beginnings of a long-term strategy in the enthusiastic engagement of Yadav (Case 4: YU) with a range of technology tools and activities, strongly supported and encouraged by parents who clearly believe that at the relatively young age of 10, Yadav is nonetheless capable of establishing a path that will lead him to employment.

In some of these cases – Peter, Gareth and Callum – technology is arguably functioning at a cognitive level, helping them learn more, and more deeply, about their areas of study. For others, it is questionable whether their intensive engagement with technology is directly supporting cognitive achievements as much as helping them to create intensely engaging contexts for learning and future learning trajectories, within which deep learning may or may not prove achievable.

Conclusions and recommendations

The findings of these case studies provide rich and diverse examples of the ways in which many of the Harnessing Technology outcomes are being realised in a range of learners' own contexts. We discuss each of these below.

Engaged and empowered learners

Despite a number of concerns from some parents about the dangers of time-wasting activities using technologies, and about risks when online, these case studies show learners of all ages, in a wide range of family and personal settings, who have good access to technology and the Internet, who enjoy using technology for their own interests and entertainment, and who are generally quite adept at integrating a range of learning activities with their wider technology activities.

Learner entitlement is met with all vulnerable groups supported

These case studies were not intended to engage with learners representing vulnerable groups, therefore we cannot comment on that aspect of the outcome.

The learners we studied – members of the broad population of mainstream learners – were evidently able to use technology that worked well enough and was connected by broadband to the Internet. In that respect, we saw good evidence of learner entitlement being met, especially in that nearly all the learners we spoke to have

access to good levels of support from family or the higher education institution where they live. The only exception is the FE student Peter, who has a poor level of connectivity where he lives, and who also does not have adequate connectivity at college.

In terms of access, a related issue involves the physical difficulties caused by the increasing amounts of technology hardware and peripherals that have mounted up in many homes over recent years. Multiple computers, games consoles, screens, printers, and the cables that go with these cause major difficulties in many houses. Two possible consequences for young learners are that:

- learners they may find themselves using the computer for long periods in circumstances that may have an adverse effect on their physical well-being (eg sitting, not properly supported, on a soft sofa with the computer on a table in front, at an angle that may create RSI-type problems)
- parents may be tempted to reduce the build-up of equipment by placing computers in children's bedrooms, against their better judgement.

As equipment gets smaller and less intrusive, these problems may reduce to some extent, but the number of different technologies in the home is increasing. Guidance should be developed for parents, perhaps channelled through their children's schools, on how to manage equipment effectively (eg by making available systems for managing cables safely) and ensure that learners do not suffer long-term adverse effects from using it.

Technology adds value to family and informal learning
and
Learners use technology confidently and safely to support their learning

We encountered a number of cases where the presence of technology arguably did add value to family and informal learning. Sometimes this occurred as a result initially of parental anxiety about one or more of the following three areas:

- Internet safety and security
- the need to use computers and the Internet sensibly and with discrimination when searching for information
- the importance of doing other things, away from the computer screen, such as reading books and spending time outside.

As a result of such concerns, it appears, several of the parents we spoke to often sit alongside their children or remain nearby when they use the computer, in the course of their school work especially. This was the case both with parents of primary and secondary age pupils. In some cases, parents became more involved in their children's learning. In a few instances, we saw evidence of learners introducing their

parents to new (often technology-related) knowledge. It is evident that the computer screen, especially when placed in a central shared area of the house, becomes the nexus for a wide range of activities. It is possible that technology can therefore help to increase the ways in which families share many interests and activities.

In some of the homes we visited, though, the level of parental involvement in and regulation of technology used for learning may be undermining learners' opportunities for developing and experimenting with technology. Anxious parents who are too intrusive may restrict learners' opportunities to learn and apply innovative means of using technology for learning.

Improved personalised learning experiences

Personalised learning experiences are a significant focus of our research because a learner in his or her own context is likely to have greater freedom and opportunity to explore, experiment and work independently. As indicated above, parental concerns about technology and Internet use can limit learners' freedom to find ways of personalising through technology their learning experiences. The evidence of these case studies also suggests, however, that many learners react sensitively to their parents' concerns while at the same time acting in inventive and often responsible ways. Therefore, a great deal of what learners do with technologies is devised and developed by them alone, independent of their parents; for the most part, parents are not fully aware of the extent of such independent behaviours. However, parents often appear able to judge the extent to which they can allow their children increased autonomy. Such freedom invariably increases as children progress through secondary school, and of course is fully achieved for the students in FE and HE.

Learners able to exercise choice among flexible learning options

As a consequence of the opportunity and relative freedom to use a computer in their own contexts, several of the learners with whom we spoke have devised for themselves highly organised means of managing different aspects of their lives, including their learning. Some are helped in doing so by a range of applications, which some learners use in highly structured ways; for example, some learners use Windows Explorer's folder management system; customise their home pages in Bebo to display personal interests, social networks and daily activities; and use their school or university's VLE.

Other learners prefer to use less highly ordered approaches, managing a personalised range of applications and websites that they constantly move between when on the computer. This involves multi-tasking behaviours, with the following open on screen: chat or messaging and social networking applications, Google and Wikipedia for searching, word-processing software, a media player for listening to music, games (to play from time to time), and so on. These activities sometimes

merge, especially for the older learners, into their current study activities. While aware that their parents generally disapprove of multi-tasking, some learners think they can handle and benefit from multi-tasking, because it makes the school work they are doing feel less oppressive. Several others, though, make the active choice to concentrate exclusively on work while they are doing it, and to open up entertainment and social applications only when they finish work.

Engaging learning experiences which support deep and higher order learning

While nearly every case study learner appeared to gain benefit from using technology in support of their learning, only a small number can be confidently described as engaging in learning experiences that support deep and higher order learning.

For the larger proportion of learners, it appears that the opportunity to use technologies enables them both to carry out school or college work and to encounter wider learning experiences, in ways that are perhaps more engaging, efficient, structured and rapid than would have been the case without the technologies. But it does not follow that this actually transforms the quality of learning for most learners towards what may be described as deep and higher order learning.

In that small number of learners engaging in learning experiences that support deep and higher order, there is evidence of an upward shift in the quality of learning, occurring as a result both of the availability of technologies and of learners' positive feelings about using those technologies. This minority of case study learners make little distinction between their uses of technology for their own pleasure and for their learning. Indeed, as learners grow older, these uses appear to be seamless across their leisure activities, study activities and explorations of their future careers.

Such learners are characterised by considerable inventiveness with the technology available, and the freedom to experiment and to devote considerable time to doing so. These are not necessarily the most intellectually or academically advanced learners, but rather those who have both the conditions for using technology and the enthusiasm to do so.

This enthusiasm tends to lead learners to sustained and deep explorations of how technology may be used for the things that interest them, or how the technology that interests them may be used in their future education or employment. Therefore, it is possible to perceive a combination of cognitive benefit in the ways that uses of hardware and software enable deeper exploration of concepts, and of broader benefit in the way that learners' interests help them to commit to what may prove to be fruitful plans.

Recommendations

The key recommendations from this stage of the research tend to concern, more than anyone else, parents and those looking after learners. Some of these findings inevitably also have implications for those working in schools, FE and universities, as well as for potential employers.

- Parents need to be supported with advice and practical suggestions designed to help children use technologies in environments that are ergonomically favourable for continued use of computers with keyboards, screens, cables and so on.
- Schools should ensure that the benefits and usability of their VLEs are explained and promoted strongly both to parents and learners, and that teachers are given sufficient time and support to ensure confidence in this crucial means of helping learners in their own contexts.
- Ways should be explored of informing parents – such as through schools' VLEs – about the benefits for their children in using technologies for learning in the home, so that parents can support and encourage positive behaviours to as great an extent as they try to prevent negative behaviours.
- Thought should be given to providing appropriate software for supporting learners in managing their studies and other related interests in creative and flexible ways. This could involve developments within VLEs, exploration of existing open source applications on the Internet, or purpose-made software.
- FE and HE institutions should explore ways of responding to the increasing technological sophistication of the next generation of learners. Institutions should provide sufficient connectivity and support during learners' studies, and should review the content of courses to ensure that these are developing to meet the needs both of the workplace and future learners.

Appendix A: Methodology and interview schedule

Phase 2 constituted one-third of the research carried out during the first year of the project, and involved mainly one-to-one interviews with and observations of chosen learners at their computers in their homes, as well as interviews with any parental figures who were present.

The 35 case study learners were chosen from the interviewees discussed in the Phase 1 report.[4] Case study learners were chosen on the basis of being particularly high, innovative or interesting users of technology, or on the basis of their choice of activities or their unusual home environments. Aged primarily from 8 to over 19, the case study learners were recruited from within the Thames valley (Oxford, Reading and London) and covered primary and secondary pupils and FE and HE students. For a complete breakdown see Table 1 below:

Education level at time of interview	**Age groups**	**Gender breakdown**		**Total**
Year 5	9–10	Male: 7	Female: 3	10
Year 9	13–14	Male: 6	Female: 3	9
Year 11	15–16	Male: 3	Female: 2	5
Further education	17–21	Male: 2	Female: 0	2
First or second year of HE	19–40 (mean 24)	Male: 5	Female: 3	8
First year of masters degree	30	Male: 0	Female: 1	1
	TOTAL	**Male 23**	**Female 12**	**35**

Table 1: Breakdown of age, sex and education for case study learners

Although a large selection of the original 103 Phase 1 learners were invited to take part in case study interviews, and families were offered a £10 incentive, the co-operation rate was much higher for male than female learners. This may in part be due to the possible safety implications of researchers visiting young girls in their homes. Attempts were made to resolve this issue by recruiting females from local Oxford schools. However, the low response rate for interviews in general meant that the research team spent a large amount of time trying to recruit families.

[4] Becta (2009) *The Learner and their Context. Report of phase 1 of the qualitative data gathering: Interviews with learners*

Families that agreed to consider taking part in the research were telephoned by a researcher, who explained the purpose of the study. A convenient time was chosen for two of the experienced researchers to visit the learner at home (one researcher if the learner was in FE or HE), at a time when a parent would also be available to participate. Learners were requested to have access to the computer that they normally used. For the one learner who mostly used a computer at a separate address, the researchers provided a laptop.

During the visit, one of the researchers would speak to the learner about his or her normal use of the computer, and would ask the learner to give a step-by-step demonstration. Learners were encouraged to talk about activities that they found most interesting and useful and were asked specific questions about how they learnt to complete certain activities, what they found difficult and enjoyable, and whether any risks were associated with specific activities and, if so, how these were avoided. Learners were told that they did not have to show the interviewer anything that they considered private, although they were encouraged to show as much as possible. Snippets of video recording were taken of particularly interesting elements of the learners' demonstrations, and still images were taken of the location of the computer. Permission was obtained from the parental figure for both of these recordings.

The second researcher would speak with at least one parental figure. Parents were asked about their experiences of technology, what they thought their children were getting out of using technologies, and how they spend time learning with the family on the computer. These questions were designed to be as open as possible to allow the interviewee to give their full opinions on particular aspects of technology use. Examples of the interview schedules for both the learners and their parents can be seen below.

Both interviews were audio-recorded, for which permission was again sought. Detailed notes and selective transcriptions were then taken from both sets of interviews and combined with relevant images from the visit to produce full case studies. From these, 14 case studies were chosen as strong exemplar studies that provide evidence for the seven themes developed throughout the case study work.

Example research instruments

The following are two examples of the research instruments used within the case studies: one for learners (adapted towards their interests by the researcher) and one for parents. Both are designed as semi-structured instruments in which the interviewers can elicit the most important technologically-related aspects of the learner's experience at home, following further into the learner's onscreen activities and experiences, and probing in more detail about parents' opinions and values regarding technology.

Case study learner instrument

INTRODUCTION

[Once sitting in front of computer that learner mainly uses]

I'm here in order to find out more from you about some of the things you do with any of the technologies you use at home – specially the computer. We learnt a lot from you when we talked last term, and now we hope you would be kind enough to show us a bit more about the different things you do – especially the things you most like doing – when you use computers.

You only have to show us the things you want to – if there's private work and conversations with friends that aren't our business, and so on, you just tell us so. You just show us what you want to – but we'd love to see all the things you like doing wherever that's okay with you.

MAIN SCHEDULE

Let's look at what you do on the computer. Let's start by you telling me what you normally go to first when you start to use the computer – eg after school. *(video computer in its location if student agreeable)*

1 OKAY – WHY DON'T YOU SHOW ME ROUND WHAT'S ON YOUR COMPUTER? – show me the screen [desktop] – what are all the things that you like to do that are there?

(always encourage respondent to tell you more detail about each thing they do and to show you what they do if possible. video the computer desktop – what comes up first – if possible then subsequently video brief selective images of various things shown)

- What do you spend most time on?
- What about your school work – how do you use it for those?
- Do you use the computer for talking with other people? How do you do that? Do you talk about homework like that ever?
- [multi-tasking] do you often find yourself having several things on the go at once on the computer?
- Show me how you do a search – can you have a go at doing a search for me that you did recently?
- Is that all? Let's look round one more time – any other things you do quite a lot? Tell me about it/them?

(*In each instance probe:* how did you learn to do that? Who taught you to do that? What do you find difficult about doing that?)

2 HOW LONG HAVE YOU USED THIS COMPUTER? Are there any other computers in the house? Who uses what? [And what is the history of technology in this house – where did it all begin and how did it grow?]

3 HAVE YOU GOT ANY GADGETS? CAN YOU SHOW ME THEM? Tell me about how you use them.
(Video briefly)

4 [FINALLY] ARE THERE ANY THINGS THAT YOU WOULD LIKE TO BE BETTER AT DOING? Can you show me at all?

DON'T FORGET TO FOLLOW UP WHERE RELEVANT:

Are there risks in doing that? What are they? How do you avoid them? How did you learn about them?

CHECKLIST [if any of these not yet mentioned by stage 4, consider checking if the learner ever uses them – if there is reason to suppose they might. No pushing through lists though…]

- games playing
- social networking sites (SNSs)
- browsing, surfing
- searching, Wikipedia
- emailing, Wii
- downloading
- viewing YouTube
- watching television, shopping
- using Word, Excel, PowerPoint
- image manipulation
- video making
- music library organising.

Case study parent instrument

Introduction:

We are really interested in finding out how you feel about using computers and the Internet in the home – about any concerns you have, and the things you would like to see more of or less of. I've got a number of questions I might try to ask, but mainly I want to hear from you what you think about all of this!

1 First of all, would you tell me a bit more about the computer(s) in this house – who uses what? What is the history of technology/computers/broadband in this house?

2 Do you use computers at all – either at home or at work? Are you a frequent user? Could you tell about the sorts of things you use it for?

3 Do you use the computer, especially the Internet, much as a family – I mean, is it something you use all together at any time? Who's the expert at using technology for the family – or is everyone more or less the same?

4 Would you say you ever use it for following up interests or learning things as a family?

5 Now let's talk a bit about [child's name]. What do you think he/she does when she is on the computer? What do you want [him/her] to get out of using the computer at home? Do you think that happens more or less?

6 Do you ever look at the school web pages or contact the school through the Internet? Do you think the school has set up some useful material on the Internet, or have you not seen these yet?

7 Do you have any concerns about the way [child's name] uses technology – computers or other gadgets? Are you ever worried about safety and risk issues on the Internet? What do you tell your child about this?

8 We won't be passing on information about individual children to anyone, but we can put things that parents are concerned about into our reports in a general way. Is there anything you would want us to share?

Appendix B: Analytic themes illustrated with reference to full set of case studies

Theme 1i. Family context of learners' technology uses: impact on learners of family beliefs and values

[This theme concerns the ways in which parents' beliefs about the importance of education, and other values – such as those relating to their religious beliefs – influence the choices they make about providing and managing the technology experiences of their children.]

CL (Year 5 male): Given the chance, CL copies and pastes information from the Internet for homework, but his parents guide him away from this. Homework must be given priority before CL is allowed to play games on the computer.

CL's parents limit CL's computer time because he has very limited free time, and they limit his games playing to 30 minutes at a time. They encourage CL to do homework, engage in outdoor activities, and entertain himself with music and toys.

- [Mum] "Yes, the priority is his homework or whatever. If he is doing a project – you know, if he is doing an exam soon for his violin – so that would come first. So we sort of compromise, you know: if he does this, then yes he can have that time."

CL's parents pass on certain warnings about staying safe on the Internet, for example to avoid sites that he does not know; they also tell him not to be taken in by messages saying that he has won a free gift, and to ignore and close pop-ups. His parents also keep an eye on the information CL gives out when signing up to websites. Moving the computer downstairs has allowed CL's parents to better monitor his actions.

- "[Dad] "Generally just tell him not to go to websites that he doesn't know, we're not sure about. … We always, sure, tell him not to put your real home address, not to put in your real birth date, and don't put your full name in."

YU (Year 5 male): YU's parents are extremely keen that he should get the best out of his schooling; they are putting him forward for the 11-plus exam and hope he will go to a grammar school.

NP (Year 5 male): NP's father values technology for a number of purposes, for example he thinks that it can replace the television and newspaper. He also thinks that certain games are good because they teach NP to think laterally. NP's father thinks that NP will get more out of the computer as he grows older and uses it more

for research purposes. He also says NP uses Club Penguin, but doesn't know how useful this is to him.

- Lego games on Xbox: [Dad] "They're like an adventure, so you're running around. […] but it's quite good because it actually teaches them how to think laterally – and they would do this to do that and to access something, and they have to do something else. That's my excuse for it anyway!"

DJ (Year 5 male): DJ (and an older brother) have autism and Asperger's syndrome. DJ's mother hopes DJ will follow in the footsteps of his older brother, who used the Internet very cleverly for his studies (eg communicating with people in other languages to improve his own foreign language skills). DJ is discouraged from chatting with his friends on the computer, particularly because of his autism.

DJ's mother would like more use of computers in class, because it helps people who lack fine motor skill (like her sons) to communicate.

- [Mum] "I'd like quite like to see children – because, that is, you know, everybody's going to have a laptop in the future, everyone's going to be doing everything on laptops. I'm not necessarily sure if I think that's good, but I think that's the way society, our country, especially this day and age, is gonna go. And I think especially for my son [DJ], and the same with [older son]..., because of their lack of fine motor skills, writing is a difficult thing. But typing information into a computer is an easy thing, so I think it would be nice for [older son] to have had more of his lessons being able to type it in rather than writing it."

UN (Year 5 male): UN's mother thinks UN does quite a lot of learning through interaction with technology, including through games. When UN was younger, he learnt the alphabet and numbers via little games, for example buzzy bee game for letters.

- [Mum] "Even with the Lego game he was playing earlier – it's an Indiana Jones game, and he's just got to collect the coins; Indiana Jones runs and he's got to collect the coins, and he's got to click on the traps, you know, twice, to stop them. So anything that's flashing red, he's got to click right on it to stop Indiana Jones dying. So that's mouse control, you know, so even though that's a simple game, he's learning something from it. There's – there's a lot of wizardry games isn't there, with the maths problems and things like that... things that he enjoys."

Parental controls on UN's computer prevent him from seeing pages (even innocent ones) on YouTube, and thus he has to log on to YouTube via his mother's profile, allowing her to keep a close eye on it. UN's mother notes that UN is very good, and it

would only be if he accidentally clicked on something that he would see it. His mother always tells him about the rules of what he is and is not allowed to do online. UN is told that, if he sees anything rude or with bad language, to come off the computer straight away; he knows that, if he disobeys, he will lose computer access.

FR (Year 9 female): The family do not have a television and do not want one, because they believe a computer would ruin the valuable time that the family share. FR's parents want the computer to be used as a tool, not as something to depend on when there is nothing else to do. They believe the use of mobile phones is "rubbish – totally irrelevant to anybody's living and just costing a lot of money".

- [Int] "What would you like her to get out of the computer?"

  [Parent] "Well, I want her to use it... not as a means to an end, but as a tool to get what she wants. [...] if she wants to communicate with people, and the computer helps her, then that's great. But I wouldn't want her to just, you know – some people use the telly because they don't have anything else to do."

FR's father taught FR to look at the name of a website to judge its credentials. FR was taught by her mother to touch type a few years ago – she can now type faster than she writes. Her mother does not allow her to play games on the Internet, because the Internet protection is not very strong, yet FR still does this at school.

FR reflects her parents' attitudes that she should use technology as little as possible.

- [Int] "Do you ever feel you ought to be using it more?"

  [FR] "No, I sometimes feel I ought to be using it less! […] "Yeah, my mum doesn't like me doing [online games] because her – what do you call it – protection thing isn't very strong... I do my gaming in school. If my teacher says 'If you've finished the work, you can have five minutes on games.'"

CO (Year 9 male): The family's computer is in a downstairs bedroom so that it can be easily checked up on. Dad discusses with CO that junk mail is a scam.

UD (Year 9 male): UD's mother says that UD plays a football game on his Playstation, which he has become expert at; it is more than a normal game of just manipulating controls to score goals, because game players make their own teams and buy and sell players. However, she doesn't think that it's massively educational.

UD's mother thinks that it is essential that UD learns to use the computer, for when he goes to university and into working life.

- [Mum] "Well, um, it's an indispensible tool these days, you know, unless you're going to work outdoors or… yeah, probably even if you were, I'm sure there would be some parts of your life that would revolve around a computer. So, you know, I would want him to be confident with, um, understanding the functionality of the core packages that are available. So that he can use it as a… you know, to present work to, um, you know, professionally presenting whatever work it is, be it school work or when he eventually enters the world of work. You know, I would be very concerned that obviously as and when hopefully he goes to university that… I mean, his life will revolve around using computers…"

OJ (Year 9 male): OJ's father realises the importance of technology for learning; he wants the boys to use the computer as a tool for their learning, as well as for their entertainment ("that also has to be done"). The family think that the computer is a very good tool.

- [Parent] "Knowledge is not what you have, but it is from where you can get it from."

OJ's parents are very careful that OJ and his brothers do not get access to pornographic sites and violent material:

- [Parent] "We don't buy toys which are, you know, war-type games. Didn't even buy them plastic guns when they were younger."

AM (Year 9 male): The computer is important for AM's father's personal studies. AM's father thinks that even games can be a learning experience. AM is competent and uses the computer as his father wishes; he always completes his homework before he starts playing games, and he asks his father to check the presentation of his homework.

- [Dad] "Even games you can learn something. Not just the entertainment, but how you are able to get to the game, how you are able to control the keyboard, how you are able to manipulate the system to get what you want."

EM (Year 11 male): EM's parents were very keen for him to have a computer, because they noticed how interested he was when they went to friends and family, and they thought it would be good for his education and employment. There is some tension: EM's parents are keen for him to benefit from technology but feel that he uses it too much for leisure – for example, multi-tasking with applications such as instant messaging while completing his homework. Mum is bothered about too much use of instant messaging.

- [EM] “The way they’ve grown up is very, very, very, very, very different to how we’re growing up. And it’s like I’m able to do sort of – I can be on MSN but can appear offline and still see who’s on and what’s going on, and be on my bbc.co.uk and do my Bitesize revision. ‘Cos I find it easier to do my revision for the lessons on the Bitesize or the Sam Learning, but if it’s something like maths or homework or something, I’d have to do it in my room or in the kitchen... It’s like she comes up when I’m on this – somehow always seems to happen. ‘Cos the thing is, she says when she’s coming up and I’m clicking off all the things I’m doing. But it’s not true, ‘cos I’m always clicking whether she’s here or not, because I have to be checking things, going on websites and all those kind of things, so it’s sort of – I’m just like I’m tired of trying to explain, ‘cos it’s just gonna get worse, so I don’t say anything. It’s kind what I’m doing. It’s like I bring good grades home, I bring As, Bs, Cs, I never bring Ds... How can I achieve these grades if I’m not studying?”

MO (Year 11 female): MO’s parents brought the computer into the house purely for their children when they started using computers at school – MO’s parents had no need for one before then. MO’s mother doesn’t enjoy using the computer, but thinks she is gaining skills through computer use. MO’s mother doesn’t think she has enough experience to understand what technology is capable of, in terms of helping with education. MO’s mother has a personal interest in history, and sees how her daughter finds information about subjects on the laptop; she wishes she could use technology in the same way, and thinks it is great for finding things out. Sometimes, MO’s mother wishes her children would also use their reading skills to find books on different subjects, because sometimes there is just too much information on the Internet, and so they struggle to find the key points; comparatively, books often have the key points in one paragraph.

- [Mum] “I’ve learnt with MO, and she’d moved on way ahead of me now, so I’m probably at a stage that I’m comfortable with [younger son] now.”

  “I have spent time with her, over the years, saying ‘look you’ve sat here for two hours and you’re getting frustrated because you’ve got all this information but it’s not telling you what you need to know.’ And sometimes, picking a book up as well just brings it back. So, you know, I want her to use the technology, but I also want her to be aware, you know, of what else is out there for her education.”

Theme 1ii. Family context of learners' technology uses: children's access to technology

[This theme relates to the question of parental resources and the ways in which these relate to beliefs about the educational value of technology, so is quite closely related to theme 1i above and may best be viewed as a sub-theme of that.]

YU (Year 5 male): YU mainly uses a desktop in an upstairs study; he also uses his dad's laptop sometimes. The laptop has a sound card, whereas the desktop does not.

NP (Year 5 male): There is only one computer in the house, but it's use is unrestricted – NP sneaks down very early in the morning to play games.

DJ (Year 5 male): The father works in telecommunications, and so the family has always had a computer around. There are three computers and one laptop in the home. All boys (two older brothers, three in total) have their own computers, and one is in the games room for the boys to play games on.

UN (Year 5 male): There are two computers available to the two boys: one in the main study (for the whole family), and one, which the boys are encouraged to use, in the family room. Both computers are at least five years old.

CO (Year 8 male): CO shares the computer, located in his brother's bedroom on the ground floor, with the family. All the family can use this bedroom. Another computer upstairs hasn't got the Internet or a printer attached to it, and thus is not really used for homework; it used to have the Internet, but it was very slow. CO explains that half of his family share the use of the downstairs computer – all of his brothers have left school, and so they rarely need to use the computer, and one of his brothers now has a laptop instead. The father uses the computer for contacting others.

- [CO] "People don't really use it, because it's hard to do homework. Whoever's got the most important job, they get it [to use the computer], so if a person is playing games and somebody else needs to do their homework, then the person who needs to do homework will get it."

FR (Year 9 female): There are three computers in the house, but the shared one is very old and therefore hardly used. Both parents have laptops, and the two daughters share the use of their mother's laptop, which is located in her bedroom. There are no different user areas on the laptop, and the interface is written in another language reflecting their mother's occupation as a bilingual. FR's mother uses the laptop only during work hours, allowing FR to go on it after school.

UD (Year 9 male): UD has always had a computer in the house; his mother's computer has Microsoft office, and the computer UD primarily uses is a Mac (his father's old computer, although father has now moved away from family).

OJ (Year 9 male): When the family first moved to the UK, they bought a computer. With three sons and many arguments occurring, the father realised it was difficult to monitor the use of one computer, thus each son was gradually given his own laptop. The laptops are all connected to a wireless network via a router. OJ notes that one of his older brothers sometimes borrows his personal laptop because he doesn't have Microsoft Office on his.

AM (Year 9 male): AM's father explains that there is a computer for the children, and he has his own computer. There is a desktop and laptop. Three children share access to their computer. Only rare access is allowed to father's laptop, if someone is on the computer, to ensure nothing is deleted of father's work.

EM (Year 11 male): EM has very good access (including two monitors). He uses the Internet every evening for several hours – spends most of his time online and has 'nearly every gadget' and wireless broadband.

MO (Year 11 female): The family has had a computer for five or six years; MO recently got her own laptop and Internet access. The main computer used to be downstairs, but is now upstairs in the spare room – MO's 11-year-old brother tends to use that one now. Originally, MO's parents thought it was safer to have the computer nearby so that they could monitor it when the children were younger, but it became a distraction because there is not a lot of space downstairs and the television was on while MO was doing homework.

- [Mum] "You've got to know what your children are up to so that if they're up to no good, you know they are up to no good!"

RU (female, age 21, post-1992 university): RU has a laptop with her nearly all the time. She gets frustrated when in the college, because it is difficult to connect to the wireless facility. Owns a manual and a digital camera and a mobile phone.

CF (female, age 19–20, pre-1992 university): CF lives with five other people; all have laptops connected to broadband and so CF's is quite slow. Her laptop is three years old and she is "nursing it along" and hoping to persuade her parents to buy her a new one for Christmas. CF doesn't have a digital camera, so looks at everyone else's photos from the university.

Theme 1iii. Family context of learners' technology uses: concerns about safe and effective uses of Internet

[This theme concerns issues such as whether learners are granted freedom or experience regulation in their uses of technology, and the extent to which parents actively engage in their children's technology activities.]

YU (Year 5 male): YU's mother said that if YU wants to download a game or something else, he asks whether it's safe. "I can trust him." YU's mother has to sit with YU's younger brother, aged three, because he doesn't know what it is okay to do. YU's mother said that whenever YU encounters something that he hasn't seen before, he calls her to come and look at it, or he closes it. He learnt this after the PC had a virus; his dad sorted it out, and the computer now has antivirus software.

NP (Year 5 male): NP's father worries about some of the language that NP might find on YouTube, because NP's father viewed a video without realising what it contained; he is worried in general what NP may find on the Internet. NP, however, is worried only about avoiding playing games with blood in them.

CL (Year 5 male): CL's parents are worried about the length of time CL spends at his computer and, in particular, the amount of time he spends playing games.

- [Mum] "… and I'm not keen on him having square eyes basically; I would like him to do other things as well. […] I try and get the balance right if I can."

DJ (Year 5 male): DJ's mother is worried about DJ's autism and explains that with the older son, they had a few problems with him communicating online – they need to have face-to-face communication. DJ's mother is also worried because you can access anything on the computer.

- [Mum] "I mean DJ could sit there and probably open a bank account and take out a bank loan – you know some sort of loan. You know, anything's possible!"

  "But there's a downside to that (instant messaging), which I've seen through – not so much DJ yet, but my middle son, who doesn't socialise, he talks to everybody through his computer – Facebook. DJ is more social than him. You know [older son] doesn't want to be with people, but DJ does want to be with people. I think – you know – they need to learn to converse with people before they start doing it this way."

UN (Year 5 male): One of UN's mother's biggest fears is not being able to control what her son does when he is at other people's houses. UN knows the rules, and

UN's parents hope he will tell other families when he is not allowed to do something. UN's parents use parental controls on his computer.

CO (Year 8 male): CO's parents are very concerned about children in general playing too many games, and that these can damage them or waste time that could be better spent on learning. At the same time, CO's father thinks that his children have been brought up very well with good values, and therefore game playing is not an issue for him.

- [Mum] "I am doing job in this school. When I see their – that whatever the time they're… even in the classes, they are opening their websites, games, music. Too much music they're… too much music. But I can say that I feel as though everything is bad. During the class, if they're a maths class, they should open only the maths website. [...] Once they're in education, once they're in class, they should only use that time for education, to get education. But they spoil the time."

- [Dad] "I am happy that my children, yeah my children... they realise what is bad, what is wrong. What is good, what is bad. So they are okay. I don't manage him totally now. So it's okay now."

FR (Year 8 female): Parents think FR should not spend too long staring at a computer screen.

UD (Year 9 male): UD's mother has a friend who is a university lecturer and is worried about the quality of first year student essays, because students often use the web as source material without looking into authenticity or credibility. This is a shared concern of UD's mother. UD knows that Wikipedia may not be correct because others put information on the website. He suggests that it may be better sometimes to use different websites. UD also sometimes talks about homework by using instant messaging.

UD's mother is concerned that SB is a bit slow at typing and that he doesn't use the computer enough to develop this skill.

Regarding safety, UD's mother recognises that UD is very cautious when using a computer; she is therefore careful about what she says to UD, and thinks that he is likely to stay safe anyway.

OJ (Year 9 male): OJ's father doesn't like the idea of just copying information from the Internet, but notes that the boys are good at pulling information together from the Internet "and make it something meaningful". OJ knows that the school does not want pupils to copy and paste information. He uses sites such as Wikipedia, because he finds it useful for information. He also thinks that Wikipedia is reasonably

well monitored despite the fact that anybody can edit it: "… vandalism will be found quick; it's usually quite accurate!"

OJ's father talks very strongly about some of the negative aspects of technology, including that it limits pupil–teacher interaction because children begin to think that they can be taught via the Internet and send queries by email.

OJ says that there are no family rules about playing online games against strangers, and that his mum and dad often say that he is spending too much time upstairs on his computer. OJ's father thinks that people are becoming too reliant on games and gaming is becoming too much a part of today's culture – for example, people getting divorced because of actions of Second Life.

Lastly, OJ's father is concerned that chatting online may ruin people's grammar and written work, although he does not believe that this is a concern for OJ, because he does not go on the Internet much.

AM (Year 9 male): AM's father is worried about pop-ups and the possible links to pornography that they may provide. He tried to rectify this by having child protection, deactivating certain sites and following the school's recommendations for systems. He didn't allow chatting via instant messaging until AM was able enough to understand their worries. AM's father thinks there isn't a set age when you can let children have free rein of the computer – you must decide whether they are mature enough. Both parents are concerned about AM's choice of games and content.

- [Dad] "Even the choice of games to play on those Playstation 3s – I happen to believe that even if you don't act what you've seen, the more you see, the more you feel there's nothing bad about it in a way."

EM (Year 11 male): EM's parents worry sometimes about what he can do – particularly through his interest of looking at crime agencies and the kinds of information he can uncover. EM's parents believe that he knows the limits, and EM's father also keeps an eye on what kinds of sites he visits; they are aware of some of the risks, they also sometimes look at the memory of the PC, but mainly it is a matter of trust. EM's parents worry about him seeing porn sites and, possibly, political sites, although in the context of the kinds of things he can find out about crime agencies, not extremist views.

EM's parents are also concerned that he spends too much time on the computer and that this affects his sleep, and that he is not sufficiently social and does not spend enough time with the family.

MO (Year 11 female): MO's mother was slightly worried about moving the computer upstairs out of sight. MO's mother is worried about safety but doesn't want safety

concerns to take over. Originally, the family had parental controls on the computer, but when the children needed to use the Internet for homework, the parents had to start trusting them. MO's mother hopes that she has a decent relationship with her children, and talks with them. She pops in at certain times in the evening so that they know they will get caught if they do anything they shouldn't.

- [Mum] "You sort of think, are we doing the right thing by doing this? You know. Keeping an eye on them? But I would like to think that we've kind of taught them well and discussed enough, and school's explained enough that there's reasons for doing things and you know when she uses it now, I hope I can trust her on the sites she uses... so far, so good."

If the children spend too much time looking for things online, MO's mother encourages them to come off, even if they just go and watch television or read a book. MO's mother tried to encourage using a timer, especially with her younger boy.

She does not see that multi-tasking by talking to others while doing homework is any use; comparatively, MO argues that it is good to take a break. MO also listens to music while working – her mother cannot understand how she can work with it playing, particularly the heavy metal music.

MO says her dad doesn't want her to download anything because he worries that she will use an illegal site and he will be liable. She considered buying on eBay, but again her dad won't allow it because he doesn't know who the users are. MO's dad buys only from reliable sites.

MO is not allowed to use instant messaging, because she once opened a link from a friend and received a virus that ruined the computer. MO uses a fake name on Facebook, sounding similar to a real name, and has added a moustache on her profile picture to disguise herself. She would not download illegally.

CF (female, age 19–20, pre-1992 university): CF doesn't want a digital camera because she is worried that she'll drop it and ruin it.

CF's mum thinks that he is better at searching on Google than she is, because he knows the precise search terms to use.

CF thinks that as long as you don't give out too much information on the Internet, and you use it sensibly, it is perfectly safe.

Theme 1iv. Family context of learners' technology uses: extent and nature of parental engagement in children's uses of technologies for learning

[This theme relates to issues such as family learning, parental use of school VLEs, and the diverse nature of parental engagement in their children's learning.]

NP (Year 5 male): NP's father mentions that they often do research together for homework or about something they have seen on television. NP's father also sometimes researches different methods that NP is taught at school, so that he can help him.

CL (Year 5 male): CL's parents moved the computer downstairs so that he could ask for help more easily. He asks his parents for help with a variety of tasks, including spell checking and when things go wrong. His parents also help him with his homework and searching the Internet; they describe how they help structure his searching processes for homework. He sometimes asks for help from his parents when rewriting work taken from the Internet.

CL's dad actively encourages his use of the computer and gets involved in teaching him skills on the computer. He has helped CL develop a website to display his toy creations. CL borrows his dad's digital camera and usually has help to put the photos online. He asks his father for advice on things he is interested in, which his father actively encourages.

- [Dad] "I've created a few websites, and CL always asks me how do I do this – and there's a website called Tripod where you can create an account and get help to build a website. And I was showing him how to do that and build something on there using that. […] You know, recently he has been asking me what is a database, you know – how do databases work? So I was looking for some information about that. Something that would be really basic for him to just get the idea of what the database is. So, things like that."

CL shows his mum how to use the computer; CL's mum therefore classes him as the expert in the family.

DJ (Year 5 male): DJ has to be monitored fairly closely because of his autism. Often, DJ's older brother sits with him when he goes on YouTube and monitors what he watches, because he is not allowed on the Internet on his own.

DJ's father showed the boys what to do on the computer, and spent time with them on the computer when they were younger, playing simple educational games to start

with. As they grew up, he started showing the boys how to use the Internet for projects. DJ's father is still more likely than his mother to join in with games.

DJ's mother knows that her skills are not very advanced on the computer, and prefers her middle son to teach DJ and sit with him. DJ's mother explains that DJ particularly needs guidance when doing research, because his Asperger's means that he can get sidetracked quite easily.

- [Mum] "In fact, [DJ] could probably go to the computer now and research himself, he probably wouldn't need – maybe he still would be with him because, you know, if you're typing the wrong words, you come up with all sorts of things."

  "We do teach [DJ]. Because he is good, and he's sensible, and because I don't always know the right technical and the right language and things, I think, and [older brother] does, I think it's better that he teaches DJ, because he's going to teach him from the very beginning the right words and the right way to do things. I mean, I could probably get shown a few things, but I – wouldn't have the language."

UN (Year 5 male): If UN has a school project, his mother will sit with him and help him do the research. She notes that UN would get bored if he had to evaluate information himself. She says that for research, the whole family takes part, including the father, who pops in and suggests thinking about certain things.

- [Dad] "We go through things, you know, and do the research. I cast my eye over the site and say 'Oh no, let's move on' – that's, you know. It's quicker for me to have a quick glance rather than him get bored and trail through things, when you can pick out sites and say 'Well, have a read of that page and I'll come back, and have a read of that."

CO (Year 9 male): CO says he would ask friends to help with Excel if they were good at it. His brother has set up the anti-virus for him, and he explains that the brother maintains this aspect of the system. His parents show little active engagement on the computer – rather, the children help the parents to shop online, look at images and learn English; his parents engage more with important values in life and trust their children's own judgements when on the computer. His parents discuss with him that junk mail is a scam. At home, his parents think the computer is necessary.

- [Parent] "And we can give our own ideas, and we can take our good ideas from children also! We are learning also. Many things I have learnt from my children."

FR (Year 9 female): The only use of the computer by the whole family is to watch DVDs and look at digital photos. Instead, they like reading books as a family.

- [FR] “But personal technology, that’s old-fashioned.” [Int] “No, but it makes an interesting contrast – you know, to those people who say families need technology to, you know, like watching television.”

  “Well, yeah, you see, if you read stories together instead of watching the telly, and then you feel you’d rather read stories together rather than spending hours on [the television].”

UD (Year 9 male): UD’s mother has limited time to engage with him on the computer due to long shifts at work, and so his grandmother takes most of the responsibility for looking after him after school. UD’s grandmother has little confidence in her own computer knowledge: “I’m not computer literate, that’s the problem.”

UD’s mother explains that as he is a slow typist, he often prefers to write a lot of homework by hand, and sometimes asks his mother to type up work while he reads it out loud, because she is a touch-typist. UD’s mother says one reason why she doesn’t use the computer with him is the physical configuration of the room: “It doesn’t lend itself easily to three people sitting around and looking at it.”

From UD’s view, he gained most of his computer knowledge from his father (now separated from his mother), and his sister taught him the social side of Internet, for example instant messaging.

OJ (Year 9 male): OJ’s father talks with his sons to give them a focus on life and tell them what their priorities should be, providing examples of people who have done well and telling them why they succeeded. The parents have drawn up boundaries for Internet use, and they check from time to time the histories of Internet searches. However, they feel the boys, most importantly, should develop self-control and be able to make their own decisions. They provided similar guidance on safety.

When asked whether they teach each other things, the father says that this is an important form of interaction for his family. When asked how he learnt to make such advanced web pages, OJ suggests that he taught himself, but can turn to his brother for help to develop skills. Although OJ’s dad works within a computer shop, his brother is the major influence in his technology learning. OJ is capable of searching online for items, but asks his brother if it is easier. However, much of the engagement within this family is in the other direction, with the sons helping their parents to use the computer.

- [Dad] “Teaching means we keep, you know, interacting with each other – I mean, around the computer.”

- [OJ] “It’s more an influence from my brother; he’s very interested in ICT. He – using his friend’s hosting, he has host – he has an actual live website. He doesn’t update it, but he did this as a school project... He taught me some stuff. If I can’t ask him again, then I go on the Internet.”

AM (Year 9 male): AM’s father uses the computer a lot with his children, and often guides them to use the computer to make their work neater – for example, doing English homework on Word – and find things out. He even encourages his primary-school-aged son to use Excel to practise fractions. AM’s mum helps too – she is the first contact and gives a lot of guidance with the children’s homework. If the father is travelling for work, he communicates with the children by using Skype with a webcam, and encourages them to work on the computer, so that they can share their work with him and he can check it. The children can easily find things on the Internet for their father, because they play with it so much.

EM (Year 11 male): EM’s parents seem to have reasonable computer skills; his father learnt from books, his mother attended a course at the local college. EM’s parents’ engagement now seems to be in terms of trying to get him to focus on school work rather than multi-tasking while doing his homework online. The family sometimes gather around the computer to chat via webcam with friends and family abroad, and to look at photos they have been sent.

MO (Year 11 female): MO’s mother often asks him for help with computer tasks that she has at work. “And then she gets a bit carried away.” (MO shows her in too much depth.) “She would email things back to me at work and I would email things back to her with work in.” MO’s mother appreciates the help from her daughter, especially when she has a deadline.

MO is totally independent – his mother thinks that if he did ask her for help, she wouldn’t have the answer. Sometimes, his mother offers him ideas of more detailed Internet searches for homework, to give another point of view. “I probably don’t spend enough time with her in that respect, finding out what information she does use.” MO’s mother says that, at the beginning, he would cut and paste text; MO’s mother would say that you can’t just cut and paste, so they would sit together to look at the information and redevelop it. She is well aware of this as a possible issue.

Theme 2i. Learners’ technology behaviours: self-directing and self-organising behaviours

[This theme covers the ways in which learners across the age range often appear surprisingly organised in their lives and learning – as if these young people organise many aspects of their lives in the course of their technology uses, including in the ways they use resources such as Bebo and Facebook.]

CL (Year 5 male): CL stores his favourite games and cheats websites underneath a Favorites tab; he explains how he does this by clicking Add to Favorites.

NP (Year 5 male): NP's father thinks that he is quite good on the computer because he doesn't mind experimenting.

- [Dad] "I think there's just – it's not being afraid of the computer. And I think he will just click on something, whereas an adult generally would think well if I press that, something is going to happen and I'm going to lose everything or whatever. He's probably quite proficient with the Control-Z to undo all his mistakes, whereas we sort of think we'll press that and we won't be able to… you know. Yeah. So I think he just – he does explore. If there's a menu, he will click on it and think 'What's that do?' Then he'll click it and, well, 'Oh, that did that. Okay, it's messed it, but we'll start again.'"

CO (Year 9 male): CO has an organised routine when he gets home from school, first going on instant messaging – "Because I'm like tired" then completing homework and finally playing games on the Internet.

FR (Year 9 female): FR visits a Christian forum to develop her knowledge about the Bible.

UD (Year 9 male): UD is mad about football; he will look for football boots online and ask his mother to buy them, play football games on Playstation, and watch goals on YouTube. UD had a free video DVD that taught him football skills.

OJ (Year 9 male): OJ chooses to do most of his homework by hand because he finds it easier and thinks it is a waste of computer ink to print it out – he uses the computer only for writing out English homework. OJ uses a USB storage device to transfer work between home and school, because he finds this easier than using email. He also has some games on his USB so that he doesn't lose them, but he has disguised the file containing these in case he needs to show the USB device to a teacher.

EM (Year 11 male): Extremely self-directing and independent, EM uses the computer to organise action plans for completing his school work. He has taught himself how to use the computer, having used one since he was in Year 6.

- [EM] "I might write myself a little task sheet or action plan or something – you need to get this done by this day. I've got coursework dates and all sorts of things, so I just plan around my days. 'Cos the thing is, I may get all the work done now, so I have maybe a day free, and that day when I'm

sitting here I've got everything done and I can relax, that day, that's when she comes and says 'Why aren't you not revising?'!"

EM meets people in person whom he has first met online.

EM explains that a common method for writing essays is to patch other essays together. He explains that teachers set out homework to suit SparkNotes.

- [EM] "I'm currently using SparkNotes 'cos it's something that everybody uses and the teachers recommend it, so I got SparkNotes there and the Wikipedia version there. […] We have been told what we need to find out and which parts we need to study, so that's the way they've set it out. We need to find out about the characters – you can do some analysis on the major characters, which is really just easy, check it and then see who we need to... We can read all about XXX and then carry on writing your essay, so it makes everything much, much easier for us."

MO (Year 11 female): Her mother explains that MO was on Bebo, now it's Facebook. MO's mother recognises how clever she is about dipping in and out of conversations with friends on instant messenger while completing homework.

For Christmas presents, MO researches where to buy what she wants, and gives this to her parents.

MO prefers to buy CDs rather than downloads, because she wants a hard copy – one of her friends downloaded lots of music on iTunes and then something happened that ruined the order of her folders. MO still puts her CDs onto the computer, because she can take her laptop when she visits her family. She often researches bands, like her favourite which is a Canadian band. She then goes to HMV to buy the music; she is going to buy an album that has not been released in the UK from Amazon.

RU (female, age 21, post-1992 university): RU uses tags – "It's just easier to keep a record of my life" – relationships, clothes, work, poetry and fun sites. She tends not to search for fun sites; instead, she visits ones that her friends pass on. To help organise her life she uses websites such as Transport for London and banking sites. She does not use Wikipedia – she has been told at university that it is inaccurate – and expects that no 'professionals' would do so.

RU does not have any great concerns; she has probably had one or two nasty comments on Facebook, but it "wasn't anything". RU doesn't put anything on her computer that's secret. She doesn't worry about fraud, but thinks that maybe she should; she sees herself as a poor student, so isn't worried about her bank account.

RU uses Skype to talk to her parents, and sometimes also her brother and a friend, because it saves money. Occasionally, she uses a webcam to show her parents something – for example if she has a new haircut or shoes. She says that using the webcam can make the connection falter, so she keeps its use to a minimum.

CF (female, age 19–20, pre-1992 university): CF keeps her personal and university email addresses separate. CF talks to people on different communication services, depending on where they are logged on – for example, if someone is not on instant messaging, she will try Facebook. CF quite likes Facebook compared with MySpace because it is not too cluttered, for example with many applications on a profile. CF checks Facebook every day. Most of the clubs at her university have Facebook groups and advertise special events – she sees if her friends have agreed to go to these events, and then joins up. CF has a Google page customised with what she wants; she picked her theme and has links to the world news, weather, the BBC news headlines and her real age to three decimal places – it is important that everything fits on one page so that she can doesn't have to scroll down. CF uses Favorites for saving websites.

If CF were to buy a games console, she would buy it for the social element, so that she can use it with friends.

JA (female, age 19–20, pre-1992 university): JA's interests include ballet, fashion, diabetes, crafts, puzzles, dogs, vegetarian food, books, romance novels, British literature, e-books, music, psychology, goth culture, hotels, martial arts, cheerleading and home schooling – mainly things she has always been interested in. JA has found many interesting sites on StumbleUpon and tries to keep them organised. (With StumbleUpon, you can say what themes you like and don't like, and it will categorise sites for you.) JA has a StumbleUpon button for whenever she needs it.

Theme 2ii. Learners' technology behaviours: innovative and/or intensive users

[A proportion of learners revealed themselves to be highly innovative and sometimes quite intensive users in the course of case study interviews. These learners covered the full age range, especially including older learners at secondary school and at Thames Valley University.]

CL (Year 5 male): CL developed his own personal website with his dad. He also likes to practise using charts in Excel – an activity that he learnt in class.

- [CL] "I like seeing if I can do it here because I learnt how to do charts on – at [name of school] so – I wanted to see if I could do it here, so if I have to do anything to do with charts, I can just go ahead... I tried to remember it until I was able to go on the computer, because I'm only allowed on it

sometimes. And then once I'm allowed to do it, I decide... I'm gonna see if I could try and do my own charts, so I just do it."

CL explains that he is one of the only people on Club Penguin to have figured out how to give his penguin a proper username other than Penguin 2342432 – "I'm probably the only one who doesn't have Penguin-something. I'm XXXX."

DJ (Year 5 male): DJ's older brother (middle of three, age 17) is described as being very clever, and also has Asperger's. DJ's brother designs web pages and uses instant messaging to talk to people around the world to aid his language learning.

- [Mum] "He's not just interested in how a language – how you speak a language – he's also interested in how it came to be. […] and he's got Spanish friends saying 'Oh, I did this today at college – am I saying this right?', because he's got a webcam, and sort of 'Am I pronouncing – is my pronunciation good?' So he's got Spanish people in Spain saying yeah, that's fine, or no, you need to do this. So the way he uses the computer is fantastic."

CO (Year 9 male): CO is not a very intensive user, because the shared computer contains mostly a number of things that his brothers use.

FR (Year 9 female): FR sends emails in a foreign language to her cousin to practise for her GCSEs. The computer interface is written in this same language, because it is her mother's laptop and her mother's native language; this also helps develop her language skills.

FR uses YouTube only to look up certain things, such as hymns. She also uses Excel in an innovative way to test mathematical formulae and create working models.

UD (Year 9 male): UD is a very advanced user of a football game on Playstation, after playing it for a long time.

UD organises all his Internet links under a Favorites tab.

OJ (Year 9 male): Dad asked OJ to make a website for him, and within two days it was done.

- [Mum] "Some things [OJ] asked [older brother] – how to do it – and he said do that, do this."

- [Dad] "He didn't follow anything, he just – he didn't follow any course on this."

OJ is very advanced in his choices: he chooses Mozilla over Internet Explorer because he thinks it is better; he uses advanced add-ons on Firefox, such as low script which blocks Java; and he uses a site called Dig, which is a bit like a targeted StumbleUpon, with links to articles and so on. He also uses SurfTheChannel to watch TV episodes.

OJ's dad says that OJ knows much more than he is taught in school.

MO (Year 11 female): MO's mother says that her IT teacher thinks MO is doing very well, and she is very comfortable using a computer. MO uses UltimateGuitar.com to practise guitar chords. She recently merged four photos in a decorative manner in a frame to give to a friend as a birthday present.

RU (female, age 21, post-1992 university): Multiple uses of Internet: own blog, website.

CF (female, age 19–20, pre-1992 university): CF discusses work on instant messenger, to bounce ideas off friends. She also uses instant messaging to catch up with friends at other universities and to arrange things. CF talks, about work, on Facebook to people on her course if they are not on instant messenger – she can ask questions.

CF likes to have appropriate (eg motivating) music on in the background when she is working. She finds podcasts of lectures really useful to get information and reiterate lecture notes; she listens to podcasts more when she is revising. CF visits BBC iPlayer daily – "It's better than paying for a TV licence". (There is no television in the house.) Sometimes, students in the house watch the laptop together.

JA (female, age 19–20, pre-1992 university): JA has two university email addresses (she swapped course and therefore received a second email address) and a Hotmail email address that diverts to Thunderbird (because she dislikes the way Hotmail is set up online). JA prefers to use open source programmes because they are more reliable and customisable – for example, she has added diaries and dictionaries to her Thunderbird page. JA also checks Gmail on Firefox. She prefers Firefox to Internet Explorer because it blocks pop-ups, is more reliable and has a selection of add-ons. JA also uses a 'You and your wedding' forum to get ideas, for example about venues, for her forthcoming wedding; she posts frequently and gets responses in 30 seconds, and shares advice with others.

JA is a StumbleUpon addict. "If there's nothing to do, I start Stumbling! It's fairly addictive". She explains that you find something that will be really interesting and then you just click again. Has 'weddings' saved as a keyword. Thinks StumbleUpon is great because it finds a large number of things that she will never find. Particularly likes weird and wacky home décor. Used to teach Year 7 maths club while at

secondary school, and used lesson plans from the Internet, because she thought these would be more fun.

JA visits FanFiction.Net, where she reads Harry Potter stories; she can choose which one to read (out of 300,000) by setting her preferences.

JA uses OneNote to organise her wedding (she would have used the open source version, but received this version free from a friend who worked at Microsoft). She has made notes about useful ideas gleaned from StumbleUpon. JA finds music for her wedding through Stumble, and then listens to it on YouTube to see whether she likes it.

JA is part of the Sims community forum, where she can download items to create her own content – she owns every expansion pack and soft pack, and obtains global hacks from the forum. JA uses websites to obtain Sims resources and mods (modifications that affect the game). JA, her partner and her sister collaborate on the Sims via email (people don't play Sims together online), with each person focusing on a different aspect (houses, people, etc); the three cannot sit together, but email games or swap computers. JA gets engrossed in house building and can easily spend an hour doing it: she finds Sims even more addictive than StumbleUpon.

Theme 2iii. Learners' technology behaviours: formation of future learning careers through personalised home technology activities

[This section gives evidence of the ways in which young learners show intensive engagement with new technologies.]

UD (Year 9 male): UD's mother thinks that the skills he is learning, such as typing, are vital for a successful career.

GU (male, post-1992 university): In GU's home, his father set up an extensive network – each member of the family (father, mother, brother and GU) has his or her own private technology setup.

GU became interested in using music recording technology when he was quite young and carried this through to university.

- [GU] "It's always been technology. Technology since I was… since as far as I can remember, I've always been into technology. I've always loved different kinds of equipment. I started my whole music production like when I was 12 when I first got my first computer. […] I was producing music on that P400 computer; it was a P400 PC and running Q-base."

  "The university taught to me to open my mind a bit more to everything

else, a lot more stuff. […] I've learnt Final Cut Pro – I've learnt that quite well, and I'm using that very well now – audio- and video-editing software. And I feel more confident in doing maybe video editing… I'm thinking about doing my masters in video production."

GU seems to have fully integrated his uses of technology into daily life, even when engaging in studies that are not primarily technological in focus:

- [GU] "Yeah, yeah, or I read a book or whatever, and I have the ideas, so I'll get there, write it… do a lot of writing until 2 'clock in the morning and then I'll go, okay, leave it like that, go to bed, and then at 4 'clock in the morning I'll wake up – oh, okay I have another idea, I'll get back on the computer again."

CF (female, age 19–20, pre-1992 university): CF signed up to a Royal Navy group at university for fun, although this might turn into a possible career. She looked up how to shine shoes for this group.

JA (female, age 19–20, pre-1992 university): JA considered changing her course to architecture, but couldn't find one available. She has been designing houses on Sims for years, and has become very good at developing them – she looks at architecture plans on the Internet to design her houses and at photos of houses to base designs on. JA thinks her sister will do an architecture course at university, and, as JA is now doing a business degree, they may be able to join together to create an architecture business in the future.