

INFORMATION BEHAVIOUR OF THE RESEARCHER OF THE FUTURE

A British Library / JISC Study



THE LITERATURE ON YOUNG PEOPLE AND THEIR INFORMATION BEHAVIOUR

Work Package II

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Introduction

This document examines the literature from a wide range of sources – including academic research papers, articles from professional magazines and opinion pieces from library bulletins etc. – to elicit information on the information behaviour of young people. A specific aim was to establish whether there has been a change in the way that teenagers (and young undergraduates) approach information, libraries and research, occasioned by advances in and, as importantly, the *availability* of ICT (information and communications technology) applications. Of major interest is in the exploitation of Internet search engines – particularly Google – and use of portable ICT devices that can be used for information retrieval.

In order to test whether there is any evidence to suggest that today's young people are different from earlier generations, evidence from several different source-types were examined. These include:

- Contemporaneous comparisons between teenagers and older users (Bilal and Kirby, 2002) or between a wide age-range of young people (Shenton and Dixon 2003a, 2003b, 2003c, 2004)
- Accounts of current activities of teenagers in which changing behaviour may be assumed because the subjects use technology not available in the past (e.g. Agosto 2002, 2005; Borgman *et al* 1995)
- Historic (1990s) studies of teenage information behaviour (e.g. Sjoberg 1999; Pivek 1998; Soloman 1993) which may be compared to later papers examining this topic (such as that by Agosto, 2005 or Corradini (2006), although it is difficult to compare studies, as they are seldom replications of earlier work.
- Commentary / opinion articles, such as by journalists (e.g. Knight and Manson, 2006), librarians (e.g. Pavey 2006), or students themselves (e.g. Windham, 2005), often based on personal experience.
- Miscellaneous material, such as from market research (e.g. Synovate, 2007), and reports of as yet unpublished work (e.g. Rodgers, 2007).

Not including market research or other miscellaneous material, 86 papers were reviewed and analysed for this Work Package. Of these, 49 involved original research 'in the field' (e.g. Borgman *et al*, 1995, Cooper, 2002); seven reviewed past literature on the subject (e.g. Hsieh-Yee, 2001) and 24 were commentary / opinion articles. There were also six 'false drops' – articles retrieved which dealt too peripherally with the topic being investigated here to be of interest.

This paper reviews first the study literature and then the opinion pieces. The study literature review concentrates on research into young people's use of and ability with ICT in their information behaviour, and their exploitation of other sources. There is also a section on use and perceptions of public and academic libraries. To elicit possible changes in behaviour, these are compared historically, although an Appendix, on page 27, highlights the difficulties in comparing studies in this and other ways.

Following this, opinion and comment pieces are considered. Much opinion, anecdote and, frankly, hype are currently circulating on the subject of 'The Google Generation'.

Rather than simply outlining these, specific claims are taken from these articles, and examined in the light of the research evidence to see the extent to which they can be validated.

It is hoped that by taking this ‘twin-track’ approach of looking first at academic research, and then at anecdote and opinion – and holding this up to the light of research findings – a detailed and authentic picture of the characteristics of the Google Generation and how they differ from previous cohorts, may be established.

Statistical summary of studies reviewed

This section details sample size, age ranges studied, and methods used.

Sample size

Sample size	No. studies
0 - 10	1
11 - 20	8
21 - 30	6
31 - 40	4
41 - 50	5
51 - 60	2
61 - 70	0
71 - 80	0
81 - 90	1
91 - 100	0
101-200	6
201-1000	6
>1000	3
Not given	7

Total	49
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As can be seen, virtually half (24/49) of research studies reviewed had sample sizes of 50 or below. Indeed, of the 15 studies with 100 plus subjects, five represent what is almost certainly the same sample of 188 children aged 4 to 18 years, from various schools in the Whitley Bay area of the UK, reported on by Shenton and Dixon (2002, 2003a, 2003b, 2003c, 2004). Another study in this category (Soloman, 1993) did not state the exact sample size, saying only that '902 OPAC transactions performed by about 500 students were observed A few children from each grade were observed' (p248) although whether an exact number is required in such an observational study is open to debate. Other studies with more than 200 participants were all survey based, including one (Livingstone et al 2005) where a questionnaire was delivered face-to-face.

The qualitative work, of course, used smaller samples, although the studies by Shenton and Dixon mentioned above, which used a sample of 188 employed qualitative methods - quite a large number for this type of research. As with qualitative work generally, it is hard to generalise from some of the very small-scale studies (such as that by Fidel, 1999, Agosto, 2002 or Hirsh, 1999), who worked with 8, 11 and 10 subjects respectively.

Sample age ranges

Age range	No. studies
<5	3
5 - 6	6
7 - 8	9
9 - 10	15
11 - 12	28
13 - 14	23
15 - 16	21
17 - 18	15

19 - 20	4
Under-grads (age undefined)	4
Post-grads (age undefined)	2

[Note: $n > no.$ of studies, as many studies had subjects in more than one age category].

A point of interest here is the large number of studies that took place in an educational setting. This is not surprising with regard to children up to the age of 16 or 18, although, in fact, papers by Agosto (2005, 2006)¹ and Holloway and Valentine (2001) did not study this age group in a school context. However, all (10) of the studies which looked at young adults, were university-based. As Large (2005) has pointed out, 'In comparisons between young people and adults, ...[research] ... has focused very heavily on university students, who may not be the most interesting group to compare with children and teens. It would be revealing to see how children compare with less well-educated adult populations whose language manipulation skills, for example, may be different from those in the university community'. (p359)

Methods used

Method	No. studies
qualitative - interview and/or observation only	17
qualitative - multi-method	11
qualitative and quantitative - multi-method	10
quantitative - multi-method	2
quantitative - survey	9
literature review	7

1 Agosto's (2002) paper does use a school setting, however.

commentary only	24
Total	80
false drop	6

Of note is the large number of qualitative studies. Almost all the papers reviewed here used a qualitative methodology. Much of this work employed several data gathering methods, including observation (Soloman, 1993), video observation (Large et al, 1998); scrutiny of work resulting from Internet or other research (Large et al 1998), and open questionnaires (Corradini, 2006). Indeed, only nine of the forty research papers reviewed (e.g. Peter and Valkenburg, 2006, Gardner and Eng, 2005, Pivek, 1998 and Costello et al, 2004) report findings from studies not incorporating at least one qualitative method.

The academic research evidence

Most academic studies examine the behaviour of the current (or contemporary) cohort of young people (e.g. Agosto 2002, 2005; Borgman et al 1995) without comparing results with those accrued historically. There is a, perhaps surprising, lack of literature comparing age groups, and those that do (e.g. Shenton and Dixon 2003a, 2003b, 2003c, 2004) tend to focus on ages within the general range of general education, rather than comparing teenagers with people in their late twenties or thirties etc. Nevertheless, of particular importance for current purposes is an outline of how young people behave – whether this is reflected in the practices of their elders is of secondary importance.

Use of information technology

Purposes

Studies of how young people use information technology – generally in the form of the Internet - in their everyday lives began appearing in the late 1990s. Early studies show that its use for educative purposes by young people began early. Williams, (1999) noted, for example, that more than 50% of a state-school class of primary children he interviewed turned to the Web to help with homework. Lorenzen (2001) found that high school students were similarly exploiting the Internet, and noted that sources appeared to be ‘official’ – online encyclopaedias, newspaper sites, institutional sites – although thought was given to evaluating web sites for accuracy etc (about which, more below. More recently, Levin and Arafeh, 2002) claimed that young people use the Internet for ‘dozens of different education-related uses’ (pii), including as a ‘virtual tutor ... textbook and reference library ... (and) study group’ (piii). Weiler (2005) found in his study of motivating factors behind students' dependence on television and the

Internet for their information needs, that the Internet had become the first source of information, whether it be for personal, academic, or professional information.

Away from a pedagogic setting, early studies (Sjoberg, 1999; Pivek 1998) found that the Internet was being used for many other tasks. In one early study, Sjoberg (1999) found that the Internet was already being used for many tasks, with communication being a major use. 'The 'school yard' was no longer the obvious meeting place for young people (p129). A similar finding was made by Pivek (1998), who found that the main use of the Internet is for looking for and choosing friends. Holloway and Valentine (2001) also found this a major feature in the use of a computer at home. D'Esposito and Gardner (1999) added, in research carried out in 1997, that in addition to communicating with and locating friends and relatives, downloading music was a popular Internet pastime - a practice that is still popular. According to market researchers Synovate (2007), the computer is now the most popular device for listening to music (cited by 81% of an un-stated number of respondents), although only 25% listened online. Downloading (41%) has now overtaken music purchased in shops (33%) in people's collections.

In sum, it appears that from the beginning of its appearance in the home, the Internet has been used for educational and recreational purposes, and as a communication medium. Obviously, the technology has moved on and there are now more ways in which these things can be undertaken, but nevertheless, certain core activities have remained constant for at least 10 years, supplemented by activities that were not possible earlier – such as social networking (e.g. on Facebook, for example). Even here, however, there are parallels, with early Internet users enjoying, for example, Usenet's facilities to read and post messages and become part of online communities of mutual interest (Lueg and Fisher, 2002).

The Internet is now, of course, available on an ever widening array of platforms and devices, such as 'PDA, the Tablet PC, and the Ipod' (Shih and Allen 2006: p90). It is perhaps, therefore, not surprising that the Internet is now used more than the TV (Synovate, 2007; Los Angeles Times/Bloomberg, 2007). One interesting observation from the literature (Windham, 2005) is that the 'Net Generation' are more likely these days to log on to a news Web site for the latest information than to turn on CNN on the television'. Of course, the difference here is one of medium, rather than the source itself. The CNN website may well be one consulted in preference to its TV partner – not, therefore, representing much of a radical change. No literature has yet been reviewed which has researched young people's use of blogs or other personal web space sites in terms of preferred news sources, and the distinction between TV viewing and Internet activity is becoming blurred by the presence of TV channels broadcasting entirely or selectively over the Internet (one can now watch BBC News 24 on the web, for example, raising the spectre of one being in the quantum 'super-position' of both watching and *not* watching TV at the same time).

Interestingly, social networking, heralded as the innovation set to 'rapidly chang[e] the face of education' (Baird and Fisher, 2005) may not be enjoying the success that has been assumed in the media (e.g. Walters, 2007). A study by the market research company Synovate found that 'only a quarter of respondents have ever used social networking sites like MySpace and blogging is still very niche (only 15% ever do it)' (Synovate, 2007: unpaginated). However, a Los Angeles Times/Bloomberg entertainment

poll (Los Angeles Times/Bloomberg 2007a) found that half of young adults visit social networking sites, but use drops away by those over 21. Clearly, as with other aspects of the take-up of new technology, more research is needed to establish a clearer picture.

Searching expertise

Much has been said recently about the apparent expertise of children using electronic resources. Indeed, the prestigious Pew Internet and American Life Project's 'Digital Disconnect' (Levin and Arafeh, 2002) was already writing about 'the widening gap between Internet-savvy students and their schools' five years ago, claiming that students were ahead of their tutors in many areas. On the same theme, Hay (2006: unpaginated) opines that 'Net Generation kids tend to be far more comfortable with and more proficient using information technologies than are their parents or teachers'. More specifically, Baird and Fisher (2005: p12) claim that young people are 'technologically savvy' and 'especially adept at quickly scanning a web page and deciding which links hold the promise of producing a 'mother load' of information or valuable content'.

A major goal of the present project is to look at the extent to which young people are, indeed, experts in ICT use, and to elicit from literature of the 1990s and 2000s whether the levels of expertise amongst children of a given age range has risen, with ever more exposure to the technology. This appears to have been the assumption of many commentators, including those cited above and others (e.g. Kipniss and Childs 2005; Windham, 2005).

Expertise in formulating search expressions and generally interrogating information systems (predominantly, of course, these days, the Internet) has been a preoccupation of researchers for a long time. Research pre-dates not only the Internet, but electronic systems generally. Soloman (1993), for example, describes a study by Joyce and Joyce (1970) in which researchers 'implemented a prototype data bank' and observed children using its index scheme to find answers 'that would be sufficient to teach a classmate about a chosen topic' (p247). Studies suggest that, contrary to the popular view, there is little evidence that young people are expert searchers, or even that their search prowess has improved with time. Joyce and Joyce (1970), for example, point to the need for well thought-out classification and display systems to avoid mistakes. In a later study, which approximated an electronic environment a little more closely, Moore and St. George (1991) investigated the information retrieval process used by grade six children (11 year olds) in New Zealand, in an assignment about birds. Much difficulty was reported in selecting search terms with which to find appropriate material from a card catalogue, and participants did not try alternative terms if their original efforts proved unsuccessful.

In the electronic media, Soloman (1993) also found that children had difficulties formulating appropriate terms, due to their 'use of natural language questions (how to build bird's nests); and multiple concepts (horses poetry)'(p259). Spavold (1990) found children were 'less confident' in 'problem-solving' database queries when compiling and interrogating a database of family records, and that their grasp of commands was 'confused and easily forgotten' (p619). With adequate support and training, however, participants in both of these early studies did acquire a certain level of competence.

Later, Hirsh (1999) found that students considered only the presence or absence

of words exactly describing their search topic / matching their search terms in deciding relevance. By focusing so narrowly on this aspect of material retrieved, they missed many other relevant documents. Hirsh also found that students did not use advanced search facilities or navigation aids. Chen (2003) also noted difficulties in formulating search queries, claiming that 'Children and youth' have trouble generating alternative search terms / synonyms (when the original terms prove fruitless) and often repeat the same search several times. Not surprisingly, they also had difficulty narrowing a search. Also unsurprisingly, research consistently suggests that students do not plan searches in advance (Bilal 2001, Large et al 1999, Shenton and Dixon 2004).

One manifestation of the lack of query formulation is the prevalence of full phrase searching by young people (as noted above, by Solomon, 1993). A review, for example, of the search logs associated with children's (given) search tasks indicated that 20 of the 32 children used 'full sentence requests, such as, "What are the three most common crimes in California?" and "How to reduce crime in California?"' in their query formulation (Schacter et al, 1998: p847). Other researchers (e.g. Chen, 2003; Bilal, 2000) have also noted full phrase searching in young people's query formulation.

It would be tempting to attribute this activity with the rise in the accessibility of the Internet. The Web, of course, may be searched with impunity using natural language (Searchenginewatch.com, 2005). This is taken to its logical conclusion in 'Ask.com' (previously 'Ask Jeeves') which encourages users to enter full phrases as search terms (an example in its help file is 'the following search example should successfully lead you to the desired information: 'where can I find cheap airfare to New York?' (Ask.com, 2007, unpaginated). However, a scrutiny of the literature shows that the practice of formulating queries in this way pre-dates the web. Marchionini (1989) is one researcher who noted such queries on a CD-ROM encyclopaedia. Younger subjects ['3rd and 4th graders', or 8 and 9 year olds] were more likely to use actual sentences to query the system (p61) although many older participants (10-11 year olds) also adopted this practice. From her review of the literature, Valenza (2006) concluded that students appear to assume search engines understand sentences and questions.

Valenza (2006) was particularly concerned with young people's understanding of the way information is organised, the presentation of results, and differences in search interfaces. She sums up previous literature nicely in saying that children have only a 'limited understanding' of these aspects of ICT use, citing Fidel et al 1999, Bilal & Kirby 2002, and Chen 2003. In conclusion, it may be that the general lack of increase in expertise in information retrieval may be due – ironically - to the perceived ease with which digital systems (as exemplified by the Web) can be searched. This is because there appears to have been a consequent lack of support by teachers and other carers. A common theme of several studies (e.g. Bilal & Kirby, 2002; Hirsh, 1999; Fidel, 1999, Oblinger and Hawkins, 2006) is that more training is needed to enable effective use of digital technologies.

Evaluating electronic resources

One area of current interest, and, indeed, concern, is the way young people evaluate information from electronic sources. Again, there is little evidence that this aspect of information has changed over the last 10 or 15 years. Two main criteria dominate the literature: relevance and quality/authority. With regard to the first of these, Chen (1993) was suggesting nearly fifteen years ago that teenagers did not review information retrieved for relevance (in this case from an online database) and, consequently, undertook unnecessary supplementary searches when they had already retrieved required information. Later Schacter *et al* (1998) found that the speed of young people's web searching also indicated that little time was spent in evaluating information (a result also found by Chen, 2003). In another study from the late 1990s, Williams (1999), observed information-seeking stopping at the point where articles were simply found, rather than perused, especially with regard to younger users. Little regard was made to the text itself – a word in the title, or an appropriate accompanying image was enough to confirm relevance. Maintaining this trend into the 2000s, Merchant and Hepworth (2002) studied the research habits of 40 pupils from 10 – 16 years, and found that teachers complained that when their charges found articles using difficult language, 'they just print off or copy down and hand in,' (p84). Hsieh-Yee (2001) reviewing literature on Internet use generally, also concluded, from a resume of papers on children's usage behaviour, that they had difficulty judging the quality of Web pages.

Researchers have similarly found a lack of attention young people give to the issue of authority. Hirsh (1999), for example, found that students did not consider issues of authority of source when evaluating websites. Grimes and Boening (2001) found in a case-study of 50 'freshmen' students in the USA, that participants evaluated Web resources in terms of quality of information 'only superficially, if at all' (p19). In fact, they were 'ill-equipped and unwilling to evaluate resources' (p20). Lorenzen (2001) found in his interviews with 15 to 17 year olds, that many thought that if a site was indexed by Yahoo it had to be authoritative, and so the question of evaluating websites did not arise. A later study, by Shenton and Dixon (2003c) found that there was no attempt by anyone (in a sample ranging from 4 -16 years) to check the veracity of information found. Later commentators (e.g. Oblinger and Hawkins, 2006) have expressed concern about this problem.

It should be noted, however, that D'Esposito and Gardner (1999), claim that in their qualitative study of 14 mainly undergraduates (admittedly, older than the school-aged children studied by Shenton and Dixon), participants used many criteria for evaluating the quality of website and the reliability of the information: 'authorship or page ownership, links to other sites, and the possibility of validation from other sources' (D'Esposito and Gardner 1999: p458). However, in this study, participants were asked what steps they undertook to evaluate material. Studies such as that by Shenton and Dixon (2003c), in which participants were observed rather than prompted; or those such as by Schacter, Chung, and Dorr (1998), where participants are asked simply to rate information, consistently find that evaluative skills are barely in evidence.

Use of library and information services

Regarding use, understanding and awareness of library services, literature reviewed indicates that even in the mid-2000s, large numbers of young people are unaware that libraries offer Internet access. A recent study by Corradini (2006), for example, found

that only 42% of youngsters knew this, despite being library users. Indeed, the image of the library was still 'almost completely bound to its traditional printed materials' (p490). The international 'OCLC' (Online Computer Library Center) (2002) found that although 70% of university students used their library Web sites for some assignment-related information, only 20% did so for most assignments. Full-text articles are used the most often (67%), with electronic books (21%) and online reference (6%) being used the least often. However, a full 90% of students also use their library's print resources, again reinforcing the view that the library is still seen as predominantly print-based. A contrasting survey in the UK by Myhill (2007), which found that the library OPAC and university web pages were well-used – especially by students in their final year – may have been due to the study design, which consisted of an online questionnaire hosted on the library website.

Findings indicating a lack of appreciation of the electronic services of libraries reflect those of earlier studies, and appear to indicate little change in terms of young people's perception of libraries. For example, in D'Esposito and Gardner's (1999) study of undergraduates' perception of the Internet, although participants acknowledged that the Internet was available in the library and that library Web pages were accessible on the Internet, 'the general perception was that the library and the Internet were two separate and unrelated entities,' (p458).

Early studies also corroborate later work with regard to the perceptions of 'libraries' and 'the Internet'. Fidel *et al* (1999) found that for his small sample of 11th and 12th grade students (17 and 18 year olds) a visit to the school library was time consuming and labour-intensive. Study participants all preferred to research information independently on the Internet. This attitude appears to have continued. Pavey (2006) claimed from personal experience, that children often arrive at Higher Education level never having used a library. Even where the library is acknowledged to have a variety of electronic resources, these may not be well exploited. In an opinion piece, Lippincott (2005) claimed that students often found 'library-sponsored' sources of information difficult to negotiate, and so preferred to use the more simplistic Google.

Opinion, assumption and anecdotal evidence

Introduction

Apparent differences in the information behaviour of current and earlier teenagers is often claimed by authors writing opinion pieces, much of it based on personal experience or opinions and often lacking in empirical evidence (e.g. Kipniss and Childs, 2005; Geck, 2006) or inferring differences from data which might not necessarily support them (Gardner and Eng, 2005). This section tests these views against the body of empirical evidence accrued from the research literature. Meanwhile, it is worth noting some general assumptions made by opinion and commentary pieces. First, the cohort of youngsters discussed is generally considered as a homogenous body – indeed, hence a group name 'Google Generation'. Second, everyone seems to be equipped with the latest gadgetry – iPod, laptop, mobile phone connected to the Internet etc., and will have been brought up on a diet of ICT. None of the literature reviewed discusses young people who do not wish to be surrounded by technology or do not have the resources

to do so. Third, there is an assumption that the students are overwhelmingly dedicated to studying (see e.g. Gardner and Eng, 2005) and are happy to invest time exploring information sources for the most appropriate in order to carry out their assignments. As described below, there is much evidence to refute some of these assumptions.

The claims

Google Generation show a preference for visual information over text (e.g. Kipness and Childs, 2005)

There is certainly a strong liking for the visual in picture form, but text still carries a lot of influence in conveying information (the popularity of texting – even over voice messages – testifies to this fact). Text still rules – but there are new forms of grammar emerging. A new form of short-hand text communication has emerged online together with the use of visual symbols to convey emotion. This is a form of substitution for the lower form of ‘social presence’ (Short *et al* 1976) offered by online texting compared to face to face communication. The growing popularity of video cameras and live video links via the Internet demonstrates that as people of all ages become more confident with ICTs, technologies improve and costs reduce, video links may come to replace text links in the social networking context. This may be significant in Higher Education as well for certain types of communication between tutor and student, where face to face links are more reassuring than text links. It is worth noting, as Sullivan(2005) does, that audio and visual forms of information presentation are hardly new: ‘Audio and visual methods of storytelling and learning have served a vast population for many ... millennia’. (Sullivan, 2005: p58)

There is also an issue within this topic about reading. There is an underlying theme in the commentary and opinion pieces written on the topic of young people and information technology, that reading is eschewed these days in favour of computers, videogames, digital music players, video cams, cell phones, ‘and all the other toys and tools of the digital age’ (Prensky, 2001: unpaginated). Prensky cites unreferenced figures that ‘today’s average college grads have spent less than 5,000 hours of their lives reading, but over 10,000 hours playing video games (not to mention 20,000 hours watching TV)’. Similarly, Kipnis and Childs (2005) opine that, because of this use of and familiarity with digital media, ‘providing documentation that is text heavy is a disservice to the students’. (p27)

In fact, there is evidence that young people are reading more than previously, despite the additional attractions vying for their attention these days. The BBC (Rodgers, 2007, unpaginated) cites (as yet unpublished) research from Dale Southerton of the University of Manchester, that

‘people in the UK are reading more than they did a quarter of a century ago. ... while Britons spent just three minutes a day on average reading a book in 1975, by 2000 this rose to seven minutes. And when magazines and newspapers were taken into account, Britons were reading five minutes more every day in 2000, compared to their 1970s counterparts.’

The article adds that 'The new findings fly in the face of many people's assumptions about modern Britain'. The market research company Synovate also found in a survey on how young people spend their leisure time, that books are read regularly by 49% of respondents, and 41% read magazines regularly (Synovate, 2007).

The news that young people are reading is not surprising, when one considers the 'Harry Potter' phenomenon. Both the latest (and last) in the series 'Harry Potter and the Deathly Hallows' (Rowling, 2007) and the earlier 'Harry Potter and the Half-Blood Prince' (Rowling 2006) both contain no fewer than 608 pages, and 'Harry Potter and the Order of the Phoenix' (Rowling 2003) is even longer, consisting of 768 pages containing 255,000 words (BBC, 2003). Despite the mammoth effort required to read these tomes, sales have been enormous, with more than two million copies of The Half-Blood Prince being sold in the first 24 hours in the UK (BBC, 2005).

Clarke and Foster (2005) undertook a survey of over 8,000 primary and secondary pupils in England, to explore why some pupils choose to read and others did not. They found that 'half the sample of pupils said they enjoy reading either very much or quite a lot and rated themselves as proficient readers. The majority of pupils read every day or once/twice a week. Pupils generally held positive attitudes towards reading – agreeing with statements that reading is important and disagreeing with statements that reading is boring, hard, or for girls rather than boys' (Clarke and Foster 2005: p2).

Even when electronic media are considered, there is some evidence that text is not eschewed by young users, simply because information may be presented in other ways. Apart from studies by Fidel *et al* (1999) and Large *et al* (1998) which showed children opting for textual information in order to complete assignments more effectively, Loh and Williams (2002) show that text may be as interesting to children as other media even when there is no pressure to complete school work. They looked at children's perceptions of Web design elements and features they considered 'cool'. The researchers concluded that 'content was more important for children than presentation; the novelty colour, sound, and animation may initially draw children to a Web site, but after the novelty effect faded, it was interesting content that motivated children to return to the site'. (Quoted in Large, 1998 p364).

Even if it were the case that young people prefer visual information, it could be argued that, rather than be a disservice to them by continuing to provide information in this way, as suggested by Kipnis and Childs (2005), the disservice would actually be to accede to such wishes. According to the US National Institute for Literacy (NIFL 2007) 'The ability to read and understand complicated information is important to success in college and, increasingly in the workplace. An analysis of the National Assessment of Educational Progress [U.S. Department of Education project] long-term trend reading assessments reveals that only half of all White 17 year olds, less than one-quarter of Latino 17 year olds, and less than one-fifth of African American 17 year olds can read at this level. By age 17, only about 1 in seventeen 17 year olds can read and gain information from specialized text, for example the science section in the local newspaper. (Haycock and Huang 2001). Clearly, therefore, it is still the duty of educators to promote literacy – in its narrow sense of reading text – to young people.

Google Generation want a variety of learning experiences, and are used to being entertained (Kipniss and Childs 2005; Hay 2000)

Information media must be interesting or they will fail to be used to their full potential, which is simply to restate the above in a slightly different way and to expose it as a tautology. Some library commentators argue that gaming technologies, for example, should be used to engage users in new and exciting ways (e.g. Squire, 2005). However, great care is needed here. There are analogies with work conducted on broadcast TV news 20-30 years ago. Newsmakers increasingly used entertainment show production techniques to the detriment of news content (Postman, 1985; Gunter, 1987; Robinson and Levy, 1985). These techniques enhanced 'interest' but impeded learning.

The research literature on young people's use of information technology in their learning suggests that in the case of assignment completion at least, what was more important than entertainment or interest was to finish by expending the least amount of effort. Large *et al* (1998) for example, in an admittedly older study, found that young people seldom used the multi-media resources when searching to solve school-based tasks, as it was harder to extract the exact information required. Fidel *et al* (1999) found this also. The children he observed 'kept exploration to a minimum, and ... ignored entertaining diversions on the screen, such as moving images' (p28) in order to complete tasks. This behaviour was even more marked in the study by Large *et al* (1998), mentioned above, where moving and still images were almost ignored in the quest to find text that could be printed out and used to answer a set task. However, there was evidence in both papers that when students were not under any obligation to find specific information, they 'often relied on information that was displayed in a graphic form ... as if they were abstracts or even indexes to Web sites. They inferred from graphics what the sites were about and whether or not they were likely to be useful' (Fidel *et al* 1999: p35).

There is some indirect evidence to refute the claim that today's young people don't like being passive recipients of information (Kipniss and Childs 2005) or that they want to learn through exploration (Windham, 2005). In fact, as noted above, many examples are found in research studies that showed a distinct disinclination to explore. Those already mentioned relate to the Internet / CD-ROM and electronic resources generally. This appears to be a manifestation of a general inclination to take the easiest route possible in undertaking tasks. Shenton and Dixon (2003, 2004) for example, found that in researching for school assignments, pupils used the same sources (e.g. same website) used over a number of searches. Unsurprisingly, these were often the most convenient or accessible sources used (e.g. a reference book at home). In fact, there were several ways in which seekers attempted to simplify the search process in order to expend the minimal effort (e.g. first sources were frequently those used; only one search term used; quality of information rarely assessed or corroborated). Similarly, Fidel *et al* (1999) found that students kept exploration to a minimum, even ignoring multimedia in an effort to complete tasks with the least effort possible.

Away from academic study, an interesting poll by Los Angeles Times/Bloomberg into TV watching habits is worth quoting at length. It found that 'about a third of teenagers [aged 12 – 17] said they didn't have TiVo or any other recording devices, but those who did, a third are still watching the *same* number of TV shows at their scheduled times, while

another 13% said they are watching *more* shows at their respective time. However, a fifth said they are recording shows and watching them on their own schedule. Nearly half of the young adults [aged 18 – 24] said they don't have any recording devices, but 23% are watching the *same* number of shows at their scheduled times, while 12% are watching *more*. While about a fifth are recording shows and watching them at their convenience' (Los Angeles Times/Bloomberg, 2007b: unpaginated). In other words, only 20% of teenagers and young adults are 'time-shifting' their TV viewing.

Google Generation have shifted decisively to digital forms of communication, preferring typing to handwriting (e.g. Frand, 2000), messaging to talking on the phone (e.g. Windham, 2005).

It is almost certainly true that many children are acquiring advanced key skills, both for using mobile phones and computer keyboards, but the popularity of messaging is probably determined largely by its low cost relative to voice, so it is difficult to see this as a fundamental trend. Windham's (2005) assertion that today's students eschew the telephone may also only be partially true. She claims that 'it's not that we can't use the telephone ... it's just that doing either is so much more difficult. Using e-mail to set up meetings, ask simple questions, or send in excuses for absences has become so commonplace that few students turn to anything else' (p56). Although not explicitly saying so, it seems clear that the communication here is between student and university staff. By contrast, Agosto and Hughes-Hassell (2005) found that many of their sample of (younger) respondents (aged 14 – 17) expressed only 'limited interest in communicating via computers (Internet, e-mail)' [feeling that (cellular)] telephones were more convenient and afforded increased personal contact' (p154), albeit the study looked at general information-seeking, and did not focus on communication with superiors/staff etc.

We are not aware of any research that really digs deep into these issues. Anecdotally, it seems likely that many children would prefer to type an assignment rather than use handwriting, but the deeper question raised above cannot be answered at the moment, we think it is still wide open.

Google Generation 'Multitask' (e.g. Windham, 2005) and are good at this (e.g. Long, 2005).

There is some evidence for the former - according to a Los Angeles Times/Bloomberg poll (Los Angeles Times/Bloomberg 2007b) 'about three in five teens and young adults said they prefer to multitask rather than focusing on doing one thing at a time. Multitasking relieves boredom, according to more than half of those who said they prefer to have several things going at once'. However, there is no hard evidence (indeed, this appears to have been a neglected area of academic research) into whether young people 'multi-task' more than other age groups or whether they are adept at handling a number of simultaneous information streams together. Also, there is little evidence to support the extent of multitasking claimed by some commentators. The idea that 'many young people today are accustomed to watching TV, talking on the phone, doing homework, eating, and interacting with their parents all at the same time'

(Frans 2000: p18) is, frankly, faintly ridiculous – although such claims are common. To give another example, Long (2005: p187), claims that whilst doing homework ‘the iPod is in the ear listening to music. Instant messaging is going on with a variety of other kids via some sort of handheld device. The phone is cradled between head and shoulder for conversation ... and the PC is cranked up to the Internet’. It is no surprise that with such extravagant and persistent claims, there is a general assumption that young people can multitask with ease.

Google Generation are impatient and have zero tolerance for delay, information and entertainment needs must be fulfilled immediately (e.g. Johnson, 2006: Shih and Allen 2006)

We feel this is a truism of the age in which we live and crosses all generational boundaries in the digital environment, as CIBER deep log studies have shown time after time. The speed of new media has cultivated a lowered tolerance for delay. Furthermore, the “anthropomorphization” of technology (Luczak et al 2003) means that users respond to computerised devices in the way they do to people. Users assign personalities to technologies, especially interactive technologies, and expect them to respond in the same way. There is no evidence that we are aware of to suggest that young people are more impatient in this regard than older people. All we can do is to repeat the obvious: that older age groups have memories that pre-date digital media experiences: the younger constituency does not.

Google Generation find their peers more credible as a source of information than authority figures, hence their intense interest in social networking and the effectiveness of viral marketing. (e.g. Manuel 2002)

On balance, we think this is a myth. It depends of course on the specific context: the popularity of social networking does not provide evidence per se that immediate peers are valued over authoritative content, merely that technology is being used to cement existing social and collaborative networks, extending them where necessary.

Research in the specific context of the information resources that children prefer and value in a secondary school setting (Madden et al 2005) shows that teachers, relatives and textbooks are consistently valued above the Internet for helping to complete homework assignments. We feel that this claim is not incisive: it seems to have more to do with social networking sub-culture and teenagers’ naturally rebellious tendencies. Its specific application to the world of education and libraries is pretty questionable.

Google Generation need to feel constantly connected to the web and their social and family networks (Frans, 2005).

This may be true of some, but not all users. The significance and nature of these connections will vary as a function of the user’s personality and background and some will develop a stronger dependence on social networks than others (Lenhart, 2007,

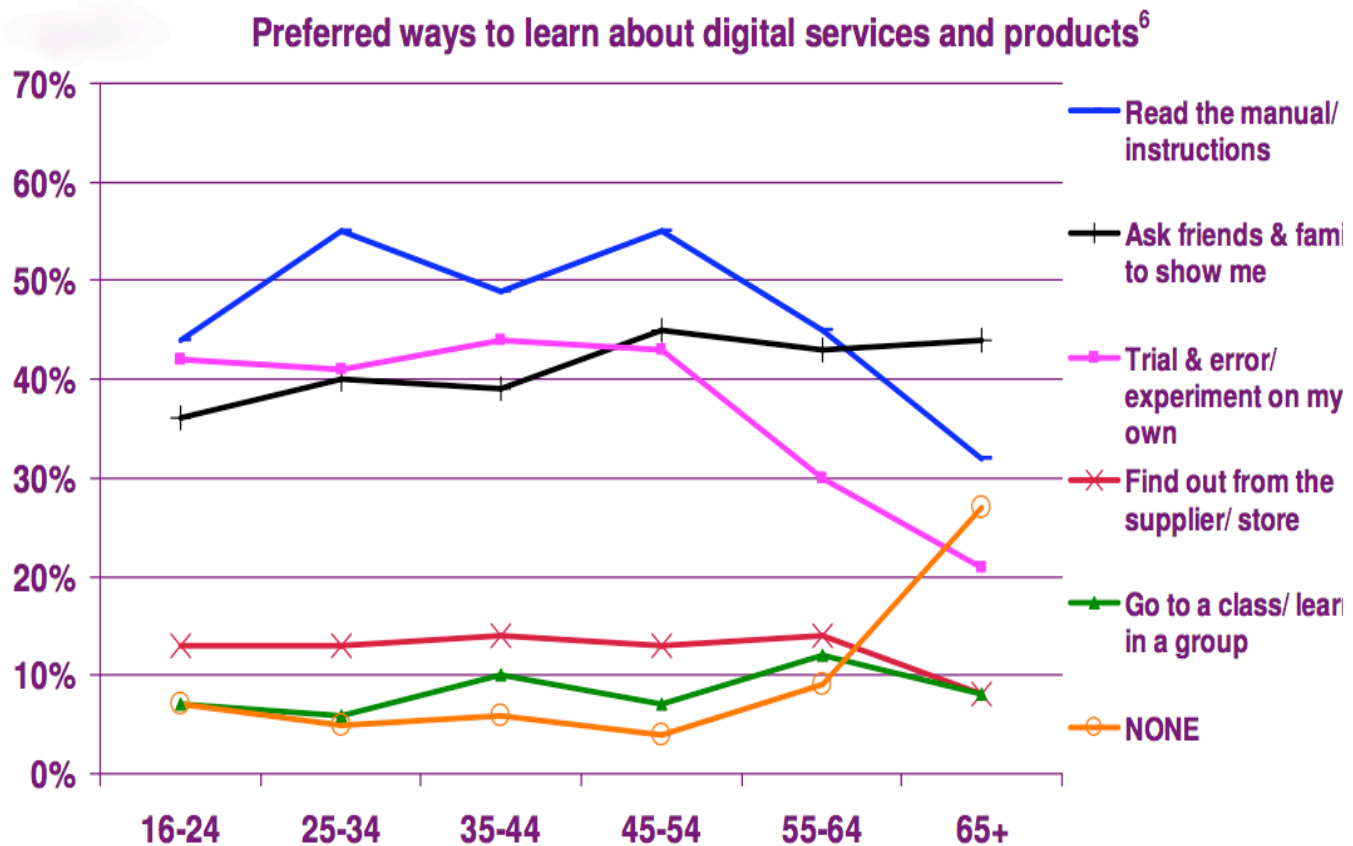
Lenhart et al, 2005). Older people are also catching up fast in terms of their use of online networks:

“Lots of people think that older people are not plugged into the digital world. This is clearly wrong,” said an Age Concern spokesman. “Many are extremely engaged with the Internet and use it regularly to keep in touch with family, to shop and take part in communities”. *Daily Telegraph* 23 August 2007.

We are not aware of any detailed research on this topic, particularly into people’s motivations for going online at different stages in their lives: which web services they use, when, why, and how they value the online experience. Newly released data from Ofcom (2007) reveals that the over-65s spend four hours a week *longer* online than 18-24s so, while we may agree with the general sentiment, with exceptions, we are more than a little sceptical that this is a specific Google Generation trait.

Google Generation learn by doing rather than knowing: while their elders are still reading the manual, Google Generation teenagers are cracking the problem by trial and error rather than by scientific method (e.g. Lippencott, 2005; Long, 2005)

There appears to be very little difference between 16 year olds and their parents, according to the survey findings by Ofcom (2006) below.



As can be seen from the graph, digital platform learning behaviour appears to be significantly different for the over 55s but this does not confer the Google Generation with any special status.

Google Generation prefer quick information in the form of easily digested short chunks rather than full text

There is overwhelming evidence from CIBER deep log studies of a distinctive form of information behaviour associated with students. Compared with faculty, they conduct many more sessions but view relatively few pages. They rely on simple thematic (rather than author) searches and are actually less likely than staff to view abstracts rather than full text. However, both students and staff share a general tendency to shallow, horizontal, 'flicking' behaviour in digital libraries. Power browsing and viewing are the norm for all: reading appears to be only occasionally undertaken online, more often offline or not at all. In the strict sense of a specific Google Generation trait, we think that this claim is not supported. We all do this, and there is no reason to suppose that young people read more when they were required in the past to flick through hardcopy journal volumes.

There is considerable evidence to support the view that many students do not explore information in any deep or reflective manner. The lack of any evaluative efforts on the part of information users has been documented above. According to Levin and Arafeh (2002) most students stop searching at 'good enough' rather than trying to find the best source etc. Some 'view the Internet as a way to complete their schoolwork as quickly and painlessly as possible, with minimal effort and minimal engagement (For some, this includes viewing the Internet as a mechanism to plagiarise material or otherwise cheat, a practice described by Valenza (2006) as 'slacker culture'

Google Generation have a poor understanding and lack of respect for intellectual property, as exemplified by illegal music downloads, the remix and rampant plagiarism (Shih and Allen, 2006; Frand 2005).

This seems to be only partly true. Both adults (83%) and children aged 12-15 (76%) self-report that they are aware that there are illegal as well as legal ways to access films, music and computer software on the Internet (Ofcom 2006), so we cannot posit 'poor understanding' on the younger generation. There are telling age differences when asked whether illegal accessing of online content should really be illegal:

Age	Should be illegal	Should be legal	Don't know
>54	67	20	13
16-24	40	50	10

It is worth noting that the issue of illegal copying has not just arisen with the advance of the home computer and the rise of facilitating soft/hardware. Concern about music copying, for example, goes back to the early 1980s (if not earlier) when the British Phonographic Industry (BPI) ran a 'Home taping is killing music' campaign, putting that slogan on record sleeves and in the music press (Dixon, 2005). With regard to software copying, an anti-copyright infringement advertising campaign run by the Software Publishers Association (SPA) Don't Copy That Floppy began in 1992 (Wiseman, 2007)

We are not aware of any long-running surveys on this issue, so we do not know whether this gap will persist or close in the future. If it does persist, it will raise major issues for libraries and the information industry.

Google Generation are format agnostic and have little interest in the containers (reports, book chapters, encyclopedia entries) that provide the context and wrapping for information `nuggets'.

This may be true of some young users, but certainly not all. We have not found any studies that address this important issue even obliquely, so we feel this one is still **wide open**. It is a hugely important issue for libraries and publishers, which makes its neglect in the research literature surprising.

In the future, presentation will still be important in the online environment. There is an expectation that when online, the world becomes more interesting because the technology offers potentially more diverse and interesting styles of content presentation. Future educational applications will need to recognize this fact and react accordingly. The idea, often referred to in the online news context as shovelware, of migrating offline content online in a form as close as possible to its original offline design will not generally work. The online world promises more and must deliver to be successful. But we certainly know at present, from e-books research, that offline printed books are preferred for cover-to-cover reading, while reference books that are dipped into here and there transfer best to the online environment.

For the Google Generation, virtual reality may be as real as the real experience (e.g. Frand, 2005).

This is probably a myth, since we cannot believe that younger people have a different understanding and experience of reality than their parents or grandparents. It is however generally salient to the project in the more limited sense that some libraries are experimenting with virtual reality environments in an attempt to better integrate their physical library with their digital resources and services.

Any blurring of what is real and what is virtual could though eventually become an issue in virtual worlds of the massive multiplayer variety such as Second Life. Here there are real business transactions taking place involving virtual money that can be converted into real money. Although it is clear that you are in a fantasy computer animated world, nevertheless there are real people underlying the avatars and some transaction are 'real' in the sense that they can cost you or make you real money. In a learning context, the virtual becomes 'real' if genuine learning transaction are taking place that determine the award of qualifications that have real world recognition. So this is a complex issue and

the impact of such virtual worlds on their participants could be very real in some circumstances.

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Appendix: Methodological issues

A number of factors complicated this project, which we feel are worth describing. Particular constraints include:

- Different environments/methods etc.
- Problems with samples
- Evolving technologies and user profiles
- Terminology differences
- Poor quality of some of the literature
- Poor desk research

Different environments and methods

Large (2005), sums up this problem. He says that 'Some studies have been conducted in operational settings related to actual class assignments (for example, Large, Beheshti, & Moukdad, 1999 ...), whereas others opted for an experimental environment where the children were presented with a task by the researchers ([e.g.]... Bilal's studies [2000, 2001])' (p358). Large (2005) also notes that various methodological approaches have been adopted, although generally children have been assigned the search task by an adult. In addition, not all studies describe the tasks the students were performing, yet these tasks are likely to affect searching behavior (Marchionini, 1989).

As Fidel *et al.* (1999, p. 24) point out, undertaking this task related to the information-seeking behaviour of children and teenagers 'is not an easy task because each study examined users of a certain age, ability, and socioeconomic level. These factors are likely to affect searching behaviour and therefore prevent a comparison among the studies.'

Problems with samples

Unrepresentative samples

Following from the above, Hsieh-Yee (2001) makes a similar point to Fidel *et al.* (1999) by, saying that 'the web population keeps growing and changing, making it very difficult, if not impossible, to find representative samples'. Large (2005) has states that, 'in comparisons between young people and adults, ...[research] ... has focused very heavily on university students, who may not be the most interesting group to compare with children and teens. It would be revealing to see how children compare with less well-educated adult populations whose language manipulation skills, for example, may be different from those in the university community'. (p359)

Determining sample ages

There are also difficulties with determining sample ages in terms of when studies took place and, therefore, when participants were the ages stated. In a study of the current sort, where it is hoped to tease out differences in behaviour between participants of various ages over a number of years, it is important to know when the research was

carried out and exactly what the age groupings of the samples were. This problem is compounded by two factors:

- A time-lag between the research and its publication
- Research incorporating wide age ranges

Regarding the first of these, many studies do not indicate when the research was carried out. In other cases, there are instances of a quite substantial time lag between the research and its reporting. Shenton and Dixon (2004), for example, report on a study carried out during 1999-2000 in a paper published in 2004. Enochsson's (2005) research on the development of children's Web searching skills poses a similar but more serious problem. Her paper, published in 2005, actually covers fieldwork undertaken from 1998 to 2004. Other authors have also undertaken studies that have taken a number of years to complete. In Borgman et al's, (1995) study, for example, experiments were conducted over a 3-year period at three sites, with four databases, and with comparisons to two different keyword online catalogues' (p663).

Enochsson's (2005) paper also highlights the other major problem making comparisons difficult – that of using a wide age range. Her sample ranges from 6 – 17 years. Much of her discussion labels participants as 'older' or 'younger'. It is difficult to establish (except through quotes age-tagged) where the boundaries are between age bands. In Enochsson's case also, of course, there is a question over when the respondent was this age. Do ten year olds of 2004 behave the same, in an electronic environment, as ten year olds did in 1998? Shenton and Dixon (e.g. 2002, 2004) and Soloman (1993) also use such labels, but at least it is clear in each case when the research was carried out.

Evolving technologies and user profiles

This problem is a direct result of the aims of the project – to see how technology has changed the information behaviour of young people. Large (2005), sums up the difficulties perfectly. 'Children now in the early grades of elementary school may have grown up with the Web Research conducted just a few years ago, however, may have involved children and teenagers for whom the Web was a new phenomenon ... This makes it difficult to know whether findings from studies conducted, for example, in the late 1990s describe current conditions. ... Unless and until the Web reaches a plateau, both in terms of its availability and its technical development, it will be necessary, at the very least, to take account of when individual studies were conducted' (Large 2005, p375). This is also a point made by Hsieh-Yee (2001), and is related to the point above about knowing when studies were undertaken.

Terminology

Terminology is another problem that is apparent in reviewing previous literature. One major aspect of this is that of interpreting terms used in defining the sample. The present project chooses 'Google Generation' for those born in 1994 or later, 'Generation Y' (born 1978-1993), and 'Generation C' (born 1978 or earlier). Google

generation' is a label also used by Myhill (2007: p5). There are, however, a plethora of names and age bands in the literature, including:

- 'Neomillennials' (Baird and Fisher (2005); undefined, but the text refers to 'today's student' (p5); and the 'current generation of learners' (p10).
- Generation X': students who were born between 1965 and 1981, and Generation Y are students born 1982 to the present (Kipness and Childs 2005: p26)
- 'Net Generation': undefined by Williams (1999), whose study centred on 11 year olds (who are now 19); defined by Costello as members of Generation X and Generation Y); born in or after 1982 (Gardner and Eng 2005); undefined 'children' (Hay, 2000); undefined but apparently current higher education students Lippincott (2005)
- 'Generation D': Claimed by Shih and Allen (2007) to vary from beginning dates from 1977-1982 to ending dates from 1994-2003. 'Most research identifies Generation-D with the birth of the PC in 1981 and the end with September 11, 2001' (p90)
- 'Chip Generation' (Sullivan, 2005, citing Abrams, S. Luther, J. (2004), consisting of 'users' born between 1982 and 1990
- 'Generation Z': Geck C (2006) (undefined)
- 'Generation @': 'those teens and twentysomethings who could toggle before they could toddle' (Knight and Manson, 2006)
- 'Digital Natives'. Defined as 'Our students today' (Prensky, 2001: unpaginated)

There are also problems related to how information-seeking behaviour and other study topics are reported. For example, there are many ways of describing searches that are not completed or which yield no or irrelevant / inappropriate documents. Soloman (1993) uses the term 'breakdown' in this context, which he describes as 'an interruption in the flow of normal activity that can either be overcome with some effort or serve as a lasting blockage to progress' (1993: p250). In contrast, 'failure is a much more constrained conception that implies deficiency, inadequacy, or stoppage' (1993: p250). Similarly, searching more than once on the same search is described in different ways. Bilal (2000, 2001) uses the term 'looping' (described as 'reactivation of previously visited Web sites and/or of previously executed searches' (2000: p650), Spink et al (1998a, b, 1999) prefer 'successive searching behaviour', defined as repeated searches on the same or evolving topic. Fidel (1999) also does not use the term 'loop' – he simply describes the operation '[some participants] just started a new search with the same keywords, expecting to see the same results page as before.(p28).