Information Obesity
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Information Obesity

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Computer and information literacy

Once they start offering courses, you know the field is dead.
Stephen Fry, Making History

This chapter explores education’s response to the changes ICT has wrought on our environments. In line with the previous chapter I term these “computer literacy” and “information literacy”. The latter term is now in common use, but the former is used more for convenience’s sake, and I do not claim it has definitive status in the field.

Many books exist which deal both with the specific content of computer literacy education (e.g. Kennewell et al., 2003), and with the use of ICT in other subjects from the primary school (McFarlane, 1997) through to university education (Laurillard, 2002). This reflects a long-standing issue. Should ICT be a subject in its own right (“computer studies”, in earlier parlance) or something that seeps into all other subjects? This question has never been properly resolved (see the chapters by Watson and Cox in Passey and Samways, 1997). In any case, it is impossible to review every initiative from 40 years. I stress then that this is not intended as a history of computer and information literacy; instead I selectively focus on certain initiatives as examples of different approaches, illuminating them with the help of the environmental model and assessing their contribution to information obesity – for better or worse. I want to show how a great deal of computer and information literacy education struggles to incorporate the two types of value identified as important at the end of Part 1 – objective and intersubjective/community value – and instead promotes mainly relativist and subjective means for countering perceived defects in how learners exploit ICT and information. It is then the task of Part 3 to explain, in more detail, why we must get beyond these limited approaches.
The typical educational policy response to ICT is based on economic arguments. Worldwide, the case is made that individuals and workforces must improve skill levels to remain competitive. It is further argued that computer literacy is a significant part of this portfolio; perhaps the most significant at this time. Where skills are lacking in individuals or the workforce, responsibility is often laid at the door of the education system, cast as outdated, unwilling, or unprepared for the challenge of educating the workforce of an information society. What follows is a representative selection of quotes illustrating this view. First, from 1982, Fred Williams (in Robins and Webster, p. 1987: 108):

“Our schools, with their assembly line instruction and even their bells, are a holdover from the industrial age... Yet we are depending on them to train our youngsters for life in a clearly developing postindustrial era of high technologies.”

In 1985, his namesake Shirley Williams MP said (Beynon and Mackay, 1992: p. 129):

“The ability of the education system to match the needs of the information society for highly educated people has now become the main determinant of a country’s employment prospects.”


“...current educational methods and policies “are not producing the stream of managerial talent which business and industry currently requires...”.”

Fast forward to 2005, and an unidentified US project manager (Zeller, 2005: 2):

“People want to ensure that colleges are actually preparing students for the future, the future being an information society.”

Finally, the Partnership for 21st Century Skills (2004: 1) warns of the competitive threat from emerging Asian “tigers”:

“Americans cannot be complacent about improving the quality of education while competitors around the world are focusing on preparing students for the demands of this century.”
With such pressures in favour of change, and a belief that the benefits of computer literacy education are manifest, why is the field characterised by “missed opportunities” (Capel, 1992; an excellent review of the first 20 years of computer literacy education in the UK1)?

From the early 1960s, as reported by the British Computer Society in 1974 (see Capel, 1992: p. 39): “any introduction of computing techniques into schools was partly stimulated by the growing career potential in the computer industry”. Teaching computing was therefore oriented to producing programmers, engineers and other computer professionals. In a subsidiary way it was also recognised that computers could help develop mathematicians and scientists, but again, the orientation was towards training specialists. Computer use was frequently restricted to mathematics lessons and/or mathematically-gifted pupils. Despite ongoing research into the way computers could be used to deliver teaching, particularly in the USA2, computers were not cheap or accessible enough for them realistically to be used in teaching humanities or arts subjects. At this time, number-crunching, and simple programming in the BASIC language, were what computers were best at (see the example of the Sinclair ZX Spectrum, below). There was no convenient e-mail or Internet, office programs such as Lotus Notes were only just emerging, and Microsoft’s era of domination (and resultant standardisation) was half a generation away.

Computer literacy education was therefore restricted by the existing educational infrastructure. Qualified ICT teachers could not simply materialise, they had to be trained, and that needed both an organised system of training, and agreement on how relevant qualifications could be accredited. Mathematics and science graduates would have typically been “good with computers” because they would have been more likely

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1 This chapter does have a bias towards the history of ICT skills education as played out in the UK setting. I ask non-UK readers to forgive this stance but I believe the UK case is at least a representative one. Links are provided on the website to resources and thinking tasks which will enable readers to explore the experience of their own countries.

2 The development of the PLATO system at the University of Illinois from the 1950s is a fascinating story. It shows that many of the “educational technologies” we assume to be fairly recent developments, like chat rooms and online quizzes, were first explored using PLATO over 40 years ago. It is also a good example of the instrumental approach. The search for something like PLATO was a direct response to the “GI Bill” which entitled veterans to college education, and other factors which contributed to a big rise in student numbers after World War II. The rise made it viable to seek technological solutions to the problem of managing the education of more students without there being an equivalent rise in funding. (See van Meer, 2003.) All of this is relevant to the use of ICT in education but to keep this chapter manageable I do not discuss it in detail.
than social studies graduates to have used them at university. When computers could be afforded, it made economic sense to install them in the teaching spaces used by these teachers. It would therefore have been difficult for a teacher in another subject, however enthusiastic they were, to access, explore and develop their own understanding of what ICT could do in their classroom. Wellington’s paper on computer studies teacher training (1984) highlights this; he observes that in 1982 there were as few as 26 trainee teachers in the whole of England and Wales who were specialising in computer studies.

However, even early in the subject’s history, it was recognised that “computer literacy” should include more than technical skills. The BCS (see above) recognised that as computers provoked changes in society, they were relevant to social studies curricula. One attempt to introduce study of the social and organisational conditions into which ICT emerges was informatics. Innovators such as Langefors and Longworth (Capel, 1992: pp. 50–4):

…developed a course based on the study of information rather than the computer... The pupil should be less concerned with how the computer works and more interested in establishing it as a tool for manipulating information (a view which has been developed throughout the 1980s and now established within the National Curriculum).

However:

Although Longworth’s course was probably one of the most notable departures from what could be described as mainstream computer appreciation, it never gained wide currency. The course was wide-ranging, cutting across subject boundaries.... This seemed to testify to the strength of a traditionally subject-based curriculum... which was able to resist pressures to break down barriers between subjects...

Capel (1992: pp. 49–50) reports that 1970s maths and science teachers found discussion of ICT’s potential social implications to be “woolly”; meanwhile, social science teachers were reluctant to get involved in what they considered a science subject. This is not to say informatics did not emerge as a subject, but once it did, it put up its own barriers between itself and other subjects. As McGarr explains (in press), resistance to diffusing computer literacy skills throughout the Irish curriculum came
from informatics teachers, concerned about eroding the status of their own specialism.

Though informatics seems to prefigure information literacy (see below), it can easily turn into what amounts to the study of the design of sociotechnical systems. This has its uses. For computer professionals such as systems analysts, it is an important part of the portfolio of skills required in such a job. But as a result, informatics is no more likely to result in a critical view of ICT than is learning programming. What this word means here can be illustrated by comparing it with US initiatives (described in Jonassen et al., 2003: pp. 123–4) to implement “critical [TV] viewing curricula” in the 1970s:

...to ensure that elementary and junior high school students (especially) did not just watch TV, they monitored it.... Most of these critical viewing curricula taught children how television and television production work, the components of entertainment television stories, the purpose of commercials and how to view their claims critically and become informed consumers, how their lives differed from television characters', that television violence should not be imitated and how to get the most from television news programming...

Nowadays we would probably call this media literacy, and the term is significant. It was believed that such underlying critical knowledge about a medium is what really indicated “literacy” in that medium, not just the skills needed to operate and consume it (which in TV’s case, as noted in Chapter 4, are instilled in us without the need for formal education). However, a sign of the relative priorities here is that “only a small minority of children have ever been exposed to these critical viewing curricula...” (Jonassen et al., 2003). In fact the existence of “media studies” is often considered evidence that teaching has gone soft or overly liberal, draining resources and students away from more important science and engineering work.

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3 The field of participatory design (see Bijker, 1989; Schuler and Namioka, 1993) acknowledges this point, though only partly; it is discussed further in Chapter 11.

4 See http://education.guardian.co.uk/chooseadegree/story/0,,1864452,00.html (last accessed 23 Jun 2008) which reports a 2006 announcement from Cambridge University that qualifications in Media Studies will no longer impress admissions tutors. Also, the report says: “This month ministers complained that there are more students taking media studies at A-level than there are taking physics”. Whatever one thinks about the relative value of these subjects, this serves well to illustrate governmental values: mediated (note the word) by the writer of the report (Francis Beckett, 4 September 2006).
This has been just a sketch of the earliest forms of computer literacy education, but they reflect long-standing institutional difficulties in defining what ICT skills education should be, and tensions resulting from external pressures to produce learners with specific skills; a lack of resources and/or trained personnel; and internal institutional factors such as the way education is organised around disciplines and the inflexibility of teaching space. But counterexamples from the same period do exist, and I want now to present two. One is anecdotal, drawn from my experiences in the 1980s in the UK. The other was documented in Science by Nevison (1976) and concerns the policy at Dartmouth College in the US in the 1970s.

I started secondary school in the UK in 1980, around the time that the first cheap home computers came on the market. These were produced by small companies and to many readers their names may mean nothing, but to people (especially men) of a certain age, names such as the Commodore 64, Dragon 32 and Sinclair ZX Spectrum will evoke memories of rickety hardware, non-existent graphical user interfaces and blocky graphics. (On the website is a short film made in homage to the Spectrum, showing how primitive it now seems; the film also makes some points about empowerment which will be repeated below.) They retailed, in real terms, for around the same as a lower-end laptop does today, so at the time remained beyond the reach of many families, but nevertheless were the first really accessible home computers.

Also on the website are copies of advertisements for these products – four from 1983 and one from 1980 (all from The Times). Some of the claims are comical now (the Dragon’s “truly massive 32K of memory” would hold a two-page Word file), but they remain interesting historical documents, particularly regarding how these consumer goods were marketed. Educational motivations come to the fore, sometimes quite explicitly: for instance, the ZX Spectrum advert dated 13 July 1983 reads:

The Government’s “Micros in Primaries” scheme is introducing more and more microcomputers to Britain’s 27,000 primary schools. All of these schools are offered subsidised computer packages based on three approved computers – the BBC Model B, Research Machines’ 480Z and the Sinclair ZX Spectrum.

The trouble is, that even though the computers are subsidised, there are likely to be more children than computers – which means that each child gets only limited time to use the computer. The solution, of course, is to buy one of the approved computers and
carry on the good work at home. By far the cheapest of these computers is the Sinclair ZX Spectrum.

Several things are apparent from this extract. First, only certain models are “approved”. (Software written for a Spectrum would not work on a BBC, nor any other model, even if written in the same BASIC language.) There is an implication that time spent at a computer, regardless of how it is used, is a good thing, worth investing in; also the idea that the investment will supplement school resources.

The Commodore Vic 20 advert lists its applications in an order that was presumably calculated to appeal to *The Times*’ readership. Note, however, the enthusiastic comment at the end, which betrays another principal marketing point:

The VIC 20 has educational programs for all ages (spelling, physics, arithmetic etc.) plus music, typing, chess and home accounts. There are special programs like Robert Carrier’s menu planner and BBC “Mastermind”, and not forgetting, of course, lots and lots of wonderful arcade games.

Did I play games on my home computer? Yes, but here we start to get to the point. No home computer these days would be advertised, at least outside the specialist press, with copy like this:

The ZX80 cuts away computer jargon and mystique. It takes you straight into BASIC, the most common, easy to use fundamental computer language. You simply take it out of its box, plug it into your TV, switch it on at the mains – and start. With the manual in your hand, you’ll be running programs in an hour. Within a week, you’ll be writing complex programs of your own, with confidence and competence.

As the film on the website shows, though games were certainly part of this culture, so was writing them (and other applications). BASIC, the language built into the computers mentioned here, is maligned and now obsolete, but it did introduce me and others of my generation to the notion that the computer could be instructed; and that this was a creative act. By the time I left school in 1985 I had acquired enough knowledge to have written my own games (selling a few copies of one) – and enough enthusiasm to study for another 2 years, gain a Computer Studies
qualification, and get a job as a programmer. (University came later, but I won't bore you any further.) In that respect, I suppose, computer studies education had the desired effect. I became a “computer professional”, and the education I received as a teenager directly contributed to my subsequent career.

However, there is an important caveat, which is the point of this story. Until starting technical college in September 1985, I never once used a computer in a classroom. All of my “ICT education” was informal, arising through self exploration of computing books and magazines and from collaboration with peers who shared my interest. It was in school where most of my computer knowledge was shared and communicated, but not in classrooms. There was a definite group of “computer kids” around, and yes, in later times we would have been “the geeks” but regardless of reputation it was a highly active informal learning community based around a shared interest, not only in games playing but in BASIC programming, and sharing our enthusiasm for both. This was also supported by a community-based computer club organised by volunteers. Many contemporaries attended this club along with adults whose own private enthusiasms drove their participation. Around 20–30 of us met once a fortnight. (All were male, I recall.) It was at one of these club nights, in about 1983, that I logged onto the Internet for the first time, though I only remember this with hindsight. (We networked through a modem hooked up to a coin-operated payphone!)

As I said, this is anecdotal, and I cannot draw objective conclusions about the effect this informal learning had on my use of ICT, both at the time and in my future life. Nevertheless it’s an example of how people motivated to learn will find ways of doing so – and of gathering together with others to do so – in ways that do not involve formal educational institutions, qualifications and fees. This happens all the time. Teenagers gather in a mate’s garage to jam on cheap guitars, learning how to play and write songs. Others spend weekends riding horses, or playing football. All show how the community provides resources we can use to learn, and motivate ourselves to learn.

This less formal, community-based approach to ICT education has been recorded within institutions. Nevison (1976) describes how the prestigious Dartmouth College helped its staff (faculty, in US terminology) and students engage with ICT. I find this article fascinating.

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5 You might like to look at the questionnaire on the website, which is a start at collecting data that may help answer the question of whether these technologies made any difference to their users.
as it paints a picture of technology use in higher education that seems decades ahead of its time. In his summary, Nevison writes:

Ten years ago one could have argued over whether undergraduates would really have much use for computing in their liberal arts studies. One could have wondered whether there were many subjects where a conscientious instructor could make significant use of a computer program. One could scoff at the possibility that a liberal arts college would regularly graduate classes where more than 90 percent of its members had used a computer. One could have raised a skeptical eyebrow at anyone rash enough to suggest that a person interested in a liberal education should learn how to write a computer program....

Those questions are pertinent enough now, but the projects he describes took place in the early 1970s! Nevison is discussing a situation in which these skills are not just taught to people but thoroughly embedded into curricula, across all subjects. He also asserts that this has happened without direct management or “training”:

The growth of computing among the students and faculty at Dartmouth has been organic. It has proceeded at an unhurried pace where students and faculty learn to program largely on their own. A new instructor at Dartmouth will find computing all around him. At a faculty meeting about half of those attending will have used computing and almost one-quarter will have included it in their teaching in the last year.

Again, how happy would a manager be nowadays to report such figures! You might think I am over-stating the case: after all, every teacher and student will now use computing at some point. But Nevison is talking of more than low-level use, such as using e-mail and chat, browsing the World-Wide Web and using Word and maybe Excel occasionally. He is talking about significant and relatively technical applications of computing technology in teaching, and to labour the point he’s writing in 1976. And this has not happened through managerial decree, but “organically”, through people exploring this technology for themselves and developing applications that solve educational problems in individual working lives.

So where did we go from there?
“Social impact" approaches to computer literacy implicitly criticise the idea that literacy can develop through learning to program (e.g. Senn Breivik and Gee, 2006: pp. xii–xiv). It is true that programming has firm roots in instrumental rationality. But there remains a creative element. Programs are created to solve problems the user faces. This can be empowering, particularly for the young, as McFarlane says (1997: pp. 10–11):

The fact that the computer behaves differently when the user does something can create a powerfully motivating response. In a child, used to a world where things are largely beyond her control and whose attempts at new things are usually only met with at best partial success, the reactions of the computer may elicit wonder, excitement and a rare feeling of empowerment.

Computer literacy education as defined from the 1990s on retained this idea of “instructing” the computer to perform certain tasks. But the creative, problem-solving aspect is often lost. Instead the aim is to produce “effective users”: which no longer necessarily means “active” users. What was once a limiting but more active definition of computer literacy – being able to write a computer program – has been changed in a way which makes it more accessible, but simultaneously, less active.

The classic example of this approach is the European Computer Driving License (ECDL). The first heading of one ECDL course book which I downloaded in 2006 asks, “What is Excel?”, which is a fair question with which to begin. The next few lines are (bullets in original):

- Excel 2003 is the spreadsheet and data analysis program in Office 2003. It combines incredible power with ease of use, giving both professionals and occasional users the features they need. Excel 2003 is designed in such a way that you can use it as a basic spreadsheet program, and learn more advanced skills as you need to.

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6 From http://www.cheltenhamcourseware.com. In spring 2008 I looked again at their materials for Excel 2007 and there have been some changes in wording, but the basic structure and message of the pack is the same. The fairest thing to do is to check for yourself: use the thinking tasks on the website to do this.
Using Excel as a Spreadsheet

- A basic spreadsheet is comprised of a table of values, some of which are calculated by formulas and functions. Excel 2003 can check your formulas and help you define functions using wizards.
- With a computer-based spreadsheet, you can change a particular data value in the spreadsheet and all the values that are affected by the change are recalculated. To take full advantage of this feature, you should use formulas and functions instead of numbers where possible.

The definitions are recursive, closed. The course exists because learners want to use Excel. No mention is made of why someone may wish to use this technology (even instrumentally, that is, explaining that it can make keeping numerical records more efficient and reliable). The ECDL cares not what people use the technology for; just that they learn to use it. Likewise, its features are simply there; formulas and functions exist and “should be used”.

It is highly unlikely that the ECDL will help anyone develop a critical, adaptable relationship with ICT. We should be fair, and observe that form follows function. Most learners on the ECDL are there for instrumental reasons (MacKeogb, 2003: p. 16). That is implied when the only motivation suggested – twice – in the first paragraph is need. There are advantages to having a standardised qualification, accepted across most of the world, indicating the holder has reached a level of competency with a range of basic ICT techniques. But in an environment where this sort of thing forms a substantial part of the educational response to ICT, it is unsurprising that the quality of society’s informational resources continues to degrade.

This argument has been made before (Reffell and Whitworth, 2002; Garson, 2000; McFarlane, 1997). Why do we often see a failure to meet organisational and personal learning needs in a dynamic, rapidly changing environment “when the specific is transient and the abstract is that which must carry the learner through a lifetime of education and re-education” (Garson, 2000: p. 192)? In other words, why are so many resources still devoted to teaching “button-pushing” skills instead of a wider, creative, critical approach to the use of computers, many successful examples of which exist?

There are two reasons that can be proposed. Firstly, technical skills like those taught by the ECDL will go out of date when the software is upgraded. The courses for Excel 2003 and Excel 2007 are not the same. This is a substantial money-earner for the training companies and
publishing houses which subsist through providing continual revisions of their own products, just as the manipulation of fashion trends is for the clothing industry: it is “planned obsolescence”, a way of persuading customers to buy new products before they may otherwise choose to.

Second, I have already discussed how creativity is not something that the whole of a workforce is required to manifest. The ECDL delivers skills required not by ICT’s active users, but rather its passive consumers, cogs in the sociotechnical machine, given little choice as to what technology they will be trained in.

Robins and Webster, in their review of the UK situation, describe how the Thatcher government greatly strengthened the link between education, “enterprise” (connected firmly to industry and commerce, as opposed to, say, public service work, political activism, etc.) and ICT. For example, they quote (1987: p. 1) a Department of Trade and Industry statement:

Where young people are regularly using technology to enter, use and manipulate information at school, they will be better placed to help industry and commerce to compete effectively.

But in an infrastructure based around the enclosure, rather than dispersal, of informational resources, this does not necessarily mean that everyone will “help industry and commerce compete” through applying the same *kind* of technological skills. Capel wrote (1992: p. 56):

All countries need to spread technological knowledge in order to maintain and improve their productivity. This then requires changes in education and work which can help to create new relations between specialists and non-specialists. However, in a society characterised by systematic inequalities there are also counterpressures to restrict that knowledge and control the form it takes...

Robins and Webster say, “the discourse of ‘computer literacy’ embellishes and simultaneously clouds the real issue on the government’s agenda: *work* literacy” (1987: p. 125), and summarise the situation thus (p. 184):

The striking lack of skills in the workforce originates not in the inabilities of the people, but in the fact that modern industry requires little of its operatives, and advanced technologies, in their conception, design and application, are a major cause of this.
Something like the ECDL, which reduces ICT use to a series of steps which can be performed regardless of the context, removes the need to think about one's activity. Reaching for the “approved” tool can be done, semi-automatically, without needing to think about whether it is the best way of doing a job. Or rather, the decision that it is “the best” has already been taken, embedded into the technological tools accessible within an activity system. Users are not encouraged to develop the skills needed to cope with software that is not on the “approved” list even if they could access it. This is the social shaping of technology applied not only to the machine but to the social frameworks and educational practices which surround it, locking the technology into the wider infrastructure and storing information in our environment about what is approved and what is not, allowing some forms of thinking to flourish but not others.

What of schools, however? The picture is not quite so gloomy here, but there are still danger signs. For the next few pages I draw primarily on the UK situation: again I encourage use of the website’s thinking tasks to help explore your own environment.

When Robins and Webster wrote their critique, a National Curriculum had been discussed in the UK, but not enacted. Now, however, all schools have a statutory requirement to “make judgements on the ‘appropriate use’ of Information Technology in every context” (McFarlane, 1997: preface). What follows is only a summary discussion of the UK National Curriculum (NC) in ICT. For the full definition of all the programmes of study see http://www.nc.uk.net.

On the surface the UK NC uses more positive, creative terminology than the ECDL syllabus. As Kennewell says (Kennewell et al., 2003: pp. 21–3):

Progression in ICT demands that pupils develop greater autonomy and confidence in their selection and use of information sources and tools. They are expected to develop into discerning users of ICT, with increasing awareness of the benefits and limitations of the software they use. They become able to present their ideas in an increasing variety of ways with a developing sense of audience. They use ICT

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7 The UK has introduced a new secondary curriculum, to be rolled out from 2008–2011. I return to this in Chapter 12 as it makes interesting points about the connections between schools and the local community. However, as this is not intended to be a critique of the UK situation, but rather the use of it as a representative example of a state education policy, I do not discuss these new developments in detail, here or later on. They will need to be attended to by anyone working in the UK, of course.
based models of growing complexity for increasingly complex lines of enquiry involving progressively greater decision making and personal autonomy. Their ability to evaluate their own work grows, and they become progressively more able to discuss and appreciate social, economic, political, legal, ethical and moral issues...

ICT capability thus involves more than the secure knowledge and understanding of a wide range of ICT skills, techniques, processes and strategies. It also includes the disposition to construct ICT solutions to problems that are appropriate to the context and are based on knowledge of the opportunities and limitations offered by the systems available.

In summary (Kennewell et al., 2003: p. 35):

progression to more advanced courses in ICT requires a more formal, systematic approach to problem solving.

These skills are (p. 177) “not expressed in terms of specific ICT techniques” but “higher order skills” such as planning, decision making, monitoring and evaluating outcomes. All these developments seem positive. Yet in their preface (xiv), Kennewell and his colleagues observe that in 2002, ICT was highlighted by the UK’s school inspectorate as “the least well-taught subject in the curriculum”.

We have already noted that ICT has not had time to develop intellectually in the same way as subjects like physics, or literature, which have established pedagogical roots and institutionalised teacher training. While many new entrants into the profession will now have some level of ICT skills, and training programmes are available for more established teachers, there can be obstacles in the way of teachers’ being able to take up these opportunities, like lack of time or resources. For professionals, admitting to a need for re-training can be a risky experience. Tanner (in Kennewell et al., 2003: p. 183) says:

...for many teachers the introduction of ICT to their teaching represents a threat to their professional standing. Most teachers are already operating successfully according to their own standards and to the norms of their school. To ask them to change their pedagogy to accommodate ICT is to ask them to take a risk.

Also, while average homes would not contain apparatus suitable for a large-scale chemistry experiment, they may well contain ICT resources
which are superior to those at school; either technologically more advanced, and/or through lower learner-per-computer ratios. Nor, probably, will pupils be allowed to play on a Playstation or use MSN, Facebook or other social networking tools while at school, yet these are already integrated into the way they relate to ICT at home and with their friends. The home and school environments therefore have ICT integrated into them in different ways. (See also Selwyn, 1998 who makes similar points regarding ICT use in higher education.)

I could say things are little changed from the 1980s, where I and my co-learners discovered home PCs and exchanged the results of this interaction through informal networks. Many would see this as a criticism and considered with reference to the huge amount of resources poured into ICT in the last 25 years, it probably is. But we might also see it as supporting the claim – for which there is considerable justification – that we should never rely on the school system to provide a complete educational experience. Despite the efforts of individual teachers, many of whom perform heroics on a daily basis, there will always be a role for community-based, informal learning networks in developing a critical awareness of our environment and the resources within it. I will return to this argument in Chapter 12, as one of the key elements in combating information obesity.

Pupil autonomy is “not the dominant characteristic of secondary education” (Tanner, in Kennewell et al., 2003: p. 11), and despite the potential of the Internet to free pupils from the “controlled learning environment provided by schools” (Tanner, in Kennewell et al., 2003), learner behaviour is often quite rigorously controlled by National Curricula and associated assessment regimes. Assessment is a significant means by which values can be embedded into education: assessment strategies usually make very clear statements about what is to be valued (graded highly) and what not. Anyone who has worked as a teacher or lecturer will agree that it is not always easy to persuade learners to do things that they feel will not contribute towards their final mark. While it’s unfair to say this is true 100% of the time, strategic learning is something every learner does at some time or another – not least because it is a useful step in information filtering. Making it known what sort of knowledge or experience will be rewarded in the final examination is therefore a powerful way of shaping learner behaviour\(^8\). Yet despite these

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\(^8\) On the website are links to websites of UK examination boards such as http://www.ocr.org.uk, http://www.aqa.org.uk, http://www.edexcel.org.uk, http://www.wjec.co.uk, as well as thinking tasks through which you can explore these schemes of work and think about how they may affect learning conducted in their name.
systemic biases against informally-developed knowledge, community-based networks for the construction and accreditation of knowledge will always have a complementary role to play alongside the formal education system. The school/home/community relationship in fact reflects the objective/subjective/intersubjective levels of value formation, and each is therefore a place in which solutions to information obesity can potentially be found.

I want to propose another reason why formal ICT teaching of the kind described and promoted by Kennewell et al. is relatively unsuccessful. Unfortunately, though their book is a useful guide for the trainee teacher, it is presented with no sense of criticism nor romance. No theory of ICT is ever mentioned, nor theories of teaching, except some brief references to constructivism and pupil-versus learner-centred teaching (2003: pp. 40–1). For a book directed mainly at specialist teachers of ICT this is a significant gap, though it would matter even if the audience were teachers just wanting to use more ICT in their own subjects. It is also, I’m afraid, not an inspiring book. I doubt that it will enthuse anyone to teach this subject with verve and passion. If such words seem out of place in teaching ICT as opposed to, say, English or Chemistry: surely that’s the problem? I doubt there is a single pedagogical suggestion in here that would be replicated in Egan’s Romantic Understanding. The two works are almost polar opposites in terms of how they define good teaching. I will take up this line of criticism again in Chapter 10.

Another reason computer literacy education is difficult is the ubiquitous nature of the technology itself. Loveless says (in McFarlane, 1997: p. 141):

The images and expectations of ICT that are held in our society are wide ranging and powerful, both extending and constraining people’s experience and teachers need to consider how these are reflected and acknowledged in classroom practice.

This power stems from the increasing penetration of ICT into the everyday lives of “digital natives”, embedded into environments at a level that is not fully to the forefront of consciousness. It is harder to reflect on what is familiar to us than what is new and unexpected. There may be ways to stimulate a critical approach, however, and do so within what is demanded by most National Curricula. Inspiration can be found in Jonassen et al.’s discussion of the use of TV in education (2003: pp. 125–6). They observe that using TV in education is difficult because:
Children too often watch television to fill time or avoid more cognitively challenging activities. In order for television to foster learning, learners have to have a reason for watching it. They should be seeking answers or confirming hunches, either about themselves or about some problem that is presented on the television program…

But this kind of self reflection and/or problem solving is hard to awaken. Television uses a presentational manner proven to reduce levels of brain activity. We watch TV passively, almost hypnotically: and “leisure television viewing habits appear to be impossible to discard when the content is educational...”.

A proposed educational solution, however, then follows:

More effectively, let students produce video rather than watch television. Producing television programming will engage them in active, meaningful learning because they are solving design problems…. television technology is a powerful learning tool when students are critical users and producers, rather than consumers.... Video production requires the application of a variety of research, organisation, visualisation, and interpretation skills...

Video and other media production require problem solving: to do them well requires critical attention to not just the medium’s technological aspects but its politics, history and culture. Even the act of editing helps show students how the TV industry can manipulate “reality” and have people, for example, appear to answer questions they were not asked. Elsewhere in Jonassen et al. examples emerge of the use of this approach in teaching ICT. One is built around WebQuests, in which the teacher sets an information search task, a kind of “treasure hunt” through the World-Wide Web. (For more, see the website.) Jonassen et al. observe that such an activity can be completed mechanically, students seeking the “right answer” without giving thought as to how it was reached: a kind of sat nav approach to web navigation. But if students are asked to design their own WebQuest, they really have to think about what is out there to be found, what it means, how it can be reached: in short, what its value is.

Linking the activity of information production with the community stock of information leads us towards the sort of project described in my introduction: high school children researching a community-level issue like obesity. Here, we see information resources and technological
interfaces working together to potentially empower a community seeking a solution to a problem. This kind of engagement with information is one constituent of social capital and shows a possible way that education with ICT can regenerate the noösphere at the community level, and contribute towards decolonisation. I return to this idea in Chapter 11.

Yet for all that the multiple and interrelated literacies involved with ICT – and the need for links between community, school and the home – are recognised, there remain institutional “holes” into which worthy efforts continually fall. Consider the experience of Garnett whose “Six ICT literacies” (2008) were developed in the 1990s as a direct response to the UK government’s “National Grid for Learning” project, a massive investment in getting the Internet into UK schools. Garnett’s model is one of the few attempts to explicitly recognise the interdependencies between various literacies. For him, these six literacies encompass:

- **Technical literacies** – computer literacy (here defined as “simple technical competence with a computer”) and ICT literacy (using a computer to access web-based resources and to communicate with others through e-mail).
- **Underpinning literacies** – information literacy (see below) and system literacy (developing in students an understanding of how the web worked, and thus improving their effective use of bandwidth).
- **Composite literacies** – e-learning literacy (the ability to identify learning goals as well as find, contribute to and moderate learning discussion groups) and e-government literacy (a direct response to the UK government’s initiatives to put official documents online, thus risking an intensified digital divide: this literacy would encourage learners to “understand the structure of government online as it would affect their rights as citizens”).

Yet once again, the institutionalised structures of education mitigated against such a broad-brush approach. As Garnett reflects:

> The operational under funding of UK online centres meant that revenue was always a problem. So centres needed to identify revenue streams which usually, but not always, came from Community Learning budgets. This structured learning into existing funding structures for learning. As a consequence newly thought out strategies like the Six ICT Literacies were not supported as they would require separate funding. ICT skills became synonymous with ECDL as there was both funding available and it was also about developing a European standard for ICT employability skills....
Like experienced generals in a new war we use the technological solutions that worked last time... whilst the need for ICT Skills was identified what this meant in practical terms was never thought through. The Treasury-driven underfunding of the revenue dimension of UK Online centres meant that, in the main they turned to existing funding structures to fund learning. So the first new educational institutions of the 21st-century, which were entirely ICT-based, were offered funding if they operated on 20th-century learning models and taught traditional basic skills.

It is necessary now to properly discuss information literacy. This has secured considerable official backing in the last few years and may finally prove a means by which education for information management can find for itself an institutional location. Once again I remind readers that this book is intended not as a detailed “how-to” guide but as a summary investigation of developments over time, reflecting on them with reference to the environmental model. There are many books and resources on information literacy (hereafter, IL) that analyse how it can and should be taught. I refer to some in this chapter and others (particularly online resources) on the website. However, the website does, as usual, contain practical “thinking tasks” which will help those of you unfamiliar with the idea of IL appreciate what it is and why it is needed. You can then explore the more detailed resources on your own.

What is IL? At one level it can be defined fairly simply. The American Library Association (1989) say that:

...to be information literate, a person must be able to recognise when information is needed and have the ability to locate, evaluate and use effectively the needed information.

The next question is why. As Bush noted, technology has improved our ability to publish and produce information, but not necessarily to manage, filter, select and organise it. But this is more than just a skill useful in the workplace or laboratory. IL:

...is described in the Alexandria Proclamation of 2005 as essential for individuals to achieve personal, social, occupational and educational goals. IL skills are necessary for people to be effective lifelong learners and to contribute to knowledge societies. This is why IL was endorsed by UNESCO’s Information for All Programme (IFAP) as a basic human right. (Catts and Lau, 2008: p. 9)
Let us not underestimate the significance of this last statement. It says not just that *some* people should become information literate, but that *all* people should – and that as a basic right, their capacity to do so should be protected and guaranteed. Without doing so, they cannot contribute to society, nor adapt to changing environments (the basic point of “lifelong learning”). Catts and Lau (2008: pp. 9–11) go on to say that IL skills are essential contributors to: national development; health and wellbeing; standards in the education sector; work and economic activity; and civic society (these, especially the latter, will be expanded on below). They also say (2008: p. 13):

The essential difference between ICT skills and IL is illustrated by the distinction that can be made between receiving and transmitting information using ICT and the process of transforming information to create new knowledge (IL) before transmitting the new information.

The information literate person is not just a conduit of information, but is actively using it and enhancing it, for their own benefit. IL, in principle, provides “a framework of knowledge construction that fosters *independent* learning (the foundation of lifelong learning...)” (Andretta, 2007: p. 3, emphasis added).

Declarations such as these define IL as more than just another ICT skill. They give it the status accorded to “simple” literacy in earlier times – an essential foundation of learning. These are bold claims, and not made only by narrowly-defined interest groups. UNESCO – via the Prague Declaration of 2003 (Senn Breivik and Gee, 2006: Appendix E) and Catts and Lau (2008) – directly promote IL, linking it to the egalitarian development of the information society and meeting the UN’s Millennium Development Goals. IL therefore claims for itself a significance that requires, in response, critical analysis of its claims. That is the task of the remainder of this chapter.

The Association of College and Research Libraries (ACRL, 2000) proposed the following influential definition of IL. The information literate person is someone who:

- determines the nature and extent of the information needed;
- accesses needed information effectively and efficiently;
- evaluates information and its sources critically and incorporates selected information into their knowledge base and a value system;
- uses information effectively to accomplish a specific purpose;
understands many of the economic, legal and social issues surrounding the use of information and uses information ethically and legally.

What we have here is IL broken down into a series of steps to be followed by those with information needs. The Cambridgeshire Schools Library Service provide another definition, which shows the stages even more clearly, along with questions that the learner should ask at each stage (McFarlane, 1997: p. 164):

- What do I need to do? (Formulate and analyse need.)
- Where could I go? (Identify and appraise likely sources.)
- How could I get the information? (Trace and locate individual sources.)
- Which resources shall I use? (Examine, select and reject individual resources.)
- How shall I use the resources? (Interrogate resources.)
- What shall I make a record of? (Record and store information.)
- Have I got the information I need? (Interpret, analyse, synthesise and evaluate.)
- How should I present it? (Present and communicate.)
- What have I achieved? (Evaluate.)

These are not the only definitions of IL – Markless and Streatfield (2007) present others such as the “Seven Pillars of Information Literacy” and the “Big Blue Model” – but all tend to describe the process as a series of steps like this. What each amounts to is a procedure for conducting an information search in an environment where securing access to (large amounts of) relevant information is taken as a given. Prior to the information-abundant era, as noted, the educational environment acted as a filter, guiding learners to the information needed to solve an educational problem. Now, where more information is in the ambient environment, the onus is moved more to the learner, to determine filters for themselves, rather than expecting a teacher to do it in advance.

Immediately, issues arise with these definitions. Describing IL as a series of steps does not have to imply a strictly linear sequence (McFarlane, 1997: p. 165), but it may well be taken as such. What may then go missing is the idea of iteration. A search may not be successful first time. Or, once it has been evaluated, that may suggest better sources were available, established either through judgments of effectiveness, or
perhaps through discussion with other learners, sharing experience and pooling search results. From this communication may arise new understandings, perhaps even further problems that in turn require information to solve. But such iteration is not easy to embed into learning. First, because of pressures of time. Second, learners, whether adult or child, may become discouraged by unfavourable results, and not see the need to change basic elements of their searching strategy to be successful. (See Chapter 11 on problem-based learning for some discussion of how to overcome these blockages.)

It may be that students do not have the prior knowledge required to critically evaluate an information source. This may be due to the complexity of the subject matter. Even well-educated people may struggle to keep up with technical debates outside their own field, even if they have a lay interest. When faced by any difficult question, even the most information literate learner still needs a teacher to guide them through the complexities. This becomes even more true when divisions in a field of knowledge are based not only on scientific differences but are complicated by the overt manipulation of opinion. For instance, faced by a manipulatively racist site (see the thinking task and discussion on the website), will a learner have the intellectual detachment to recognise how the site achieves its aims? Especially if they are young and at least half-inclined to be strategic thanks to Big Brother being due on TV and thus limited time to find yet another site on Martin Luther King then condense it into a 500-word paper? These pressures are, in fact, exactly what are exploited by the creators of material such as this: it is ambitious to expect learners to expose them on their own.

Who, then, should facilitate IL? Who is the “learned friend” helping students identify an information need, explaining the complexities of a subject where necessary, and guiding the learner through the search?

IL has been strongly influenced by the idea that it is the province of librarians. Bodies such as the American Library Association and the Association of College and Research Libraries have been prime movers in establishing IL (see Rockman, 2004: pp. 4–6). Patricia Senn Breivik, chair of the ALA’s Presidential Committee on IL in 1989, entitled her book with E. Gordon Gee (2006) Higher Education in the Internet Age; but the subtitle is clear about which wing of HE is considered most significant: “Libraries Creating a Strategic Edge”. Jacobson (in Rockman, 2004: p. 138) says:

Before the term information literacy became current, library instruction, or bibliographic instruction, was the label given to the instruction that librarians provided.
Librarians clearly have a vital role in information management. They have a head start due to their technical knowledge of information handling, and ethical values long embedded in their profession, such as equality and free access. However, the library is not necessarily the ideal institutional location for IL. Libraries, particularly public ones, are under pressure, faced by declining funding that is itself a reaction to the increased availability of information online. Roszak (1994, Chapter 9) made this point and others have done so since, even while seeking to reassert libraries’ importance in the Internet age (e.g. Rockman, 2004; and many others).

Historically, the library has taken a passive role in information management. It serves as an agent between publisher and user, an organiser and preserver of information, and (perhaps as a result of its passivity), occupies a position of integrity and credibility within the educational system (Pradt Lougee, in Hess and Ostrom, 2007: pp. 321–6). But the instrumental returns from libraries are hard to quantify. How would a library’s “success” be measured? If on borrowings, or footfall; even if either could be maximised in the Internet age, this might retard the environmental quality of a library (who would frequent one where all the books were out and which was noisy and busy?). If on the quality of work produced by its users: how could the library’s direct contribution be measured? It is therefore difficult to connect the value of the library to other instrumental motivations driving education in the present time. Libraries still have advocates, of course, sometimes forceful ones; writers like Senn Breivik and Gee (2006) do a good job of promoting the library’s contribution in any case. But the budgetary situation, and the “audit culture”, mean that any widespread allocation of teaching responsibilities to libraries is unlikely, either in schools, universities, or (via the public library system) society as a whole. (It should be noted that initiatives such as “Library 2.0” – see Miller, 2006 – are addressing some of these challenges and trying to give the library a more active role in the information age.)

Instrumental rationality’s tendency to emphasise quantifiable returns may have other effects on IL education. For education institutions, criteria of success vis-à-vis information management may include measures such as the quantity of information resources available, levels of IL training provided to staff and students, and perhaps external inspection (cf. Senn Breivik and Gee, 2006: p. 14). Individuals may then also have their “IL skills” examined through measures of “competence” (Cameron, in Rockman, 2004), indicators (Catts and Lau, 2008), rubrics and so on. Like all indicators, these may well be a valuable resource for
guiding practitioners, but there are both practical and strategic problems with using them. IL could become just another “hoop” to jump through, something else to stick on the e-portfolio, recorded and used as another form of information filter by employers and the like. And if that comes to pass then students will inevitably treat it very strategically. They will, most likely, want to know what the “right answer” is, to ensure that their record of achievement is unblemished. Universities may become judged on the IL scores of their graduates, and gradually, the achievement of high IL detached from the learning it is supposed to support. It may become just another strategic indicator, a rote-learned, quantified set of competencies which we can measure, then castigate those who do not have them (courses, or individuals) as “to blame” for not promoting the “right” set of skills.

If this seems an unfair extrapolation of current trends then remember that IL is emerging into an education system that, as noted, is no longer solely built on the presumption that empowered, flexible learners are its primary product. Recall Robins and Webster’s criticisms (1987: p. 181) that “the process of technological innovation this century has been one which has brought about a reduction in the performance skills of the bulk of workers”. Very little in the “stepwise” definitions of IL suggests something which requires creativity; rather, it has the feeling of a performative or routine response to information overload, a piece of social engineering even.

This is most apparent when IL is touted as the best response to plagiarism, considered a significant threat to the validity of education in the Internet age; particularly amongst university students, though prominent writers and academics have been discredited for using others’ work without citation9, and “even the UN Security Council has begun to use [anti-plagiarism] technology to ensure the originality of commissioned reports” (Senn Breivik and Gee, 2006: p. 149). IL initiatives such as those of California State:

place a high premium on helping students to learn correctly how to represent the language, thoughts and ideas of others... how properly to cite sources, how to understand and respect copyright laws and intellectual property rights... and how to avoid unethical behaviour (Rockman, quoted in Senn Breivik and Gee, 2006: p. 150).

9 In the week I wrote this chapter, Dr Raj Persaud, long a fixture in the UK media, was branded a plagiarist; see http://news.bbc.co.uk/1/hi/health/7452877.stm (last accessed 19 June 2008).
However, might this be another case of a simple solution being proposed to a complex problem? Most students I know are already paranoid about inadvertent plagiarism, and I believe that few incidences of plagiarism are truly pre-meditated. They can also be avoided by better assessment design. On my degree, all assessments involve the students either submitting a draft of work-in-progress, or a project proposal, prior to the principal submission, and/or working on projects that are specific to them, such as writing reflective learning journals, assessing practice in their own school or workplace, or creating websites or other software designed to solve specific educational problems. Plagiarism is not impossible in such circumstances, but it is a lot more difficult than when students are given a question such as “Assess whether Britain’s policy of appeasement contributed to Hitler’s invasion of Czechoslovakia”, an essay which has probably been written thousands of times before, and in any case could easily be written by a third party.

McFarlane (1997: pp. 115–6) also points out that the rise in plagiarism may be a result of the increasing separation between teachers and learners, whether in large universities or elsewhere. Someone who sees a student only as one face amongst hundreds of others is likely to be unfamiliar with their writing style, level of English, and subject knowledge. When marking their papers, how does the teacher know whether it is typical of that student? However, through deeper involvement with the student as a learner, communicating with them on a regular basis, coming to know their personality, style and competence, and seeing many pieces of work instead of just one; plagiarism will not only leap out of a page if it happens, but may be less likely in the first place, thanks to greater personal respect and understanding.

Nothing in these last two paragraphs is the direct result of IL, but that is the point. Plagiarism occurs because of a complex set of organisational and institutional factors connected to the increasing commercialisation of education, bad practice by educators, their employers and students, and information obesity. Not only lecturers and students, but parents, the wider educational community and the consumers of the end-products of education (employers) need to look more closely at why plagiarism happens. It is this kind of critical debate, about the wider impact of ICT on how we make knowledge, which is needed to combat information obesity: but which for reasons that I am concerned with throughout this book, happens so rarely.

10 In early Key Stages of the UK National Curriculum, copying-and-pasting off the Internet is actively encouraged in younger learners (see Parkinson, in Kennewell et al., 2003: p. 159).
That critique of plagiarism policy distracted me from the main strand of my argument, which was the role of libraries in IL instruction. There is another way in which the emphasis on libraries in IL is significant, and I want to spend a few pages dealing with it.

The basic point is that librarians are not subject specialists, but information retrieval specialists. Because of the values embedded into their profession, they cannot help with the creation of new knowledge. That is what teachers do. One needs a base of existing knowledge in order to synthesise and create new knowledge from found information. But as Egan says (1990: p. 237):

Knowing where to find knowledge and “learning how to learn” have their clear educational values, but they become enemies of education if they are used as justifications for reducing the amounts of knowledge that students should memorize; the mind and imagination can do nothing with the library of knowledge one knows how to access when “needed”.

His emphasis on memorisation may seem old-fashioned now, even unpopular, but goes some way to suggesting why examinations remain prevalent\(^\text{11}\). Kohr writes (1993: pp. 94–5) that if intervals between examinations are long, requiring students to keep knowledge in their head for a year or perhaps even longer:

...you have to retain the totality of the subject for so long that it usually stays put for life.

However when intervals between examinations (or other assessments) are short:

Examinations are so frequent, every three to four weeks, that an increasing number of students treat knowledge like hot coal, to be dropped, lest severe damage be done, as soon as the examination is over.

It is when things are retained in the mind that new information has a better chance of being evaluated properly. The prior knowledge one

\(^{11}\) There are other benefits to examinations. It is the one form of assessment where the marker can be almost completely sure that they are reading the students’ own, original work. This alone will probably ensure a continued role for examinations in 21st century education despite the stress they cause.
needs to use to construct new knowledge from information retrieved must, by definition, already be there. This is what allows the knower to better criticise the found information. But if all that matters is “retrieval”, this may promote the assumption that knowledge does not need to be in the head any more, as it can all be found “out there”. This alone should give pause for thought for anyone who thinks IL is the solution to all information obesity problems. Good food nourishes the body – bad food just passes through and does very little on the way. Focusing only on information retrieval not only does not combat information obesity, it may even be a fundamental cause of it. Information is not knowledge: it is the sum total of the “symbolic codes” in which we store knowledge, but without it being worked on by individual minds (with or without the help of others) – and this process takes time and effort – it will not become knowledge in those minds.

Egan links these ideas with the notion that IL is the quintessential “transferable skill” for the information society (1990: p. 46):

One of the stranger, and I think educationally destructive, currents in educational discourse during the later 20th century has been the suggestion that one can achieve some of the finest fruits of learning without actually having to do the learning. This is often connected with the claim that knowledge is doubling every $x$ number of years and so it is pointless to try to teach a great deal of particular knowledge…. These observations then commonly lead to the conclusion that we should rather focus on teaching generic thinking skills. Thus instead of students tediously learning a great deal of factual material, they can instead acquire the skills that will enable them to recognise problems and know where to go to find whatever particular knowledge they need to solve them.

The idea that all one needs to do to learn about something is to retrieve information that has already been created by others is actually no more than the old behaviourist approach to education reconstructed for the Internet age. Students are again being treated as “empty vessels”, minds ready to be filled with the expert’s pronouncements, only now, the role of expert is delegated largely to the authors of web-based material. Even if students are expected to select from a menu of expert pronouncements – or rather, identify what is “expert” by picking through a heap of other stuff, much of which will be trash – their own responsibility and capacity for constructing knowledge is diminished.
I may seem to have been rather critical of IL. Let me say then that I consider IL to be a very important element of practical strategies to combat information obesity. The guidelines that the principal authors provide (and if the preceding chapter has not served to indicate who these are, see the annotated reading list) form the basis of the teaching strategies developed in Part 4 of this book.

I have also taken a rather limited view of the topic, which again I must blame mainly on a lack of space. Some authors, particularly Christine Bruce (1997; see also Bruce and Edwards, 2007), have developed a more rounded view, recognising degrees of IL running from a purely technical approach (with learners expected to mechanically work through the various steps without conscious reflection on why), through recognising its role in individual knowledge-building, up to a wisdom-based conception of IL, in which the learner is being information literate if they are applying learning to help solve environmental problems in the community (Bruce and Edwards, 2007: p. 51). This fits perfectly with the environmental model of information, and will therefore be returned to in Part 4.

But that model also requires us to see the whole environment as an information storage medium. Our absorption of information does not always happen consciously, as the result of an active learning process. Our reactions to information – even our need for it in the first place – are not always placed to the forefront of our consciousness. Possibilities for the use of information are as much embedded into the technologies and organisations that structure our lives as they are into formal learning situations. It is here where I believe most IL theory and practice is currently lacking. I want to show that people are not mentally and cognitively free to define their own information needs, and will not necessarily see the tensions between what they need in order to make meaning in a given environmental situation, and what the constraints are on their doing so. These points need further elaboration, and that is the task of Part 3 of this book.

In summary, this chapter has tried to show how social shaping can apply to the sociotechnical frameworks and activity systems that support a technology, as well as just to the “machine” part of the technology. The values which control the development of that technology set conditions in which certain ways of thinking (both thinking about the technology, and thinking with the help of the technology) are more suited than others. Alternative modes of organising the creation of knowledge may arise at certain times and in certain places; the “Dartmouth” model is one at the level of a university, and my experiences with the Spectrum may have constituted one at the level of a school and community. But such
approaches are now discouraged, through monitoring and evaluation processes which accredit through more instrumental criteria such as financial returns and exam results, and disregard the intersubjective value the alternative methods may have had for the learners.

The tendency in ICT and information education at the present time is to emphasise the economic and instrumental value of ICT to organisations and society, and use subjective value as the basis of the strategies learners are expected to develop as they are turned, by the educational system, into resources for these organisations and society. I suggest that in combination, these tendencies are very dangerous for our future creativity, and therefore, the health of our communities and their informational environments. The value of both objective and intersubjective knowledge in this area are frequently overlooked. Little attention is paid to knowledge, even when developed through sound principles of scientific method, that has over the years warned of the educational dangers of such an approach; and the value of informal, community-based, intersubjective understandings of ICT is almost completely discounted by most educational policy, despite the rhetoric of governments.

I can only repeat warnings made by others, to which I have frequently referred throughout Part 2. ICT absorbs enormous amounts of the education sector's financial resources, used not just as a teaching tool but for administration, strategy-setting and marketing as well (Senn Breivik and Gee, 2006). Education risks becoming obese on this technology just as the military sector has become, consuming resources to little effect. This is quite in opposition to the idea that ICT should allow its users to do more with less: to become more productive, in other words. At the same time, ICT remains something that can liberate at the individual level, free a mind from a fixation on current possibilities and allow creative solutions to be developed. Is this a paradox? Or an indication that we have an educational system in which the creative development of the individual mind is no longer a priority? What can we do about it if the latter turns out to be true?

This contradiction has lain beneath the argument of this chapter. Yet both sides of the fence are agreed on one thing: ICT education is often poor, whether from the instrumental point of view, concerned with the effective use of large investments, or from the more individualist and community-based view which believes it the role of the education system to develop critical, self-empowering and active citizens. The fact that these warnings have been repeatedly made, to little effect, must now itself become the subject of critical enquiry, and is what I will now go on to investigate.