The impact of ICT on literacy & critical thought

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Examining the impact of information & communications technology on literacy and critical thought in the British education system.

Honours dissertation

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Declaration

I, James Greenwood, confirm that this work submitted for assessment is my own and expressed in my own words. Any use made within it of works of other authors in any form (e.g. ideas, figures, text) are properly acknowledged at their point of use.

A list of the references employed is included at the end of each chapter, and a complete bibliography included at the end of the research.

Signed: _____

Date: _____

Reasons for undertaking the research

I am not, through this research, attempting to discredit the role of ICT in education – far from it. As a student, teacher and author, I have enjoyed many benefits as a child of the information revolution that otherwise would have been closed to me; the effect of ICT on *my* education has been profound.

I have, however, seen the state of ICT teaching in British primary and secondary schools, and believe there is considerable room for improvement – improvement that may not necessarily come from cramming more technology into the classroom. My role in undertaking this piece of research is one of advocacy; using my personal experiences, and those of others, to assess how ICT is being used in education, and how it could be better used.

Acknowledgements

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Introduction

ICT expands horizons by shrinking worlds.

- David Brown, Chairman, Motorola Ltd.[1]

No other innovation in human history has made the world seem quite so small as the Internet. It has started (though obviously not finished) to eat away at the barriers to communication that were in place only twenty years ago; a slow and potentially unreliable international postal service, limited and expensive international telephone options, and the almost complete inability for the average person to communicate with a large body of people in another country en masse. As Peter F. Drucker said in his 1999 paper, "in the new mental geography created by the railroad, humanity mastered distance. In the mental geography of e-commerce, distance has been eliminated."[2] Sending a message to Japan from the UK was a process that would have taken months at the start of the 20th century, weeks in the 1950's, and seconds in 2006.

The Internet, when combined with the wider aspects of globalisation, creates a world in which international communication and travel is easier, faster, and cheaper than ever before. You could, for example, after conversing with a friend in another country online, arrange a visit and have the flight, transfers and a hotel room booked within half an hour – all without ever having to leave your computer.

This can only be, in the wider view of humanity, a good thing; people in countries who may not have the level of education they need available domestically may find it more beneficial to study abroad, and may now be more able to do so than they were 10 years ago[3].

When, however, looking at students in the UK, it is not necessarily quite so positive; students in 2005 found themselves not only competing for places in universities with the 444,630 domestic applicants, but a further 77,525 students from the EU and other countries[4]. All indications show the number of international applications is on the increase. Keeping this in mind, surely the focus of the British pre-Higher Education system should be to provide students with an education that meets or exceeds the standards found elsewhere.

Whether or not this is, in reality, happening is one of the focuses of this research.

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[1] Quoted in D*f*EE & QCA, 1999. p.97
[2] Drucker, 1999.
[3] Note that this description is somewhat utopian; foreign students are still expected to pay fees much higher than domestic students at most institutions.
[4] Statistical data from the UCAS Statistical Enquiry Service.
http://www.ucas.ac.uk/figures/enq/index.html

Definitions of terms

In order to properly explore the subject of the research, the technical terminology used must first be quantified and defined.

Information & Communications Technology (ICT)

For the purposes of this research, computing technology will be referred to as Information & Communications Technology, or ICT. In the context of the subject, "ICT" refers specifically to desktop or laptop computers, interactive whiteboards or the internet, unless otherwise stated. This narrow definition does not include mobile telephones, specialist hardware, or other technology not used in education.

Learning Technology

> "The most significant learning technologies are wearable glasses and electric lights, since they enable people to read at any time and throughout their lives."[5]

The term 'learning technology' is, to an extent, interchangeable with ICT as described above, but it only relates to technology used in an educational context. Again, the definition is narrow; it describes only computational hardware & software used in education. Utilising as broad a definition as that offered by Barbara Tuchman (above) would prove problematic when assessing its effect on literacy.

Literacy

> "Literacy can be defined on a number of levels. It is obviously concerned with the ability to read and write but a fuller definition might be the capacity to recognise, reproduce and manipulate the conventions of text shared by a given community."[6]

The definition of literacy is rather a difficult subject, with definitions ranging from the narrow & linguistic (the ability to read, write, and comprehend) to the very broad & cognitive (thinking methodologies, expression and understanding of concepts).

Literacy has also been defined differently over time; at one time people were considered literate if they could write their name. As Linda Langford says, "the needs of society at any time determine how a society interprets a concept […] The concept of literacy really depends on the information needs of the society of the

[5] Barbara Tuchman, as quoted in Withrow, 2004. p.44
[6] Hertrich, 1997.

time"[7]. Over the course of the last century, definitions of literacy have expanded from the basic ability to understand and reproduce the written and spoken word to include bibliographic concepts and principles, through to the new "evolved" linguistic conventions seen online.

It would be unhelpful to look at 'functional literacy' – the term given to the borderline between literacy and illiteracy – as in the context of the research (21st century Great Britain), few students currently in the educational system leave illiterate. Instead, the question is whether or not literacy standards (as set by governmental or institutional bodies) are falling, or whether literacy levels (as held by students at the various tiers of education) are meeting these standards. The cognitive aspects of the broader definitions shall not be included, as they are covered in the 'critical thought' definition given later.

Literacy, therefore, shall be defined for the purposes of this research by the following questions; can students understand the written and spoken word, and utilise it to posit their own opinions, be it in an informal, formal or academic context? Are they better or worse equipped to do so than they were 20 years ago?

Information literacy

This is a term that has received much discussion among educationalists over the past several years. While it has been described as a modern educational concept, its definition is even more unclear than that of "traditional" literacy. As Langford says:

> From where did this term emanate to occupy so much discussion? Is it a transfiguration, a concept that is age-old but given new clothes to fit in with the educational speak of the Information Age? Is information literacy merely an embellished view of the traditional understanding of literacy? Or has it become a full transformation of an educational tenet in the light of evolving understandings in learning theory?[8]

The term seems to carry with it confusion, as definitions spring up from the sundry researchers published in the field. Some suggest that it describes the skills set required to be a functioning member of "the information society", which is not exactly the target of the research. As such, the term will not be included; mention of it has only been made due to its ubiquitous usage in Information Technology/literacy publications.

[7] Langford, 1998. p.63
[8] Ibid.

Critical thought

For the purposes of this research, critical thought is essentially the ability to use critical or deductive reasoning to form opinions of one's own about complex subjects. This ability is not restricted to any one discipline; it describes the opinion-making process rather than the end result, and could equally describe the critical way in which one would perform a piece of literary analysis as it could describe forming an opinion on a subject in the newspaper.

Education, or "the education system"

When referring to the educational system, the system being referred to is that of the United Kingdom, and the various tiers used in the UK education system are used, as follows:

> * Note that FE includes many more vocational qualifications, including GNVQ's, baccalaureate certificates, Higher National Diplomas, etc.

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Not a potion for remembering, but reminding

Adversity to educational change through the ages

Human beings are, and have always been, creatures of habit. Whenever change comes, it is met with resistance from some or most of the people it affects. This is not a new phenomenon, nor is it one solely enacted by the ignorant; as shall be discussed in this chapter, some of the greatest minds of all time have held reservations about technological advancement.

Let us start with the oft-quoted section of Plato's *Phaedrus*, in which he tells an apocryphal Egyptian myth, using Socrates as a mouthpiece:

> Socrates: Well, this is what I've heard. Among the ancient gods of Naucratis in Egypt there was one to whom the bird called the ibis is sacred. The name of that divinity was Theuth, and it was he who first discovered number and calculation, geometry and astronomy, as well as the games of checkers and dice, and, above all else, writing.
>
> Now the king of all Egypt at that time was Thamus, who lived in the great city in the upper region that the Greeks call Egyptian Thebes; Thamus they call Ammon. Theuth came to exhibit his arts to him and urged him to disseminate them to all the Egyptians. Thamus asked him about the usefulness of each art, and while Theuth was explaining it, Thamus praised him for whatever he thought was right in his explanations and criticized him for whatever he thought was wrong.
>
> The story goes that Thamus said much to Theuth, both for and against each art, which it would take too long to repeat. But when they came to writing, Theuth said: "O King, here is something that, once learned, will make the Egyptians wiser and will improve their memory; I have discovered a potion for memory and for wisdom." Thamus, however, replied: "O most expert Theuth, one man can give birth to the elements of an art, but only another can judge how they can benefit or harm those who will use them. And now, since you are the father of writing, your affection for it has made you describe its effects as the opposite of what they really are. In fact, it will introduce forgetfulness into the soul of those who learn it: they will not practice using their memory because they will put their trust in writing, which is external and depends on signs that belong to others, instead of trying to remember from the inside, completely on their own. You have not discovered a potion for remembering, but for reminding; you provide your students with the appearance of wisdom, not with its reality. Your invention will enable them to hear many things without being properly taught, and they will imagine they have come to know much while for the most part they will know nothing. And they will be difficult to get along with, since they will merely appear to be wise instead of really being so."[9]

[9] Plato, *Phaedrus*. 274d-275b.

In this scene, Plato has the technocrat Theuth (Thoth) singing the praises of writing, which was in its infancy at the time of the play's composition. If one was to ignore the setting, and direct references to the written word, it is easy to see the parallels between this and a discussion between a computer-literate person extolling the virtues of ICT to a technophobe.

More than this, the description of the literate as not being wise, but "opinion-wise" (*doxosophoi)* is interesting, as this is somewhat similar to the argument some make of the Internet's effect on students; that they no longer *know* anything for themselves, but come to rely excessively on the internet to support their academic work. As Fern Faux said in her thesis of 2003:

> [Plato's] concern is echoed in present day concerns, where there is a swing from print to electronic media, about children using the Internet, where those historically 'in control' no longer hold sway over what is read, by whom, and how it is interpreted.[10]

Of course, as Jacques Derrida astutely pointed out, if the *Phaedrus* had not been written down, we wouldn't know about this view, or, indeed, any others Plato held.

Julius Caesar, however, agreed with the view held by Plato; he talks of writing weakening the memory in his commentary on the Gallic War almost 350 years later[11]. It is important to remember, at this point, that education in Greece and Rome relied to a large extent on the memorising of passages from Homer and so on, and a good memory was highly-prized commodity in a general, a politician, or a slave. The famous rhetorician Isocrates said "all men trust the spoken word more than the written word", though this is, perhaps, hardly a surprising statement for an orator.

The Greek historian Diodorus Siculus, however, writing his *Bibliotheca historica* at around the same time as Caesar, sang the praises of literacy as an empowering agent for the populace to participate in political life, to learn from historical mistakes, and to communicate with others:

> ... it is by means of this that the most important and the most useful of life's business is completed – votes, letters, testaments, laws, and everything else which puts life on the right track. For who could compose a worthy encomium of literacy? For it is by means of writing alone that the dead are brought to the minds of the living, and it is through the written word that people who are spatially very far apart communicate with each other as if they were nearby.

[10] Faux, 2003. p.51

[11] Caes. Di Bello Gallico vi.14.4: "quod fere plerisque accidit ut praesidio litterarum diligentiam in perdiscendo ac memoriam remittant" – "since it happens to nearly all that by the assistance of writing they relax their diligence in learning by heart and memory." Personal translation.

> As to treaties made in time of war between peoples ore kings, the safety provided by the written word is the best guarantee of the survival of the agreement. Generally it is this alone which preserves the finest sayings of wise men and the oracles of the gods, as well as philosophy and all of culture, and hands them on to succeeding generations for all time. Therefore, while it is true that nature is the cause of life, the cause of the *good* life is education based on the written word.[12]

Despite this, however, literacy was not a topic many ancient authors wrote about; in Lucretius' extensive history of the invention of culture "little attention is given to the art of writing"[13]; it would be presumptuous to assume that this omission meant Lucretius did not believe writing was an important part of the culture of the ancient world, but he clearly did not believe it to be one of the most important.

Moving ahead several centuries to the publication of Cervantes' *Don Quixote*, we see again the perils of immersing oneself in literature:

> "In short, he so buried himself in his books that he spent nights reading from twilight till daybreak and the days from dawn till dark; and so from little sleep and much reading, his brain dried up and he lost his wits."
>
> Miguel de Cervantes, *Don Quixote*

Books also play something of a double-edged role in Marlowe's *Dr Faustus*:

> Mephist.: Here, take this book, peruse it well:
> The iterating of these lines brings gold…
> Faustus: Thanks, Mephistophilis, for this sweet book:
> This will I keep as chary as my life.
> …
> Good Angel: O Faustus, lay that damned book aside,
> And gaze not on it, lest it tempt thy soul,
> And heap God's heavy wrath upon thy head!
>
> Christopher Marlowe, *Dr Faustus*

As Andrews & Locke say, "on the one hand, they can be seen as repositories of accumulated wisdom. On the other hand, they have the potential to charm and ensnare readers in search of power and various forms of self-gratification."[14]

[12] Diod. xii.13. Translated in Harris, 1989. p.26
[13] Harris, 1989. p.30
[14] Locke & Andrews, in Andrews, ed. 2004. p.124

Literacy was by no means universal by this point, just as it had not been during Caesar's time, and becoming obsessed with reading was seen as being unhealthy behaviour that would lead to *losing* one's wits, not learning.

Moving ahead to the 20th century, the shift of focus for technophobic writers was what would come to be known as the information revolution; in Kurt Vonnegut's 1952 novel, *Player Piano*, the not-too-distant United States has become a technocracy with a supercomputer at its core; a supercomputer that humanity has to destroy to become free. Literature such as this, as well as the dystopian works of Orwell and Huxley, where people have been reduced to little more than mindless automatons, need little introduction. Now, we see columnists, critics, and educationalists writing at length on the declining standards of literacy and *thinking* as caused by this "brave new world" we live in.

The point being made is that Luddism is not simply adopted by the ignorant, or the witless; fear of change is simply human nature, expressed in different by the best and worst of humanity. Just as Plato feared the written word would reduce those with the capacity for wisdom into pseudo-intelligentsia with only the *appearance* of being wise[15], some now fear overreliance on the internet as a source of information is choking individual thought from the student – that people no longer form their own opinions, but only quote those of others. The purpose of this research is to assess whether there is an element of truth behind the claims of the technophobes, and – if so – whether it is truly a problem.

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[15] Interestingly, Plato's point is made of using multimedia for reading in a piece of research conducted by the Sunday Telegraph. The research shows that pupils who use interactive programmes could not remember stories they had read the previous day because they were distracted by cartoons and sound effects. Trebilcock, 2006.

Linguistic (d)evolution?

The fight for the English language

On the effect ICT is having on the English language, opinion tends to split into two fairly uneven camps; the first believes that ICT (in its all-encompassing sense of *all* communications technology) is having a detrimental effect on, in particular, written communication; the second, somewhat smaller group, believes that the changes made to the English language through "textspeak" and "netspeak" are more evolution than devolution, and despite breaking traditional linguistic conventions, that people are expressing themselves better than ever before.

The language of the computer

> English is the language of the future, the language of the computer. English is the most important tool you'll ever need, no matter what career you choose. You have a right to English. Make it your right!
>
> Benjamin Zephaniah[16]

With the Internet becoming more and more important as a method of communication, we will increasingly see (as has happened with telephone call centres over recent years) many – if not most – online workers will be from countries such as India and China, as students in those countries are having an increasingly better grasp of the English language than their British counterparts[17]. David Graddol, the author of a report on this topic commissioned by the British Council said:

> "This trend has major implications for the UK where many people do not speak another language with any great proficiency. When we are in competition economically, educationally or culturally, conversing in English alone is no longer enough." The report found that English is not taught as a foreign language in many schools, including China and India. Instead it is seen as a "basic universal skill."[18]

This view of English as being a "basic universal skill" is interesting, as it is *not* seen as such by many students in the UK; the "right to English" Benjamin Zephaniah emphatically encourages children to embrace is, to a degree, going ignored.

Already, MidPhase.com, a large US-based web hosting company, employs its technical support staff (available only via email and real time online chat) largely

[16] Quoted in DfEE & QCA, 1999. p.43
[17] "In China, 60% of primary school children learn English and more people in India and China speak the language fluently than anywhere else in the world." Taylor, 2006.
[18] Ibid.

from outside the US; almost 59% of their technical support staff and 40% of their total staff are based in Russia[19]. They have the technical skill required to solve problems, and sufficient knowledge of English to pass a solution on to their customers. The focus here is on written English rather than spoken, which is much easier to learn. The problem inherent with the call centres established in India was the difficulty of understanding someone with a very basic knowledge of English and a thick accent. There is no such problem online.

Will this truly cause problems for the British? Undoubtedly. Native speakers have always benefited by learning English as children; with its irregularities and quirks, it is notoriously difficult to learn as a second language. It is the language of the New York & London stock exchanges, the Times, and the language one must be proficient in – regardless of intellect – to study at one of the top five universities in the world; indeed, 74% of the top fifty universities are based in English-speaking countries[20]. It is, in part, because of this, that workers in the UK and USA are paid much more highly than elsewhere. Now, other countries with lower labour costs have the opportunity to capitalise, in every sense, on this situation as their standard of English rises. The benefits English-speakers have traditionally enjoyed are being eroded by increasing standards of English teaching and learning in other countries. When one combines this with the drastically higher employment costs in the UK than in these other countries, it seems obvious that many employers will move their business to somewhere cheaper.

The loss of the formal voice

Nobel laureate Ernest Rutherford once told a colleague that if a scientist could not explain a theory to a barmaid, he did not truly understand it; he prized the ability to communicate a complex idea through simple speech to a layman. It is, of course, what is expected of teachers in all tiers of education, and is often what differentiates a good teacher from a bad one.

The problem with this comes when one can *only* explain a difficult concept in simplistic (by implication, *overly* simplistic) terms; explaining how to create an atom bomb to a barmaid will not mean she could create one when provided with the materials.

Professor David Crystal of the University of Wales, Bangor, believes:

[19] Personal communication with MidPhase management, April 19th 2006.
[20] As ranked in a Times Higher survey. Times Higher Educational Supplement, 2005.

> The variety of applications of new technology leads to new stylistic forms and increases the expressive range of a language, especially at the informal end of the spectrum.[21]

Prof. Crystal believes the informalisation of speech (losing punctuation & grammatical conventions) should not be condemned, rather "we should be exulting in the fact that the Internet is allowing us to once more explore the power of the written language in a creative way."

People are, however, creatures of habit, and there is a danger through only composing casual, informal text that one's formal or academic writing will suffer. Crystal adds the proviso, "There is of course, a role for educationalists in teaching children which style is the most appropriate and where." Will this be an uphill battle?

Most students, myself included, are at one time or other guilty of informal or conversational writing in academic assignments; is this to become the norm for UK institutions?

The Americanization of the English language

Most pieces of software available today that are created by American companies have different language options for the user; most often highlighted is "U.S. English" or "English (U.S.)"; British spellings & grammatical forms are available, if at all, in "English (U.K.)" or "International English". This is surely not a big problem, as few people nowadays would think twice about seeing "gray" instead of "grey" in the palette.

The problem instead comes in the default selection of the U.S. English dictionary in word processors that causes the spellchecker to highlight British spellings of words, or in some cases automatically change them to the U.S. spelling. This is particularly confusing for children, who may not have problems with spelling; the number of American spellings being found in the written work of British students has been on the rise since the Internet found its way into schools.

Is this necessarily a bad thing? Perhaps not; in today's culture of globalisation, perhaps it would be a good thing to agree on one form of international English; the American variant does, after all, remove some of the more idiosyncratic elements of British English. As with the emoticon- and abbreviation-filled "netspeak", there are many who argue that American English is simply an evolution of the language, streamlining some inconsistencies, and introducing new words.

[21] University of Wales, Bangor, 2005.

This is not the focus of this research, but has instead been highlighted to show the confused state of literacy in today's world. When children are marked down for American spellings in their written and printed work, while their word processor puts them in automatically, it is hardly surprising that there is a great deal of confusion when it comes to literacy. This incongruence between teacher and technology only serves to obfuscate and confuse students – particularly those with special educational needs.

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Search engine for the soul

Technology circumventing critical thought

> I do direct them to the internet for some things, though in itself it constitutes a problem; most students are not looking at books at all because they prefer websites and you would expect books to be more authoritative. My recommendation is to use the web as a first port of call, following it up with other sources but they don't do the latter
>
> Quotation from lecturer, NIESR Study, 2001[22]

The internet, by its very nature, is full of mistakes. The adage "a source is only as good as its author" rings especially true on the internet, where often one may have little idea of a website author's credentials, or even their name. Yet, it is increasingly becoming used as a major source of information for academic research, from simple fact-finding (for which the internet is well-suited), to qualitative, published opinion pieces or commentaries.

While even fact-finding on the internet carries risks with websites being unreliable, using the internet to find opinions on complex subjects can prove even more problematic. In a system where anyone is as able as the next to set up a website, information finders may find themselves referencing websites that do not hold up under the lightest of critical scrutiny.

Not of note unless you quote

> Plagiarism is the ultimate taboo because it lays bare the logic of the world – especially that of our universities.
>
> Gary Day[23]

In his controversial article of 2005, Gary Day denounced the hypocrisy rife in Higher Education in the UK, saying that originality and individual thought was a thing of the past in academic circles. He says "Higher Education is a template culture; its purpose is to produce copies," and it is not difficult to see in action; points made must be backed up with similar points made in previous research, specific threads of the argument must be tied up nicely with a quote here and there, and a submitted essay will likely not get a first class result unless it has an extensive bibliography stapled to it.

Higher Education, and even more so in the lower tiers of education, is breeding a generation of what Jamie McKenzie called "infotectives" in 1998; defined as a student thinker capable of asking great questions about data in order to convert

[22] From *Open Books, Open Minds*, 2006.
[23] Day, 2005.

the *data* into *information*, and eventually *insight*[24]. McKenzie's vision has – at least in part – been realised, as the majority of students are now competent fact finders, capable of finding answers to questions by utilising an arsenal of search engines, multimedia, and traditional sources. Whether or not these people "ask great questions" is, to an extent, unanswered.

What we are starting to see is a glut of young people capable of doing little more than "grazing the net" for answers written by other people. Rather than *thinking* about an answer to a question, the kneejerk reaction is to search for it online.

Google: we do the work, so you don't have to

With the immense increase in websites through such innovations of recent years as Usenet, free web hosting & blogging, the volume of information online has skyrocketed. As McKenzie says, "we have more information than we can possibly digest, consume or fathom"[25]. Thankfully, effective means of searching for information, search engines, take much of the work out of finding information.

It is easy to see the appeal of using the internet as a source of information; within a few keystrokes, relevant, often up-to-the-minute information is available for consumption. A canny student can tell the difference between a good source of information and a bad one, and the work that used to take days of poring over books in a library can now be done in minutes online.

The implication of such an easy, relatively effort-free source of information is that the user begins to depend on it – to *rely* on it. Heavy internet users may find themselves, in an essay, doing little more than stringing together quotes found online with limp text that only echoes the statements of others, rather than giving original opinions.

As Gary Day implied in his article mentioned above, walking the line between substantiating opinions of one's own and simply echoing the opinions of others can be difficult; a student may not even *realise* that he is doing it, as it has become so accepted in education. More and more, people are using Google as the ultimate 'cheat sheet', and it is something that teachers in primary schools are *required* to teach.

[24] McKenzie, 1998.
[25] McKenzie, 1997.

The fault of the teacher?

Finding things out

1. Pupils should be taught:

a. to talk about what information they need and how they can find and use it [for example, searching the internet or a CD-ROM, using printed material, asking people]

b. how to prepare information for development using ICT, including selecting suitable sources, finding information, classifying it and checking it for accuracy [for example, finding information from books or newspapers, creating a class database, classifying by characteristics and purposes, checking the spelling of names is consistent]

c. to interpret information, to check it is relevant and reasonable and to think about what might happen if there were any errors or omissions.

- extracted from the key stage 2 programme of study for ICT[26].

These guidelines are at the top of the list of requirements for teaching ICT; children must learn to find and use information, prepare it for development, and interpret it. Useful skills, to be sure, but in the classroom, focus often turns entirely away from *thinking* about a solution to *finding* one.

This is particularly true in ICT-based lessons in other subjects, where – in order to fulfil the requirements of the governmental bodies – computers are used for little more than "trivial pursuits"; finding answers to simple, fact-based questions. This process, as McKenzie says, carries little or no educational benefit[27], and only serves to indoctrinate children into logging on when they have a problem to solve.

This causes significant problems in the higher tiers of education, where students may look online for notes on books rather than reading them for assignments; regardless of whether or not they credit this work (i.e., whether or not they plagiarise), they *learn* very little. All that happens is the opinions of the person writing the notes are passed on; the student forms no opinions of their own.

This practice is rife, at all levels of education in the UK, and what's more is it is *accepted*; academic work that relies heavily on sources, making few or no conclusions of its own, can easily be awarded a high mark, provided it is constructed well.

The point of this chapter is to show how the integration of ICT in teaching, in all disciplines, seems to be taking the emphasis of learning away from thinking, and

[26] DfEE & QCA, 1999. p.100
[27] Online research is a topic covered at length in unit 6D of the KS2 ICT syllabus.

towards finding; people may no longer required to have the same higher-level critical thinking skills required in previous years in order to pass a degree course.

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Snake oil for schools

Does IT really do what we were promised it would?

Have the old problems been solved?

There have been problems with integrating ICT into education since the first microcomputers became affordable for colleges and schools. Have the old problems educators faced with using these systems been solved, or are they irrelevant in today's world? See the following list of problems highlighted by an educationalist:

1. *The marginalization of teachers*

   Teachers have little influence when decisions about software design are taken and are rarely involved in field testing.

2. *IT as an intrusion into education*

   Computers are an intrusion into the curriculum, both insensitive to the agreed aims of a liberal education and opposed to proven practices, and, in secondary schools, subject values.

3. *Format*

   The basic games format still persists and is preventing the emergence of a more flexible, educationally challenging deployment of the [computer].

4. *Reification of computer*

   There is a distinct danger of (some) pupils reifying the computer into a 'super brain'. The computer as a source of 'knowledge' could thus attain an unjustified centrality in the curriculum.

5. *Unintended consequences*

   Not only may information technology be reinforcing gender and ability differences, but software content may exclude the concerns of 'minority' cultures and languages.[28]

For the most part[29], the questions are as fresh today as they were when they were written – in 1985. This list of problems was written over twenty years ago, when microcomputers were the standard, and yet the problems remain almost exactly the same. Similarly, David Chandler & Stephen Marcus, also writing in 1985, said:

[28] Baker, C. (1985), 'A critical examination of the effect of microcomputers on the curriculum', quoted in Beynon & Mackay, 1992. p.7

[29] Concerns about gender & minority discrimination in ICT teaching has been allayed in recent years.

> Many educators feel pressure to rush into the purchase of computer hardware and software without adequate background knowledge to make intelligent choices.[30]

If ICT is still the hot issue it appears to be, why is there no consensus on these problems? Is nobody tackling them, or does it mean that nobody can tackle them?

Technology empowers

One of the reasons for teaching assistants becoming more important in schools is the fact that the widespread integration of ICT in schools (not just in teaching) "empowers" teachers to the point that they are expected to do much, much more than they were twenty years ago. Teachers are now expected to complete self-assessments, in house assessments of other teachers, and compile their own, fully-documented, extensive schemes of work for their subject; all in addition to their classroom teaching.

This immense workload clearly means that *someone* must relieve the pressure. Particularly in the case of primary schools, this falls to TA's. This is not a necessarily bad thing – though unqualified, teaching assistants often bring real-world experience into the classroom; something many newly qualified teachers lack – however, their role should be in an *assistive* capacity. They should not be responsible for the teaching of a subject considered to be so pivotal by the government.

However, computers do not always liberate their users; as I said in an article in 2005[31], ICT can effectively shackle educators to a computer on which they may not have the expertise, or even the access privileges to fix the inevitable problems that arise. Teachers become users of technology as much as their students, and may be no better equipped to handle problems than them. When the computers stop working, so does learning if the problem cannot be fixed quickly.

The empowering or debilitating effects of technology are not restricted to teachers, either; students too are greatly affected by computers. As Buckingham said:

> Some have argued that these new technologies are inherently empowering for children. They are seen to offer new opportunities for self-expression that will 'liberate' children from adult control, and enable them to create their own cultures and communities.

In so 'liberating' children, however, parents and educators alike must recognise the educational benefit (or lack thereof) of doing so.

[30] Chandler & Marcus, eds. 1985. p.100
[31] Greenwood, 2005. p.8-9

Big promises… has it delivered?

There were some very grandiose promises and forecasts made about the role of the computer in education over the course of the past decade. Have these delivered?

To an extent, yes; technology is now more widely used in education than ever before, and the research shows, on the whole, it isn't to the great detriment of the student[32].

Now, with most schools having a significant number of computers available for teaching, has the "glamour" of ICT worn off? David Buckingham says this:

> Schools are no longer children's first point of access to computers. Children are already living in a digital world; and so, as with 'older' media, we need to find ways of enabling them to understand and to participate actively in it.
>
> …
>
> Children who use the internet at home are already becoming critical users of information: they have a strong sense of their own autonomy and authority as learners, and they want to contribute rather than simply consume. Yet this is precisely what is so often denied to them in school. [33]

Children use their computers for entertainment at home, so the "edutainment" approach to ICT teaching may not necessarily work anymore (assuming it did to begin with). There is no longer anything particularly new or exciting, from the learner's standpoint, about using computers; they are as much an accepted part of school life now as the blackboard was 20 years ago. Any motivational benefits research conducted in the late 1990's[34] indicated must now be disregarded; so what is left?

> The computer has never lost its power as an image, and that image has been nurtured by literature and the media, but it has also changed, over the last half-century, from that of a semi-secret wonder, to a tool for the expert, to a taken-for-granted part of everyday life. It will not be surprising that attitudes and practices regarding the way students use IT have developed over time.[35]

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[32] Much research also, it must be noted, is inconclusive. See Becta's 'What the research says' series of pamphlets.
[33] Buckingham, 2003. p.175-76.
[34] Regular use of ICT across different curriculum subjects can have a beneficial motivational influence on students' learning (Cox, 1997); improved confidence, motivation and self-esteem particularly for children with special educational needs and disaffected students (Passey, 2000); online learning engages de-motivated and disaffected students (Duckworth 2001; Passey 2000; Harris and Kington 2002). Quoted in Becta, 2003e.
[35] Martin & Rader, 2003. p.11

The Technology Presumption

Jamie McKenzie calls the idea that new tools will enhance any classroom and any lesson the "technology presumption"[36]. Educators believe, due to the information generated by the pro-technology government and commercial enterprises marketing their products at schools, that information technologies may enhance learning, thinking, and overall performance, even when there is no credible evidence that this is the case. "To the contrary," McKenzie says, "they may sometimes dilute, divert and distract."

Regardless of the subject, the focus of education must be for the learner to learn. Educational technologies, over the course of the past decade in particular, have been marketed at schools as being the end to all educational woes. Interactive whiteboards were intended to make teachers' lives easier by providing pre-prepared, peer-reviewed lesson plans, yet this is only now starting to happen, and not on a large scale, and PowerPoint was heralded by some as the best thing to happen to education since the abacus.

The fact of the matter was these claims were made by interest groups or a government wanting to appear focused on education by throwing money into buying the best computers available for schools. Multimedia presentations are not, necessarily, any more motivational, engaging, or educational than traditional lectures or lessons, yet school management still likes to see it.

> According to the sales pitches, computers offer children access to untold worlds of discovery, and reawaken their spontaneous desire to learn […]
>
> Yet computers are largely seen here as delivery mechanisms – as neutral means of accessing 'information' that will somehow automatically bring about learning. 'Wiring up' schools is often seen to produce immediate benefits, irrespective of how these technologies are actually used.[37]

A computer *can* be a useful educational tool, that *can* bring educational benefit to both educator and learner, but only in certain contexts, where the educator is absolutely comfortable in using the technology, and understands where and when to use it.

PowerPointlessness: the role of multimedia in diluting information

[36] McKenzie, 2003a.
[37] Buckingham, 2003. p.174

Multimedia presentations are widely used in the business world as well as in the classroom, with the aim of concisely presenting information in an attractive, professional manner; certainly a useful aim in today's quick fire culture. In education, however, multimedia presentations are often misused; much like the overly simplistic "trivial pursuits" tasks mentioned earlier, lessons may be given with a presentation, passing only trivial information about the subject, conveying little, if any, critical meaning. The presumption seems to be that if one is teaching with a PowerPoint presentation, the attached bells and whistles can sufficiently distract the viewer to the fact that the presenter does not actually have the required subject knowledge to *give* a presentation on the subject.

Learners may leave a presented lesson with only anecdotal additions to the bullet points on each slide, as learning takes a back seat to the spectacle. It is this bizarre concept of separating task from result – reminiscent of the era of 'fuzzy math' – that causes such problems for ICT. As Lord Dennis Stevenson, the Prime Minister's adviser on ICT and education, said:

> The modern world requires new skills. Understanding ICT and, more importantly, being able to apply it to the problems we face is one of the most important. Increasingly ICT will be vital for our individual prospects and for our economy's future.[38]

Being able to apply one's knowledge of ICT in real-life situations is the critical element of learning ICT; indeed, it is the only reason it is taught in schools. One does not learn how to speak English to decline verbs in a darkened room, but to communicate with the rest of the world. The same applies to learning ICT. In much, if not most, of the ICT curriculum at key stage 2 and beyond, the marking schema for exercises places only a small percentage of the total mark on *content*. One can, as I did in the first year of my degree course, give a PowerPoint presentation on the diction and wardrobe of the average Yorkshireman, and still get a first class result. The fact that such an exercise carries with it little or no educational benefit is secondary to performing the exercise itself. Such trivial exercises leave people believing that giving a multimedia presentation is simply a matter of throwing together some bullet points and making it all look pretty rather than knowing one's subject matter in great detail before attempting to tell others about it.

[38] Quoted in DfEE & QCA, 1999. p.97

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Revolutionising education

Are educationalists keeping up?

What is 'computer literate'?

> What is it that teachers and their pupils respectively need to *know* (and thereby be able *to do*) to be regarded as technologically literate?[39]

Perhaps one of the more difficult aspects of teaching & learning with and about computers is that the goalposts never seem to stay still for very long. The question above was asked in 1992 – 14 years ago – yet answering it remains problematic. Does the term 'computer literate' mean today what it did ten years ago? Unlikely; someone well-versed in using 1995's technology could hardly be considered to be an expert in today's. More than this, however, the average piece of software available today differs greatly from the competing software on the market – should ICT teachers be well-versed in *everything* in order to be considered qualified for the job?

> It is reasonable to suggest that a person who has written a computer program should be called *literate in computing*. This is an extremely elementary definition. Literacy is not fluency.[40]

This definition was given in the mid-1970's, and would scarcely apply to any primary school ICT teachers (and few in secondary schools) today; computer use has shifted from writing programs to applying them. What does this mean for the definition of 'computer literate'?

Can a teacher who has only ever used Microsoft software be considered truly computer literate, or must they have experience working with another Operating System? Must they understand how hardware works, and be able to fix mechanical faults? Perhaps they should be able to do this, but in reality, they aren't.

In the three primary schools I have worked in, not one of the ICT coordinators was an ICT graduate. In school A (a state-funded Church of England school of 255, with 22% of the pupils speaking English as an additional language[41]), the ICT was coordinated by an English teacher, and ICT lessons were taught by a lunchtime supervisor turned teaching assistant. In school B (a state-funded primary school of 230 in which almost half of the pupils spoke English as an additional language[42]) the ICT was again coordinated by a class teacher of another discipline, and taught

[39] Beynon & Mackay, 1992. p.28
[40] Nevison, 1976. p.401
[41] Information from Ofsted report taken in 2003. Reference available.
[42] As above. Report taken in 2000.

by a teaching assistant. In school C (a private, fee-paying primary school of under 100 pupils[43]), ICT was coordinated and taught by an English newly qualified teacher whose ICT skills were, at best, basic.

This seems to be a typical situation; the number of ICT graduates going into teaching is not high enough to satisfy demand, so teachers and TA's with even the most basic computer skills are given the job.

It is perhaps best said in the 2003 Ofsted inspection of school A:

> In information and communication technology, pupils achieve satisfactorily and standards in Year 6 are at the national expectations.

The national expectations for key stage 2 ICT are met by a lunchtime supervisor whose experience was in secretarial work before taking a position at the school.

It should be noted that this is not intended to disparage Teaching Assistants; their role in schools has become increasingly important over recent years, and many schools would cease to function without them. The comment is that if this Teaching Assistant is considered qualified enough to attain satisfactory standards in inspections, surely that standard is too low. Also, if TA's can attain satisfactory results, what is the point in requiring prospective teachers to undergo such intensive training as they do? In the two schools that used TA's for the bulk of their ICT teaching, neither had any other core subjects (English, mathematics, science, geography, history, modern foreign languages) taught by anyone other than qualified teachers.

Does this mean ICT is any less important than the other subjects? No; increasingly, the government is considering ICT to hold a 'central role in maintaining the quality of higher education'[44], as well as the other tiers in the system[45]. So why is it happening?

Full steam ahead

The government's "full steam ahead" approach to Information Technology subject teaching and its integration with other curricula does not seem to be mindful of the fact that, while they *are* on the increase, the number of ICT graduates going into primary or secondary school teaching is still nowhere near satiating demand. The government is still offering 'golden handshakes' for entrants on training courses for shortage subjects, but what is being done in the interim period, until

[43] Barker, K. Personal communication.
[44] Quote from the Dearing Report of 1997. NCIHE, 1997. Chapter 8.
[45] Consider the Key Skills initiative; the three core skills are Communication, Application of Number and Information Technology; ICT is now up there with the three R's. Department for Education & Skills, 2006a.

the majority of ICT teaching is being done by qualified ICT teachers? Seemingly nothing, and it seems like an odd strategy considering how central ICT is in the governmental plan for education.

> Technology has revolutionised the way we work and is now set to transform education. Children cannot be effective in tomorrow's world if they are trained in yesterday's skills. Nor should teachers be denied the tools that other professionals are trained to take for granted. Standards, literacy, numeracy, subject knowledge – all will be enhanced by the [National Grid for Learning] and the support it will give to our programme for schools improvement.
>
> Tony Blair, 1997[46].

The focus of Blair's "education, education, education" era has undoubtedly been the computer, but to what end? As is clear from the growing number of computers per school (and shrinking number of pupils per computer), the major impetus has been in providing the hardware to schools.

However, while over 99% of schools now have an internet connection[47], few schools have ICT co-ordinators qualified to wrestle ICT into the curriculum, as *must* happen in order for it to have the transformative effect Blair forecast.

The evolving role of the teacher

The face of teaching has, over the course of the past decade, been completely transformed because of ICT, though in a different way than many of the forecasters predicted. Of technology integration in teaching, Ian Forsyth said in 1996:

> One of the initial changes is that the teacher becomes a monitor and a mentor. The teacher's role becomes less instructional and more supporting.[48]

The idea that the computer would do much of the instructing was naïve, even for 1996; the teaching role remains firmly in the hands of the teacher, in ICT lessons. The prediction of teachers becoming little more than technical support is still unfulfilled, and will remain so for many years to come.

That said, teaching ICT *does* require a different approach to classroom teaching; teachers become instructors, with students working independently or in groups, only needing guidance or troubleshooting with technical problems, or clarification on guidelines. ICT teaching can, often, be more pedagogical, with teaching happening in a one-on-one basis. The government's requirements of teachers also changed; from 1999, all NQT's (newly qualified teachers) were required to attain

[46] In a speech given at the launch of the NGfL in 1997. Quoted in Crawford, et al, 1999. p.2
[47] Ibid.
[48] Forsyth, 1996. p.31

specified 'technical and pedagogical standards in ICT use'[49] and, by 2002, practicing teachers should 'generally feel confident and be competent to teach, using ICT within the curriculum'[50].

Is this happening, even now?

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[49] DfEE, 'The Initial Teacher Training National Curriculum', quoted in Crawford et al, 1999. p.4
[50] Becta, 'Connecting Schools, Networking People', quoted in Crawford et al, 1999. p.5

Conclusion

The fact is that this is a time of great transition – for education, and the world as a whole. The computer revolution has not ended, though it may have come to a middle. The past decade has been filled with problems for educationalists – the inevitable growing pains that come with great transition.

Nobody can deny that technology is having a tremendous effect on education, and while some research shows a positive effect, the time of children and teachers being *excited* by technology is over. The problems faced (with subject teachers being over faced by what is required of them, etc.) can only be solved in the long term, and will require extensive training programmes for teachers, new and old; we cannot wait a generation for education to truly catch up with the pace of the modern world. Qualified teachers must be trained and encouraged (rather than goaded) into using technology where it would have a positive impact on learning.

This training cannot cover only how to *use* computers, but *when* and *why* they should do so; it is the latter two areas that we seem to be falling down on, and in order to improve, that has to change.

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Integrating technology into the classroom is, even now, not as simple as it should be, due in large part to the now widespread commercialisation of education. With interactive whiteboards, vendors found themselves with a product that no school had, and every school wanted. In the rush to satiate demand, mistakes were made by programmers designing a product for people who may lack technical expertise. The whiteboards that are available have software that is incompatible with any other brand of whiteboard, making sharing teaching materials (essentially the major benefit of using IWB's) impossible unless the school keeps purchasing their hardware from the same company. McKenzie says "this attempt to saturate and penetrate the school market is more about marketing than sound learning"[51]. David Buckingham further adds:

> Computers are aggressively marketed to parents and teachers as an educational medium – indeed, as *the* indispensable educational tool for the modern world.[52]

Once one gets beyond, as McKenzie puts it, the "glitz and glimmer"[53] of educational technology, the much-quoted benefits of integrating ICT into subject teaching essentially come down to:

[51] McKenzie, 2003a.
[52] Buckingham, 2003. p.174
[53] McKenzie, 1997.

- Making education easier for the teacher
- Enriching education for the learner

The claims made by educational technologists at the end of the last century that computers improve student and teacher motivation, and such, *belong* in the last century; the fact is that a week or two after working with a new piece of technology, it stops being noticed, provided it does its job properly. Any relationship between ICT and motivation was limited to the time when technologically-minded learners only had access to computers at school. Now that the majority have computers at home (the implication being that they can use them recreationally at home, while being confined to using them to learn at school), teachers may, in fact, be faced with a challenge to motivate their pupils *into* using technology.

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The problems identified are not society-wide, nor are they necessarily the "fault" of the government; there are some very competent, very successful ICT teachers in the country who are doing an excellent job of integrating technology into the curriculum to the benefit of their students.

However, in the many schools in which this is not happening, something must be done. ICT is a critical subject, and deserves to be treated as such. Despite, as just mentioned, the problems not being the fault of the government, any major change must come from them.

While the governmental literature for ICT is comprehensive, and not difficult for ICT literate people to understand, the problem is that not every teacher and TA *is* ICT literate. The current problem is that not everyone is on the same page; in order for this to happen, one of two courses of action should be taken. Neither course of action will solve all of the problems described through the course of this research, nor do they come without drawbacks.

Train teaching staff if ICT integration is to remain mandatory

> If teachers are expected, as a matter of course, to integrate ICT into their teaching, they must have the required skills to know *how* and *when* to do this. The only way this can happen is through comprehensive training programmes given by fully ICT-literate trainers.
>
> **Drawback:** Training opportunities for the majority of schools & colleges are restricted to one or two inset days per term. This will undoubtedly not be enough to upgrade ICT skills across the board to the required level. In order for training to be truly comprehensive, teachers will have to be taken out of the classroom, and implementation of such a training plan -

be it at the national or institutional level - would cost more than high level management is either able, or willing, to pay.

Remove mandatory ICT integration in other subjects

Integration of ICT in the other curriculum subjects is intended to give students the opportunity to *apply* their ICT skills in their other work, building their confidence with ICT as well as doing a better job of the piece of work by using a computer. This only happens when the subject teacher has a sufficient enough knowledge of computers, as well as a firm understanding of how best to integrate computers into their teaching; this seems to be the point that many teachers fail with.

As the research shows only a marginal improvement in writing quality, productivity, and so on, and if neither the student nor their work benefits from ICT-based lessons in other subjects, the incentive to put on such lessons - a tick in a box during an Ofsted inspection - should be removed. Teachers should be permitted to teach however they want to, provided their students benefit as much as possible from the experience. Marking down a teacher for not using computers in his or her lesson, regardless of whether it would be of benefit to do so, only furthers the technophobia many teachers have. In a very real, very tangible way, teachers can suffer by not fully understanding technology, and this can be immensely off-putting to those who are only interested in teaching their subject.

Drawback: if there is no incentive to integrate ICT into other subjects, the majority of teachers will not do it. Regardless of whether or not this is good for the learner, school management will likely be unhappy with this. As McKenzie says, "idle equipment is a big embarrassment. Frequent use is the order of the day."[54]

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To address the adversity to linguistic (d)evolution, it may, as Prof. Crystal and others claim, be a good thing; people are beginning to express themselves better in an informal setting than ever before, through the use of emoticons & abbreviations. However, some ability to compose text and speech in formal English is still a requirement of holding most jobs, regardless of the position, and certainly for studying in Higher Education.

Therefore, to counter the proliferation of informal "netspeak" and "textspeak", new literacy initiatives must be introduced that reintroduce students to formal and

[54] McKenzie, 2003a.

academic English while still in school. Considerable emphasis must be placed on the benefits of good aural and written English skills.

As for the claims that computers can circumvent critical thought, the reaction of some is "so what?". William Leahy, writing in the Times Higher Educational Supplement, said "showing students how to assess, not produce, knowledge is the way ahead"[55]. He asks why, in the current culture, "should one have to make an argument in the first place when better, more plausible and rigorously researched arguments already exist? The construction of such arguments and counter arguments is the job of academics". This is rather an interesting show of the current state of Higher Education, where students are not viewed as being there to enter academia, but simply to get qualified in order to get a job.

Skilled information-gatherers and presenters are, of course, useful in many professions; many graduates will leave university and go into jobs doing precisely this, but to give up on individual thought in Higher Education seems to suggest there is no more thinking to do. Ranald Macdonald says:

> When graduates go to work, many will not need to use the critical and independent thinking skills they develop in study. Rather, they will perform routine tasks using information provided by others. We need to be clearer about what skills we want students to have.[56]

Perhaps this is the case, but should all students in HE suffer as the bar is lowered for future professionals who won't need individual thought in their jobs? Clearly not; to say that individual thought should be abandoned suggests that there is no more thinking left to do. Without students exercising their critical skills, there will be no new academics, inventors, or truly great minds.

The only clear way out of the situation, as far as I can see, is through the vocational qualifications offered in Further Education. If a student wants to learn how to use a computer in order to get a job in data entry, or similar, why would they need a degree? Instead, perhaps, a reasonable alternative would be to undertake a GNVQ or HND in a relevant subject. This recommendation does, of course, make it all sound rather simple. The main obstacle in doing this would be to break the society-wide view that getting a degree will mean a job at the end of the course, and that a degree is the only option for would-be professionals.

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[55] Leahy, 2005.
[56] Macdonald, 2000.

ICT is not now, nor will it be for some time, as universal as English or mathematics; if the government's aim is, as it seems to be, to integrate ICT so fully into the curriculum as the three R's, it is still some way away.

However, with ICT being increasingly used for academic work, particularly in FE & HE institutions, written English *must* suffer due to neglect; students may find themselves, through sheer lack of practice, unable to write academically in written exams, or even in a job application form. We have not yet reached the paperless office envisioned in the 1960's, and written English is still an important skill for students and professionals alike.

The education system can ill-afford to focus on lower-order skills (such as data entry, word processing, etc.) in this age of globalisation. Universities cannot shy away from requiring their students to think critically, and independently, because the job market doesn't.

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In conclusion, the integration of technology in education has not ceased to have an effect, and the changes that come with ICT will continue to have an effect in the future. During this 'middle ground' time, where there is the demand for technology integration, but a significant lack of qualified teachers to provide it, the best must be made of what *is* in place.

While it is difficult not to vehemently champion one course of action as being the solution to the woes of this time, there simply is no 'one size fits all' answer to the problems identified in the body of this research. That said, the recommendation is not merely to wait for the problem to solve itself.

While the guidelines provided by regulatory bodies such as the D*f*ES & QCA, as well as those of advisory boards such as Becta, are good, their sheer volume is over facing for the already overworked teacher. If all it is perceived as doing is complicating an already overcomplicated, underappreciated job, little attention will be paid to it. The literature must therefore be simplified if NQT's are to even have a chance of fully understanding what is required of them, and then, critically, *acting* on it in their teaching lives.

Local Education Authorities and school management should try, wherever possible, to ensure the quality of ICT teaching is maintained when lessons are taken by teaching assistants. Training for teachers and TA's interested in ICT should be available in order to cope with the demand.

Some of the problems faced by educationalists in the 1980's are still unsolved today, but if schools are to have any hope of defeating them, they need people with a full understanding of ICT, and its potential implications for integration into

other curricula. These people can only come from Higher Education, as new trainee teachers, and they will require a firm grasp on critical thought to assess when best to use technology in their teaching, and when not to. Let us hope that the ICT teachers of tomorrow don't end up in call centres instead.

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