

Towards an Information-Rich Society? or an Information-Overloaded one?

(Is the media becoming more important than the message?)

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Abstract

The rapid growth in all forms of electronic publishing is creating many new problems – both technical and socio-economic. This paper examines some of these from three different perspectives, representing the author's personal involvement in this field in three different capacities.

As the Chairman of the Editorial Board of the *Journal of Educational Media* there is a need to address the issue of what role, if any, electronic publishing can and should play in the future of the journal. The particular subject of this journal, moreover, means that there is a need for the journal readers to have access to samples, at least, of the television and multimedia material which frequently forms the basis of the papers in the journal. This poses difficult issues, both technical and procedural, relating to both the paper version of the Journal and any future electronic versions. A particularly important question is the status of any electronic supplements to the printed journal, since it is extremely unlikely that they will be usable in 50 years' time, even though the paper copies will still exist in libraries around the world.

As Convenor of an ISO Working Group, the author is required to distribute, solely by electronic means, a wide range of documents throughout the world. The paper will discuss the technical issues that this raises, particularly when documents may be created using many different software packages, and yet must be delivered in a form that often requires very strict adherence to the original author's formatting.

As a user of electronic documents in many different fields, the author is faced with still more problems. In particular, the amount of email received by the author makes it quite impossible to read it all; yet how does one decide what to delete before reading? Equally, the number of web pages found as a result of a search on almost any topic is so vast that it is inconceivable that anyone could look at them all. Finally, very few people are able or willing to read documents of more than a page or two from a screen, and resort to printing before reading. Is electronic publishing increasing the rate of deforestation of the planet?

Electronic publishing, in the broadest sense of the word, thus raises a great many problems at every stage of the process. These can best be captured by the growing sense of information overload that many (most?) people are suffering from, and the undoubted fact that, in many cases, the medium is becoming more important than the message that it conveys. Based on more than ten years' experience of using electronic document distribution in several, quite disparate, fields, the paper concludes by suggesting some key principles which must be observed if the brave new world of electronic publishing is not to collapse under the weight of its own success.

1. A Brave New World?

As the 20th century draws to a close, the world, or at least that part of the world which is conventionally referred to as the *developed* world, is becoming increasingly closely interconnected by a variety of forms of electronic communication. It is hard to believe that a mere fifteen years ago there were no mobile phones, no notebook computers, no world-wide web, and that electronic mail was a very hit-and-miss affair used only by the military and a handful of scientists. Microcomputers were about five years old, but were still primarily the province of academics and scientists, with the Commodore Pet and the Apple II dominating the market. The desktop PC had only just been made respectable by the introduction of the IBM PC, based on the Intel 8086 chip, but neither IBM nor anyone else anticipated how rapidly the market would develop over the next few years. The Apple Macintosh was still over a year away.

Now, only half a generation later, children use computers as a matter of course from their first days at school, almost all professional persons have a computer on their desk, over a quarter of all homes have at least one computer, which is used for an unimaginably wide range of activities from games to wordprocessing, from music composition to home accounts. And, above all, almost every computer in the workplace, a majority of those in education, and a rapidly growing proportion of those in the home, is connected to the Internet. The majority of letters published in *The Times* are now sent by email, advertisements on buses have an unexplained line at the bottom starting **http//:**, radio announcers invite requests and comments to be sent to rapidly spoken addresses whose distinguishing factors appear to be large numbers of "dots", and television documentaries invite viewers to obtain more information from the production company's web site.

We, or at least those of us in the developed world, are moving at an ever-increasing pace towards a brave new world in which everyone is connected to a supra-national information and communication system – towards an *Information-Rich Society*, in fact. And it is all good, without any harmful side effects – or so we are led to believe. And yet

- Managers now regularly type their own letters and briefing papers on their desktop computers because it is "easier" than dictating to their secretary and then correcting

the typed copy. But is this really what they are being paid several times as much as their secretary for?

- Articles on almost every conceivable subject are “published” on the world-wide web for all the world to read. And yet who knows what is the real value of these articles, without the moderating influence of editors, publishers or referees?
- Politicians talk about connecting every school-desk to the Internet, without, apparently, any conception of what this would actually mean. They talk of the educational value of “browsing the Internet” with its enormous “database” of information, and yet even they would surely laugh at a teacher who suggested that the best way to teach children was to leave them alone in a library “to learn from all the books there”!
- And, of course, the gap between the developed world and the rest of humanity grows ever wider.

This paper will not attempt to solve these, or other, problems posed by the information and communications revolution. Indeed, it will not even argue that these problems are not outweighed by the very many benefits that this revolution has already brought, and will continue to bring. It will, however, focus on the author’s experiences in three disparate areas of electronic publishing and attempt to draw some conclusions and some lessons for the future.

2. Electronic Journal Publishing

The *Journal of Educational Media* (JEM) started life some 25 years ago as the Journal of the United Kingdom’s National Educational Closed-Circuit Television Association (NECCTA). After various changes of name, both of the journal and the association, it is now published by Carfax, although it retains the subtitle of *The Journal of the Educational Television & Media Association* (ETmA), and the ETmA retains the right to nominate both the Editor and the Chairman of the Editorial Board. The latter post is currently held by the author of this paper.

JEM is a relatively low circulation journal, although steps are currently being taken to broaden its scope and to increase its readership; it is, nevertheless, well respected amongst its international readers. One of the areas that its publishers and editorial board are grappling with, however, is how best to take advantage of the opportunities presented by electronic publishing. Most of these are conventional issues, faced by many other publications around the world, but JEM also has certain other issues to address which, if not unique, are certainly unusual. These arise from the subject matter of the Journal, which is the educational uses of television, both broadcast and video, and of multi-media. A long-standing problem, therefore, has been the fact that what is being discussed in many of the JEM’s pages cannot be seen by those reading those pages.

Until recently there was no solution to this problem, and it has, undoubtedly, meant that whole classes of potential papers have never been submitted for publication because of the difficulty of describing what is often undescribable. Recent developments in digitized video, however, open up the possibility of making video clips available in electronic form, while the

very nature of multimedia means that segments of multi-media programmes could also accompany papers in certain circumstances.

However, life – at least electronic life – is never that simple!

The first issue that faces the Editorial Board and the Publishers is one that is faced by any journal considering electronic publication, namely, in what format will the Journal be distributed?

This is really two questions in one, for there is a hidden question regarding the status, if any, of a paper version. Many readers, both individuals and libraries, will continue to prefer a printed journal both because it is easier to read and because it is easier to archive. We shall return to the question of archiving later, but the well-known preference of most people for reading from paper is an extremely important issue in many contexts. The two key aspects of this are probably convenience and physiological/psychological.

The convenience of paper over electrons at the present time is undeniable, for who can seriously envisage reading journal articles from a computer on a bus, train or plane, or at home in front of the fire, or even in the proverbial bath (although the author has yet to meet anyone who admits to reading a paper journal in the bath either!). Technological developments will bring longer-lasting batteries, greater miniaturisation, and even wireless connection to the Internet, but other factors will probably come into play to prevent the supermicro-computers of the future being significantly less inconvenient in this context than today's notebook computers.

Which brings us to the physiological and psychological issues.

There can be no doubt that, regardless of age, gender or experience, almost everyone finds it more difficult to read from a screen than from paper. There are a great many issues here, of which some of the most important are:

- The ability of the eye and brain to identify and acquire information appears to work far more effectively when allied to a physical contact; the best-known example of this is probably the fact that almost everyone has no problem in finding a required page, chapter or paragraph when “flipping” through the pages of a book, whereas few, if any, people can scroll through a document and find the same items, even though the scrolling process is much slower than the “flipping” of the pages.
- Staring at a screen for any length of time induces considerably greater eye strain than does reading a book for the same period. Quite apart from any actual strain induced by reading large amounts of text from the screen, this also produces a psychological reaction which discourages the reading of lengthy articles from the screen.
- Many people, even very experienced computer users, feel happier with a physical, and readable, copy of what is stored in a computer system in case “something happens” to the version displayed on the screen. This pre-disposes them to print anything that they think might be important – so why read it in any detail from the screen?

- Relatively few desktop computers, and virtually no portable computers, can display even a single page of text at a size which is comfortable to read. This results in extensive scrolling of text, which appears to be a particularly unsettling process compared with “scrolling” of the eye over a fixed page of text. This problem is enhanced in systems which scroll the whole document, rather than moving directly from one page to another.
- Readers frequently refer back to earlier sections of an article. The process of scrolling back through a document to find the relevant section is considerably more intrusive than the process of flipping back through the pages of a book.

As a result of these, and other, factors the vast majority of readers would, ideally, prefer a conventional, printed, journal, and will probably end up printing copies of any articles in electronic journals in which they are interested before they read them properly.

So why should we be producing electronic journals at all?

There are, of course, a great many reasons, both relating to economy (for the publisher, if not for the reader), and to the other possibilities that electronic publishing brings, such as keyword searching, hyper-links to other articles and/or supplementary information, and virtual journals which are distributed over several different computer systems. Nevertheless, in the case of the JEM, and many other journals as well, it is probable that any electronic version would need to be accompanied by a conventional paper edition for those many potential readers who would not accept a fully electronic journal or, especially in the less-developed world, who do not have, and cannot envisage having, the computing and communications facilities to make such an option even remotely feasible.

Which leads us back to the original question concerning the format of the electronic version of the Journal.

One of the most obvious issues with electronic publication is concerned with ensuring that readers pay for their copy and that some control is enforced over what they can do with it. As already indicated, most readers will wish to print any material that they wish to read at all seriously, and so the files containing the articles must be capable of being printed on a wide range of printers. On the other hand, it is obviously undesirable for the reader to be able to make copies of the electronic documents – at least in a form which could be subsequently editable – although they do need to be able to store copies on their computer so that, for example, they can read them on a notebook computer that is not connected to the Internet. It is not intended to discuss these issues any further here, as they are fundamental to the whole electronic publishing concept, other than to raise two specific problems, one related to hardware and the other to software.

The individual reader will, potentially, have one of a wide range of types of computer hardware with which to access any electronic documents, and it is clearly essential that such documents are not tied to any particular platform. This might be acceptable for library use, but if an electronic journal is to achieve the same level of acceptability as its printed cousin then the reader must be able to use the hardware that he or she has regular access to. After all, the printed version can be read anywhere!

A similar problem arises with software. Since electronic journals will be distributed in forms other than plain text they will need appropriate software such as Acrobat, or some other, proprietary, system. Here again it is important that the software is available on all platforms and, moreover, that it is widely used. Most readers will not be happy if they require different software to read every journal that they subscribe to.

In the case of the *Journal of Educational Media* there is a second, loosely related, issue. This concerns the possibility of distributing media files containing video clips, multi-media extracts, or other similar material whose availability is essential for a proper understanding of specific papers.

Here the software problem becomes still more acute, as do the hardware requirements. Playing an MPEG-1 video clip is relatively straightforward on a high-end Macintosh or Pentium PC, for example, but those many potential readers who still only have an 80486 computer running Windows 3.1, or something even earlier, would have no chance of getting the video to play on their computers. On the other hand, the majority of multi-media presentations are platform-dependent, and a journal including a clip from one of these programs would need to provide several different versions for the different platforms.

There is also the question of how this material is distributed.

Clearly, an electronic version of the JEM could incorporate appropriate files containing this supplementary material, as long as the issues aired above were fully addressed, but what about a paper version of the Journal? One possibility might be a CD-ROM bound into the journal, or supplied alongside it. This is technically feasible for simple multi-media presentations, but if good quality video is required then something better than CD-ROM is required. In practice, this probably means DVD-ROM, although it will be some years before more than a minority of computers are equipped to play these discs, and probably even longer before DVD discs can be produced at an economic price in the limited numbers required for a journal (as compared with feature films).

So, although the possibility of providing video and other material alongside appropriate papers is an attractive one, the logistics involved will be formidable if all subscribers are to have a reasonable chance of being able to view this additional, but no doubt critical, material. And clearly subscribers would be upset, to say the least, if major elements of the journal were, in effect, denied to them without any concomitant reduction in their subscription – and probably even then.

All of this, however, pales into insignificance when we turn to considering the longer term archiving of journals or, more specifically, of the papers within those journals.

With paper it is relatively easy. As long as a modicum of care is taken over the environmental conditions, paper will last for hundreds of years. But who would place a bet on being able to read the electronic journal in a mere fifty years from now? Still less being able to play any associated video or multi-media?

There are two, quite independent, problems here.

The first concerns the hardware/software combination that is required to read the document or play the media. The history of the past fifteen years indicates that there is a high probability that in ten years' time whatever software is in current use will be quite unable to read, let alone play, any files produced by today's state-of-the-art software. And it is even more probable that today's software will not run on the hardware in use in ten years' time. In order to ensure that documents can be read, and media files played, it will, therefore, be necessary to regularly convert them to the newer formats that are replacing the existing ones. This will not necessarily be a straightforward task, especially in the area of media files, or of any documents incorporating a dynamic element.

The second problem relates to the method of storage for, whereas librarians know how to look after paper documents so as to ensure that they last for hundreds of years, no-one yet knows how long, for example, a CD-ROM or a DAT tape will last – although it is believed that a CD-ROM might last as long as 30 years!

It seems clear, therefore, that although electronic journals will bring substantial short-term benefits in the areas of searching and distribution, this may be at the cost of a significant reduction in ease of use and the potential for serious long-term storage, retrieval and archiving problems. There is undoubtedly a place for electronic journals, but it can be argued that in many cases the production of a journal in electronic form rather than conventional paper form will create more problems than it solves. Is the decision to go electronic often a case of the media becoming more important than the message?

3. Electronic Document Distribution

One of the major effects of the electronic age, and of the Internet in particular, is the revolution that it has caused in the way in which documents can be distributed between co-workers around the world. Arguably, this is nowhere more apparent than in the development of International Standards where, by definition, the participants in almost every single project are spread around the globe. As Convenor of an ISO Working Group (for the development of successive Standards relating to the Fortran programming language) the author is required to distribute a wide range of working documents, and occasionally other material, to participants in many countries. Usually this material may be distributed on a publicly available basis, but on some occasions appropriate steps must be taken to strictly limit access to a well-defined set of people.

However, document distribution of this nature also raises its own set of problems due, primarily, to the wide range of potential software systems in use, and so ISO has produced a set of rules relating to acceptable formats for document distribution. In practice these can cause more problems than they solve due to, for example, the rule that WordPerfect 5.1 *or later* is acceptable. In effect, this requires thousands of people who are perfectly happy using an older version of WordPerfect (or Word, for which a similar rule applies) to upgrade whenever a new version is released in order to be sure of being able to read certain types of documents. On the other hand, if the format of the document is required to be adhered to exactly, as is frequently the case, then a word-processing system is quite unsuitable since different page defaults, font descriptions, etc, can result in changes in appearance – some quite subtle and some extremely obvious.

For potentially printable documents, therefore, ISO recommends the use of Acrobat (pdf) files, while html is recommended for documents which are expected to be primarily viewed on-screen. PostScript is no longer an acceptable format, due to the many problems that it can cause, notably when printing is attempted on computer systems having printers significantly different from that on the computer system on which the file was created. However, these recommendations, in turn, create problems for, although it is easy to turn a flat text document into an html one by the addition of a couple of lines at the beginning, and one at the end, it is impossible to create an Acrobat document without the use of special, proprietary, software – which not everyone concerned is willing or able to purchase. In practice, therefore, the author of this paper, in his role as a Working Group Convenor, is willing to accept documents in Acrobat, PostScript or, if all else fails, plain text, and then converts documents in either of the latter two formats into Acrobat format before distributing them to the WG membership.

However, even this is not as straightforward as it appears. The Acrobat system very cleverly uses a proprietary Multiple Master Font technology to ensure that the document will be displayed and printed correctly even if the end-user's computer does not have all the fonts installed that are used in the document. However, this only works correctly if all the fonts used are present at the time of distilling into pdf. If the Acrobat file is produced by the author the document then all should be well, but if, as described above, it is produced on a quite different computer then problems do occur – most obviously when attempting to create a pdf file from a document produced by LaTeX, when the resulting document is usually extremely difficult to read on the screen, although it prints perfectly satisfactorily.

Nevertheless, in this area, the use of the Internet to distribute documents works quite well – apart from one, frequently overlooked, aspect, namely the disenfranchisement of those who do not have appropriate Internet access and software tools on their computer systems. This is a problem which has been already referred to on more than one occasion, and can be neatly exemplified in the context of the author's ISO Working Group. For many years the activities of the WG have been tracked by colleagues in Russia (formerly in the Soviet Union) who have made valuable comments on drafts of Standards and even a Russian language translation of the published International Standard, although they have only rarely been able to attend meetings of the Group. Currently, however, they are no longer able to participate due to their lack of adequate Internet connections. And while Russia may not be amongst the most developed countries in the world, it is hardly a Third World country!

4. Email and the World Wide Web

The author of this paper sent his first international email messages in 1986, and has observed the evolution of a loosely connected set of academic and military networks into the world-wide Internet from the position of a major user of the technology. Without it he would not have been able to achieve much of what he has achieved during the last decade. Without it his life would, today, be much less pressured! Long ago he decided that life was too short to belong to *any* of the many Newsgroups which related to various aspects of his work, still less to those of more personal interest. And yet he still receives over a hundred email messages every week, often several hundred. The art of knowing what to “delete before reading” is essential, and yet how can one know what to treat with such cavalier disdain without the risk of missing something important?

Furthermore, email has an interesting psychological trick up its sleeve, for while most people have no difficulty in prioritising conventional correspondence, it appears to be much more difficult to put email on one side for reply at a later date. Partly this is because the sheer volume of email that many people receive makes them afraid to defer anything until later in case it gets lost in the mass of old email messages, and partly it is the ease with which a reply can be composed and despatched while the original message is still being read. Indeed, many people find that the only way to control this urge to respond is to print out email messages, and to then process them in the same way as any correspondence received by conventional mail – other than the fact that the reply, when it is ready, will be despatched by email instead of the regular postal service. Of course, when the message is a long one, as observed earlier in a different context, most people find it easier to read in printed form anyway. Despite its often transitory nature, therefore, a surprisingly large amount of email ends up being printed on paper, at the cost of still more trees.

Which brings us back to the World Wide Web.

This is a truly remarkable development, which scarcely anyone could have forecast even a mere five years ago. If any one development can lead to an Information-Rich Society it is surely the World Wide Web. And yet who has not entered a perfectly reasonable enquiry in the search field of one of the popular search engines and received, a few moments later, the first ten of 50,000 items purportedly relating to the subject specified? And who will ever know if any outside the first hundred or so are really relevant?

The Web is certainly an Information-Rich facility that has the potential to be of enormous value. And yet what proportion of that information is truly valuable? Very little of the information available is verified by any independent arbiter. Some of it is undeniably extremely valuable; and some of it is complete rubbish. But how can the poor “web surfer” determine which is which? Is not much of what is available on the Web a triumph of quantity over quality? of image over substance?

The potential of the Internet in all its guises is enormous. And yet almost everyone who uses it to any serious extent complains of the difficulty, if not impossibility, of separating the valuable information from the redundant and the “noise”. Has our Information-Rich Society already become an Information-Overloaded one?

5. Some Conclusions

The author recently completed the proof-reading of a book (of around 650 pages) that he had written with a co-author from Seattle, on the West coast of the United States, some 6000 miles from Oxford. About one third of the book was written using WordPerfect 6.0 on a Pentium-based PC in Seattle, with the other two thirds being written using WordPerfect 3.1 on a Power Macintosh in Oxford. Both authors sent pdf copies of their chapters to each other by ftp as they progressed with their writing, and all suggestions and error corrections were communicated by email. The final text of the book was submitted to the publishers in a mixture of WordPerfect files, together with a set of pdf files. All of the copy editor’s queries were sent to the authors by email, and replied to in the same way. The final page proofs were made available to the authors in pdf form via the publisher’s web site. A textbook use of electronic methods, one might imagine!

However, both authors found it necessary to print both their own chapters and those of their co-author in order to read and comment on both their own and their co-author's work. Despite being sent both WordPerfect and Acrobat versions of the final manuscript the publisher required, in addition, a paper copy to actually work from. Although the proofs were available in pdf form, this was primarily for the benefit of the Seattle author, who was able both to receive his copy of the proofs more quickly than would otherwise have been the case and, possibly more important, was able to send his corrections to the Oxford-based "primary" author in the form of "notes" in the pdf files – a feature of Acrobat Exchange which dramatically simplified the task of combining the two sets of corrections. What the publisher required back was a conventionally marked-up set of the printed page proofs.

So – only a partial textbook success, for, despite the comprehensive electronic facilities available, at every stage publisher and authors fell back on paper, and probably used more paper in total than if they had been typing the book using old-fashioned typewriters!

And this is the paradox. Does electronic publishing actually reduce the amount of paper used? Or is it simply increasing the rate of deforestation of the planet?

There can be no doubt that the era of electronic communication has arrived and that it will continue to develop in ways that we still cannot imagine. After all, who could have forecast ten years ago that documents might be spread across many computers in different parts of the globe and that simply clicking on a word in one part of the document would automatically, and almost instantaneously, cause the next part to be fetched from somewhere thousands of miles from where the first part was kept, and displayed on a computer being used by someone who had never, and probably would never, have any direct contact with any of the authors of the document he or she was reading?

And yet there is considerable potential for damage if care is not taken.

- First, and foremost, those of us in the technologically advanced sectors of the world must not allow the development of electronic publishing to disenfranchise the less technologically developed countries.
- Next, we must remember that computers are barely fifty years old, telecommunications is little over one hundred years old, and humans are millions of years old. We do not evolve as fast as does technology, and allowances must be made for human physiological and psychological features which have hardly changed in hundreds, or indeed thousands, of years. In particular, what is best for the technology is frequently not best for its human users; we forget that at our peril.
- Thirdly, we must remember that more is not necessarily, or indeed usually, better. The difference between an Information-Rich Society and an Information-Overloaded one is purely a matter of degree, and it is vital that we err on the side of caution and control, rather than (as at present) abandonment and chaos.
- And, finally, we must always ask ourselves why we are doing what we are doing the way we are doing it. In sharp contrast to our predecessors we have an enormous range of tools at our disposal for presenting and distributing information. However, we

must always ensure that we choose the best tools for the job – from the perspective of the user and not from that of the producer. In particular, we must *never* allow the media to become more important than the message.

There *is* a brave new world out there. We can, and should, take full advantage of what evolving technology has to offer. But that technology should be used to serve our needs and not to dominate them. The human race is almost infinitely adaptable, given time, but it is also unconquerable.