

Developing a flexible structure for a pure e-journal

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ABSTRACT

Despite the recognition of electronic journals as an important means of publication, there is, as yet, little migration to this medium. In this paper we review progress in the establishment of a peer-reviewed 'pure' electronic journal, and place it in the setting of the nature of the scientific research paper. In particular, we review the background to the journal, outlining its main features and the way it has been designed to fulfil several roles in extending the scope of e-journals for academic research as a whole. We also suggest developments in which the e-journal may help create a research framework centred around digital data transfer.

Introduction

From the days of Lancaster (1978) and even Bush (1945), there have been glimpses of the 'electronic revolution' in publishing. There have been false dawns since then, mainly due to limitations of hardware and software. Such technical restrictions hardly seem to be a worry now. However, there are so many groups working in the field of electronic publications (in one form or another) that it is, nevertheless, difficult to see what the trends will be. Indeed, we would argue that these trends cannot really be known at the moment. Rather, we suggest that a form of evolution will take place and adaptations to different environments will take place in several, perhaps many, ways. There are advantages in coming into the field of e-publishing at a relatively late stage and it could be argued that it is advisable to wait until a settling-in period has occurred. For instance, technology is improving all the time and many things are now possible that were difficult or expensive only two years ago. The extensions to HTML and the fall in the cost of printers and scanners are obvious examples. Hence, there is now a good opportunity to see what is currently under way and which adaptive route might be the best for a particular environment. This adaptation does not relate just to the e-journal. Changes in attitude are required of all participants.

If the evolutionary analogy can be taken a little further, specifically with respect to e-journals, we feel that new contributors should look carefully at what they want to achieve. Commercial publishers are trying various methods of establishing quality e-journals as well as attempting to create an ethos of electronic publishing. It remains to be seen which will actually survive. This paper presents but one view of this changing environment as it applies to *Glacial Geology and Geomorphology (GGG)*, a new e-journal developed between academics, library and computing, which is sponsored by an academic publisher.

Evolution or revolution?

Traditional print-on-paper journals have had some 300 years to evolve to the present state of refinement. However, during that time changes in the appearance of journals and the ways in which they are used have been negligible. Yet, gaining access to journals now is much easier than even 10 years ago and searching the range of published information, whether other journals, reports or data bases, grows easier by the year. This is commonplace knowledge and experience. However, academics familiar with on-line searching facilities, inter-library loan, WWW access, etc, are still reluctant to use e-journals as a preferred publishing medium. We acknowledge this conservatism and trust the quality e-journals will show what advantages there are to the medium, whether in electronic viewing or in electronic distribution. It is sometimes useful to distinguish between these two aspects. A study by Harter (1996) shows that, 'the great majority of scholarly peer-reviewed e-journals have had essentially no impact on scholarly communication in their respective fields'.

The problems facing libraries and, ultimately, readers are:

- 1) Cost. How can this be minimised for all? Publishing overheads still have to be met. However, can they be sustained with decreasing library budgets and thus increased pressures on the whole of the system? Will academics be prepared to pay more for better facilities for their work? This contentious topic will not be reviewed further here, but there are clearly areas where the e-journal can have a major role to play.
- 2) Storage, archive and retrieval. These long-standing problems for librarians can be ameliorated by e-journals. Clearly, however, there are remaining difficulties regarding who does what and where. From our immediate point of view, operating *GGG*, we have shelved these and will operate from local servers/mirrors with appropriate back-up.
- 3) Immediate availability. Readers will increasingly demand ready access to published material, whether electronic or print. Access to some electronic systems may already be difficult and time-consuming. One, partial, way of assistance here may be to offer a 'one-stop-shop', where an e-journal provides the core of a range of facilities. This is one area where development is rapid and potentially wide-ranging. However, it may be diffusion-limited due to slow acceptance by academics.

If, with *GGG*, we have identified a niche in the academic area correctly, we still need to fill it with high quality publications. This is the fundamental difficulty at present. Along with peer-reviewed credibility therefore, we need to be able to use the WWW/electronic medium effectively. In marketing terms, this is not so much delivery of an existing product in a new package as selling a new product which will do things customers had only dreamed of previously. This is point (3) above, and takes us back to Bush and Lancaster as well as Bernal (1954).

As much geological (and related) publication material relies on visual presentation, the graphics/illustration side is clearly one to be developed. Colour becomes easy to deliver. This is not just a gimmick; presentation of Geographical Information Systems and digital terrain models can only be seen effectively in colour. Similarly, constraints of black and white images, whether photographs or complex graphics, no longer need apply with effective colour

presentations. Electronic delivery and storage should have revolutionised the publication of scientific/academic papers. Data gathering, analysis, presentation, comparison with previous work and bibliographic searching can all be done digitally or with a very high element of digital input. Yet this is uncommon except for areas of physics (e.g. <http://xxx.lam1.gov/> with UK mirror at <http://xxx.soton.ac.uk>).

An increasingly digital locus of research frameworks will be expected to develop in the next few years. The e-journal has a part to play in this as much as the librarian and information specialist. One role of e-journals can be to facilitate changes in behaviour and to promote easier information flow and use of the widespread systems (storage, retrieval, processing) now available. However, we do not believe this will, in itself, produce a new methodology of enhancing information flow without showing the benefits of e-journals within an integrated structure. Such a structure includes the enhanced properties and range of facilities, such as improved linkages, searching and discussion groups provided by e-journals. In the case of *GGG* this range of facilities is held within the milieu (Whalley *et al.*, 1996). Whether this notion can also be used to increase revenue remains to be seen. The relationship suggested in Figure 1 indicates what these enhancements require before e-journals become fully accepted as part of an academic's research framework.

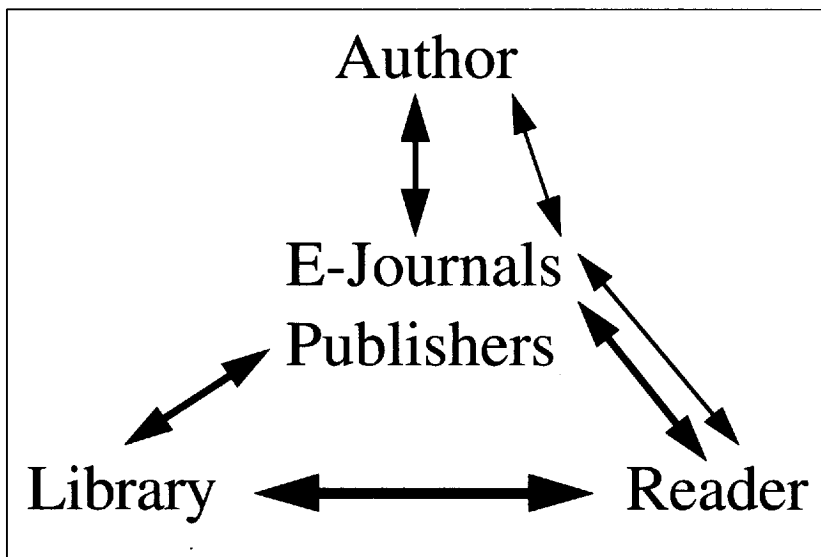


Figure 1. Suggested relationships and feedbacks associated with e-journals

Background to Glacial Geology and Geomorphology

Glacial Geology and Geomorphology (GGG) was conceived from the first as a pure e-journal (i.e. no paper-product counterpart). A gap in the 'market' was identified and reinforced by a perceived antipathy by an established journal in the general subject area. The various advantages of an e-journal in this field were also considered as part of the inception process. Discussions took place between our group at Queen's University and the British Geomorphological Research Group (BGRG) as an academic professional body as well as John

Wiley and Sons who already published one journal for the BGRG. The following is a brief summary of the timings of the project.

January 1992	Initial idea and discussion with John Wiley and Sons
November 1993	More detailed discussion with BGRG and John Wiley; Mock-ups, experiments etc.
November 1994	BGRG decision to go ahead with publishers
November 1995	Start of contract with Wileys
March 1996	Projected launch date
July 1996	Actual launch (24th)
July 1997	Finish of John Wiley contract
	Project moves from QUB to John Wiley
	Editorial Office still at QUB

As with many projects which are enthusiasm-generated, there were various amounts of 'slippage' in the development and full development could not really begin until a research assistant was in place. Even then, a wide variety of problems had to be overcome.

The problems of establishing a new journal in its own right need to be added to those concerned with developing publishing in a new medium. The main limiting factors about development so far have been related to the human preconceptions of what an e-journal should or might be. In some form, such views may often be considered to be 'conservative' or even retrogressive. There have also been technological challenges in establishing the journal. These problems have been:

- Setting up the e-journal
- Establishing its quality and credentials
- Setting up a distribution and subscription base and network.

We deal briefly with the last of these immediately and the first two are covered in sections below.

A feature of *GGG* has been an attempt to make it, ultimately, cost-effective for both the individual and library. The publisher has a 'traditional' or 'library-orientated' view of subscription costs. Subscriptions are dealt with by post for all journal dealings alongside the development of a computer database during the launch phase. The public side of *GGG* can be entered free but a password is given once a subscriber has been entered in the database. As with some other new e-journals, *GGG* is initially 'free' in return for feedback from subscribers. However, a conscious effort has been made to make it possible for *GGG*'s costs to be covered by a large number of small individual subscriptions by making it a focus for research in the field. Devices have to be worked out for this procedure. It depends upon a charging mechanism which will cope with the security demands of credit cards for occasional transfers or other means of dealing with small amounts of money. The 'Millicent' system may be one solution to the latter. However, it remains to be seen if this is a viable model (Whalley et al., 1996) or whether a library-orientated subscription mechanism will dominate. The needs and perspectives of libraries and subscription agents are clearly significant here too.

As one of the fundamental precepts of *GGG* is to make it adaptable to the needs of authors, readers and referees (who are often forgotten), feedback from these participants is considered to be vital. The reluctance of potential authors to contribute papers is the most fundamental problem. Non-existent impact factors for new journals do not help, but the major problem is the reluctance of authors and readers to consider the medium seriously (Harter, 1966).

Using the Internet/WWW as a dissemination medium

In *GGG*, the Internet structure is used as a dissemination medium with WWW browsers as the delivery mode. Rather than produce a screen facsimile of a traditional paper we have tried to produce a journal which can be read easily on screen, allows easy navigation in a paper and between papers, and can be printed easily.

One, if not the main, requirement of a journal in the geological community appears to be (from anecdotal and questionnaire evidence) a peer-review system. A double-blind review system has been used for which we have developed a electronic (Web/ftp-based) system of transfer as well as conventional data transfer by paper or disc. We prefer totally electronic manuscripts as this is more rapid. The limitation is still where the author or referee cannot deal with this medium. We wish to establish a system which maximises direct (on-line) use. The intent is to minimise accumulated errors by quality control procedures at all stages of article processing. Reading print rather than screens is still preferred by referees and copy editors. This may change, but the advent of the inexpensive desk top scanners with good OCR will help in one direction. The easiest compromise for editing marks on paper copies may well be to scan pages and convert to GIF image, which can be transferred easily. The technology for this is available and the costs extremely low (<£200). At an early stage in development some people claimed that electronic delivery would be an impediment to readers (and authors) in developing countries. We disagreed then and still do so. One library with an Internet connection in even remote locations can download the required information. As journal prices continue to rise, print-on-paper versions become rapidly more prohibitive.

Use and Advantages of the Internet/WWW

The development of HTML/browsers has made navigation through hypertext documents much easier. At an early stage it was found that it was very easy to become 'lost' in a paper. We used an HTML marked-up version of an existing paper published by John Wiley and Sons in the journal *Permafrost and Periglacial Processes* (see: <http://boris.qub.ac.uk/ggg/papers/example/ep01.html>) to test and develop navigational aids. The development of 'frames' is particularly important. The paper's table of contents allowed division into appropriate 'pages' as screens. The presence of active guide links at the top and bottom of each page makes it easy to provide access to the next/previous pages and return to the paper's table of contents. The paper itself is viewed as full-screen once entered. Within the paper, links are provided to references as well as figures. This makes it easy to check a reference and then return to the main text. Two reference lists are required for this, one at the end of the paper, the other being the one linked to.

We are examining ways of handling images which minimise 'Web-lag' as far as possible, but allow efficient assimilation by the reader. Small in-line images can be loaded but enlarged by active links and placed as separate, manipulable, screens if required. It is in the nature of the WWW that hypertext links provide easy ways of searching material within an article, through the collection of papers that make up the journal as a whole, and other e-journals. By using searching tools at an individual computer the academic has increasing control on searching devices (e.g. BIDS, Z39.5) which can be used to examine the currently viewed e-journal at the same time as a wide range of other databases. This is an area undergoing tentative development, but which, we believe, has considerable potential.

Drawbacks of the WWW

That HTML is not as sophisticated as SGML used for page mark-up presents some difficulties. For *GGG* this was accepted from the outset, but based upon the assumption that both the level of sophistication of HTML and of the browsers employed would solve many of the difficulties in time. This has largely been the case where page layout has been involved: also, for example, coding with HTML editors makes tables much easier to implement than by 'hand'. The major drawback is dealing with mathematical symbols. Although possible in HTML 3 only ARENA seems to support MATH entities and this only in part. We use images of the necessary mathematical and statistical work used in *GGG* at present. Examples are given in /ep01.html as above. The geological community is not widely conversant with LaTeX, although papers with much mathematics can be coded in that and converted to in-line gifs with the latex2html program. We have not explored the possibility of in-line production from equation editors of the latest versions of Word and Word Perfect.

Unlike delivery by Acrobat, WWW material is presented as a scroll. This makes for long and unwieldy documents. In the case of *GGG*, however, we have divided each article up into sections. The length of these rather depends upon subject matter, but experimentation showed that this made navigation easier within the article. We tried using numbered paragraphs, (e.g. 1.3.1, 1.3.2 etc.), but dispensed with this as it seemed to give no real advantages and detracts from the appearance.

A potential problem for delivery is the quality of graphics and especially photographs which are limited by the screen resolution of WWW. We are monitoring this as we go, but tests suggest that this may not be as critical as might be thought. If there are problems of resolution, then ways exist of getting round it, for example by having a hierarchy of images which can be used as image maps to show enlarged portions. Indeed, this can be used as an informative device, although not, of course, in a printed version. It is also feasible to send images directly to subscribers via Acrobat/pdf, along with a print copy if we so wish. Our rather negative experience of potential readers faced with a demand for an Acrobat reader before downloading suggests that this path is not yet acceptable to for many potential users.

The compilation and refereeing of papers

So far we have had papers submitted in several formats: floppy disks, e-mail attachments and uploading to us by anonymous ftp. The latter seems to be a good way of dealing with the

large images that are often used in, for example, remote sensing. We have recently used optical character recognition (OCR) with a flatbed scanner to upload material. The use of sans-serif font allows picking up with ease: the software we have used (Caere Omniscan) has dealt with this easily and has an HTML output available if required. In general, we prefer ASCII text as the style for receipt, as this makes it easier to send on to referees, etc. (Figure 2). Although style-sheets are now available on the WWW so that authors could send us papers, we have not used these as we consider the layout best organised after the refereeing process.

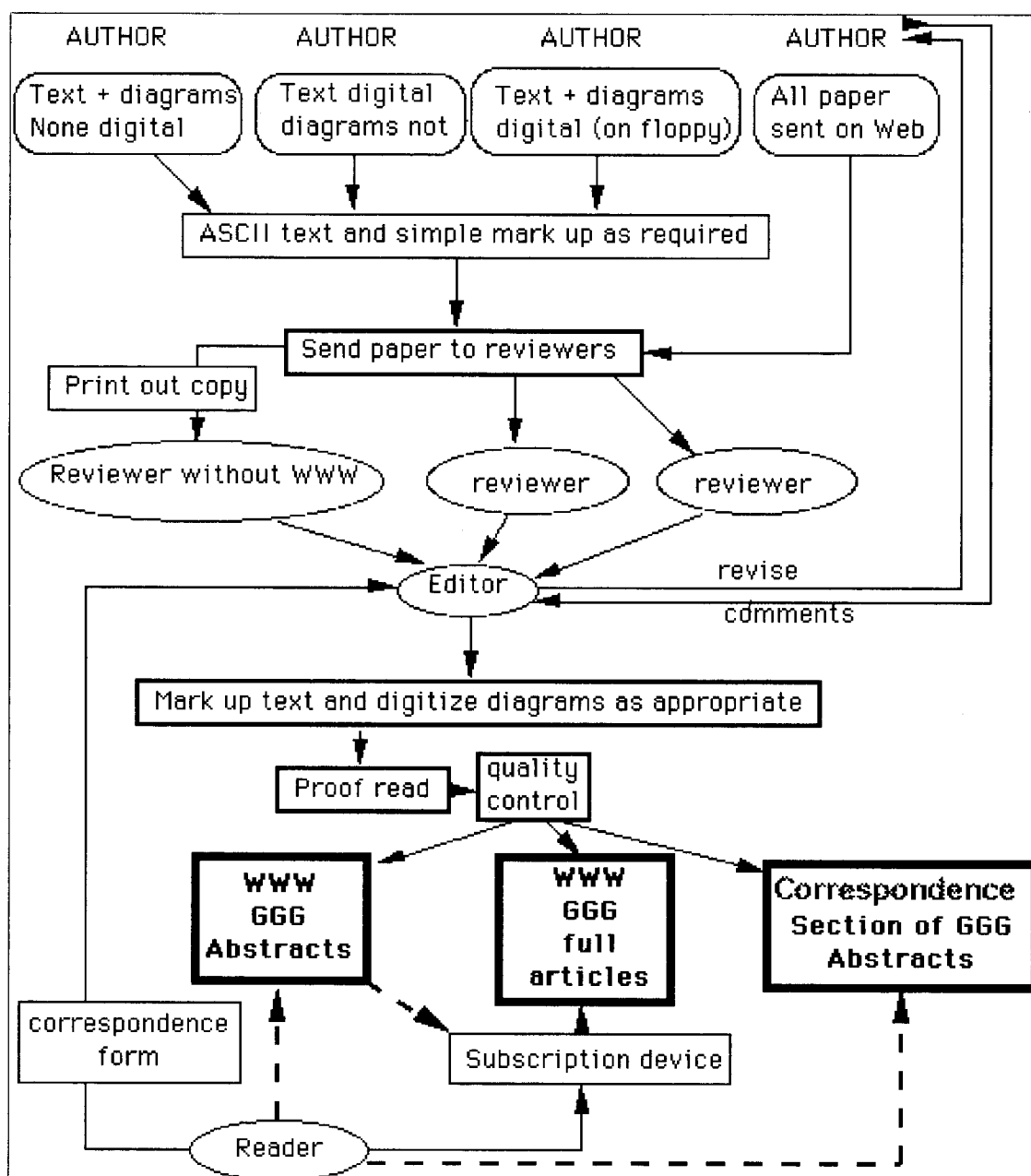


Figure 2. The Basic processes in *GGG*

We have been sent GIF images as parts of articles. However, we prefer to take high quality images and to scan/convert these ourselves. It also makes changes easier to make during the

editorial/refereeing process. For instance, adding text to a photograph may be done more quickly editorially than by sending back to an author. This is an additional overhead for the journal, but may be the most efficient way until authors and their assistants are fully conversant with tools such as Photoshop. A suite of methods for efficient two-way article transfer will make the whole process more efficient and this is an immediate aim for *GGG*.

The greatest problems to date have been at the editor-to-referee stage of refereeing. We have contacted referees by e-mail as a first courtesy. This may seem a slight thing to do, but it certainly makes sure that there are no delays because the potential referee is away. He/she can also envisage the suitability of the paper to their experience. One referee we recently approached said that his experience of the topic was not up-to-date and would prefer not to take the task on. We wasted no time in dealing with this by e-mail and could then approach another referee. The greatest delays of paper production are usually in the refereeing/revision process. We have sent papers to referees by e-mail attachments as well as opening a secure URL so the referee can down-load the paper by ftp. The way we hope to deal with papers in the long run is to provide each paper with a secure area on the server so that ftp and 'local' URL are provided together with scripted forms that referees can fill in. Comments have come back via e-mail and these can be passed directly to authors.

Editorial processing

The editorial process is a subject that has had books written about it, but two main aspects are of interest here. First, we have made the refereeing process 'double blind'. While there are some academics who think that this is not a valuable process, there does seem to be a general view that it is important. Refereeing in this way presents few difficulties, only a certain amount of care when sending manuscripts. Secondly, we wish, as an editorial decision, to make the process more consensual. That is, if there are disagreements between referees and authors then it is hoped that an agreement can be reached by negotiations (e.g. Chubin, 1994). The editor, or member of the editorial board, mediates this process. In this way we hope to produce acceptance of an article which might otherwise be rejected. As referees use a whole variety of criteria for 'acceptability', we deem this a more appropriate way of maintaining quality rather than by having a high rejection rate. This is not the same as a 'consensus journal' (e.g. Stodolsky, 1992, 1995), although there is no reason why this approach should not be taken in time, either on its own or as an adjunct to the basic refereeing system. Questionnaire responses suggest that most academics are not aware of consensus journals, although *Journal of Interactive Media in Education (JIME)* has promulgated this idea widely in the last year.

Developments - the e-journal as concept

We suggest that marketing is important to:

- (a) Increase overall awareness of e-journals and the unique facilities they offer.
- (b) Produce a one-stop shop for a range of facilities for a specific e-journal. This range of possibilities is increasing all the time and includes software options as much as hardware devices. (In the latter category, we mention inexpensive colour printers, fast modems for home use and digital 'photo-copiers' in institutions.)

As academics take the advantages of the e-journal concept on board they should become used to the increased facilities on offer. We see that, just as frames have greatly aided internal navigation, so other developments will assist the data integration which digital media can facilitate. Acrobat delivery is one of those developments which is clearly gaining in popularity in relation to e-journals. Specific Java, JavaScript and CGI applications are yet other developments which will be used increasingly, especially as they need no user operation. In particular, the Application Program Interface has great potential. In Netscape, this can allow a plug-in to view non-HTML data. Not only does this include multimedia (e.g. Shockwave/Director), but will be of particular use for viewing graphics and VRML as well as pdf files via Acrobat's Amber plug in. Client-side storage devices ('cookies' in Netscape) are also ripe for development in e-journals as they contain preferences and other useful information of states between JavaScript/CGI programs. Perhaps imagination is the only restriction on developments such as these.

The other important facilities are related to data access and information-handling tools. Perhaps publishers should assist directly with the implementation of Z39.50 alongside a range of e-journals. If this does happen, then it will be an important part of a culture change for all involved with academic research. Floridi (1996) has examined the nature of these Internet facilities and this culture change and facilities as well as some of the implications concerning quality control.

Cohen (1993), in a useful overview of the implementation of electronic libraries, restates the principal of least effort as Mooers' Law: 'an information retrieval system will tend not to be used whenever it is more painful and troublesome for a customer to have information than for him not to have it'. We take this to be a formal manifestation of the librarians' statement that, 'we never see Dr X up here nowadays'. That Dr X is often the first to complain that a library has stopped taking a favourite journal may also be associated with this in some way. Further aspects of the need for a culture change have been discussed by Lynch (1994), especially regarding the role of organisations. The wide range of participants involved in digital communications need to discuss the mutual problems and benefits of these changes.

Conclusions

We believe the electronic environment for academics' work is changing rapidly, but that most do not yet appreciate the nature, scale and rapidity of these changes. The role of the e-journal may be pivotal by inculcating these changes, by offering a wide and rich variety of devices to aid academics and their research frameworks. The ways in which various e-journals are adapting the hardware and software now available to provide service enhancements are exciting but difficult to evaluate.

We stress that the way *GGG* has developed, and is developing, offers only one possible route to a fully working e-journal. In general, the e-journal has possibilities that can make the editorial process easier and faster by implementing negotiation procedures electronically, and this is also in tune with the needs of readers and authors. The cost of e-journals and their development is still high and the overheads and subscription methods are still in need of careful analysis before e-journals become more widely accepted by academics.

References

Bernal, J.D. 1945. Information service as an essential in the progress of science. 20th Aslib Proceedings, London, 20-45.

Bush, V. 1945. As we may think. *Atlantic Monthly*, 176 (1), 101-8.

Chubin, D.E. 1994. Refereeing and the trilateral negotiation. In *Editing the refereed scientific journal*. (Weeks, R.A. and Kinser, D.L. Eds). IEEE Press, New York. pp.7-12.

Cohen, J. A. 1993. The electronic library in higher education: an overview and status report. *Interpersonal Computing and Technology*, 1 (1), available at <http://www.helsinki.fi/science/optek/1993/n1/cohen.txt>, (COHEN IPCTV1N1 on LISTSERV@GUVM.GEORGETOWN.EDU)

Floridi, L. 1996 The internet: which future for organised knowledge, Frankenstein or Pygmalion? *The Electronic Library*, 14 (1), 43-52.
(<http://www.ucet.ufl.edu/~true/1101/floridi>)

Harter, S.P. 1996. The impact of electronic journals on scholarly communication: a citation analysis. *The Public-Access Computer Systems Review*, 7 (5).
(<http://info.lib.uh.edu/pr/v7/n5/hart7n5.html>)

JIME Journal of Interactive Media in Education (<http://www-jime.open.ac.uk/jime>)

Lancaster, F.W. 1978. Towards paperless information systems. Academic Press, New York.

Lynch, C.A. 1994. Scholarly communication in the networked environment: reconsidering economics and organizational missions. *Serials Review*, Fall, 23-30.

Stodolsky, D.S. 1992. Invitational journals based upon editorial consensus: A new editorial role in electronic journal publication. *Psychology*, 3(67). (Anonymous ftp: princeton.edu in /pub/harnad)

Stodolsky, D.S. 1995. Consensus journals: Invitation journals based upon peer review. *The Information Society*, 11 (4), 247-260.

Whalley, B., Munroe, G., Landy, S., Trew, S. and MacNeil, J., 1996. Publishing a scholarly journal on the World Wide Web. *Aslib Proceedings*, 48 (7/8), 171-176.

George Munroe has worked in a support role in the Queen's University of Belfast, where he helped introduce Internet services as leader of a small special developments team. He was the task force leader for the UNITE (User Network Interface To Everything) task force of the Trans European Research and Education Network Association (TERENA). He has trained Eastern Europeans on setting up network services on behalf of TERENA at NATO sponsored workshops.

In 1997 he left the University to work for small Belfast based Internet company which he helped form in 1994. He is currently providing training courses on behalf of this company, UNITE Solutions, and acting as a trainer for Internet Society sponsored workshops on a global scale.

Sheila Landy graduated from Birmingham University with a degree in Russian Language and Literature and then taught in London. She went to QUB Library school, gained Diploma in Library and Information studies. Joined QUB library staff and is now Science Librarian. Member of QUB library senior management group. She is interested in the electronic libraries and, particularly, e-journals and their impact on readers and reader services. She has been responsible for the librarianship requirements of electronic journals in the GGG project.

Shelagh Power is currently Research Assistant for the Glacial Geology and Geomorphology project at the Queen's University, Belfast. Her background is in Information Science, which she studied at undergraduate and postgraduate levels. Before joining QUB Shelagh spent some time with a commercial Internet company. Her main interests now lie in Electronic Publishing, in particular exploiting Internet and networking technologies for the effective delivery of academic information, and the technical developments in this field. She is now with the Institute of Electrical Engineers in London.

Justin Macneil graduated in physics but developed an interest in computing and electronic media. He was appointed as the first research assistant to the GGG project and he spent a year in Belfast. During this time he was responsible for setting up the basic structure of the journal and particularly on the subscription device. He is now a member of the Netskills team at the University of Newcastle on Tyne.

Brian Whalley is professor of geomorphology at the Queen's University of Belfast and Director of the School of Geosciences. His academic interest is in glaciers and glacial geomorphology and he has published widely in this and related fields over the last twenty years. A need for a new academic journal in the field of glacial geomorphology was identified about four years ago and this developed into the new electronic journal GGG in collaboration with John Wiley and Sons.