

EMBEDDED MULTIMEDIA IN ELECTRONIC JOURNALS

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“Words still have ... primacy, but they can be illuminated by images and moving pictures and by numbers and by sounds.” (Wilson, 1995, p. 1)

Electronic Journals

In his editorial prepared for the proceedings of the first International Conference on Electronic Library and Visual Information Research (ELVIRA) held in 1994, Collier proposed a refined definition of the electronic library.[1] At that time, an electronic library was defined as:

“A managed environment of multimedia materials in digital form designed for the benefit of its user population, structured to facilitate access to its contents and equipped with aids to navigation of the global network.”

Today, for many in the academic environment, the concept of the ‘electronic library’ has become synonymous with electronic journals or e-journal collections. Overall, of the more than 157,000 serial titles reported in a recent edition of an international periodicals directory, 10,332 were available exclusively online or in addition to a paper counterpart.[2] In the academic arena, the number of e-journals has grown from less than 30 titles in 1991 to nearly 2,500 in 1997, an increase of more than 8000 percent in less than ten years![3] While there are a number of reasons for such growth, the proliferation of Internet connectivity and the adoption of the World Wide Web for a full range of economic and communication applications clearly has provided the impetus for many publishers to develop and expand access to their publications within this environment.

E-Formats

ASCII

Prior to the development, enhancement, and widespread adoption of the Web, however, the format and distribution options of e-journals were limited. Typically, commercial journals were made available on a CD-ROM as scanned bit-mapped images, as ASCII text, or both. In general, these were accessible only from a single workstation or a library local area network; in rare cases, access was made available over a Campus Wide Information System (CWIS).[4] With the increased availability and use of e-mail for personal and professional communication beginning in the early 1990’s, scholarly groups, as well as individuals, began to publish new e-journals in ASCII format, distributing these to subscribers via e-mail, or providing access from a designated Internet gopher site.

PDF

With the development and release of the Portable Document Format or PDF by Adobe Systems in the early 1990s, and the free availability of its associated Acrobat Reader software, PDF soon became the format of choice for many commercial publishers.[5] As a version of the

Embedded multimedia

popular Adobe PostScript page description language used by both individual and commercial publishers, PDF provided the option of displaying e-journal articles as near-equivalents of their PostScript hard copy counterparts.[6] Using Acrobat Exchange, the associated adjunct software, PDF also offered additional features for online presentation and browsing.[7] Among these are the ability to:

- Link within and between documents
- Annotate and bookmark documents
- Present thumbnail sketches of pages
- Embed fonts within documents
- Index and search documents
- Support multimedia components

HTML

Following the development of the World Wide Web and the subsequent creation of such Web browsers as Mosaic and Netscape Navigator, and their quick adoption by academic, commercial, and public sectors, a number of publishers began to provide access to their e-journals using components of the HyperText Markup Language, HTML. Utilizing the hypertext features of the language, publishers soon offered e-journals that provided the ability to link to in-text cited sources, footnotes, and inline and supplemental graphics and images. With appropriate helper applications and plug-ins, some e-journals also accommodated basic and advanced audio and video files, and other multimedia.[8]

Web Journals

While the World Wide Web and HTML can provide enhanced access to journal content, some publishers continue to produce e-journals that merely mimic the presentation and content of print publications.[9] Others, recognizing the potential of the Web environment, have begun to offer content that is only available in the electronic version of a journal title, in some cases including peer-reviewed articles as well as letters unique to the online version.[10] Some have gone further, providing opportunities to comment on a published article, either as an annotation to the text of the article, or in associated electronic discussion forum or chat session.[11]

Transcending the Limitations of Paper

Although some publishers have been conventional in their use of Web medium, others clearly recognize that such “technologies permit us to move beyond the traditional features of the print-based paradigm to explore new ways of using e-journals”. [12] In addition to what may be considered ‘textual extensions,’ many are becoming keenly aware that “there is room for other media, for example audio/visual media such as videos, soundclips and Java applets to make the basic information clearer or the reading more attractive ... “[13] In fact, there is a growing appreciation that such an environment provides the opportunity to present information that by its nature could not be conveyed by the printed page .[14] Most importantly, a multimedia medium, by being inherently interactive, offers an opportunity for fuller interpretation and analysis by the user, thereby further facilitating the communication of research.[15] In recognition of these and other benefits, a growing number of e-journals are incorporating basic as well as high-level multimedia as an integral component in these publications.

MmIT 25[4] Nov.1999

While there has been an increasing development and refinement of Web-based multimedia in recent years, several types are currently more often used in e-journals.[16] Among the more common types of multimedia and their associated plug-ins or helper applications identified in a review of selected electronic journals were animation (animated GIFs, Shockwave, Flash), audio (MIDI, Quicktime, RealAudio, RealPlayer), modelling (Chime), and video (MPEG, Quicktime, RealAudio) (Table 1).

Table 1. Common Types of Embedded Multimedia and Associated Plug-Ins or Helper Applications

Animation

Animated GIFs

Flash (Macromedia®) <http://www.macromedia.com/shockwave/download/download.cgi>

Shockwave™ Player (Macromedia®)

<http://www.macromedia.com/shockwave/download/download.cgi>

Audio

MIDI

Quicktime (Apple) <http://www.apple.com/quicktime/>

RealPlayer (RealNetworks) <http://www.realnetworks.com/>

RealAudio (RealNetworks) <http://www.realnetworks.com/>

Datasets

Interactive graphing

Java applets

'Live Math'

Modelling

Chime™ (MDL® Information Systems, Inc.) <http://www.mdli.com/support/chime/default.html>

Numerical code

Plotting

ACEGR/GRACE

Software

Source code

Spreadsheets

Vector files

Flash Player (Macromedia)

<http://www.macromedia.com/shockwave/download/download.cgi>

Video

MPG

Quicktime (Apple) <http://www.apple.com/quicktime/>

RealPlayer (RealNetworks) <http://www.realnetworks.com/>

RealVideo (RealNetworks) <http://www.realnetworks.com/>

Virtual Reality

Virtual Reality Markup Language (VRML) (Cosmo Software)

<http://www.sgi.com/software/cosmo/redirect.html>

Information about these and other Browser Plug-Ins and Helper Applications is available from the Netscape Netcenter Browser Plug-Ins site, <http://home.netscape.com/plugins/>

Of the multimedia e-journals reviewed (Table 2), nearly two-thirds cover general as well as highly specialized fields of science and technology, with biology and chemistry well-represented. The remaining third covered the social sciences, the humanities, and education. Not surprisingly, several Web-only journals employed the highest variety of multimedia formats.

Table 2. Selected Multimedia Electronic Journals

American Communication Journal <http://www.uark.edu/~aca/>

Applied Microbiology and Biotechnology

<http://link.springer-ny.com/link/service/journals/00253/index.htm>

Applied Physics. B, Lasers and Optics

<http://link.springer.de/link/service/journals/00340/index.htm>

Biochemical Journal <http://bj.portlandpress.co.uk/electronic.htm>

Biofilm <http://bioline.bdt.org.br/bf>

Chemical Communications <http://www.rsc.org/is/journals/current/chemcomm/cccpub.htm>

The Chemical Educator <http://journals.springer-ny.com/chedr/>

Combustion Theory and Modelling <http://www.iop.org/Journals/ct>

CrystEngComm <http://www.rsc.org/is/journals/current/CrystEngComm/cccpub.htm>

E-Law <http://www.murdoch.edu.au/elaw/indices/issue/v3n3.html>

Earth Interactions <http://EarthInteractions.org/>

EOL (Ethnomusicology OnLine) <http://research.umbc.edu/eol/eol.html>

EPJ Direct <http://link.springer.de/link/service/journals/10105/index.htm>

Experimental Biology Online

<http://link.springer.de/link/service/journals/00898/index.htm>

Expert Review in Molecular Medicine <http://www.ermm.cbcu.cam.ac.uk/>

G.O. Geowissenschaften Online

<http://link.springer.de/link/service/journals/10062/index.htm>

Genome Research <http://www.genome.org/>

Heart Surgery Forum <http://www.hsforum.com/>

Interactive Multimedia Journal for Computer-Enhanced Learning <http://imej.wfu.edu/>

Internet Archaeology <http://intarch.ac.uk/>

Internet Journal of Chemistry <http://www.ijc.com/>

Intersections <http://www.sshe.murdoch.edu.au/hum/as/intersections/>

Journal for MultiMedia History <http://www.albany.edu/jmmh/>

J.UCS Journal of Universal Computer Science

<http://link.springer.de/link/service/journals/00893/index.htm>

Journal of African Music and Popular Culture <http://ntama.uni-mainz.de/>

Journal of Biological Chemistry <http://www.jbc.org/>

MmIT 25[4] Nov.1999

Journal of Cell Science <http://usa.biologists.com/JCS/>

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

Journal of Molecular Modelling

<http://link.springer.de/link/service/journals/00894/index.htm>

Journal of Seventeenth-Century Music <http://www.sscm.harvard.edu/jscm/>

Living Reviews in Relativity <http://www.livingreviews.org/>

Molecular and General Genetics : MMG

<http://link.springer.de/link/service/journals/00438/index.htm>

Molecular Biology of the Cell <http://www.molbiolcell.org/>

Molecules Online <http://link.springer.de/link/service/journals/00783/index.htm>

Nanotechnology <http://www.iop.org/Journals/na>

Naturwissenschaften <http://link.springer.de/link/service/journals/00114/index.htm>

New Astronomy <http://www.elsevier.com/locate/newast>

New Journal of Physics <http://njp.org>

Nonlinear Science Today <http://link.springer.de/link/service/journals/00333/index.htm>

Optics Express <http://www.opticsexpress.org/>

PhysChemComm <http://www.rsc.org/is/journals/current/physchemcomm/pccpub.htm>

Sciences of Soils <http://link.springer.de/link/service/journals/10112/index.htm>

Scientific American <http://www.sciam.com>

Sociological Research Online <http://www.socresonline.org.uk/>

Studies in Nonlinear Dynamics and Econometrics <http://mitpress.mit.edu/e-journals/SNDE>

Videre <http://mitpress.mit.edu/e-journals/Videre/>

VR in the Schools <http://soe.eastnet.ecu.edu/vr/pub.htm>

World Wide Web Journal of Biology <http://epress.com/w3jbio/>

“In the Beginning ...”

Today, the number of identified multimedia e-journals, is comparable to the number of electronic journals identified nearly ten years ago. Yet, just as the number of e-journals has increased, so too will the number of Web-based multimedia journals. In time, this critical mass of electronic resources will come to represent the true multimedia electronic library defined by Collier earlier in the decade.

To document and promote the use of multimedia in electronic journals, a Web-based clearinghouse entitled M-Bed(sm): A Registry of Embedded Multimedia Electronic Journals, has been established at <http://www.public.iastate.edu/~CYBERSTACKS/M-Bed.htm>

Candidates for inclusion in this alphabetical directory are welcome and may be submitted from the site.

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Coda

"We have short-term retention of approximately 20% of what we hear, 40% of what we see and hear, and 75% of what we see, hear, and do (Gantt, 1998, p. 1)

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