Seize the E!
The Eclectic Journal and Its Ramifications

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Presenter

SUMMARY. In recent years, an increasing number of electronic journals have embedded audio, video, and other multimedia within their publication to augment their usefulness. In addition, some have further enhanced access and use with a variety of "eclectic" features, functionalities, and content, such as advanced navigation; font, format, and display control; modeling; personalization and customization options; and reader participation. In general, most cataloging records, however, do not reflect such components, depriving users of the necessary information and instruction that could facilitate use. A variety of recommendations and options are reviewed as possible solutions. *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <http://www.HaworthPress.com>]*

THE ELECTRONIC JOURNAL

For many in the academic environment, the concept of the "electronic library" is synonymous with electronic journal (or e-journal) collections. Overall, of the more than 164,000 serial titles reported in a

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http://www.haworthpress.com/store/product.asp?sku=J123
10.1300/J123v44n12_11

recent edition of an international periodicals directory, 27,083 were available exclusively online or in addition to a paper counterpart,[1] an increase of more than 260 percent over a three-year period.[2] In the academic arena, the number of peer-reviewed electronic journals has grown from seven titles in 1991 to nearly 4,000 titles in 2000, an increase of more than 28,500 percent![3] As noted in this directory, "most scholarly publishers now provide an electronic version of print journals because the World Wide Web has proven to be a convenient, cost-effective, and reliable resource."[4] Indeed, "there has [clearly] been a dramatic increase in the use of the Internet as a publishing medium . . . [with] new breeds of serials" emerging every day.[5]

MULTIMEDIA E-JOURNALS

Earth Interactions

Earth Interactions (earthinteractions.org) is a Web-only e-journal jointly published by the American Geophysical Union, the American Meteorological Society, and the Association of American Geographers. Begun in 1997, this e-journal serves researchers from universities, government, and industry that work in various areas of the Earth-systems sciences, a broad discipline that includes the atmospheric, oceanic, hydrologic, solid-Earth, and biological sciences.[6] From its conception, *Earth Interactions* was intended to be more than an electronic publication that would only reproduce what could be printed in the conventional paper scholarly journal.[7] In creating this e-journal, the goal was to "exploit the [digital] medium" and to "go beyond the capabilities of the printed page." *Earth Interactions* encourages authors to include sophisticated graphics, and raw data, as well as computer code with their submissions.[8]

Earth Interactions supports MPEG (Moving Picture Experts Group) and QuickTime™ files that allow authors to include image loops and animations within the text of their articles. It also permits authors to include audio narratives with these presentations so that a reader need not consult the written text. The journal allows authors to include small datasets as an integral part of an article and provides access to larger datasets by allowing links to external data-archive facilities. *Earth Interactions* also supports the inclusion of *Mathematica Notebooks* (www.wolfram.com/products/mathematica/tour/page10.html) interactive documents that allow a reader to enter data for equations within an

article to create graphs for these values. In addition, authors can provide the numerical code for models that enable readers to interact with authors' data and observations to verify and expand upon their results.

Earth Interactions is not unique in its use of embedded multimedia; an increasing number of e-journals incorporate a wide variety of multimedia as an integral or adjunct part of their publications.[9]

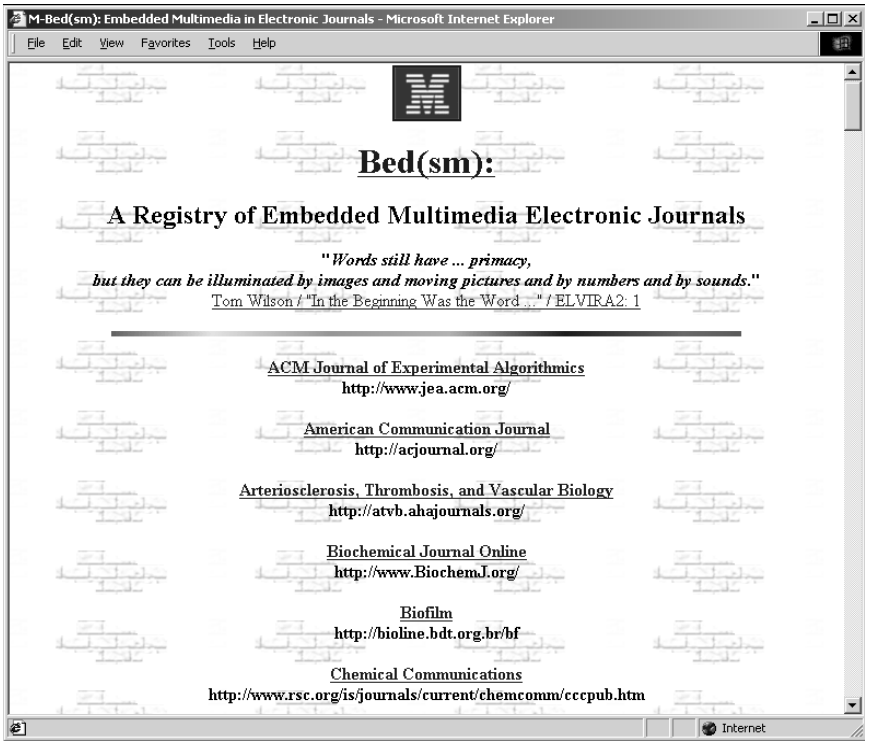
Benefits of Multimedia

Although many e-journal publishers remain conventional in their use of the World Wide Web, others clearly recognize that Web "technologies permit us to move beyond the traditional features of the print-based paradigm to explore new ways of using e-journals."[10] In addition to "textual extensions," some e-journal publishers are becoming keenly aware that "there is room for other media . . . to make the basic information clearer or the reading more attractive . . ."[11] Furthermore, there is growing appreciation that the multimedia environment provides an opportunity to present information that by its nature could not be conveyed on the printed page.[12] Overall, as inherently interactive media, multimedia offers an opportunity for the reader to more fully interpret and analyze to facilitate the communication of research.[13]

Common Multimedia Formats

While there has been an increased development and refinement of Web-based multimedia in recent years,[14] several types are used more often in current e-journals. Based upon a review of known multimedia e-journals in 1999, McKiernan identified animation, audio, modeling, and video as the more common types of multimedia utilized. He found that animated GIFs, Shockwave Flash™, MIDI (Musical Instrument Digital Interface), QuickTime™, ReadAudio™, RealPlayer™, Chime™, MPEG (Moving Picture Experts Group), and RealVideo™ were among the more common formats and plug-ins.[15] Among the journals using one or more of these multimedia types are *Expert Reviews in Molecular Medicine* (www-ermm.cbcu.cam.ac.uk) (ShockWave Flash™, *Interactive Multimedia Journal for Computer-Enhanced Learning* (imej.wfu.edu) (QuickTime™), the *Journal for MultiMedia History* (www.albany.edu/ jmmh/) (RealPlayer), and *Videre* (mitpress.mit.edu/e-journals/Videre/) (MPEG)[16] (see Figure 1).

FIGURE 1. Screen print of main page of *M-Bed(sm): A Registry of Embedded Multimedia Electronic Journals* <http://www.public.iastate.edu/~CYBERSTACKS/M-Bed.htm>.



OBSERVATION I

As multimedia electronic resources become more available and are candidates for inclusion in local collections, their multifaceted nature raises significant issues for catalogers who seek to describe them appropriately. In a review of multimedia e-journals in summer 1999, McKiernan[17] found that of 41 identified titles, 34 had records in the OCLC WorldCat database. Of these, only five–less than 15%–noted the availability of a multimedia component. From this review, he concluded that catalogers in general were not aware of the multimedia dimensions of such journals. For those cataloging records with a

description of the multimedia content, McKiernan found no standard or uniform descriptions of such components (the five records that mentioned multimedia did so in the 516, 520, 538 MARC fields). Later in spring 2002, the OCLC WorldCat records for these multimedia e-journals were reviewed again, with no difference. However, while a significant percentage of cataloging records for the select multimedia e-journals lacked adequate notes describing relevant multimedia content, some librarians are indeed cognizant of these additional components, and include explicit and appropriate descriptions and other notes for these "new breed" serials.[18]

ECLECTIC JOURNALS

[1]*eclec.tic*
Etymology: Greek eklektikos, from eklegein to select, from ex- out + legein to gather–more at LEGEND. Date: 1683

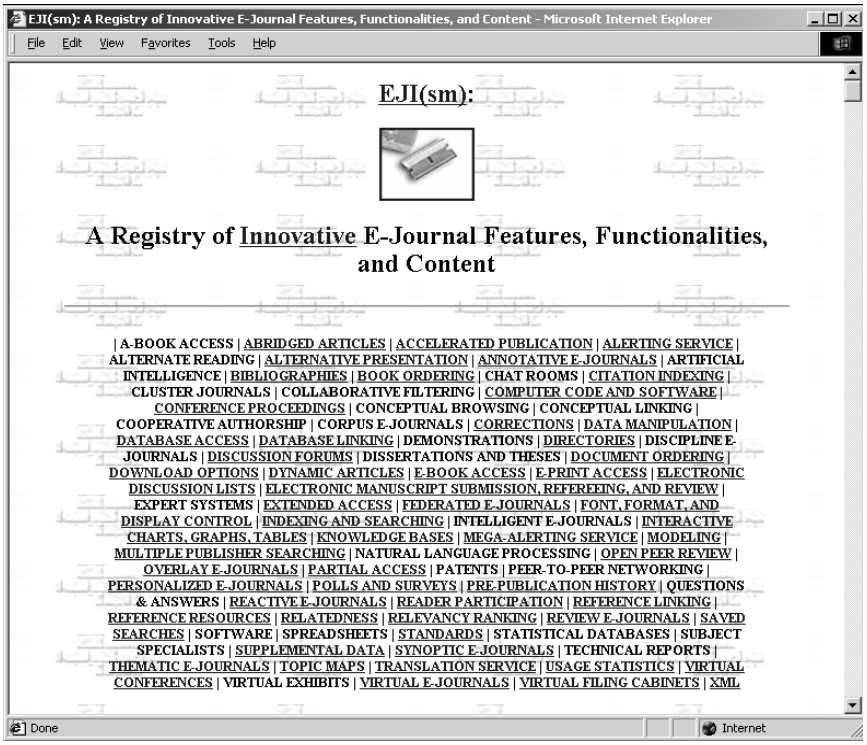
> 1: selecting what appears to be best in various doctrines, methods, styles
> 2: composed of elements drawn from various sources; heterogeneous[19]

An "eclectic" journal may be defined as

> A Web-based resource that at its core provides access to the conventional content of a digital form of a journal, but also provides or permits interaction with novel and innovative features and functionalities (e.g., reference linking, cross-publisher searching, page customization, open peer review, etc.), and/or novel and innovative content (e.g., e-books, pre-publication history, electronic discussions, translation services, e-prints, bibliographic databases, etc.).[20]

The variety of eclectic features, functionalities, and content can range from embedded computer code; "dynamic" articles; font, format, and display control; and three-dimensional subject indexes, to interactive models, "reactivity," reader participation, and supplemental data[21] (see Figure 2).

FIGURE 2. Screen print of *EJI(sm): A Registry of Innovative E-Journal Features, Functionalities, and Content* <http://www.public.iastate.edu/~CYBERSTACKS/EJI.htm>.



Computer Code

To complement or supplement the contents of select articles, an increasing number of e-journals encourage authors to provide supplemental data or resources. One of the more noteworthy supplemental materials found is computer code or programs. A notable example is the computer software provided as an appendix to a recent article in *Conservation Ecology* (www.consecol.org). The program, *Nonpoint*, allows a reader to simulate the interaction among key stakeholders in the management of a lake vulnerable to pollution. Actors in the simulation include scientists, economists, regulations, farmers, the lake and its en-

vironment, and the reader. In addition to the program, full documentation for the use of the program is provided.[22]

Dynamic Articles

Unlike the print medium, the Web offers authors an opportunity to augment a previously published work with current findings and new observations. For example, in *STKE Reviews*, a section with *Science's STKE: Signal Transduction Knowledge Environment* (stke.sciencemag.org), authors can update reviews as circumstances warrant.

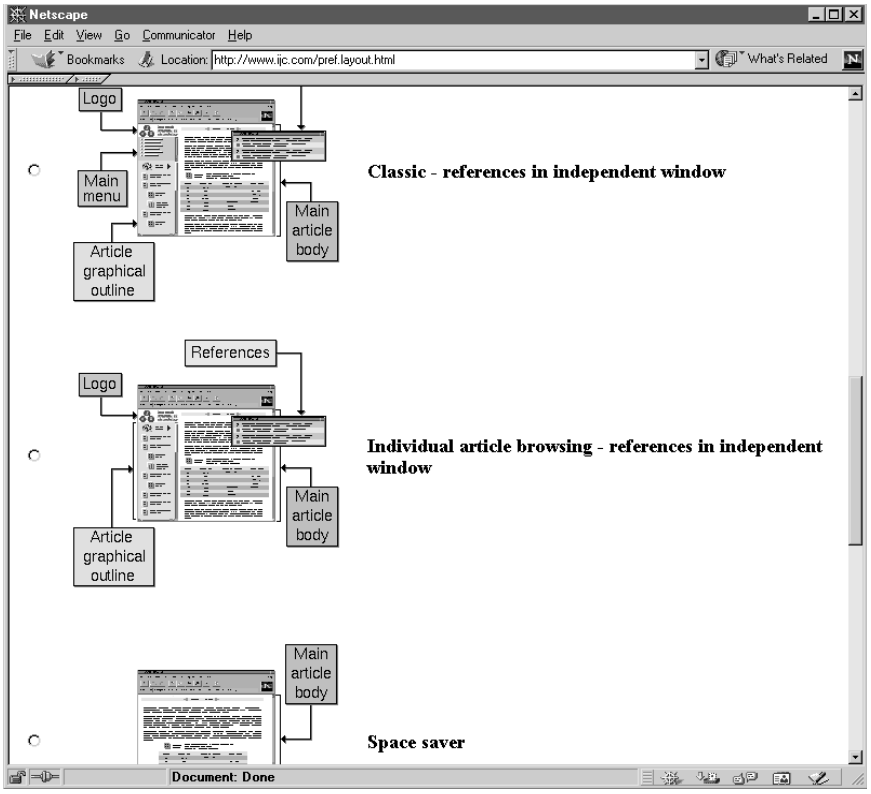
Font, Format, and Display Control

To reduce the information overload of readers, some e-journals enable readers to specify the journal titles to be read on a regular basis from a collection of available titles. For example, the Institute of Physics (www.iop.org) allows readers to create a "Personal Main Menu" in which the reader can customize a main menu that includes only journal titles selected by the reader and not all titles subscribed to by his or her library. Personalization and customization of e-journals, however, are not limited to the selection of e-journal titles or topics. The *Internet Journal of Chemistry* (IJC) (www.ijc.com), for example, offers a variety of options for reader configuration of its content structure, reference link style, journal title format, author name order, footnote display, and other components and content[23] (see Figure 3).

Indexing and Searching

A select number of e-journals have embraced the potential of the digital environment, providing novel and innovative access to their content. One, *J.UCS: The Journal of Universal Computer Science* (www.jusc.org), provides access to its articles using the alphanumeric subject category codes of the *ACM Computing Classification System*.[24] Articles are assigned one or more subject codes as well as keywords, and subject codes are hotlinked within an abstract, allowing a hyperlinked search of all articles assigned the same code. *J.UCS* is a joint publication of the KNOW Center in Graz, Austria and Springer-Verlag. It covers all aspects of computer science and was one of the first electronic journals, having been published without interruption since its founding in 1995. A second e-journal, the *Astrophysical Journal*, offers a "self-organized" visual index (simbad.u-strasbg.fr/ApJ/map.pl) to more

FIGURE 3. Schematic depicting optional page layouts for the *Internet Journal of Chemistry.*



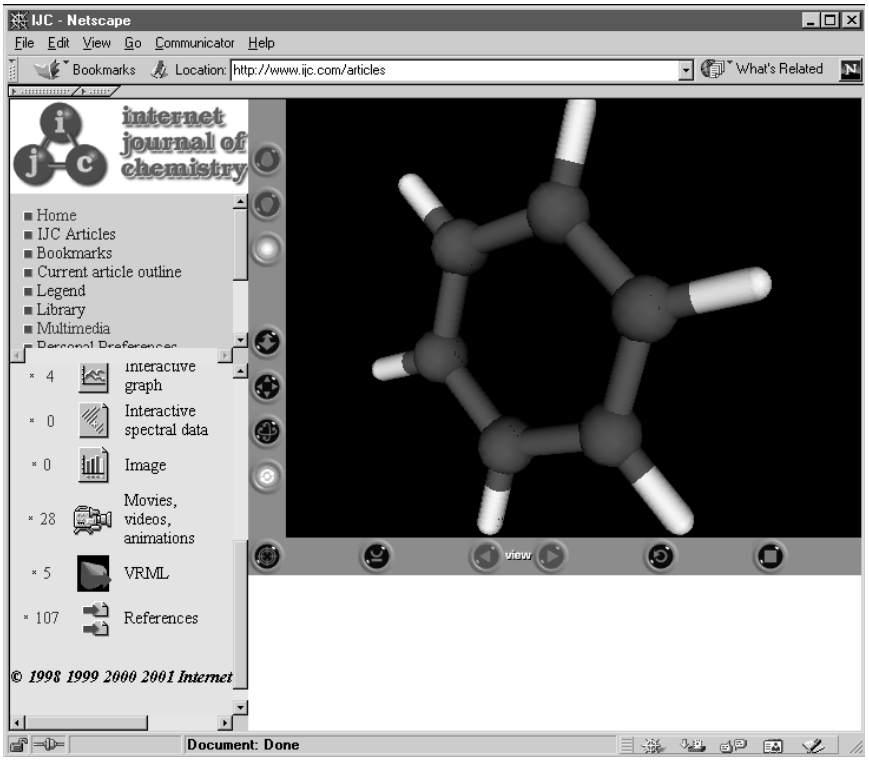
than 16,000 recent articles (1994-2000) created by the application of a Kohonen Self-Organizing Map (SOM) algorithm. SOM is an artificial intelligence technology based on neural computing developed by Teuvo Kohonen of the Helsinki University of Technology. The algorithm automatically organizes indexing terms (or documents) and clusters them within a two-dimensional grid.[25, 26]

Models

Of the various media types embedded within the *Internet Journal of Chemistry*, perhaps the most impressive are interactive chemical 3-D

structures created with the Virtual Reality Markup Language (VRML) and with Chime, the chemical structure plug-in provided by MDL Information Systems (www.mdli.com). With Chime models, using the mouse pointer or mouse control options, readers can rotate the molecular model; display the structure as a wire frame, sticks, ball and sticks, or space fill, or other appropriate structure; change the rendering from three-dimensional to two-dimensional; change the coloring; or cluster components, among numerous options. VRM models have similar display and manipulation options (see Figure 4).

FIGURE 4. A three-dimensional model of benzene used to illustrate an article in the *Internet Journal of Chemistry*. The interactive model was created using VRML, the Virtual Reality Markup Language.



Reactivity

Journals have long encouraged readers to respond to articles and other components. Such responses typically have taken the form of letters to the editor or companion articles that support or oppose published items. In the digital environment, a number of publishers are continuing this tradition by providing Web-based forms to facilitate submissions. For example, *bmj.com* (bmj.com), through its "Rapid Responses" feature, allows readers to comment on articles, editorials, and other content, as well as on previously published letters. The IDEAL Online Library (www.idealibrary.com) publishes a *Forum* column that provides critiques of published papers within the scope of its individual journals (e.g., *Animal Behaviour Forum* (www.academicpress.com/anbehav/forum).

One of the most innovative e-journals incorporating a variety of novel features, functionalities, and content is the *Journal of Interactive Media in Education* (JIME) (www-jime.open.ac.uk), a journal that seeks to "foster a multidisciplinary and intellectually rigorous debate on the theoretical and practical aspects of interactive media in education." Through its "document-centered discourse interface," JIME enables readers, reviewers, and authors "to progressively enrich JIME documents with . . . interactive demonstrations, video and audio clips, evaluation instruments, discussions, and pointers to related or future work."[27] Within framed windows, readers may opt to display editor, reviewer, and public comments beside an original article.

Reader Participation

Unlike the print medium, the Web permits journal publishers to dynamically solicit and ascertain reader opinion about a variety of professional and publication issues. Using the Web, bmj.com solicited reader preferences about the publication of articles in its paper journal. Specifically, it requested that readers rate the importance of "readability" versus "appraisability" of proposed shortened articles. In a second questionnaire, it solicited reader opinions about nine paper versions (www.bmj.com/cgi/content/full/319/7220/DC1/1) with links to examples of the particular versions. Among these were a "traditionally structured short version with emphasis on methods," "journalistic style," and "diary style."

As a distributed, interactive environment, the Web can empower readers to develop resource collections of significant benefit to their community. For example, readers of the *MRS Internet Journal of*

Nitride Semiconductor Research (nsr.mij.mrs.org) can contribute relevant references to journal articles, books, conference papers, or unpublished work, for inclusion in its Web-accessible database (nsr.mij.mrs.org/refs/Default.html).

Supplemental Data

In addition to offering computer code and software programs, some e-journals allow authors to include such supplemental materials as output files from programs, data sets, as well as text appendices. Within an article in *Internet Archaeology* (intarch.ac.uk), the "first fully refereed electronic journal for archaeology," readers may search data sets using a variety of specialized query forms.[28] Search results with relevant data are displayed in an HTML table. In some cases, links are provided from within tables to an interactive map. A reader can export data sets, including underlying geospatial data, to a local database or to a geographic information system (GIS).[29]

OBSERVATION II

In a review of the OCLC WorldCat cataloging records for a sample of eclectic journals (n = 8) conducted in late Spring 2002, only one (15%) included mention of relevant eclectic components of those with cataloging records (n = 7).[30] From this random review, one may conclude that catalogers in general are also not aware of the eclectic features, functionalities, and content of these "new breed" serials journals.

RAMIFICATIONS OF MULTIMEDIA AND ECLECTIC JOURNALS

As the online catalog continues to become "the hub for information discovery," it is essential that the "catalog become comparable with other tools so it can provide maximum support for users." As observed by Hsieh-Yee, "[T]o serve remote . . . [and other catalog users], catalogers . . . [should] . . . include technical information or requirements specific to a resource so that . . . users would know if they have the necessary setup to use the resource. Indeed, [t]he implications for catalogers [of evolving and emerging electronic information forms and formats] are that they must have an efficient way to produce resource

descriptions that can assist users in searching, identifying, selecting, and accessing [these] resources."[31] With the development and use of an ever-evolving variety of multimedia and other components, one can expect over time that authors will create and submit their contributions with embedded multimedia and eclectic features, functionalities, and content not currently accepted by e-journals.

New components would have an impact not only on the nature of the e-journal, but on library staff as well. To appropriately and adequately identify and describe the multimedia and eclectic components of "new breed" e-journals will require that a cataloger's workstation be equipped and configured to allow for the retrieval of these components. This responsibility raises numerous technical, professional, and service issues, of which the currency and accuracy of a catalog record may be paramount.

To maintain accurate and current catalog records, catalogers would need to be notified or be required to revisit an e-journals routinely to identify any new components. Cataloger description of multimedia and other eclectic components could be greatly facilitated if publishers noted these in an explicit location on an e-journal's Web site.

SOLUTION I

While clearly beneficial to both the cataloger and user, recommendations about the nature, structure, and content of e-journals that could facilitate use and description raises the issue of the implementation of appropriate standards for e-journals in general, and those for multimedia and eclectic journals, specifically.

Standards

"A standard is generally intended to be a level of attainment. The American Library Association (ALA) describes a standard for libraries as 'a rule or model of quantity, quality, extent, level of correctness . . . intended as a criterion by which current judgments of value, quality, fitness and correctness are conformed.' Technical standards in library work are similar to industrial standards, and typically provide a measure of excellence or adequacy for a product or a thing."[32]

The international standard for the presentation of periodicals, ISO 8: 1977, "sets out rules intended to enable editors and publishers to present periodicals in a form which will facilitate their use; following these

rules should help editors and publishers to bring order and clarity to their own work. These requirements are of varying importance and may go against certain artistic, technical or advertising considerations." The standard addresses such components as:

- References
- Title of periodical
- Issue
- Numbering
- Volume
- Date
- Layout
- Running title
- Pagination
- Presentation of articles
- Contents list of issue[33]

For "layout," it notes that:

> Typographic uniformity should be used in similar issues of a periodical. A variety of sizes and weights and other typographic and editorial methods should be used for distinguishing different issues of the text. The typography of articles, abstracts, abstracts sheets and bibliographical identification should follow the appropriate International Standard.[34]

A more recent publication offers recommendations of "good practices" for publishing printed journals and other serial publications that cover similar aspects as the ISO standards:

- Title
- Information about the serial
- Issues
- Articles
- Format and presentation
- Standards, commercial, and legal requirements[35]

For "format and presentation," it notes that:

> The choice of formats may depend on the nature and contents of the serial. Factors to be considered include the number and types

> of illustrations and tables and the number of columns per page . . . The choice of printer and prices will also be factors determining format.[36]

SERIAL STANDARDS COMPLIANCE

While there have been national and international standards and recommendations for the presentation and layout of periodicals for several decades,[37, 38, 39, 40, 41, 42, 43, 44] adherence has never been uniform nor universal.

A recently published in-depth review and analysis of the degree of standards compliance by several dozen biomedical journals published in Spain is illustrative of the current situation. Using a sample of 221 biomedical journals published in Spain, López-Cózar assessed compliance using a checklist of 136 elements derived from standards for the presentation of periodical publications developed by the International Organization for Standardization (ISO) and from recommendations published by UNESCO, the International Committee of Medical Journal Editors, the Council of Biology Editors, and E. J. Huth.

For most parameters in this assessment, three aspects were evaluated: presence, presentation, and location. Based on his analysis, López-Cózar concluded that about one-third (34.3%) of the Spanish biomedical journals complied with the recommended standards and practices. This reflected the complete absence of specific elements relating to the volume (e.g., cover, contents list, index) and abstract sheet, more than a general neglect of a large number of standards. López-Cózar observed that the poor degree of compliance with standards by Spanish biomedical journals was due in part to the lack of familiarity with standards on the part of authors, editors, and publishers, and in part by the fact that these individuals and organizations are rarely involved in the creation and development of standards.

López-Cózar concluded his review with several appropriate generalizations regarding compliance and standards in general, most notably that:

- standards for the presentation of periodicals are infrequently used and inadequately used;
- publishers are understandably reluctant to implement standards that are technically complex; and
- the gestation and birth of a standard is an excruciatingly slow and complex problem.[45]

Such observations and conclusions are not unique. In a study published in 1971, 168 of the most-cited British scientific serials were examined to evaluate the differences in their presentations. In this review, the British standards for presentation of serial publications (B.S. 2509: 1970)[46] and Bibliographic References (B.S. 1629: 1950)[47] were used as the bases of comparison. The investigator found that while the majority of the serials followed the standards for bibliographic references, fewer complied the standards for presentation. Interestingly, serials in the fields of Chemistry and Medicine adhered less to the standards requirements than serials in other fields.[48]

BEST PRACTICES

In the forthcoming revised edition of guidelines for "good practice" in publishing printed and electronic journals,[49] there is explicit acknowledgment of the proliferation of electronic journals and their significance:

> Like the first edition, the book provides practical guidelines for all those involved in publishing journals. . . . However, the focus has changed in some important ways. The exclusion of electronic journals is no longer justified; in the intervening years, parallel print and electronic publication has become the norm for the vast majority of journals, and the separation has become artificial. Material on electronic publication has therefore been added throughout the book.[50]

Of particular note is recognition of the existence of the variety of "eclectic" features, functionalities, and content:

> In many cases, the electronic version of a serial will be more than just a straight copy of the print version. It may contain more content, have links to further information, additional datasets, images, sound or video. . . . Alternatively, moving images and three-dimensional pictures can also be accommodated.[51]

In addition, the guidelines note that

> electronic serials may contain links to other sites, e.g., linking from a citation to an abstract or full-text database. They may also link to the author's primary datasets or executable files. . . . [A]

> number of medical and scientific journals have links into the medical database Medline/PubMed . . . and to the DNA and protein database GenBank. . . . Links to computer programmes and data sets are also being setup.[52]

SOLUTION II

Regina Romano Reynolds of the National Serials Data Program (NSDP), Library of Congress, is among many who recognize that e-journals pose significant issues for publishers and librarians alike, noting that "publishers are experimenting with a new medium and need the freedom to try new approaches and models."

She further notes that "traditional bibliographic rules which governed the print world have not responded rapidly enough to the electronic environment," recommending that "publishers must keep librarians informed" and that "librarians must realize that e-journals are in a state of transition and should expect experiment and change" and that "neither side should forget the user."

To facilitate the bibliographic management of electronic serials she recommends that publishers:

- carry "masthead" information on the journal homepage, including issuing body, publisher and place of publication;
- show consistency in title presentation;
- maintain stable URLs; and
- give information about differences between print and various electronic versions

More importantly, she insightfully recognizes that "this is the right time to consider a standard or set of guidelines addressing the presentation of e-journals, " noting that "[d]efining 'best practices' would guide new e-journal publishers on 'how to do it better' and help established publishers provide reliable and predictable information to secondary publishers and librarians, their business partners."[53]

SOLUTION III

To facilitate the identification of essential bibliographic data, the International Organization for Standardization established a standard that

would provide "a concise summary of bibliographic reference data." Known as the "Bibliographic Strip" it was to be "printed at the foot of the front page of the cover of a periodical" to facilitate "on the one hand, the arrangements of the periodicals and, on the other, the compilation of citations."[54] One might consider the creation of analogous features for electronic journals–an "Eclectic Strip" which would serve as an index of eclectic features, functionalities, and content available in a specific electronic journal. The Eclectic Strip would be visible and prominent on the main page of the e-journal, where on the one hand it would facilitate the identification and use of eclectic components, and on the other, it would facilitate the proper cataloging of the serial.

SOLUTION IV

Bibliographic Control of Web Resources: A Library of Congress Action Plan

In mid-November 2000, the Library of Congress Cataloging Directorate sponsored the *Bicentennial Conference on Bibliographic Control for the New Millennium: Confronting the Challenges of Networked Resources and the Web* "as a working meeting of experts from the various communities that play a role in the creation, retrieval, and cataloging of Web resources. The primary goals of the conference were:

- to develop to an overall strategy to address the challenges of improved access to Web resources through library catalogs and application of metadata; and
- to identify attainable actions for achieving the overall strategy.

"The aim of the conference . . . was to generate recommendations for the Library of Congress, in collaboration with the larger library community, to use as a blueprint for action to improve bibliographic control of the Web."

Participant deliberations resulted in eleven sets of recommendations that were subsequently distilled into an "Action Plan." For these, a number of over-arching objectives for the framework of the plan were extracted and include several related directly and indirectly to the management of embedded multimedia and eclectic e-journals:

- 1.2. Explore ways to re-purpose/reuse metadata received under programs for registration, acquisitions, cataloging, copyright, and related activities.
- 3.2. Identify and publicize existing registries of metadata schemes to establish points of convergence among them, to promote the consistent labeling of fields, and to facilitate mapping of fields.
- 3.6. Convey and reiterate the need for the continuing development of AACR2 to provide principles and practices for bibliographic access to and control of the full array of electronic resources on a timely basis and in harmony with other descriptive cataloging standards.
- 4.2. Develop specifications for a maintenance tool to provide mechanisms for detecting and reporting changes in resource content and associated metadata. Communicate the specifications to the vendor community and encourage their adoption.
- 4.3. Develop specifications for a metadata creation tool for authors that can support various metadata standards. Communicate the specifications to the metadata community and encourage their adoption.
- 4.5. Promote OAI (Open Archives Initiative) standard for harvesting metadata.
- 5.2. Sponsor a series of open forums on metadata needs to support reference service in conjunction with various professional association meetings to include catalogers, reference librarians, vendors, systems developers, publishers, and administrators.[55]

SOLUTION V

New Generation Journals

On February 14, 2002, the Budapest Open Access Initiative (BOAI) was formally launched.[56] The BOAI is a public statement and plan of action that calls for "open access to peer-reviewed research articles in all academic fields and the preprints that might precede them." 'Open access' is characterized by the free availability on the public Internet of peer-reviewed journal articles, as well as non-reviewed preprints of potential interest to the scholarly community.[57]

The BOAI endorses two strategies for achieving its overall goal: (1) author self-archiving and commitment to offering open access to the full content of publications, and (2) the establishment of "a new generation of

journals."[58] The first strategy advocates that authors deposit a digital copy of their publications or pre-publications in a publicly accessible Website, while the second calls for the founding of new research journals that do not charge for a subscription or impose access fees.[59]

Web-based Journal Manuscript Management and Peer Review Software and Systems

In an effort to provide and promote open and wide dissemination of articles, the BOAI proposes that new journals no longer invoke copyright to restrict access or use of journal content. Significant savings can be expected for open-access journals by publishing only online and by dispensing with the costs associated with managing subscriptions of authorized and unauthorized access.[60] In addition, free or affordable software for electronic journal publishing would also reduce the cost and expedite the production of open-access journal.[61]

In recent years, a variety of experimental and commercial systems have been developed that facilitate the management and review of scholarly manuscripts for electronic and paper publication. Among the established and recent Web-based systems are:

- AllenTrack™ [www.allentrack.net]
- Bench>Press™ [benchpress.highwire.org]
- EdiKit℠ [www.bepress.com]
- ESPERE [www.espere.org]
- Journal Assistant™ [www.journalassistant.com]
- ManuscriptCentral [www.scholarone.com/products_manuscriptcentral.html]
- Rapid Review™ [pc.cadmus.com/rapidreview/][62]

The increasing interest in and adoption of Web-based journal manuscript management and peer review software and systems[63] presents an unprecedented opportunity to facilitate the incorporation of multimedia and eclectic features, functionalities, and contents by authors. More importantly, such software and systems also hold the potential to concurrently facilitate the explicit presentation of multimedia and eclectic components within actual publications, thus facilitating appropriate cataloging that would significantly enhance access and use of these "new breed" serials.

The future of scholarship will be both diverse and complicated, with rich options for publication using a variety of multimedia and eclectic features, functionalities, and content. To facilitate access and use, catalogers and cataloging should identify and delineate these components.[64]

NOTES

1. *Ulrich's international periodicals directory*, 37th ed. (New Providence, N.J.: R. R. Bowker, c1998), vii.

2. Ulrich's international periodicals directory, 40th ed. (New Providence, N.J.: R. R. Bowker, 2001), vii.

3. *Directory of scholarly electronic journals and academic discussion lists*. Washington, DC: Office of Scholarly Communication, Association of Research Libraries, 2000), vii.

4. Ibid.

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