

Electronic Publication as a Means of Fostering International Cooperation in Engineering Education

Marion O. Hagler
Department of Electrical Engineering
Texas Tech University
Lubbock, TX 79409
USA

Abstract - The experiences in publishing the August 1996, November 1997 and November 1998 issues of the IEEE Transactions on Education suggest ways in which electronic publication via CD-ROMs and the World Wide Web can enhance international cooperation in engineering education in comparison with traditional means of publication.

Introduction

The international development of the World Wide Web (WWW) provides unprecedented means of daily cooperation and collaboration on complex endeavors between people widely separated on the globe. On a dramatically different distance scale, engineering educators now frequently employ the WWW for easy dissemination of a wide variety of instructional materials (such as notes and homework solutions), as well as, increasingly, for deployment of interactive multimedia instructional environments (including chat rooms and e-mail discussion groups) [1]. Application of the WWW in engineering education is proceeding in countries around the world through extensive experimentation and discussion [2, 3, 4]. Early results already suggest that the WWW may become central to certain parts of engineering education [5].

In such a complex and multifaceted effort as applying the WWW in engineering education, sharing results and experience is, of course, critical to good progress. Specifically, sharing information in sufficient detail and with as little delay as possible is essential for timely evaluation and subsequent application of successful efforts. Fortunately, the same

characteristics of the WWW that make it attractive for local application in engineering education also permit global and timely access and assessment of the materials and learning environments that are developed around the world.

Three experimental issues (August 1996 [2], November 1997 [3], November 1998 [4]) of the *IEEE Transactions on Education* illustrate several ways in which the process of electronic publication via CD-ROMs and the WWW can foster international cooperation in engineering education.

The Functions of Archival Publication

The functions of publishing an archival journal can be described as (1) collecting (soliciting), (2) selecting (reviewing), (3) distributing, and (4) preserving contributions submitted by authors [6, 7, 8]. Electronic publication is simply the application of information technologies to one or more of these functions. Experience in publishing three experimental issues [2, 3, 4] of the *IEEE Transactions on Education* demonstrates the application of information technologies to each of these functions.

In soliciting contributions, e-mail and Web pages offered fast and inexpensive means of publicizing these three special issues and, indeed, can focus extra attention on special issues that deal with any specific topical areas. As far as collecting the contributions was concerned, authors submitted the files for their contributions by FTP (file transfer protocol) directly to a controlled access WWW server. Authors then could check their files immediately

by viewing them with a Web browser. Authors were encouraged, but not required, to base their contributions on file formats that typical WWW browsers are configured to view, or else can be configured to view through the use of browser plug-ins. The contributions could contain multimedia and Java applets, for example. When authors were satisfied that all their files were properly displayed on the WWW server, they notified an editor that the contribution was ready for electronic review.

E-mail was used to assign reviewers to each contribution, as well as to query reviewers who delayed in sending their responses. The reviewers received user names and pass words to the controlled access WWW server so they could examine the contributions. They used their Web browsers to view and download files and submitted their reviews by e-mail.

After completion of review and final editing, approximately two months before physical publication of the issue, the editors placed the accepted contributions on a widely publicized and publicly accessible WWW server. During this two month period, the accepted contributions were recorded on a CD-ROM in a format that permitted them to be viewed directly from the CD-ROM with a WWW browser. Contributions recorded on the CD-ROM contained multimedia and other software, including Java applets. Platform specific files, such as executables and source code, were included also.

A copy of the CD-ROM accompanied each printed copy of the journal issue. The printed copy contained traditional printed contributions, as well as abstracts of each contribution that appeared on the CD-ROM. The contents of the CD-ROM remained on the publicly accessible WWW server for about two months after the publication of the CD-ROM and the accompanying printed copy. The contributions thus were available on the WWW for a total of approximately four months.

International Cooperation through Electronic Publication

Publication of the August 1996, November 1997 and November 1998 issues of the *IEEE Transactions on Education* illustrates how electronic publication can promote transglobal interaction among engineering educators by

increasing the possibilities for international participation in each of the four fundamental functions of archival publication. As the reach of the Internet continues to expand, solicitation of contributions via e-mail and the Web reaches authors almost everywhere quickly, independent of their location. The speed and convenience with which contributions can be submitted, and verified, by authors encourages contributions from widely separated geographical locations. The approach invites international participation in the review process because, by viewing the contributions on the WWW and submitting responses to the editors by e-mail, reviewers can conduct and submit their reviews quickly easily from almost anywhere. Electronic publication grants geographical freedom not only to reviewers, however. The editors need not be near the WWW/FTP file server and hence can be almost anywhere, as well.. The guest editor for the August 1996 issue of the *IEEE Transactions on Education*, for example, worked in Japan although the file server that held the contributions was maintained in the USA. Because the geographical location of the editors is not important, transglobal interactions can be enhanced by participation of editors from almost any country. Participation of editors, and guest editors, from different countries can focus attention on activities that might go unnoticed without the broader perspective that the added geographical diversity provides. Placing the published contributions on the WWW makes them available, without mailing delays, promptly to almost everywhere. For example, contributions initially submitted as late as mid-May of 1997 were available on the WWW by August 1997, months before the CD-ROM and the printed copy reached subscribers. The international distribution of the contributors to all three experimental issues suggests that authors around the world find the FTP submission process relatively convenient.

Conclusions

The application of information technologies to the collection, selection, distribution and preservation of archival contributions offers the possibility of fostering international cooperation in engineering education during each aspect of the publication process. Beyond international cooperation for its own sake, the transglobal

awareness of innovations in engineering education promoted by the electronic publication process may increase the number of people interested in such innovations to the critical mass necessary for further development and implementation. The critical mass could be difficult to assemble with more limited distribution or through traditional printed publication, which permits descriptions and representations of some innovations that are probably too pale to attract the interest that a fuller understanding can produce.

References

1. For links to examples, including engineering, visit the World Lecture Hall at <http://www.utexas.edu/world/lecture/index.html>.
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