

Change and the Agricultural Communicator: Electronic Dissemination of Extension Information

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Agricultural communicators are accustomed to acting as change agents. Now communicators face the challenge of dealing with technological changes that are reshaping their own profession. A case history is presented of electronic delivery of Extension information at the University of Florida's Institute of Food and Agricultural Sciences (IFAS). This paper examines the role of the technical communicator within an evolving framework of institutional change. It is seen that tasks traditionally performed by editors and artists are in one sense unchanged, although they are now performed using modern tools provided by computers. However, there are new opportunities for communicators, especially in the areas of user interface design and knowledge management, that are made possible by the new computer medium.

Introduction

The Cooperative Extension Service within the Institute of Food and Agricultural Sciences (IFAS) at the University of Florida has been advancing electronic delivery of Extension information for the past 12 years. In the last five years IFAS has implemented an electronic publishing system using CD-ROM as a primary delivery medium. Workshops¹ sponsored by IFAS for national Extension audiences have included emphasis on the institutional changes needed to implement a policy for electronic information delivery

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as well as emphasis on the more technical aspects of CD-ROM and information retrieval system production. During these workshops Extension employees have asked many questions about the future role of the agricultural communicator and the editorial process in electronic information production and dissemination. This essay presents some issues and proposes some answers to these questions.

Throughout this essay we use the IFAS case history as an illustration of one institution's experience in electronic dissemination of information. First, we present a brief history of this project in IFAS, discussing the shift from paper to electronic delivery methods and the implications of this shift. Then we examine knowledge, skills, and abilities traditionally expected from agricultural editors and graphic artists and compare their previous roles with emerging roles.

Electronic Information Dissemination in Florida

IFAS became involved in building electronic information retrieval systems beginning in 1981 with the establishment of FAIRS (Florida Agricultural Information Retrieval System), one of the first attempts in the nation to build a comprehensive computerized database of Extension information. FAIRS was originally modeled after commercial videotext systems. A database of text and graphics with a graphical user interface² was built on a mainframe computer network, to be accessed over telephone lines.

Since its inception FAIRS has changed considerably as new technology has become available. One such change was driven by the availability of CD-ROM technology, which allowed the user interface to evolve from a low resolution black and white graphics display to a high resolution color graphics display capable of showing photograph-quality digitized images. After a pilot project was conducted with CD-ROM technology, FAIRS was reorganized and expanded in 1990 with a new focus, that of designing systems to deliver Extension information to stand-alone desktop computers on CD-ROMs. The database technology used in FAIRS has evolved to include relational databases³ and a document database that can be accessed by a hypertext system⁴ and a fulltext searching system,⁵ as well as decision support capabilities such as expert systems.⁶

The Shift From Paper to Electronics in IFAS

One mistake that was made early in the development of electronic information dissemination in Florida was to ignore the importance of printed documents. During the earlier stages of the FAIRS project, designers specifically desired *not* to use the computerized database simply for storing large volumes of text. The computer was

supposed to provide much more sophisticated decision making by using expert systems or through computer simulation. In fact, the computer was supposed to solve the problems associated with providing printed publications by doing away with publications.

After reviewing a pilot CD-ROM, a county agent advisory group asked the CD-ROM developers to make printed publications a top priority and to provide documents in a form that could be printed on a laser printer from the CD-ROM. The agents noted that Extension publications are the leading medium for dissemination of Extension information, and it was important that the new computer technology adapt to printed publications as a first priority.

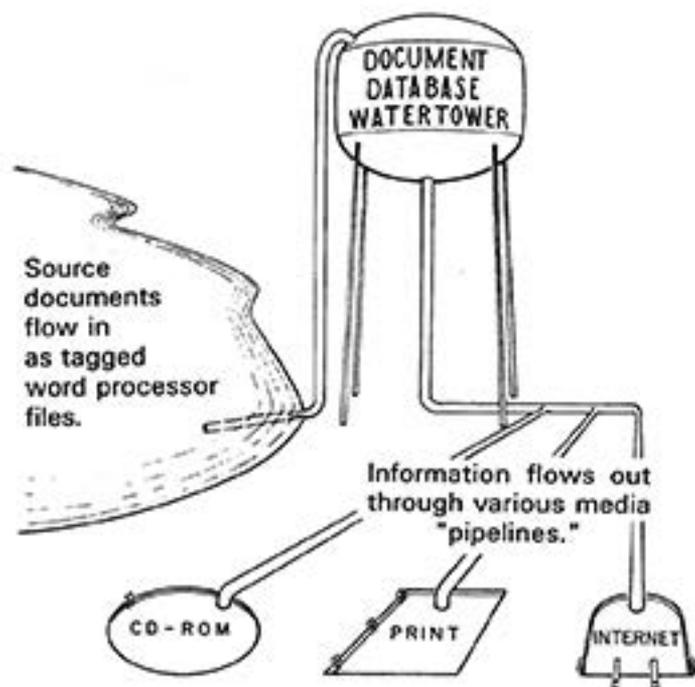
In response to the need for printed publications, the FAIRS CD-ROMs now include a print-on-demand capability for more than 3,000 Extension publications. At a county office an agent can use the searching and retrieval software quickly to locate relevant documents, view the document on a computer monitor, and print the document to a laser printer to produce a relatively high quality printed document. This ability to print on demand contrasts to the maintenance of a large collection of reprinted documents at each county office, as has been the practice over past decades.

Informal reports from agents confirm that print-on-demand documents are meeting a need, although some agents have expressed concern about the costs of laser printing, which are borne by the local offices. Some counties print a file copy of each document from the CD-ROMs and make xerographic copies for distribution as a way of holding down printing costs.

Getting Publications Into Electronic Form

Electronic documents submitted for publication in IFAS are entered into a document database. This archive is the repository for all IFAS electronic information. Metaphorically, this repository has been termed the "watertower." Information flows from this tower into a variety of products through various "pipelines" of communication. The chief outlets for Florida users are CD-ROM distribution, which includes fulltext search and hypertext capabilities, and the printed publications, which can be printed either from a central location or in county offices on a print-on-demand basis from the CD-ROM. IFAS also places documents on the IFAS computer network for distribution to county agents in Florida. In addition, IFAS is currently adapting publications for distribution on Internet.

The input to the document database is a word processor file, enhanced by standardized style codes. Documents are prepared in subject matter departments using a commercial word processor



(WordPerfect) that has been chosen as a standard within the institution. Employees are provided with software tools to enter standardized WordPerfect styles when preparing documents. The WordPerfect styles reference a specific set of WordPerfect codes for producing pages from a laser printer, but, more importantly, the codes identify elements of the document, such as title, authors, and headings. The style codes thereby serve as a way to introduce generic markup codes into a document. These codes allow automated processing to be used to generate the different forms of the document needed for delivery through the different pipelines.

Once the document receives administrative approval for publication, it is transmitted to the publications coordinator, who assigns a publication number and then assigns the document to a publication production specialist for handling. This specialist performs an editorial review of the document, checks the tags in the electronic file, and tracks the document through the publication process.

There has been a conflict between the need for additional editorial attention to documents and added pressure to produce more publications, faster, with decreased staff. A prolonged period of budget cutbacks made it impossible to fill most staff vacancies, and the staff of publication production specialists was declining. At the same time

the attempt to build a large archive of publications on CD-ROM brought an influx of new materials into the publication channel. Adding to the pressure was the fact that electronic delivery stresses immediacy of delivery, making delays in processing less acceptable to authors and administrators. To help with this problem, different levels of edit are available to authors of IFAS publications. These levels range from mechanical style checks (evaluating capitalization, abbreviations, and use of numbers) to a language edit (including word usage, grammar and syntax) to a substantive edit (evaluating suitability of content and presentation for the intended audience).⁷ An editor reviews every new and revised publication, although the designated level of edit may vary.

When Florida procedures have been discussed at national meetings, communicators from other states have expressed considerable concern that the role of communicators was being severely downgraded by computerized publishing. Editors perceived that their skills were in danger of being replaced, inadequately, by spell checking and grammar checking software. Graphic artists expressed concern that their design skills would not be fully used when most publications were put into a single standardized format.

Although recognizing that computerization of information delivery is changing the tasks of editors and graphic artists, the authors argue that electronic publishing requires more, not less, input from communications professionals. Not only are traditional skills needed from communications staff, but new applications of these skills are needed to carry out the new tasks for communicators brought into play by electronic information delivery. Because many publications are destined for publication both in print and on the CD-ROM, editors become doubly important as facilitators and consultants.

New Roles for Editors and Graphic Artists

Former ACE president Dave King has urged agricultural communicators to identify themselves as communication professionals, not as specialists in specific techniques or media, in order to be able to "help people communicate well, whatever the medium or mode" (King, 1991). The Florida experience illustrates the necessity of this position for forward-looking agricultural communicators.

The most effective communicator has always been one who can use both words and pictures. In many cases, editors not only edit text, they also perform page layout; and artists often develop a text-only file into a printed piece, displaying a word-based message in order to enhance its usability. Multimedia information delivery intensifies the importance of a communicator's ability to work with text and graphics at the same time. Furthermore, both editors and

graphic artists have the opportunity to expand into new areas of communications expertise with multimedia electronic publishing.

Expanded Roles for Editors

At the University of Florida, agricultural publications editors are classified in the State of Florida Career Service System as "publications production specialists." Their job description includes a variety of tasks, the first of which is to review and edit text from a variety of educational and technical publications for grammar and mechanics, style, accuracy, format, and suitability for specific audiences. Whereas some of these tasks involve checking surface features (such as capitalization and use of abbreviations), the job description also provides for substantive editing, defined by Van Buren and Buehler (1991) as editing that deals with meaningful content of the publication, including but not limited to coherence of the individual parts, logical subordination of ideas, identification of irrelevant or inappropriate material, and the determination that material is grouped and subdivided in a rational manner. Computers can facilitate production of publications in various ways. IFAS editors now edit word processing files on screen rather than mark hard copy, and they need to know how to use software that checks spelling and grammar constructions. But although computer programs can assist in rule-based revision processes, such as spell-checking and grammar-checking, many questions of grammar, syntax, parallelism, word usage, and consistent use of terminology cannot be resolved by software. Certainly, problems of conciseness, coherence, and organization require intentional editing by a skilled editor. Computer programs assist rather than replace editors in these tasks.

IFAS editors have the new task of reviewing the consistency of the tags inserted into the electronic documents. A translator program is used in document processing by FAIRS staff to convert tagged documents into database format for electronic delivery. Editors need to understand the structure of a document as well as the constraints the translator puts on document structure.

User Interface Design: A New Vista for Artists

All illustrations included in electronic documents must be converted to a digitized format if not produced in a computer graphics program at the outset. Graphics artists use computer graphics programs to produce illustrations and to scan artwork drawn by hand. These tasks, however, do not constitute the full role of graphic artists. New opportunities are available in designing user interfaces.

Personal computing has now entered the age of multimedia, which encompasses a variety of communication channels including text,

computer graphics, digitized images, animation, motion video, and sound for voice and music. Under multimedia, computer interfaces take on an entirely new appearance. In its ability to communicate through images and sound, multimedia is perhaps most like television. However, unlike television, multimedia allows users control over what they see. Multimedia is a new art form that provides new opportunity, but we are still learning how to use it effectively.

Communicators need to become involved in designing appropriate mixtures of media for particular information packages, and user interface design is a part of the package. Graphic designers who work with publications have experience in applying principles of good design to printed pages. Now they need to expand their skills to computer screen design and gain familiarity with how design factors affect usability of information on the screen and what aspects of screen design influence learning in educational programs.

Computer interfaces also seem influenced by several decades of television in which viewers demand to be entertained by appealing graphics. Now that digital motion video can be delivered on CD-ROM, user interfaces can be enhanced by full motion video clips as well as animation. Experience with television and print media can be applicable in designing information for the new electronic media.

Future Trends for Agricultural Communicators

There is little doubt that electronic distribution of Extension information is on the increase and that agricultural communicators will be increasingly involved in this effort. In order to chart some directions, we discuss what we see as some of the major areas of involvement. The following sections describe the communicator's role in information design and knowledge management, and as institutional leaders developing and managing electronic information.

Information Design

Printed publications force information into a linear order, with some provisions for digressions such as notes and sidebars. Traditionally, editors have placed importance on the logical ordering of information and smooth transitions to provide a flow of ideas. Often the organization of a document calls for a progressive revelation of information, each new unit building on a foundation laid by previous units. These organizational plans have serious deficits when used for information that will be delivered on a computer screen.

When people search document databases for on-screen delivery of information, they are usually seeking specific information easily accessible to them. They may not be interested in reading an entire

document. In fact, the concept of a document as a unit of information may disappear in a hypermedia system. Rather, users explore a web of interconnected information and ideas. Hypermedia documents therefore pose new challenges for the organization of information. For example, when information is not accessed in a predetermined linear order, spatial references, such as references to "preceding" or "following" sections, become meaningless.

Developing an organizational strategy for hypermedia documents is a task for the contemporary communicator. One ramification of hypertext information delivery is a need for modular information, with a focus on short segments of self-contained information. An implication for Extension publications would be to concentrate on the development of fact sheets—short documents combined into groups if a more comprehensive set of information is desired on a topic.

Knowledge Management

In the shift from paper to electronics, more importance is placed on the relationship between the information in the document and other information within the system. In the electronic library we get an unprecedented capability for integrating and interrelating knowledge. In the hypertext model of organizing information, such as that used for the FAIRS CD-ROM, knowledge is organized as a network of nodes and links. Each node represents a concept, and links connect a node to other nodes containing related information. The traditional document becomes a collection of nodes in the hypertext database. A hypertext database can contain tens of thousands of nodes and an even greater number of links, connecting information provided by multiple authors and their documents. Providing a clean organization to this network is another task for communicators.

Recent work in artificial intelligence indicates that the electronic libraries of the future will become vast knowledge bases with intelligent interfaces with which users interact to obtain information. As the volume of accessible information expands, the organization of the knowledge base will become critical for locating relevant materials. Through effective knowledge management, we will not become swamped by an information explosion. An important role for communicators will be to use software tools to organize and structure large databases, mapping the domain of knowledge department by department. This task has been termed "knowledge management" by Collette (1991), who argues that for technical communicators to achieve their true potential "[people] must develop strategies for using and managing knowledge from an organisational [sic] or company-wide perspective, as a collective knowledge asset" (p. ET-45). This is a vital task within any large organization, for without

proper knowledge management valuable information can become lost. Information science (library science) training would be helpful for a communicator engaged in knowledge management.

Institutional Policies for Coordination of Information

Implementing an institutional policy of electronic information delivery is no small task. Initially, such projects begin as research efforts and may require a lengthy period of maturation to evolve into a mainstream institutional approach that carries a significant percentage of the organization's information load. Often, one of the greatest challenges is adapting institutional bureaucracies into a new configuration that embraces and nurtures new technology.

In implementing an electronic publishing system at a land-grant university, all the players—from Extension specialists, to word processing staff, to editors, to county agents—must be prepared to adapt to new technology. This means, for example, that systems of rewards must be altered to provide incentives for working in electronic form. It also means streamlining the procedure for producing electronic information so that it becomes an asset to the institution rather than a burden. Because of the prominent position at the end of the information delivery pipeline, communicators must take an active role in shaping the design of the system to serve users better.

Conclusions

We have identified ways in which the job of agricultural communicator will evolve in the era of electronic Extension information dissemination. The traditional knowledge, skills, and abilities exercised by agricultural editors and artists will still be required, although electronic tools may be used to accomplish certain tasks. Standards and guidelines must be set, and training must be provided at the input side of the system to assist specialists in proper preparation of electronic documents. And, as this process is never perfect, editors and artists must continue their roles of adding value to information through assuring effective presentation of that information for various media. This last task calls on traditional communicators' skills, and also requires that these skills be expanded into areas such as user interface design for computer screens.

New areas of great importance to communicators are knowledge management of large document databases and evaluation of final product usability. Building the document database requires proper knowledge management as a huge network of interconnected information is created within the database. Finally, communicators must advise administration on the organizational adjustments needed to

support electronic publishing and in evaluating the user interface at the output end of the electronic information pipeline.

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Notes

1. Presentations include workshops at the National Extension Technology Conference, 1991 and 1992, and at the International Conference on Computers in Agriculture, 1990 and 1992. In 1993 an update on the IFAS experience was presented at the joint NETC/ACE conference. Subsequently, a three-day seminar was held at the University of Florida for a group of Extension communicators, administrators, and computer system analysts from southeastern states and USDA.
2. A graphical user interface is an interface design based on using overlapping windows, icons, scroll bars, etc. that the user activates through the use of a pointing device such as a mouse.
3. A relational database provides a way of viewing information as tables with rows and columns, similar to a spreadsheet.
4. Hypertext is a network of interconnected documents that the user navigates by selecting hyperlinks, connectors that lead from topic to related topic.
5. Fulltext searching enables users to retrieve documents containing particular words or phrases.
6. Expert systems are computer programs that mimic the reasoning processes of experts by applying rules.
7. The names of these levels of edit are taken from Van Buren and Buehler (1991).

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