Integrating the World Wide Web into Existing Extension and Educational Technology

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SUMMARY. Studies by academic, extension, and private foundation think tanks have reaffirmed the land-grant philosophy as an important component of American society in the twenty-first century. Successful land-grant systems will have more closely integrated educational, research, and extension programs characterized as more accessible, affordable, and accountable than current models. The World Wide Web (Web) will play a key role in this transformation. Web technology is evolving rapidly, necessitating continuous and rapid adaptation by information providers (Lineberger, 1996a, 1996b; Rhodus and Hoskins, 1996). The availability of low-cost, user-friendly Web access through home TVs promises to upset the existing paradigms of extension information delivery through county offices and undergraduate instruction exclusively in the campus classroom. Some land-grant professionals have adopted Web technology as a tool to deliver educational programs and coursework; however, most have not, citing as justification the very steep learning curve and time involved in formatting materials for electronic delivery. We have emphasized the need for lifelong learning to our clientele and students; we must heed our own advice. Faculty must develop the ability to integrate appropriate technology into their own programs, since it is clear that land-grant systems of the future will not provide them with the support personnel to do it for them.

A technology becomes integrated when members of a community have a difficult time remembering how life proceeded in its absence. My contemporaries and I are the last generation to know how communication was before the telephone was in every home and the television had become the focus of family life. Travel without the automobile or the airplane is a concept foreign to most residents of the developed world today. Just as the constancy of change is a certainty, so is the advance of technology.

The evolution of the World Wide Web (Web) has been documented in several excellent works (Hughes, 1994; Rhodus and Hoskins, 1996; Wright, 1997). The Web began in 1989 (Hughes, 1994; Wright, 1997), but in reality much of what we know as the Web began in 1993 with the development of the Web browser Mosaic by the National Center for Supercomputing Applications at the University of Illinois (Rhodus and Hoskins, 1996). Whether you regard Tim Berners-Lee or Marc Andreessen as the father of the Web is an academic debate; the fact that the Web exists, that it has grown to be an international resource, and that it has been widely adopted are the points under consideration.

How the Web works has also been the subject of several writings (Hughes, 1994; Lineberger, 1996a, 1996b; Rhodus and Hoskins, 1996). Most authors consider Web technology sufficiently novel as to require some explanation of how it works in the introductions to their papers. I will depart from this convention, however, and attempt to focus on the how and why of integrating Web technology into contemporary educational programs.

The power of the written word

The measure of accomplishment of professionals in the land-grant university system is the written word. This is as true for extension and teaching professionals as it is for researchers. Both quality and quantity of written materials are important; publishing must be done early and often in one's career; writings that are peer-reviewed are looked on more favorably than are documents prepared for classroom or clientele use.

Preparation and delivery of the written word has spawned many industries and career opportunities—word processors, printers, binders, mail persons, overnight delivery, librarians, etc. A finite cost is associated with each step in the process. A finite time is required to complete each of the processes.

Extension groups in the land-grant system have excelled in preparation, printing, and delivery of documents of all types. Elaborate hierarchies of communications specialists including graphic artists, writers, editors, and printers were employed by extension administration. Desktop publishing software and the availability of inexpensive, high-quality laser printers changed much of the way documents were prepared and enabled more decentralized document distribution. However, the continued erosion of base funds by repeated budget

cuts has made even decentralized document handling cost-prohibitive.

The evolution of information delivery took a quantum leap with the emergence of Web technology. The Web offers real advantages to the teaching and extension components of the land-grant system whose principal business is providing information.

- Information is delivered as electronic files without printing;
- Color and multimedia formats can be delivered for little extra expense;
- Information is delivered from a networked computer without mailing costs;
- The information server can be accessed from anywhere in the world at any time;
- Revision of documents can be rapid—there's no stockpile of out-of-date documents; and
- Web server logs track information use.

While almost all horticulture departments have adopted some aspects of Web technology in their teaching and extension programming, only a few appear to be integrating the technology into their day-to-day operations.

Beyond the written word—unique capabilities of the Web

Using the Web only for printing documents is like buying a 17-inch high-resolution color monitor for your computer when all you do is word processing and reading e-mail. The capabilities of the technology far exceed those required for the intended application.

Most modern Web browsers support many different functions either with integrated software or through the use of plug-ins and helper applications. Full-motion video, recorded and live audio, electronic mail, and text searching are just a few of these capabilities. Presentation-quality slide sets can be downloaded and viewed or projected directly from a Web site. Software utilities and updates are distrib-

uted via the Web. An increasing number of computer applications that run in the browser are being developed using Java script technology.

Links to novel Web applications are outdated almost as soon as they are written. However, as of this writing, the links below exemplify Web sites that support functions common to the teaching and extension professions (see Table 1).

Impediments to the broad-scale adoption of Web technology

The major limitation preventing broad-scale integration of Web technology into the classroom and extension office is the technology phobia and lack of technology training of land-grant professionals. Before 1994, an argument could be made that cost and availability of user-friendly software represented a significant obstacle. Virtually every land-grant professional has access to the requisite computing equipment, network connectivity, and software needed to fully integrate Web technology into his or her program. Self-help manuals for creating excellent Web resources abound (see for example the Beginner's Guide at <http://www.ncsa.uiuc.edu/General/Internet/WWW/HTMLPrimer.html>, and the style manual at <http://info.med.yale.edu/caim/manual/index.html>). The individual must, however, make the time commitment to learn how to use these resources efficiently.

In the same way that launching into any new venture takes valuable time from other activities, the time commitment for preparation of Web resources necessarily means something else remains undone. The perceived lack of skill in basic computer systems and operation (well deserved in some cases!) and the lack of experience with the Internet and local area networks provides more than enough justification in the minds of many to see the Web as a threat rather than an opportunity.

Table 1.

Search for information	http://aggie-horticulture.tamu.edu/ihound.html
Project a slide set	http://aggie-horticulture.tamu.edu/syllabi/cnotes97a/201h/lecoutlines/lecture22.html
Print a map to a location	http://maps.yahoo.com/yahoo/
Find a person's phone number	http://www.yahoo.com/search/people/
Purchase a computer	http://www.gateway.com
Contact ASHS	http://www.ashs.org/
View current chemical labels	http://www.aginfo.com/label/label.html
Read the last issue of <i>Science</i>	http://www.sciencemag.org/
Locate an internship position	http://www.hcs.ohio-state.edu/hcs/Ed/Interns.html
Download software updates	http://www.info.apple.com/

The narrow part of the funnel

When I first arrived on the scene as head of Horticultural Sciences at Texas A&M University in 1990, I was amazed at the degree of independent publishing of extension publications that was underway. Specialists cited the need to get information to the clientele rapidly, and working through the communications specialists often meant delays and conformity to their schedules rather than ours. An analogy in the classroom is the creation of study packets that are photocopied locally and bound in lieu of the more time-consuming and expensive process of writing text books. Information is being developed faster than professionals can commit the time to getting that information formatted in printed documents. The flip side of that notion is that faculty procrastinate publishing information to such an extent that rapid-delivery technology is needed to make deadlines like the first day of class!

Professionals who are skilled in information technology can remove the narrow part of the funnel by taking direct responsibility for information resource preparation and delivery. While this direct information providing is often cost-effective and time-efficient, it places an additional burden on the professional to master an increasingly complicated array of computing equipment and to develop outstanding communications skills, graphic as well as written, to have the material reflect the high standards of quality and content associated with the land-grant university system. These skills must be developed in addition to, not in place of, the technical and scientific skills associated with the specialty or discipline.

In the same way that book publishers and in-house communications specialists were the narrow part of the funnel heretofore, the Webmaster, whose authority and control are absolute, can become a restriction in the future. Software is already available that will allow for distributed information providing by individuals in an organization whose only training needs to be in how to copy and paste text from a word processor into a fill-in form on a Web browser. Tim Rhodus, webmaster of Horticulture and Crop Science in Virtual Perspective at Ohio State University, has developed several

applications around this concept including the Buckeye Yard and Garden onLine (<http://www.hcs.ohio-state.edu/bygl.html>), the Online Internships for Horticulture database (<http://www.hcs.ohio-state.edu/hcs/Ed/Interns.html>), and Weekly Gardening News (<http://www.hcs.ohio-state.edu/hcs/webgarden/WGN/WGN.html>). Distributed information providing will be facilitated by future releases of word processing and presentation software that will automatically save files in html format. Whether these tools are user-friendly enough to encourage faculty to become active information providers remains to be demonstrated.

Keeping the county-level delivery system in place?

Some discussion should be focused on the role of the county extension office in the land-grant mission.

Modern information technology allows citizens direct and rapid access to the land-grant university. The county extension office is no longer required to be a local repository of printed information, and the county agent should no longer be expected to be an omniscient consultant of all problems agricultural for either the producer or homeowner.

A local extension presence is still central to the functioning of the land-grant concept and, therefore, a county or regional presence is indispensable. Citizen advisory groups serve a crucial role in helping to identify needs and priorities for extension and research programs, and in insuring a shared ownership that is important to the long term financial welfare of most of our institutions. The University of Illinois task force eloquently and succinctly stated the opportunity presented to the land-grant system: "The challenge to the College and Extension is to create a seamless organization that allows citizens access to the information and educational resources at any place in the organization appropriate to their needs" (<http://www.ag.uiuc.edu/commis-sion/recorg.html>).

To the extent that county-level programs can function as entry points for information-seekers and can assist citizens in obtaining the information that they need in an efficient and effective manner, they will not only survive, but they will prove to be indispensable. However, where the local offices no longer can provide needed services,

when information-seekers can get their information faster from other sources, they will evolve out of the system. Local offices can themselves be information providers, and indeed, many extension services are building local Web sites into their network strategy. They can assist clientele by locating Web resources appropriate to local needs (i.e., they can develop road maps to the information superhighway) and by training individuals how to use information technology efficiently.

If I had a dollar for every time someone referred to my work in building Aggie Horticulture as playing on the computer, I would indeed be a rich man! Fortunately, even early skeptics of Web technology are being converted into believers (and users) as they see its usefulness as an information providing tool. I'm not expert enough to predict how students and clientele will access the Web 2 years from now. After all, in 1993 one had to use a networked computer to access the Web. By late 1996, Web access was enabled to television through the WebTV device and network. Now, there are palm-top submicrocomputers that provide Web access. In all these technological advances, the one constant parameter has been the Web and its millions of interconnected computers serving millions of gigabytes of information to anyone in the world at any time.

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