

Technology-facilitated instruction: a shifting paradigm and an opportunity knocking

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Abstract

The 1990's heralded a transformation of a significant sector of our society from a passive, one-way, instructor-to-student learner audience to an aggressive, self-directed, inquiry and discovery learning based audience. This transformation was brought about both by a revolution in traditional classroom instructional methodologies and emergence of the Internet and technology-facilitated instruction. Nearly 90% of a teacher survey group indicated that use of the Internet is an integral part of today's elementary and secondary school classroom or homework instruction. With more than 65,000 sites being added to the Internet daily, the Internet provides real-time, nearly instantaneous access to a wealth of information on every conceivable subject. Agricultural technologies is no exception. Use of the Internet can provide instructional opportunities and connectivity of faculty to traditional, new, and diverse audiences. However, in order for faculty to be successful, they need to take a marketing approach to technology-facilitated instruction while at the same time shifting their perspective from information deliverers to instructional facilitators and guides. Research has shown that successful technology-facilitated instruction requires appreciation of learner preferences and a mix of presentation platforms and instructional media. Two significant lessons learned from experiences reported here are: 1) successful and rewarding instruction via the Internet requires interaction, engagement, and connectivity between the instructor and the student, and 2) availability and access to Internet resources do not guarantee classroom or instructional success. Guidelines for integration of Internet-supported, technology-facilitated instruction into the shifting paradigm from traditional agricultural instruction can make the transition a rewarding opportunity.

Introduction

The 21st century will offer new and interesting challenges and opportunities for Extension and agricultural

education. Looking back and present, the 20th century also brought opportunities and challenges to outreach. One of the most significant resources to become available to help Extension and agricultural education do a better, more efficient, and cost-effective job of "improving peoples' lives by providing research-based knowledge through education" is the Internet. Today, nearly every Extension office at the national, state, county, and local level is connected via Internet access. The number of individuals, agencies, commodity and clientele groups having access to the Internet - and immediate access to Extension and agricultural educators - increases each day.

However, simply having access to the Internet is not all it takes to insure that electronic information transfer and education via the the Internet will serve clientele needs any better than the traditional one-on-one small group meetings, workshops, and seminars. Basic marketing and management principles must be applied to the use of the Internet: knowing your audience or market is essential. Combining the right product with acceptable price, good promotion, and effective delivery or presentation location - all essential ingredients to successful marketing - are important to Extension and agricultural education programming (Price and Ferrell, 1990).

A decade ago few of us envisioned the role that the Internet and electronic access would play in our lives. Nor did we visualize the many opportunities it would provide in educational programming. Today, most of us rely on the Internet daily in our routine educational efforts. Some of us have expanded our use of the Internet to include weekly programmed media releases, information correspondence, structured curriculum and in-service training, and non-interactive information delivery. Still, opportunities exist for expanded use of the Internet in agricultural education programming and traditional on-campus instruction. This paper provides a summary of some of the lessons learned in traditional settings and guidelines for integrating the Internet technology into Extension and agricultural education programming and college instruction.

What's Important - Understanding Market Needs and Desires

A recent study by Ziff-Davis affiliate ZDTV (Syllabus, 1998a) reported that 78 percent of a surveyed

Here are some interesting facts from the U.S. Department of Commerce 1998 report titled "The Emerging Digital Economy". <<http://www.ecommerce.gov/emerging.htm>>

- In 1993, when President William Clinton took office, there were 50 web sites on the Internet; today there are 65,000 being added every hour.
- In 1997, 100 million people logged onto the Internet, an increase of 60 million users in one year.
- The digital economy makes up more than 8 percent of the U.S. economy.
- The United States will require 1.3 million new information technology workers over the next ten years - that's more people than currently build cars for the Big Three automotive manufacturers!

group of adults including teachers indicated that personal computer (PC) use was important to primary and secondary school student learning, formal collegiate studies, and self-directed learning and information gathering. Teachers (87% of the survey group) reported that use of the Internet was integral to finding content and resources for teaching in today's classroom and in home or self-directed study. It follows then that the Internet has become integral to teaching and learning in today's society.

However, simply having access to the Internet does not make electronic information transfer and use of these emerging technologies fail-proof when it comes to improving peoples lives by providing research-based knowledge through education. Use of the emerging electronic technologies requires adaptation of materials and information, changes in delivery style and format, and working in a new setting. This poses a new paradigm for teachers of agriculture, Extension leaders and on-campus university faculty. As Gray (1998), Brair Cliff College, points out, designing an instructional program for delivery via the Internet involves:

- changing the instructor (Extension) role from lecturer or presenter to facilitator or leader;
- guiding participants through necessary information in a non-linear, Internet-linked environment, that enables them to construct knowledge in a new and more meaningful way;
- building a sense of "community" and enhancing learning by incorporating collaborative elements just as in the classroom setting; and
- insuring academic integrity, i.e., the information provided is valid and accurate.

Specifically, as Gray (1998) points out, faculty wishing to integrate Web-based instruction into their curriculum must "immerse themselves as students in a (Web) environment."

Use of Internet for student-to-student and student-to-resource connectivity, access to distant resources, and for organizing and delivering instructional materials has established itself as a viable tool with many instructor-student networks. For example, University of Northern Colorado professor L. Lesser currently teaches

introductory statistics via the Internet. At Stanford University, one of the trend-setting collegiate environments of North America, the Electrical Engineering department now offers a complete master's degree program online. Another example is that of the Montana State University MSSE (Master of Science in Science Education) program, whereby students complete nearly 90 percent of their course work via Internet access to faculty and science educators (Obbink and Tuthill, 1998).

Not only are instruction and interaction between student and instructor being made more accessible by the Internet, but classroom resources are made virtually instantaneously available via Web access. For instance, Pennsylvania State University students taking calculus now have the option to purchase a traditional calculus textbook or choose an online version of the published text (Syllabus, 1998b). Students at Haywood Community College in Clyde, North Carolina can experience American Literature by being immersed in a virtual reality environment that includes scenes from American literature classics.

With so many venues available through the use of Internet technology, students can be virtually immersed in their studies - which often become an investigation, rather than an assignment. Whether it be the traditional classroom or the informal agriculture education or Extension clientele, use of the Internet brings the learner together with "inquiry" and "discovery" learning. This is a significant contrast to the traditional classroom instructor-lecture format. This new format presents a new opportunity for teachers and students alike.

Graves (1998) reports that "discovery learning" is a powerful form of learning, whether for the purpose of "discovering oneself" or the discovery of knowledge previously unknown to the learner. This concept surely applies to individuals falling into the categories of "adult learners", Extension clientele, non-degree students, and in-service professionals seeking continuing education and professional improvement.

Availability Does Not Guarantee Success

The greatest obstacle to integrating the Internet into the teaching-learning environment, whether the long-standing practice of Extension forums, short courses, and seminars, or the traditional agricultural education classrooms and courses is a lack of sense of how and what the Internet can be used for educationally. Research by Wood (1999) reveals that a variety of possible uses of the Internet in non-traditional instruction should be recognized and utilized by agricultural educators. They include: acquiring skills, virtual touring, locating information, problem solving, analyzing data, researching, exchanging and publishing information, and studying the Internet.

The value of using these venues through enhanced technology in the classroom is born out by many examples. One such is the faculty of the College of Veterinary Medicine at Michigan State University, who report that use of the Internet in either formal or informal teaching allows faculty to offer students more options for learning, including various means of obtaining and studying material and different ways for faculty and students to interact. E-mail allows students to ask questions they might be hesitant to raise in class. Electronic classrooms facilitate access to much more information - requiring students to organize their work and develop critical thinking skills.

As Bazzillion and Braun (1998) point out: "One of the Web's great virtues is the flexibility it offers to be creative and to enhance student learning." Constructivist learning theory suggests several areas in which Web-based instruction can provide results superior to in the classroom:

- active learning - students using the Internet assume an active role in learning by exploring the Web;
- individualization - students are able to explore other learning styles and find out what works best for them;
- cooperative learning - students can gain skills in negotiation and team-building, and shared learning;
- contextual learning - students can have the opportunity to relate learning to specific topics and real-life situations;

- learning to learn - students go beyond traditional memorization of facts and fundamentals to the acquisition of learning skills.

The University of Washington (UW) Office of Extension and Extended Studies serves as a model of distantly delivered instruction via the Internet. Reporting in the UW Extension Distance Learning course catalog "Qualities for success through distance learning": university administrators report that knowledge of student learning styles, student preferences, styles of instructional delivery are essential to effective Internet instruction. The most appropriate students for distance learning are those self-motivated, goal-oriented individuals who enjoy working independently - learners with a profile that fits the traditional Extension clientele. Students must be compelled to engage in and complete the study, motivated to learn, self-disciplined, free to set their own schedules, enjoy working alone outside the traditional classroom, comfortable following written instructions without face-to-face interaction, able to provide at least as much time as in the formal classroom, comfortable using e-mail, voice mail, VCR, computer, and modem connections, and able to manage their own time and pace their workload.

The importance and value of identifying and organizing Internet-accessible information is further supported by Bower (2000) who reports that development of effective multimedia instructional resources requires organization and structure to be successful. Bower describes a systematic process for the design, development, and delivery of instructional multimedia. The key ingredients are: pre-development consisting of analysis and design, development, and post-development consisting of implementation, delivery, evaluation, and subsequent revisions.

From the Student Perspective

Why do students choose to take online courses? Results of a study by eCollege.com, Denver, CO, during the spring of 1999, and published in the September 1999

Essential ingredients for effective online instruction:

Simplicity in the interfacing, software and hardware requirements

Frequent communication with the instructor.

Active participation and engagement by and with the instructor

Be cautious of text overload. With a large class, if student participation is required, it's quite possible to have 50-100 messages posted between the time you sign off and sign back on again.

Frequent logging-on essential to keep up

Table 2. Technology-based tools and resources available for online instruction.

email	real or virtual guests
radio	broadcast television
calendars	asynchronous forums
CD-ROM	digital video segments
video tapes	electronic grade books
simulations	paper-based materials
word puzzles	course content materials
quizzes/surveys	faculty-student interaction
online glossaries	student-student interaction
synchronous chat	video or audio conferencing
teaching assistants	electronic project submission

What it comes down to is getting the right faculty who are innovative, creative content experts, subject matter experts, and who understand how students learn so they can put something pedagogically sound online.

Summary

Today's educational arena for instructors of agricultural technologies represents a dynamic environment, offering many opportunities for both the instructor and the student. Resources such as the Internet and the associated technologies to access and utilize the Internet as a teaching tool are developing and becoming available to agricultural educators at a rate that can easily facilitate keeping pace with the rapid advances in agricultural technologies. Experience has shown numerous traditional classroom and agricultural education audiences are receptive to the Internet and technology-facilitated instruction. The Internet can provide a rewarding and enriching learning experience for both traditional and non-traditional students if used in the proper setting. Once faculty involved in agricultural education gain an appreciation for the opportunities created by the Internet, the next step in successful use of the Internet for extension of agricultural education is understanding of the proper blend of technologies to use, student preferences, and effective approaches to using Internet resources to enhance their traditional classroom and non-traditional distant instruction. The Internet and Internet-facilitated instruction clearly represents a new opportunity - and possibly a shifting paradigm - for teachers of agricultural technologies.

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Appendix

Models to Look at - Emerging Platforms of Technology-Enhanced Instruction

Ten years ago few university faculty members had heard of email or the Internet, let alone the idea of Web-based college-level instruction, teacher inservice and recertification. Few university faculty members had contemplated offering such less structured instructional opportunities as county Extension Agent training, commodity grower newsletters, pesticide applicator or private consultant recertification training using technology-facilitated distant delivery instruction. Today, one needs only take a brief look at what's happening outside of the college campuses to get the message - email, the Internet, and Web-based information access and instruction have become 'essentials' in the scheme of things. Self-directed adult learners, traditional on-campus students, and faculty providing instruction to both of these audiences have begun to realize the potential opportunities created by the Internet. And, many university campuses and industry sectors are taking an active role in the evolution of technology-facilitated information delivery. Here are just a few examples of what's happening on a noteworthy scale on college campuses and at other institutions around the U.S.

- At Winona State College in Minnesota <<http://www.winona.edu/>> , new entering freshman in the 1999/2000 academic year were required to have access to laptop computers, by ownership or lease.

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- For more than a decade, the Department of Space Studies of the University of North Dakota <<http://www.space.edu/info/offices/index.html>> has been providing educational opportunities to military personal at two Air Force bases in North Dakota. One program, SPACE.EDU (<http://www.space.edu>), provides a continuity of educational opportunities for students by making place irrelevant, i.e., an interactive educational experience whether or not they live near the campus - even from outside the United States. Starting in 1998, the program graduated Master of Science in Space Studies students entirely through distance learning.

- California State University, Los Angeles <<http://instructional.calstatela.edu/>> professor of economics and statistics Dr. Stephen Pollard teaches business statistics with technology-facilitated resources incorporating as many resources as possible into his courses. His course curriculum includes group projects, real world cases, extensive use of e-mail, and the WWW.

- The College of Veterinary Medicine at Michigan State University <<http://www.cvm.msu.edu/>> recently installed electronic classrooms, complete with video projection systems and a computer on each student and faculty desk.

- Winona State University offers intensive faculty development events called Web Camps to improve their teaching. Nearly all of the faculty present some of their class notes, interactive learning resources, or assignments on line. Some faculty have created animations to demonstrate processes covered in lecture. Others are making use of e-mail and Internet conferencing software to communicate with students. Winona State has declared itself a "full scale laptop university".

- Montana State University has begun its fifth cohort of graduate students as part of the MSSE - Master of Science in Science Education program <<http://153.90.193.71/msse/>> . This tri-college degree program provides inservice secondary education teachers the opportunity to earn all but about 9 credits of a 2-year graduate course via the Internet. Three classes of students have already graduated. This equates to nearly 65 MS degrees earned using Web-based instruction.

- The University of Colorado at Denver offers its Graduate Program in Public Affairs courses in an online

format <<http://www.petersons.com/dlearn/sites/768690si.html>> . Two years into the program the school was offering twelve courses online, including research methods, governance and institutions, and a number of electives. The online courses parallel the traditional classroom courses: the content, coverage, and level of rigor are the same. Online courses are capped at twenty students per section and the students can interact via threaded discussions using conferencing software.

- The Johns Hopkins University Press <<http://jhupress.jhu.edu/press/>> began publishing the journals of nine university presses on the Internet. At present count there are 64 online journals in arts, humanities, and social sciences.

- University of Maryland University College <<http://www.umuc.edu/gen/virtuniv.html>> is a Web-based online program which confers 13 bachelor and 4 masters degrees and offers professional development programs. (<http://www.umuc.edu/gen/about.html>).

- Citrus Community College in Glendora, California, has devised a hybrid program, Double Time, which combines campus-based classes with online instruction to creatively meet both the time pressures and the place demands of community college students. <<http://www.citrus.cc.ca.us>>. In the program Double Time, two courses share the same classroom and time period with an alternating biweekly schedule. Students fulfill the remainder of the course work online.

- In 1998, Al Lepine's distance learning Web site <<http://members.tripod.com/~lepine/>> counted 117 distance education programs offered by colleges and universities, along with a plea for viewers to keep the listings current with links to brand new programs.

- In February 1998, the Dept. of Education released a 2-year survey of distance instruction in higher education. <<http://www.nces.ed.gov/>>. The report of the National Center for Education Statistics notes that a full third of U. S. postsecondary schools offer distant education courses. Most courses offered are designed for undergraduates and graduate students, but the potential audiences targeted for distance education are professionals seeking recertification and other workers seeking skill updating.

- Stanford Online <<http://stanford-online.stanford.edu/>> has a highly specific distance education niche to serve engineers. For 30 years, Stanford has served local Silicon Valley companies live via microwave, and more distant companies via videotape.

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