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Electronic Teaching and Learning: Trends in Adapting to Hypertext, Hypermedia, and Networks in Higher Education

by

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Chapter 1

What is this Book About? Summary of the Scope and Limitations of This Study

When the information highway comes to town, channels and nightly schedules will begin to fade away and could eventually disappear. In this postchannel world, more and more of what one wants to see will be delivered on demand by giant computer discs called file servers. These might store hundreds of movies, the current week's broadcast programming and all manner of video publications, catalogs, data files, and interactive entertainment.

(Elmer-Dewitt, 1993, p. 52)

A few B-schools have proved that progressive education for future technology managers can bring more job offers. At the University of Texas in Austin, B-School students who graduated last year with a concentration in IS management received an average of 3.25 job offers.

Winkler (1994, p. 28)

Introduction

Most law libraries are in the process of transferring huge portions of their collections to computer databases. Chicago-Kent School of Law plans to scan its entire collection into the computer. Some science journal publishers are experimenting with making articles available only on CD-ROM discs. A $41,000 set of CD-ROMs from Chadwyck-Healy in England will contain the largest collection of English poetry in the world. CD-NAARS places up to 4,000 annual reports on a CD-ROM which is updated every three months. Daily newspapers such as the San Jose Mercury Center are available in their entirety to network subscribers of America Online (e.g., see Mossberg 1993b). Harvard Business School is in the process of converting most cases into digitized files for use in electronic computers. As described in the Newsletter of the Harvard Business School, course modules are being developed in which several cases will be placed on a CD-ROM disc:

We hear from many of you about the importance of course materials that bring real-life management challenges into the classroom, engage students, and provide you with the basis for presenting core course concepts. We're trying out new ways to help you. One is our first CD-ROM based multimedia course module, which has the working title Managing International Organizations. The multimedia module presents an opportunity to analyze the approaches of four companies--Phillips, Matsushita, Proctor & Gamble, and Asea Brown Boveri. Managing International Organizations enables full-text searching, electronic note-taking, highlighting, and other forms of annotation. All numerical data are presented in spreadsheet format that will work with either Excel or Lotus 1-2-3. (Spring 1993, pp. 1-2)

Accounting and business educators were early users of spreadsheets and CD-ROM databases. In the area of videodisks, CD-ROM hypermedia discs, Internet international education and research databases, and other forms
of multimedia, however, the sciences and humanities have taken an early lead over accounting and business education in colleges and universities.

Lingering doubts about the value and power of multimedia in education are fading. The first thing participants encounter in Wharton's Advanced Management Program at the University of Pennsylvania is a ToolBook hypermedia system. Lawyers now regularly use multimedia to sway juries, thereby, demonstrating the educational and training values of multimedia technology. In 1989, Joe Wyatt, the Chancellor of Vanderbilt University, challenged EDUCOM to identify 100 examples of "successful" applications of computer aided learning (CAL) in higher education. (EDUCOM is a group of cooperating colleges and universities dedicated to advancing computer and communications technology in education.) In response, EDUCOM provided descriptions of "101 Successful Uses of Computer Technology" in college classrooms in The Chronicle of Higher Education on October 16, 1991 (p. A26). These applications are used by vastly different colleges and universities, which indicates that CAL's usefulness is not limited to only high technology universities. Empirical research which has examined these and earlier CAL attempts, however, is not conclusive as to their value in motivating and teaching students. Results are seldom conclusive as to any pedagogical tool or method. One educator's trash may be another educator's treasure. Keller (1993a) reports that the results of an extensive two-year study by AT&T corporation point to mixed blessings of multimedia and the need to keep it simple in many settings.

Computers have been a part of accounting education since the 1950s when Sadler (1958) described how accounting teachers turned to electronic data processing. Over 35 years later, we are entering a new and much more monumental phase in the evolution of computers in education. We are beginning what we and others refer to as a technological paradigm shift resulting from joint advances in international networking, hypertext software, hypermedia software, multimedia classrooms, electronic books, and various other important innovations discussed later in the book. Networking is probably the most important factor, because it provides the ability to link computers, learning materials, learners, and teachers even though all four elements are widely dispersed geographically. Hypertext and hypermedia are allowing learners and teaching machines (usually computers) to interact nonlinearly. In other words, actions of the learner dictate the sequence of learning events. Coupled with all of this is the anticipated digitization of most of the knowledge of the world in giant databases accessible on networks. This makes it possible to conduct fast and vast searches at nearly the speed of light. Campbell and Helm compare the best of current online network services, including the "Big Four" CompuServe, GEnie, Prodigy, and America Online. Over 12 million Americans are already connected online to national and international networks. Some view the technology paradigm shift as part and parcel of the current educational paradigm shift as described in Frecka (1992).

The paradigm shift in education technology is transpiring amidst other upheavals in education. Changing patterns of student populations, student living environments, student cultures, student motivations, student flows between nations, and student economic resources and opportunities must be reckoned with by virtually all educators worldwide. Technological changes are part and parcel to both problems and opportunities in education. Purported shortcomings and/or failures of education systems to prepare students for modern times have led virtually all professions to question traditional education requirements, licensing requirements, employment practices, etc. Heavy pressures are being brought to bear upon schools, colleges, and universities to fix up systems deemed broken or faltering relative to missions and goals. For example, Arthur Andersen accounting firm executives in Measelle and Egol (1994) discuss the broken system of education and the hope that emerging technologies for self-directed learning will help repair this system.

This study provides no hard evidence that newer electronic technologies are a panacea to education ills and crises. Virtually all accumulated evidence to date must be tentative, because the technologies themselves are changing almost monthly so that a study based upon technologies last month may not apply to newer technologies this month. Developers from home offices to Hollywood studios are still too much in the early phases of developing and perfecting new crafts to draw firm conclusions on the potentials and pitfalls of hypermedia.

Also, pioneers in authoring and applying electronic learning materials have often prepared materials hurriedly, using limited budgets, and, therefore, these applications should not be used to judge the far-reaching abilities of
technology. Accounting and business textbook publishers have confounded the problem by adapting slowly to change. The bulk of their resources are still devoted to hard-copy books with relative pittances allocated to electronic supplements for instruction and student use; however, virtually all executives of publishing firms foresee a change in this allocation process, with an increasing emphasis on CAL.

Widespread development efforts for electronic learning are underway in corporate training programs, medical training, military training, and courtroom jury presentations. Most large public accounting firms, for example, plan to drastically move training into the electronic area by the end of this century. Even if expected benefits were limited, the anticipated cost savings are enormous due to savings in such areas as printing costs, travel expenses, training facility costs, and lost billing time due to employees having to travel long distances to training centers. As an example of this trend in corporate training, we recommend the high quality interactive videodisc applications training modules developed in England by Price Waterhouse. This source and related commercial options are listed in Appendix 1.

As mentioned before, empirical studies of any pedagogical method or tool may be of limited value in judging whether a given instructor and/or student fares better or worse. Case method teaching works better for some educators than others, and for a given educator, it works better in some circumstances than in others. The same can be said for Computer Assisted Learning (CAL). Certainly, past empirical studies of CAL may be misleading for the present and future, because CAL of yesterday under older technology is far different than CAL opportunities of tomorrow. In accounting courses of yesterday, CAL was largely focused on computer use of spreadsheets, accounting software, and serious business games. Today CAL can be extended to electronic classrooms and other learning sites in far more creative and interactive learning experiments. Tomorrow, CAL will include interactive multimedia events carried across vast electronic networks.

This book is not a traditional type of research report, nor is it an exhaustive survey of literature and educators. The book is a somewhat personal account of why we ventured into CAL, what we discovered, and where we made and overcame some mistakes. Two papers (Jensen and Sandlin, 1992a, 1992b) are included in parts of this paper in updated and revised form, primarily in Chapters 2 and 3. Results of two surveys and other inquiries as to trends in education technology on university campuses are reported in Chapters 4 and 5 and Appendices 1 and 7 through 17.
Chapter 1 - What is this Book About? Summary of the Scope and Limitations of This Study. This chapter provides an overview of the book and briefly discusses the sources of the information and results that are discussed in later chapters. The primary sources are literature searches, our own experiences with CAL authoring and course applications, encounters by Professor Jensen with other faculty during presentations of his hypermedia dog and pony show at over 50 college campuses and conferences, direct contacts with leading edge authors of CAL hypermedia materials, direct contact with publishing firms, and responses to a formal survey questionnaire received from over 100 accounting programs in universities around the world.

Chapter 2 - Why? The Paradigm Shift in Computer-Aided Teaching/Instruction and Course Control Software. This topic was discussed in Jensen and Sandlin (1992a), and the discussion is updated and revised in light of more recent events and findings. It summarizes the personal conclusions of primarily Professor Jensen after several years of intensive use of CAL both in accounting courses at Trinity University and in presentations at over fifty college campuses and conferences where he was invited to present demonstrations of CAT and CCS. The chapter delves into the advantages and disadvantages of using computer classroom teaching aids. Chapter 2 also provides checklists of things to look for in publisher supplied electronic supplements and checklists of things to try or to avoid in CAT, CAI, and CMI applications. Computer supplements which will soon be available for accounting and finance textbooks are listed in Appendix 1 of this book. In regard to publishers' plans for the future, in our survey questionnaire we requested crystal ball visions of the publishing industry after the Year 2000, but none of the publishers were willing to speculate as to the future.

Chapter 3 - How? Getting Started in Authoring for Computer-Aided Teaching/Instruction. This chapter is based on material originally collected in Jensen and Sandlin (1992b). In Chapter 3 of this book, it is enlarged and updated to include new hardware/software alternatives which are on the market. This paper deals with hardware options, authoring software available from CCS vendors, and related options. The purpose of Chapter 3 is to evaluate the hardware and software options available for professors who want to author CAL materials or to modify CAL aids provided by textbook publishers and other commercial vendors.

Chapter 4 - Who and What? Who is Using Electronic Technology and What Are They Doing? This chapter summarizes the results of survey responses from 1,340 accounting faculty in 111 leading university accounting programs in the United States, Canada, and other parts of the world. It indicates what hardware and software alternatives are most popular at the present time. As a result of the first survey, a follow up survey was mailed to respondents who indicated that they may be ahead of others in developing CAL accounting education materials. Results of less formal inquiries are also reported regarding CAL training materials presently being developed and/or utilized among the largest accounting firms.
Chapter 5 - What Lies Ahead? What Educators Anticipate for CAL in the Near and Distant Future. This chapter summarizes the responses to questions in our survey regarding accounting educators’ attitudes toward new electronic technologies and their predictions and insights regarding the possible future of these methods in accounting education.

Chapter 6 - The Paradigm Shift in Technology and Learning: Teaching Will Never Be the Same. This chapter summarizes our own conclusions and insights regarding the future of education in general and in accounting worldwide.

Survey of Accounting Educators

Appendix 3 contains a questionnaire that we mailed in October 1992 to accounting faculty in 450 colleges and universities in selected parts of the world. Neither the accounting faculty nor their universities were selected at random. Instead we mailed the questionnaire to the largest programs (in terms of numbers of full-time accounting faculty) listed in Hasselback (1992). In the majority of instances, we had friends or acquaintances in the targeted programs. The questionnaire was mailed to those persons, and they, in turn, were asked to circulate it among their accounting faculty colleagues and return the completed results to us. This procedure was adopted to increase the response rate for a very long and complex questionnaire that on a random sampling basis had very little chance of a reasonable response rate.

Completed questionnaires were received from 111 universities comprising 1,340 reported full-time accounting faculty. Responding universities are listed in Appendix 2. Wide cross sections of universities are represented in Appendix 2, including cross sections of Canadian universities and universities in Australia, England, and other parts of the world. Some countries were excluded from the survey since we restricted the sampling base to only universities listed in Hasselback (1992). Many countries do not have any listings in that directory. Also, some countries do not educate or train accountants in accounting programs in universities. In those nations accounting education occurs almost exclusively in off-campus training and apprenticeship programs.

A number of respondents returned the questionnaire without filling in the blanks and stated that, since so little was happening in regard to the utilization of electronic technology in their accounting programs, it was not worth the time and trouble to respond to the difficult questionnaire. We initially speculated that there would be a non-response bias in that nonrespondents might have a lower utilization of emerging technologies than respondents. However, the utilization of these technologies among respondents was so low that we now speculate there probably is not a significant response bias in this regard.

On Site Visitations and Conference Networking
In addition to the questionnaire results, one of the authors (Jensen) made site visitations to universities listed in Appendix 2. Those universities requested that he make a presentation of his relatively modest hypermedia dog and pony show. This afforded him an opportunity to inspect campus facilities and make inquiries as to what type of electronic CAL materials were being developed both in accounting programs and other programs on campus.

In conferences and elsewhere both authors have repeatedly asked about what developments are taking place among accounting faculties. In almost every instance professors report little development work (other than spreadsheets and classroom computer slide shows) taking place in learning materials for accounting and other business programs. In contrast, various other programs on nearly all campuses are doing hypermedia development work, particularly in the natural sciences where data visualizations are especially important to learning. This finding was consistent with the Appendix 3 questionnaire results indicating that accounting faculties are lagging behind other disciplines in research and development of CAL materials. Although most campuses now have some electronic classrooms, our results indicate almost minimal use by accounting faculty at present. Various programs report that electronic classrooms are soon to be developed in classrooms presently used by accounting and other business faculty. These classrooms may stimulate more development work when they become available.

Our travels have also put us in contact with publishing companies and public accounting firms. Electronic supplements to accounting textbooks which are available from accounting textbook publishers are discussed in Chapter 2. All of the Big Six accounting firms are anticipating radical changes in training programs, including changes that virtually do away with hard-copy training materials and travel to training sites. Accounting firms tend to be well ahead, at present, of universities in plans and efforts to put CAL course materials into multimedia computer platforms that can be delivered in employee homes and local offices.

**Literature Searches**

We regularly track news reports of CAL in newspapers and magazines. Some helpful sources of current happenings are the journals listed in Appendix 4. Many Appendix 4 journals are free to educators and are very up to date on emerging technologies and educational applications of those technologies. We also found other journals listed in the references of this paper to be extremely helpful.

Because so much of the technology crucial to the paradigm shift (hypermedia software, multimedia computers, world wide networking, etc.) is quite recent, library searches of past academic literature proved to be of limited value. For example, the Williams, et al (1988) computerized education literature database is useful for studying precursors to CAL, but emerging CAL in hypermedia and worldwide networks has evolved too recently to be in this and related literature databases. Library searches suggest accounting educators are not on the leading edge of either research or development in CAL electronic learning technology (except for occasional references to accounting education applications of computerized spreadsheets and business games). Accounting firms and industry, however, have been on the leading edge of database developments such as those reviewed in Luzi and McCabe (1993).

Since the Internet has become such a major factor in the future of education, research, and communication, we highly recommend the book by LaQuey and Ryer (1993) and the summary article by Mossberg (1993a). The Internet is the world’s largest collection of international computing networks. Over 15 million users are registered with Internet, including all the world’s major universities. Users can access hundreds of libraries around the world in seconds and tap thousands of newsgroups using USENET. With TELENET, users can operate computers at remote sites in other locations, including computers in other nations. Users who understand File Transfer...
Protocol (FTP) can choose from millions of databases and download (usually at no cost) all or parts of these databases. At present, the Internet is not especially user friendly and people who use the Internet for purposes other than email, users tend to be technically skilled in UNIX and networking. There are several easier ways to partly use the Internet such as with the user friendly Gopher that accesses databases and other computer users via menus instead of a complex addressing system. As the Internet becomes more vast and easier to use it may well be the greatest technological advance in education and communication in the twentieth century. Present users are primarily in educational and government institutions, although commercial servers such as America Online make it possible for the general public to use the Internet.

In the June 1993 issue of Videography (p. 8) it is reported that on May 22 a videotape of the 85-minute film "Wax: or the Discovery of Television Among the Bees," written and directed by David Blair, was transmitted digitally over the Internet. Advanced Multimedia Systems in New York City can now multicast videos on the Internet to subscribers. Picture quality and frame rates made the transmission less than perfect, but then Marconi's first radio broadcasts were not of the finest quality in the early stages of development.