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ABSTRACT

This report and literature review describe a project that investigated the use of hypermedia software and software and conducted workshops for teachers in the use of hypermedia in family and consumer education. Project materials included in this report are as follows: (1) a selected bibliography listing 49 references on perspectives on technology and education, 13 references for technical assistance with hypermedia, and 13 computer and education periodicals; (2) a discussion of authoring systems; (3) descriptions of 14 hypermedia software packages; (4) a list of 14 resources for laserdiscs, CD-ROMs, and hypermedia software; (5) information on copyright regulations for software; (6) a checklist for a hypermedia starter system; (7) a hypermedia author's checklist; and (8) key ideas concerning the use of hypermedia in critical science-based family and consumer education programs. The final report is followed by Tools for Implementing Critical Science-Based Curricula in Family and Consumer Education, a literature review from which the following findings were drawn. Hypermedia, software programs designed to facilitate use of computers with videotapes, compact disks, scanners, and other peripheral multimedia equipment, can be used to enhance learning in family and consumer education. Hypermedia programs are often easy to use and permit teachers and students to create "stacks" of information that can be assembled in various ways to help students explore topics in consumer and home economics education such as nutrition, fabrics, and family management. Using this methodology, students can develop their critical thinking skills and solve problems, rather than just memorize blocks of knowledge. This type of approach is in keeping with the recommended critical science-based curriculum in family and consumer education. No technology, however, can supplant teachers and their decision-making and teaching skills in guiding their classes. The literature review contains 46 references. (KC)

Hypermedia Technology: Tools and Strategies for
Furthering Family and Consumer Education Curriculum Goals

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Applied Technology Act of 1990 (P.L. 101-392)

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Summary of 1993-1994 Project Activities

Continued to monitor hypermedia hardware and software. Updated previous references and resource materials used for consultation, workshops, presentations. (Appendix A)

Continued the development and refinement of hypermedia software applications further integrating Family and Consumer Education concepts. Further refined software examples for dissemination. (Appendix B)

Served as a resource for schools interested in hypermedia technology and the relationship to Family and Consumer Education curricular goals.

Reviewed literature in technology uses in Family and Consumer Education. Summarized how hypermedia technology can further goals of Family and Consumer Education in an article. Submitted to the Journal of Vocational Education Home Economics Education. (Appendix C)

Further explored the concept of technology and constructivism and relationship of Family and Consumer Education curricular goals.

Conducted workshops and presentations on hypermedia technology and relationship to Family and Consumer Education.

Workshop Locations and Participants

Agency	Location of Workshop	Date	Participants
CESA 2	McFarland	Fall-93	canceled due to low enrollment
CESA 4	Black River Falls	11-11-93	12
CESA 12	Superior	4-15-94	canceled due to low enrollment
CESA 9	Merrill	4-20-94	13
CESA 7&8	Gillett	4-28-94	9
Kenosha Unified School District	Kenosha	6-20-94	8

NOTE: CESA 1 and CESA 2 had high numbers of participants in the 1992-1993 project workshops. Attempts were made in the fall of 1993 and spring of 1994 to schedule additional introductory workshop and advanced workshop for previous year participants.

Hypermedia Technology and Family and Consumer Education Presentations

The following presentation were made on hypermedia as a tool to advance family and consumer education curricular goals.

Facilitating Higher Order Thinking with Hypermedia in Home Economics Education. Presented at the American Vocational Association Annual Meeting, Nashville, Tennessee. December 3, 1993.

The Use of Hypermedia in Family and Consumer Education. Presented at the School of Education, Instructional Materials Center Open House, University of Wisconsin-Madison. May 4, 1994.

Hypermedia As a Tool in Family and Consumer Education. Presented at the Wisconsin Home Economists in Elementary/Secondary Education Annual Meeting, Oconomowoc, Wisconsin, July 25, 1994.

In addition the following presentation are being planned:

The Wisconsin Education Association Annual Meeting, Madison, Wisconsin, October, 1994.

American Vocational Association, Pre-Conference on Assessment in Family and Consumer Education, Dallas, Texas. December 1994.

Hypermedia: New Technologies for Family and Consumer Education

Spring 1994

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Table of Contents

Selected Bibliography: Perspectives on Technology and Education

Allen, C. A. (1988). Social interaction between a teacher and small groups of students working with a microcomputer. Computers in the Schools 5 (1/2) 271-284.

Ambron, S. and Hooper, K. (eds.) (1990). Learning with interactive multimedia. Redmond, WA: Microsoft.

Apple, M.W. (1991). The new technology: Is it part of the solution or part of the problem in education? Computers in the Schools 8 (1,2,3) 59-81 .

Bagley, C. and Hunter, B. (1992). Restructuring constructivism, and technology: Forging a new relationship. Educational Technology 32 (7) 22-27.

Bellon, J.J.; Bellon, E.C.; and Blank, M.A. (1992). Teaching from a research knowledge base: A development and renewal process. NY: Macmillan Publishing Co.

Bereiter, C. and Scardamalia, M. (1989). Intentional learning as a goal of instruction. In L. Resnick (ed.) Knowing, learning and instruction. Hillsdale, NJ: Lawrence Erlbaum.

Bowers, C.A. (1988). The cultural dimension of educational computing: Understanding the non-neutrality of technology. NY: Teachers College.

Bowers, C.A. (1988). The cultural dimension of educational computing: Understanding the non-neutrality of technology. NY: Teachers College.

Collins, A. (1991). The role of computer technology in restructuring schools. Phi Delta Kappan 73 (1) 28-36.

Collins, A. (1991). Cognitive apprenticeship and instructional technology. In L. Idol and B.F. Jones (eds.) Dimensions of thinking and cognitive instruction. Hillsdale, NJ: Erlbaum.

Collins, A. and Brown, J.S. (1988). The computer as a tool for learning through reflection. In H. Mandl and A. Lesgold (eds). Learning issues for intelligent tutoring systems. NY: Springer.

Crowell, S. (1989).A new way of technology:The challenge of the future. Educational Leadership 47 (1) 60-63.

David, J. L. (1991). Restructuring and technology: Partners in change. Phi Delta Kappan 73 (1) 37-40, 78-82.

Dede, C.J. (1989). The evolution of information technology: Implications for Curriculum. Educational Leadership 47 (1) 23-26.

Dede, C.J. (1987). Empowering environments, hypermedia and microworlds. The Computing Teacher 15 (3) 20-24, 61.

DeVillar, R. A.. and Faltis, C. I. (1991). Computers and cultural diversity. Restructuring for school success. New York: State University of New York Press.

D'Ignazio, F. (1988). Bringing the 1990s to the classroom of today. Phi Delta Kappan 70 (1) 26-27.

Duffy, T.M. and Jonassen, D.H. (1992). Constructivism and the technology of instruction. Hillsdale, NJ: Lawrence Erlbaum.

Fish, M. C. and Feldmann, S.C. (1990). Learning and teaching in microcomputer classrooms: Reconsidering assumptions. Computers in the Schools 7 (3) 87-96.

Friend, C.L. and Cole, C.L. (1990). Learner control in computer-based instruction: A current literature review. Educational Technology 30 (11) 47-49.

Hollis, W. F. (1991). Humanistic learning theory and instructional technology: Is reconciliation possible? Educational Technology 31 (11) 49-53.

Jonassen, D.H. (1989). Hypertext/hypermedia. Englewood Cliffs, NJ: Educational Technology Publications.

Jonassen, D.H. (1990). Thinking technology. Toward a constructivist view of instructional design. Educational Technology 30 (9) 32-34.

Jonassen, D.H. (1991). Evaluating constructivist learning. Educational Technology 31 (9)28-33.

Landow, G. P. (1992). Hypertext. The convergence of contemporary critical theory and technology. Baltimore: Johns Hopkins University Press.

Merrill, M. D.; Zhongmin, L. and Jones, M. K. (1990). ID_2 and constructivist theory. Educational Technology 30 (12) 52-55.

Merrill, M. D. (1991). Constructivism and instructional design. Educational Technology 31 (5) 45-53.

Mevarech, Z.R.; Silber, O.; and Fine, D. (1991). Learning with computers in small groups: Cognitive and affective outcomes. Journal of Educational Computing Research 7 (2) 233-243.

Milheim, W.D. and Martin, B.L. (1991). Theoretical bases for the use of learner control: Three different perspectives. Journal of Computer-Based Instruction 18 (3) 99-105.

Mojkowski, C. (1989). Transforming curriculum and instruction with technology. Paper presented at the Annual Meeting of the American Educational Research Association. San Francisco, CA. ERIC Doc. No. 309 746.

Neilsen, J. (1989). Hypertext & hypermedia. Boston: Academic Press, Inc.

Nix, D. (1988). Should computers know what you can do with them? In R.O. McClintick (ed.). Computing and Education: The Second Frontier. NY: Teachers College Press.

Nix, D. and Spiro, R. (eds.)(1990). Cognition, education and multimedia. Hillsdale, NJ: Lawrence Erlbaum.

Norton, P. (1992). When technology meets the subject-matter disciplines in education. Part One: Exploring the computer as metaphor. Educational Technology 32 (6) 38-46.

Norton, P. (1992). When technology meets the subject-matter disciplines in education. Part Two: Understanding the computer as discourse. Educational Technology 32 (7) 36-46.

Ognibene, R. and Skeele, R. (1990). Computers and the Schools: Unused and misused. Action in Teacher Education 12 (2) 68-72.

Perkins, D.N. (1991). Technology meets constructivism: Do they make a marriage. Educational Technology 31 (5) 18-23.

Perkins, D.N. (1991). What constructivism demands of the learner. Educational Technology 11(9) 19-21.

Rude-Parkins, C. (1992). Computer-based curriculum development tools for teachers. Journal of Educational Multimedia and Hypermedia 1 (2) 179-186.

Sheingold, K. (1991). Restructuring for learning with technology: The potential for synergy. Phi Delta Kappan 73 (1) 17-27.

Spiro, R.J; Feltovich, P.J.; Jacobson, M.J. and Coulson, R.L (1991). Cognitive flexibility, constructivism and hypertext: Random access instruction for advanced knowledge acquisition in ill-structured domains. Educational Technology 31 (5) 24-33.

Spiro, R.J; Feltovich, P.J.; Jacobson, M.J. and Coulson, R.L (1991). Knowledge representation, content specification, and the development of skill in situation-specific knowledge assembly: Some constructivist issues as they relate to cognitive flexibility theory and hypertext. Educational Technology 31 (9) 22-25.

Steinburg, E.R. (199). Computer-assisted instruction: A synthesis of theory, practice, and technology. Hillsdale, NJ: Lawrence Erlbaum Associates.

Taylor, R.P. (ed.) (1980). The computer in the school: Tutor, tool, tutee, NY: Teachers College Press.

Tennyson, R. D.; Thurlow, R. and Breuer, K. (1988). Problem-oriented simulations to develop and improve higher-order thinking strategies. Computers in Human Behavior 3 151-165.

Williams, C. J. and Brown, S. W. (1990). A review of the research issues in the use of computer-related technologies for instruction: What do we know. International Journal of Instructional Media 17 (3) 213-225.

Winn, W. D.(1991). The assumptions of constructivism and instructional design. Educational Technology 31(9) 38-40.

Young, M. (1991). Epilogue: Technology as an educational issue: Why it is so difficult and why it is so important. In H. Mackay, M. Young and J. Beynon (eds.) Understanding technology in education. NY: The Falmer Press.

Yuen, S. (1988). The challenge of microcomputer technology to vocational education. Journal of Studies in Technical Careers 5 (1) 49-59.

Technical Assistance with Hypermedia

Apple Computer (1990). HyperCard stack design guidelines. NY: Addison-Wesley.

Anderson, Carol J. and Veljkov, Mark D. (1990). Creating interactive multimedia. Glenview, IL: Scott, Foresman and Co.

Beekman, George (1992). HyperCard 2 in a hurry. Belmont, CA: Wadsworth Publishing Co.

Borrell, Jerry (1993). Mastering the world of quicktime. NY: Random House.

Bull, Glen L. and Harris, Judi (1991). HyperCard for educators: An introduction. Eugene, OR: International Society for Technology in Education.

Coulouris, George, and Thimbleby, Harold (1993). HyperProgramming. Building interactive programs with hypercard. NY: Addison-Wesley.

Drucker, D.L. and Murie, M.D. (1992). QuickTime handbook. Carmel, IN: Hayden.

Farmer, Lesley S.J. and Hewlett, Jean (1992). I speak HyperCard. Englewood, CO: Libraries Unlimited, Inc.

Franklin, Carl and Kinnell, Susan K. (1990). Hypertext/hypermedia in schools. A resource book. Santa Barbara, CA: ABC-CLIO.

Goodman, D. (1990). The complete HyperCard handbook 2.0. Toronto, NY: Bantam Books.

Horn, Robert E. (1989). Mapping hypertext. Lexington, MA: Lexington Institute.

Lamb, A. and Myers, D. (1991). HyperCard creativity tool for writing, organizing and multimedia. Orange, CA: Career Publishing.

Lamb, A. (1993). IBM LinkWay plus LinkWay Live! Authoring tool for presentations, tutorials and information exploration. Orange, CA: Career Publishing.

Computers and Education Periodicals

Computers in the Schools. The Haworth Press, Inc., 10 Alice Street, Binghamton, NY 13904-1580. Tel. (607)722-2493. Rates: $38 (individual), $90 (institutions).

Computing Teacher, The. International Society for Technology in Education, 1787 Agate St., Eugene, OR 97403-1923. Tel. (503)346-4414. Membership rate: $46.

Education and Computing. The International Journal. Elsevier Science Publishers, Journal Department, Postbus 211, 100 AE Amsterdam, Netherlands. Rate: $166.

Educational Technology. Educational Technology Publications, Inc., 700 Palisada Avenue, Englewood Cliffs, New Jersey 07632. Tel. (201)871-4007. Rate: $119 for one year.

Journal of Computer Assisted Learning. Blackwell Scientific Publications Ltd, Journal Subscriptions Department, Marston Book Services, PO Box 87, Oxford OX2 oDT, UK. Rate: $160.

Journal of Computer-Based Instruction. Howard Troutner, Executive Director, ADCIS International Headquarters, 229 Ramseyer Hall, 29 West Woodruff, Columbus, OH 43210-1177. Rate: $36 (Free to members of the Association for the Development of Computer-Based Instructional Systems).

Journal of Computing in Higher Education. Carol B. MacKnight, Office of Instructional Technology, A125 Lederle Graduate Research Center, University of Massachusetts, Amherst, MA 01003. Tel. (413)545-2690 / (413)545-1906. Rate: $35 (individual), $45 (institution).

Journal of Educational Computing Research. Baywood Publishing company, Inc., 26 Austin Ave., P.O. Box 337, Amityville, N.Y. 11701. Tel. (516)691-1270. Rate $95 (individual), $173 (institutional).

Journal of Educational Multimedia and Hypermedia. Journal of Education Multimedia, Association for the Advancement of Computing in Education, P.O. Box 2966, Charlottesville, VA 22902. Subscription/ membership rate: $45 (individuals), $68 (institutions).

Journal of Research in Computing on Education. International Society for Technology in Education, 1787 Agate Street, Eugene OR 97403-1923. Tel. (503)346-4414. Rate: $65 (for non-members), $46 (as part of membership dues).

Technological Horizons in Education. T.H.E. Journal, 150 El Camino Real, Suit 1112, Tustin, CA 92680-3670. Rate: Free to qualified individuals ($29 for non-qualified).

Technology and Learning. Peter Li, Inc., 2451 E. River Rd., Dayton, OH 45439. Rate: $12.00.

TechTrends--For Leaders in Education and Training. Subscription: Association for Educational Communication and Technology, 1025 Vermont Ave., NW, Washington, DC 20005. (202)347-7384. Rate: $30 (Free to members of the Association for Educational Communication and Technology).

Authoring Systems

Using the computer as a control center for hypermedia requires the use of authoring software. Authoring software allows the user to actually write their own programs. The software presents a "blank slate" and many tools and procedures which may be selected to fill in the blanks. There are a number of factors that are important to consider in choosing authoring software. Among these are (Anderson & Veljkov, 1990):

- How easy is it to use?
- Is a procedural (i.e. programming) language required for use or is this an enhancement?
- What hardware is compatible? Do I have what is necessary?
- With what other software and hardware is it compatible?
- Does it have support for color?
- Does it permit integration of graphics, animation, sound, video, and text editing? What hardware, other software, and expertise is needed for this integration?
- Does it have hypertext functions (i.e. permit the nonlinear linking of information?

A good authoring software will make the operation and integration of the computer and any peripheral device(s) easy to accomplish. The ease of integration depends on the amount of programming which is required. In some instances this language is an optional feature which can be used to enhance basic operations. In selecting authoring software, <u>care should be taken to distinguish between software systems that are designed primarily for the authoring of multimedia presentations and those that have hypertext/hypermedia capability. For purposes of building rich conceptual knowledge structures and fostering higher level reasoning, the nonlinear hypertext linkage functions are probably much more important than the multi-media applications.</u>

There are numerous types of hypermedia authoring software packages available. After purchasing a specific piece of software, it is important to watch for upgrades or new versions. These appear very rapidly and sometimes upgrades are provided free or for minimal cost. Several well-known hypertext software packages are described below (Franklin & Kinnell, 1990; Anderson & Veljkov, 1990; Eiser, 1992; West, 1993).

References:

Anderson, C. J. and Veljkov, M. D. (1990). Creating interactive multimedia. A practical guide. Glenview, IL: Scott, Foresman and Co.

Eiser, L. (1992). Hypercard IIGS software review. Technology & Learning, 12(4), 16-17.

Franklin, C. and Kinnell, S.K. (1990). Hypertext/hypermedia in schools. Santa Barbara, CA: ABC-CLIO.

West, N. (1993). Multimedia masters. MacWorld 10 (3) 114-117.

Sample Hypermedia Software Packages

- Macintosh Authoring Software

<u>HyperCard</u>. HyperCard is often regarded as a benchmark against wh.ch other hypertext/hypermedia software can be compared because of its ease of use and advanced features. HyperCard had been supplied free with all Macintosh computers since 1987. However, begining around 1992 Macintosh supplied a more limited version, HyperCard Player which does <u>not</u> have authoring capabilities. Many HyperCard stacks related to education are now available, and many of them are in the form of public domain or shareware packages. HyperCard provides a very sophisticated authoring environment that permits text editing facilities and a complete set of painting and graphics tools, as well as audio and QuickTime movie support. The currently available version of HyperCard (2.1) has limited support for color, however, and has been criticized because the user must have some programming skills (in the HyperTalk scripting language) to perform some authoring functions, such as integrating videodisc material. The HyperCard Development Kit is available from Claris. It includes specific documentation for getting started, scripting, authoring and reference guide. Full color support and other enhanced capabilities are expected in the future. Cost: aprox. $140 (retail) and $99 (academic).

<u>SuperCard</u>. Developed by Silicon Beach Software, SuperCard is super set of HyperCard 1.6. It can make use of stacks created in HyperCard but has color capability and more advanced scripting features. But it also has its limitations, for example, SuperCard is great for projects if color is important but not for annimation. Cost: approx. $200.

<u>Architext</u>. ArchiText is an intermediate-level development tool that can handle large amounts of text and basic graphics, and has a built-in ability to record users session. It does not have a built-in programming language. It works better with large amounts of text, compared to HyperCard which has more of a multimedia approach. On the other hand, the ArchiText development environment leads the designer to create maps of information, which HyperCard does not, which may be helpful for visually oriented users. Cost: aprox. $400.

- Apple II Software

<u>HyperStudio</u>. Hyperstudio was developed by Roger Wagner Publishing. It has many of the same characteristics and terminology as Hypercard but does not have a built-in programming language that permits more complicated applications. However, some functions, such as video access, are actually easier to perform with HyperStudio than with Hypercard. An advantage is that it will run, albeit slowly, on an Apple IIGS with two floppy disk drives and 768 Kb of RAM. Cost: aprox. $130.

<u>Tutor-Tech</u>. Tutor-Tech will run on an Apple IIe with only 128 KB of RAM and comes with two versions; a teacher disk and a student disk. The teacher disk can be used to author a stack that may then be read but not modified by the student disk. Some of the limitations of this application are due to differences in the hardware. The Apple II does not have the high resolution screen that the Macintosh does. Links in the program are limited to links between pages and there is limited control over graphic image creation. There is also no programming

language. However, it can be used quite easily by persons with little or no prior experience with the program. Tutor-Tech is available from Techware Corporation. Cost: aprox. $200.

HyperCard IIGS. A relatively new program is available from Apple Computer for the IIGS that is designed to simulate HyperCard. It has many of the same features as HyperCard; for example, creation of stacks, cards, and interactive buttons with a mouse click, point program and pull-down and tear-off menus. There is also color capability and HyperTalk programming language. Disadvantages are that the hardware requirements are extensive (a hard drive and at least 4 megabytes of free space and 2 megabytes of RAM), there are relatively few third party stacks available, there is no built-in way to control a videodisc player (and no directions are included for writing a script), and no run-time version is supplied so that other users must have their own copy of the program to use your stacks. Cost: aprox. $100.

- IBM (MS-DOS and Windows) Software

ToolBook. ToolBook is a full-featured Windows application construction kit similar in concept to HyperCard on the Macintosh. ToolBook has some nice features--one of the best is that everyone element in the visual display is an object that can have a script attached. Objects can also be grouped without losing their scripts, and the group can have a script as well. ToolBook books can exchange data and communicate with other running Windows applications using Windows IAC and DDE (Interapplication communications and Dynamic Data Exchange. Excellent multimedia support. A utility, Convert-It, helps in porting HyperCard stacks to ToolBook. ToolBook requires a run-time module free for educational users. Potential developers should make sure the machines their software will be run are capable of running Windows well! Sophisticated applications development may require a programmer. Cost: aprox. $400 (retail) and $150 (academic).

LinkWay Live!. LinkWay Live! is a hypertext/hypermedia development program designed primarily for the K-12 market with MS-DOS systems. It has excellent documentation and is easy to learn. It resembles HyperCard in a number of ways and even has a more limited script language. It permits the integration of other medias such as CD-ROM, videodisc, music, and speech. It is available from IBM and requires at least 640 Kb of RAM. Cost: aprox. $140.

KnowledgePro. KnowledgePro is a fairly expensive authoring system that emphasizes text. Because it takes a character approach rather than a bitmapped approach to screen display, it cannot integrate text and graphics seamlessly. It contains a sophisticated built-in programming language but can be difficult and time-consuming to use. It requires 1.2 megabytes of disk space and 512Kb of RAM. Cost: aprox. $500.

Guide. This software from OWL was the first of the hypermedia products available for the Macintosh and has been the first program with versions to run on both the IBM and Macintosh platforms. It has an overall text orientation but can incorporate graphics. Both Guide and HyperCard use buttons and links but buttons in Guide are typed and stay with the text instead of screen location. It's strength is probably as a course development tool for text-driven subjects like history and English. One positive feature is that it can be used like a word processor when it is not being used for hypertext applications. Guide is available from OWL Internationalh. It runs on an IBM AT with two disk drives and 640Kb of RAM or a Mac with 512Kb of RAM. Cost: aprox. $275.

Hypermedia Applications: Examples

HyperCard for Education: Educator HomeCard. Apple Computer. (1991). Includes stacks for student managment (seating charts, gradebook, student information file), lesson managment (lesson planner, presentation backgrounds) and learning ideas. Additional modules are available. ($25)

Cool Mac Stacks. Drucker, D. (1992). Carmel, IN: Hayden Publishing. Includes stacks such as WildAbacus, Pizza Navigator, Say the Numbers You have Dialed, Boxer. ($20)

Food/Health Stacks (#1831). EDUCORP.Set includes stacks such as digestion, restaurant guide, shopping list, growth records, patient names, vitamins, the AIDS click and AIDS stack, Master Calorie. ($25 for set; individual disks $7)

Bill's Clip Art (#7204). EDUCORP. Includes clip art pictures for use in hypercard stacks. ($7).

Resources for Laserdiscs, CD-ROM and Hypermedia Software

CD-ROM Product Guide. Bureau of Electronic Publishing, Inc.,141 New Road, Parsippany, NY 07054. Tel. 1-800-828-4766

Educorp Catalog. Educorp, 7434 Trade Street, San Diego, CA 92121-2410. Tel. 1-800-843-9497 (Excellent source of HyperCard Stacks and CD-ROMs.)

The Videodisc Compendium. Emerging Technology Consultants, P.O. Box 120444 , St.Paul, MN 55112. Tel. 612-639-3973 ($30 subscription; excellent source of educational videodiscs.)

Hypermedia Stacks. Hypermedia and Instructional Software Clearinghouse, University of Colorado - Denver, Campus Box 106, P.O. Box 173364, Denver, CO 80217-3364. Tel. 303-556-4364

Laser Learning Technologies Catalog. Laser Learning Technologies, 3114 37th Place South, Seattle, WA 98144. Tel. 1-800-722-3505

Laser Video File. LaserViews, 561 Bloomfield Avenue,Verona, NJ 07044. Tel. 1-800-872-3472

Educational Videodiscs and Multimedia Products. Optical Data Corporation, 30 Technology Drive, Warren, NJ 07059. Tel. 1-800-524-2481

LaserDisc Movies. Pioneer, 1263 Hamilton Parkway,Itasca, IL 60143. Tel. 708-285-4561

Queue Educational CD-ROM. Queue, Inc., 338 Commerace Drive,Fairfield, CT 06430. Tel. 1-800-232-2224

Directory of CD-ROM Databases. SilverPlatter Information, Inc., 100 River Ridge Drive, Norwood, MA 02062-5026. Tel. 1-800-769-8763

Educational Videodisc Catalog. Video Discovery, 1515 Dexter Avenue N. Suite 400,Seattle, WA 98109-3017. Tel. 1-800-548-3472

Voyager Company Catalog (Laserdiscs and CD-ROMs). The Voyager Company,1351 Pacific Coast Highway, Santa Monica, CA 90401. Tel. 213-451-1383

CD-ROM Catalog. Wayzata Technology Inc., P.O. Box 807, Grand Rapids, MN 55744. Tel. 1-800-735-7321

Interactive Videodiscs and CD-ROMs for Education. Ztek Company, P.O. Box 1055, Louisville, KY 40201-1055. Tel. 1-800-247-1603

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Shareware: Also covered by copyright. A shareware arrangement is really a license to use the software, not own it. Copyright holders for shareware allow purchaser to make and distribute copies of the software, but demand if you adopt it for use, you must pay for it.

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- modifications of software are not allowed,
- decompiling of the software are not allowed,
- development of new works built upon the package is not allowed without permission of the copyright holder.

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- development of new works built upon the package is allowed and encouraged but must also be designated as freeware

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- modifications to the software are allowed
- decompiling of the program is allowed
- development of new works built up the package is allowed without conditions on the distribution or use of the derivative work

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References:

Drucker, L. and Murie, M. (1992). QuickTime handbook. Carmel, IN: Hayden;

EDUCOM (1992). Using software: A guide to the ethical and legal use of software for members of the academic community. (1992). Washington, D.C.

Checklist for a Hypermedia Starter System

The purpose of this checklist is to help you begin thinking about a hypermedia system and what one might need to know for purchasing these components. The system discussed here is where the computer functions as the control center of other peripheral devices. Peripheral devices include: the printer, scanner, CD-ROM drive, computer-controlled VCR or laser disc player.

Cost may be considered a major factor in determining purchases. However, time to learn how to use the computer or other devices is just as crucial. It much easier to learn how to use one component at a time, than be overwhelmed with "too much at once."

Only a few components are mentioned here as to just provide some insight as to what might be included as part of a system and what is needed to "put it all together." Each device has it's own requirements in order to operate as part of a hypermedia system (i.e. cables which connect it, software which allows tells it "what to do").

I. COMPUTER SYSTEM

- computer, monitor, keyboard, mouse and mouse pad
- Authoring System, such as HyperCard (Macintosh) or LinkWay (IBM)
- At least 8 MB of RAM is usually recommended for with a Hypermedia system.
  Note: RAM (Random Access Memory) is different than hard disk storage space.

II.. PRINTER

- Printer - Features you may wish to consider: ability to print graphics, quality of print, volume of use
- Is it compatible with your computer? If not, is an interfact kit required (i.e, software and cables which make it compatible with your computer)?

III. CD-ROM DRIVE SYSTEM

- CD-ROM Drive
- Powered Speakers and/or Headset- to hear some audio tracks which are not played through the computer and to hear any audio CDs; also the speakers amplify the sound for larger groups; headset aids individual listening
- SCSI cables (to attach to computer or the scanner; SCSI cables form a chain linking it to the computer)
- SCSI terminator (used on the CD Drive if no other device is in the chain)
- Software for using the CD-ROM Drive - Should be included with the purchase of the drive
- Additional software is required if the CD-ROM Drive will be used for audio CDs, such as a CD audio toolkit.

IV. SCANNER SYSTEM

- Scanner - A flatbed scanner allows whole page scanning, other types are available
- Interface Kit which allows the scanner to be compatible with the computer
- Software (basic software to operate the scanner should be included in the interface kit or with the scanner purchase)
- SCSI cable (to attach the scanner to the computer or to the CD-ROM Drive)
- Additional software may be purchased for reading text (Optical Character Recognition - OCR); may be included with the Scanner depending on what type you are purchasing.

Author's Checklist

Stack
- ____ has been compacted
- ____ includes an overview/introduction
- ____ includes an objective
- ____ includes directions as needed
- ____ has a menu allowing nonlinear access
- ____ clear focus and logical program progression
- ____ performance measure of learning
- ____ content, spelling, grammar correct

Cards
- ____ includes a title card
- ____ each card has navigation options
- ____ adequate white space
- ____ one idea per card
- ____ appropriate graphics are used
- ____ text is in fields
- ____ text size, style and font are appropriate

Fields
- ____ appropriate font options
- ____ text locked when not to be changed
- ____ wide margins for text
- ____ scrolling field rather than card full of text
- ____ one idea per field

Buttons
- ____ use same locations for buttons
- ____ uniform styles
- ____ work as intended
- ____ purpose clearly indicated
- ____ no extraneous buttons

Backgrounds
- ____ appropriately used

Source: Rude-Parkins, C. (1992). Computer-based curriculum development tools for teachers. Journal of Education Multimedia and Hypermedia 1 179-186.

Key Ideas: Hypermedia Use in Critical Science-Based (Family-Focused) Family and Consumer Education Programs

Program Goals: From a critical science perspective a major goal of family and consumer education is to help learners develop the ability to function proactively and responsibly as family members now and in the future. In this view students need to know how to think and act in relation to family concerns, both collabortively and individually in family and community contexts. Students need opportunities to be reflective questioners and active constructors of their own knowledge, and to take responsibility for their own learning throughout the lifespan.

Program Elements:

View of Learning. In a critical science view of education, learning is conceptualized more as a process of constructing one's own understandings and capabilities than of transferring information from one person to another. As an authoring tool, hypermedia can be used to put learners in the educational driver's seat. Hypermedia serves to facilitate rather than predict thinking (Nix, 1988).

Teacher and Learner Roles. Teachers may serve as a facilitator of learning or serve as a collaborator with students fostering greater intellectual independence and personal initiative in learning among students. Hypermedia can be used to promote active engagement in learning by providing more varied, realistic, and interactive learning resources and by giving learners greater control over learning opportunities and processes.

Learner Relationships. Family-focused learning goals suggest there is a need to provide opportunities for students to learn to work effectively with others in groups, as well as on their own. Hypermedia can be used to structure collaborative learning opportunities as well as enable learners to pursue personal as well as group learning goals, and to capitalize on unique but often complementary learning styles and strengths.

Curriculum Structure. Family-focused curriculum goals emphasize the whole of ideas and the interconnectedness of knowledge within that whole. Hypertext and hypermedia applications can provide frameworks for connecting diverse symbols (i.e., text, sound, video) as well as diverse knowledge bases rapidly and in new varied ways.

Thinking Skills. Thinking and reasoning can be enhanced through hypermedia as it fosters advanced reasoning about family issues and concerns by making routine mechanics easier (such as data management) and by facilitating knowledge creation and recreation that makes short to long-term knowledge transfer more likely to occur (Dede, 1989).

Individual Learner Goals. Multiple approaches to teaching, both linear and nonlinear, will likely be more effective in actively engaging a greater proportion of the student population in learning that is personally meaningful, and effective in developing the capacity for family action. Hypermedia software and hardware permit the nonlinear access to, and organization of, information. It can be used to individualize the pace and time of learning as well as learning goals and the instructional material made available to students.

Evaluation. Hypermedia can be used as a tool for the demonstration of student learning, such as through simulation, self-evaluation and visual displays. It can allow students to carry out tasks that cannot actually be done in school, reflect on their performance by soliciting feedback and/or comparing performance with that of others, and by displaying what they have learned so that others may also benefit (Collins, 1991a & b; Bransford, et al., 1989; Collins & Brown, 1988).

Hypermedia systems and applications will certainly not be the answer to all of the challenges in structuring [illegible]tive family and consumer education programs. Nevertheless, existing research and practice in select [illegible]uctional areas, suggest that technology has great potential for enhancing educational efforts to empower families, and to build occupational skills of persons interested in family [illegible]

References:

Bransford, J.D., et. al. (1989). New approaches to instruction: Because wisdom can't be told. In S. Vosniadou and A. Ortany (eds.). Similarity and analogical reasoning. NY: Cambridge University Press.

Collins, A. (1991a). Cognitive apprenticeship and instructional technology. In L. Idol and B.F. Jones (eds). Dimensions of thinking and cognitive instruction. Hillsdale, NH: Erlbaum.

Collins, A. (1991b). The role of computer technology in restructuring schools. Phi Delta Kappan 73 (1) 28-36.

Collins, A. and Brown, J.S. (1988). The computer as a tool for learning through reflection. In H. Mandl and A. Lesgold (eds.), Learning issues for intelligent tutoring systems. NY: Springer.

Dede, C. (1989). The evolution of information technology: Implications for curriculum . Educational Leadership 47 (1) 23-26.

Nix, D. (1988). Should computers know what you can do with them? In R.O McClintick (ed.), Computing & Education: The second frontier. NY: Teachers College Press.

Hypermedia Technology: Tools for Implementing Critical Science-Based Curricula in Family and Consumer Education

by

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Abstract

Although Family and Consumer Education professionals have been interested in the instructional use of computers for over a decade, most of the literature in this area has thus far focused on the use of available software for subject-specific instructional tasks, or detailed the extent of computer use among teachers in the field. In this article, insights from a state project on hypermedia technology are used to illustrate the importance of framing discussions about the use of computer technology in Family and Consumer Education within the broader contexts of alternative curriculum orientations, educational reform agendas, and contemporary roles of teachers.

Hypermedia Technology: Tools for Implementing Critical Science-Based Curricula in Family and Consumer Education

Over the past decade, Family and Consumer Education professionals have expressed a good deal of interest in the use of computer technology for instruction (Browning & Durbin, 1985; Petrich, 1987; Longstreth, Kelley, & Paris, 1989; Moss & Parrish, Thompson, 1984). Early on, Hausafus & Ralston (1983) demonstrated how computer technology could be used to provide simulated learning experiences in a teacher education setting. Soon after, Browning & Durbin (1985) reviewed existing software for specific Family and Consumer Education subject areas and differentiated between computer-assisted instruction, computer-managed instruction, and teacher utilities. Petrich (1987), Longstreth, Kelly, & Paris (1989), and Rogers, Thompson, Cotton, & Thompson (1992) conducted studies to investigate the extent of computer use among Family and Consumer Education teachers and to determine reasons teachers were, and were not, embracing them as instructional tools in various areas.

To date, the literature dealing with instructional computing in Family and Consumer Education has emphasized the use of available software for single-purpose, subject-specific instructional tasks such as diet analysis (Orta, 1984), clothing selection (Rogers, Thompson, Cotton, & Thompson, 1993), and family time and financial management (Moss & Parrish, 1992). An important broader question that seems to have been overlooked is, "To what degree are existing computer technology systems consistent with contemporary Family and Consumer Education curriculum models and emerging educational reforms?" A recent project to examine hypermedia technology as a tool for implementing Wisconsin's critical science-based secondary Family and Consumer Education curriculum model (Way & Bauer, 1992; Guide to Curriculum..., 1987) provided some interesting insights into this question. This project was jointly funded by the Wisconsin Department of Public Instruction and the University of Wisconsin-Madison. The purpose of this article is to detail what we learned about hypermedia hardware and software, and to describe why we believe hypermedia technology illustrates the importance of framing discussions about the use of computer technology within the contexts of alternative curriculum orientations, broader educational reform agendas, and contemporary roles of teachers.

Hyper-what? Why?

Hypermedia is a term coined by computer philosopher Ted Nelson in 1965 to describe electronic environments which permit the nonlinear organization of, and access to, large amounts of information in various forms, including text, sound, music, graphics, animation, and video (Franklin & Kinnell, 1990; Galbreath, 1992). Today, a typical system of hypermedia hardware might include a computer with video input, a CD-ROM drive, laserdisc player, a scanner, and an LCD projection panel for large screen display. HyperCard, which was released for the Macintosh computer in 1987, and shipped with them since then, is probably the most widely-used piece of hypermedia software. However, there are a number of hypermedia software packages available for other platforms such as LinkWay Live for MS-DOS systems and HyperStudio and HyperCard IIGS for Apple computers. Peripherals, such as scanners and video disk players generally require additional pieces of software. Hypermedia should not be confused with the term "multi-media" which may or may not permit the nonlinear organization of, and access to, ideas and information.

Hypermedia typically involves the organization of information in a series of screens (called "cards" and "stacks" in HyperCard) that appear on the computer. Figure A contains three screens (cards) of information from a presentation stack used to discuss hypermedia hardware and software components. The figure illustrates some of the ways hypermedia differs from other computer-based systems available for instructional use.

One difference is that hypermedia systems have the capacity to organize information in nonlinear ways such that any idea can be linked to and accessed from potentially any other idea. Links are made through "buttons" that, when clicked with a mouse, permit "jumps" from one place to another at the user's discretion. Hypermedia also has the capacity to incorporate information in both digital and analog forms. Television, music, and photograph images are examples of analog media. Computers, their files, and displays are digital in nature (Van Horn, 1991).

Hypermedia systems permit sophisticated data base management. Moreover, they also serve as tools for authoring one's own software -- without learning a programming language! (A number of hypermedia software packages, including HyperCard, also have extended programming languages for those who choose to use them, however.) Hypermedia is extremely easy to use, even for middle school-age students, and both teachers and students find it incredibly fun and involving (Campbell & Hanlon, 1990; Lengel & Collins, 1990). Many excellent texts are available for persons interested in learning more about hypermedia. See, for example Beekman (1992), Bull and Harris (1991), Coulouris and Thimbleby (1993), Drucker and Murie (1992), Farmer and Hewlett (1992), and Lamb (1993).

Although the 'fun and involving' aspect of hypermedia is probably not novel in comparison to much computer technology, the other unique characteristics of hypermedia permit the use of computers within Family and Consumer Education in ways that are vastly different from traditional technology applications. As a consequence, we found that hypermedia is quite compatible with the critical science-based curriculum model, and other educational reform agendas, which often call for change in fundamental elements of teaching and learning. The other insight we gained, however, is that hypermedia technology, per se, cannot guarantee that such curriculum changes will occur. These findings serve as an important example of the need to judge the applicability of computer technology not only from the traditional perspectives of subject-matter relevance, technical desirability (for example, hardware requirements and user friendliness), and learner interest, but also on the basis of consistency with curriculum orientations, educational reform agendas, and accompanying structures for teaching and learning.

Uses of Hypermedia: Computer-Assisted Instruction versus Computer-Involved Environments

Hypermedia systems are extremely flexible in terms of their applicability to educational settings. In many ways, hypermedia can be used for the same purposes as other varieties of computer hardware and software. For example, the HyperCard authoring software can serve as a tool for computer-managed instruction purposes such as keeping grade or supply records or generating forms. Hypermedia can also be used as a tool for computer-assisted instructional tasks such as preparing multimedia presentations for large groups, preparing tutorial programs for individuals or small groups, and maintaining collections of information on topics for student use. These are important and useful applications and the features of hypermedia such as nonlinear access, multimedia options, and large storage capacities often make them more powerful and flexible than traditional hardware and software tools for these purposes.

Figure B illustrates two screens of information from a tutorial program on the FHA/HERO student organization developed by a middle school teacher in Wisconsin using HyperCard (Footnote 1). All students in her classes have an opportunity to progress through this stack in their own self-determined order and at their own pace.

Figure C contains three cards from a stack developed to illustrate how hypermedia can be used to build databases for teacher and student use. In this case, a file drawer metaphor shows how information concerning family theories can be organized and expanded over time by students and/or the teacher. The information can be incorporated in the form of text (as shown) but also recorded audio tapes, video clips, graphics, or photos.

Our analysis suggests, however, that the greatest potential of hypermedia for furthering critical science curriculum goals, seems to lie not as much in its usefulness for computer-managed or computer-assisted instructional purposes as in its applicability for creating what have been termed computer-involved environments (Pogrow, 1987).

In computer-involved environments, computers and authoring software are used by individuals and small groups of students for themselves, and also for the teacher and the entire classroom. Student-planned individual and group investigative projects, using hypermedia to access, manipulate, store, and present information are typical learning activities. Learners have more control and interact more with each other and with the teacher in these environments than in traditional classrooms. There is more interest in the learning processes facilitated by the computer, for instance, what the students themselves can do with computers and how computers may facilitate efforts to reason about issues, than in the learning products resulting from computer use, for example what specific content will be "mastered" or what specific analyses performed. Such environments are consistent with a cognitive view of learning, in which the active role of the learner, including learner control, is seen as a main determinant of learning (Ryba & Anderson, 1990; Lehrer, 1993).

Figure D illustrates a screen from a stack developed to structure student investigative projects on caring for children. Students are to choose a story illustrated through a laserdisc video, magazine photo article, teacher-developed case study, research report, or parent interviews. They are then asked to complete the story using a systematic reasoning process, and share results by adding their ending to the class stack.

Computer-involved environments are much more likely to produce learning that reflects deeper conceptual understanding, and the ability to reason about complex issues that do not have just one correct solution. Lengel and Collins (1990) have called this promoting **wisdom**, the top of the educational pyramid, which is accomplished only after learners have had an opportunity to **wrestle with knowledge**; to turn data into meaningful pieces of information, and then personal understandings.

A survey of over 3200 public elementary and secondary schools by Apple Computer (Lengel & Collins, 1990) suggests that few schools today are making use of computer-involved environments. Schools are known to progress through a series of developmental stages in the adoption and use of technology. One way of conceptualizing these stages is as follows (Lengel & Collins, 1990):

1. **The P Stage** - emphasis is on teaching **programming** and the computer itself is the object of instruction. The computer is a relatively **peculiar** item in the school and often is seen as the **personal** property of one or a small group of teachers involved in the initial introduction.

2. **The D Stage** - the computer is used mainly for **drill** and practice in regular subject areas and computers are more widely **diffused** throughout the school. There is often **disappointment** about what computers can actually do relative to instruction and student learning.

3. **The T Stage** - computers are used as productivity **tools tailored** to individual students, teachers, and the curriculum. There is a movement away from use in direct instruction to more use for general purposes such as word processing,

database management and telecommunications.

According to the Apple research, most schools today are in the D stage of development. The researchers predict the next two stages, reflecting computer-involved environments, will be:

4. **The T2 Stage** - schools will use more powerful hypermedia tools such as HyperCard software and CD-ROM and laserdisc databases that permit the nonlinear organization of, and access to, large amounts of information in many forms (e.g., text, audio, video) throughout the curriculum and operations.

5. **The U Stage** - computers will be **ubiquitous** in schools; **used** for everything. They will also be **unobtrusive** and **uneventful**.

Our own 1992 survey of a random sample of 100 Wisconsin secondary Family and Consumer Education teachers suggests that computers in Family and Consumer Education classrooms are indeed being used mainly in a manner consistent with the D and/or T stages described above (Way & Bauer, 1992). Teachers reported that computers were most frequently used by individual students for short-term exercises such as dietary analysis and loan amortization, for drill and practice such as review of basic fiber facts, and for teacher and student word processing. Findings further indicated that only about 7% of the teachers had ever used hypermedia technology in or out of the classroom, although two-thirds of the teachers reported they were using computers for instructional purposes with some degree of regularity.

Computer-involved environments, using hypermedia to promote active learner involvement, more collaborative group effort, and greater intellectual wrestling with complex issues appear to be consistent with the critical science curriculum perspective being applied in an increasing number of Family and Consumer Education classrooms. Such environments also seem appropriate for addressing key elements of several well-publicized educational reform efforts.

Hypermedia, Critical Science Curricula, and Educational Reform

The critical science curriculum perspective, also called practical problem-based curriculum design (Hultgren & Wilkosz, 1986) or family focus design (Fauske 1986), is now being implemented in a number of states including Wisconsin, Ohio, Minnesota, and Pennsylvania (Laster & Dohner, 1986). The main interest in this approach is in helping students develop abilities needed to make intellectually and ethically defensible judgments regarding the continuing concerns of families (Brown, 1979). Central features of the framework include attention to the authentic and complex concerns of families, construction of integrated knowledge schemes related to ill-structured and value-laden as well as well-structured family questions, integration of thinking and reasoning skills as a part of curriculum content, and attention to social skills needed for collaborative action (Hultgren & Wilkosz, 1986; Laster & Dohner, 1986; Way, 1994). These elements of the critical science curriculum framework are strikingly consistent with aspects of recent calls for the reform of vocational education (Hayward and Benson, 1993; Bell & Elmquist, 1992) and education more broadly (Brooks, & Brooks, 1993; Means, 1994; Means, Blando, Olson, Middleton, Morocco, Remz, & Zorfass, 1993; SCANS, 1991).

It is possible to compare conventional instruction and reform instruction by examining the approaches to teaching and learning within each. "Reform instruction" (Means, et al., 1993) is seen as encompassing more authentic and multidisciplinary work, more student-initiated activity and active student participation, more interaction and collaboration among students and between students and the teacher, more attention to student diversity, and more authentic assessment. Conventional instruction is seen as teacher directed, more likely to emphasize knowledge dissemination than personal knowledge construction, more individualistic and homogeneous than collaborative and heterogeneous, more fragmented than integrated in treatment of subject-matter, and likely to focus on assessment of factual knowledge and discrete skills rather than broader contextualized abilities.

Our examination of hypermedia technology suggests that it can help facilitate implementation of critical science-based Family and

Consumer Education curricula and that educators can simultaneously address a number of broader educational reform recommendations with it. Specific characteristics of hypermedia are discussed below in relation to six elements of teaching and learning often featured in critical science curricula and educational reform initiatives.

The View of Learning

In past years, a didactic view of education has characterized much of the teaching practice in the United States. In this view, learning is seen predominately as the transmission of information, and sometimes well-defined technical skills, from teacher to learner. The critical science-based curriculum model calls for a more constructivist view of education (Brooks & Brooks, 1993), however. In this view, learning is conceptualized more as a process of constructing one's own understandings and capabilities than as the simple acquisition of someone else's knowledge and skills. To function effectively, today's families must construct personal knowledge for use in making judgments about what are commonly value-laden questions that affect not just one's own family, but families in the generalized sense.

As an authoring tool, hypermedia can be used to put learners in the driver's seat of intellectual action and knowledge construction. Unlike other computer software, hypermedia does not structure or predict thinking; rather it serves to facilitate thinking and make it more productive (Nix, 1988; Dede, 1989).

The Role of Teacher and Learner

Traditionally, teachers have been viewed as the primary source of knowledge within the school classroom and have functioned largely as directors of learning. Compliance has been an important, albeit unwritten educational goal, and consequently learners have tended to assume predominately passive intellectual roles. Some educational scholars have argued recently that broader school structures, characterized by bureaucratic regimen, also foster passivity and dependence among teachers as well as students (McCaslin & Good, 1992).

These postures which emphasize intellectual dependency and deskill teachers are inconsistent with the critical science view which acknowledges the need for lifelong learning and autonomous functioning in diverse family work and occupational work settings. Hypermedia technology can be used to promote active student engagement in learning by providing more varied, realistic, and interactive learning resources and by giving learners greater control over learning opportunities and processes.

Hypermedia software does not require a great deal of formal computer training or expertise to use; it is possible to gain expertise in basic features quickly and learn more as you go. Because it is easy to use as an authoring system, teachers have more freedom to guide learning with hypermedia; they are not as likely to feel "stuck" with programs that do not meet needs as they might when using software that is difficult or impossible to change. Students can be more creative and flexible when they are able to work on their own without worrying about all of the formalities of the hardware and software (Campbell & Hanlon, 1990). And teachers also have more time to facilitate learning when they aren't placed in the position of being the sole content and/or computer expert in the room.

The Relation of Students to One Another

Traditionally, educational environments have emphasized individualistic and competitive goal structures for students (Kohn, 1986; Johnson, Johnson, Holubec, & Roy, 1984). Homogeneity among student populations has also been typical of a majority of American classrooms. Today, however, school, family, work, and community contexts are increasingly diverse and require greater degrees of cooperative problem solving and action.

The critical science curriculum framework suggests there is a need to provide opportunities for students to learn to work effectively with others in groups, as well as on their own. Collaborative learning opportunities enable learners to pursue personal as well as group learning goals, and to capitalize on unique but often complementary learning styles and strengths. Communicative and emancipatory family action will be more likely to occur in families where members are comfortable with, and appreciative of, collaborative group effort and human diversity.

Hypermedia technology can be used to facilitate learning by collaborative groups as well as by individual students, and in fact, when introduced into school classrooms, seems to naturally foster an increase in collaborative learning (Collins, 1990). (EXAMPLE: Student A: "Darn, my 'paint' keeps flooding my whole screen!" Student B: "Oh, that just happened to me. Here, let me show you how to fix the 'leak' using the 'fat bits' pixel enlarging tool. You made three drawings to show how work and family go together? I never really thought about it that way before!")

The Nature of Family and Consumer Education Content

Traditional educational approaches have emphasized disciplinary rather than multidisciplinary forms of knowledge. The six substantive areas of family and consumer education (consumer and resource management, housing and living environments, child development, family relationships, nutrition and food, clothing and textiles) (Home Economics Concepts, 1989) have long been used as the beginning place for program planning in the field. The critical science-based curriculum framework, however, emphasizes the interconnectedness of subject-matter as applied to the complex continuing concerns of families, which may mean drawing upon several traditional subject-matter areas at once. Hypermedia provides a powerful system for connecting diverse knowledge bases rapidly using multiple forms and formats for representing knowledge.

Hypermedia also supports efforts to address thinking and reasoning skills as a part of family and consumer education content. Hypermedia can enhance cognition by making routine mechanics easier, for example, by assisting with database management, data analysis, or data display) and by facilitating the knowledge creation and re-creation that makes short to long-term knowledge transfer more likely to occur (Dede, 1989).

Learning Goals and Patterns

Helping an increasingly diverse student population develop the skills and abilities needed to deal proactively with complex family concerns in ever more complex environments suggests a need for more flexible educational goals, and teaching and learning strategies that will enable students to achieve them. Traditional singular, and often linear, patterns of teaching will not likely serve to nurture and challenge all learners. Unlike the most commonly used computer technology, hypermedia can serve to individualize learning goals and processes, including the time and timing of learning.

The hypermedia application which most permits individualization of instruction involves using hypermedia as a way of accessing, sorting, and presenting information related to student-selected topics and concerns. Hypermedia's ease of use, and flexible authoring capabilities have led teachers to note that it is equally engaging for learners of varying ability levels, learners with diverse interests, and learners with varying levels of computer expertise.

An exploratory middle school Family and Consumer Education class near Milwaukee, Wisconsin completed investigative projects during a two-week time period last spring and displayed results using hypermedia. Projects addressed diverse topics including gang membership, family genealogy, child abuse, nutritional content of snack foods, and babysitting. Finished size of investigative project reports using hypermedia ranged from two to thirty computer screens of displayed information. Learners chose a variety of ways of representing ideas, using text, sound, picture images, and graphics. Depth of investigations varied, and not necessarily in direct proportion to size (length) of completed project reports.

A middle school teacher at another school noted that the hypermedia investigative project had been one students' only productive learning experience during the entire year. Given its ability to support varying cognitive styles and to engage learners with differing interests and abilities, it is not surprising that Lehrer and colleagues recently found middle school social studies students who completed investigative projects using hypermedia had more realistic understanding of the knowledge construction process, recalled more facts, and had more elaborated concepts (Lehrer, Erickson & Connell, 1992).

Learner Assessment

The appropriate assessment of student learning has been a topic of increasing concern among both scholars and practitioners. Much educational literature is now calling for development of more "authentic" approaches to evaluation that will better assess the extent to which learners can apply knowledge and skills in real-world settings (Marzano, Pickering, & McTighe, 1993; Wiggins, 1993). The need for such approaches to evaluating teaching and learning in family and consumer education programs has long been recognized (McClelland, 1983). Recall of information is no guarantee of the ability to make reflective judgments about issues such as handling anger in the family, guiding the intellectual development of children, balancing work and family, and/or assuring one's economic well-being.

Hypermedia technology can support demonstration of student learning in a number of ways. Among these are simulation, self-evaluation, and visual displays. Hypermedia can permit students to carry out tasks that cannot actually be performed in school; reflect regularly on their performance by soliciting feedback and/or comparing performance with that of others; and display what they have learned so that others may also benefit (Collins, 1991a and b: Bransford, et al., 1989; Collins & Brown, 1988).

Both current literature and our own experience strongly suggest that hypermedia technology can be an important vehicle for implementing key elements of a critical science curriculum perspective while simultaneously addressing at least some aspects of current educational reform efforts.

Beware the Technocratic Ideology

Lest it appear that we are advocating hypermedia technology or <u>any</u> technology as the final gateway to Family and Consumer Education perfection, we offer a last insight gained through our project explorations - **beware the technocratic ideology!** Hypermedia technology alone cannot and will not create learning environments consistent with any particular curricular orientation. Hypermedia alone will not ensure rich and involving centers for teaching and learning.

While hypermedia offers much potential for re-thinking and re-casting fundamental elements of teaching and learning, we also found that it can de-skill teachers, reinforce out-dated program content, and validate bad teaching practices as well as stimulate reform and improved student achievement (Callister & Dunne, 1992).

Hypermedia authoring software can just as easily be used to develop drill and practice programs on out-of-date concepts as up-to-date ones, for example, the now outmoded Basic Four Food Groups versus the newer Food Pyramid. Hypermedia can be used to try to give students all the right answers (Eat this! or Don't eat that!) or help them reason through some of the broader issues underlying family behavior patterns (What are economic and health consequences of using bovine growth hormone (BGH) to increase milk production in dairy cattle? Why is there so much non-nutritious food advertising aimed at very young children through the media?). Commercially prepared hypermedia "stacks" can be used as is and perhaps unquestionned by teachers, or they can be modified to reflect individual student needs and interests and what the latest research says about family concerns and how students learn.

If hypermedia technology is truly to be of help in implementing new curricular approaches and enhancing meaningful learning, teachers and technology must be viewed in tandem. Teachers, not computers, have the capacity to ask what Family and Consumer Education program goals should be, whether particular questions are worth studying or not, and what learning approaches are appropriate for whom. Buying more technology and/or helping teachers gain technical computer skills are not going to be sufficient to change or improve educational practice in Family and Consumer Education. Only when teachers are fully empowered to make appropriate decisions about technology within the contexts of curriculum and learning theory will the potential benefits of technology really be realized in Family and Consumer Education. The "technological tail" must not be allowed to wag the "pedagogical dog" (Callister & Dunne, 1992, p. 326). Teachers, teacher educators, administrators, and educational policymakers concerned about families would be wise to keep the teacher-technology circle of interaction clearly in mind.

Footnotes

Footnote 1 - This hypermedia stack was developed by Chris Longe, Horace Mann Middle School, West Allis, Wisconsin.

References

Bell, T.H. and Elmquist, D.L. (1992). Technical interaction in the classroom. Vocational Education Journal, 67(3), 22-24.

Brooks, J.G. & Brooks, M.G. (1993). In search of understanding: The case for constructivist classrooms. Alexandria, VA: Association for Supervision and Curriculum Development.

Brown, M. (1979). A conceptual scheme and decision-rules for home economics curriculum content. Madison, WI: Wisconsin Department of Public Instruction.

Browning, R. and Durbin, S. (1985). Computers in the home economics classroom. Washington, DC: Home Economics Education Association.

Bull, G.L. and Harris, J. (1991). HyperCard for educators: An introduction. Eugene, OR: International Society for Technology in Education.

Callister, Jr., T.A. and Dunne, F. (1°92). The computer as doorstop: Technology as disempowerment. Phi Delta Kappan, 74(4), 324-326.

Campbell, R. and Hanlon, P. (1990). HyperCard: A new deal in the classroom. In S. Ambron and K. Hooper (Eds.), Learning with Interactive Multimedia (pp. 258-286). Redmond, WA: Microsoft Press.

Collins, A. (1991a). Cognitive apprenticeship and instructional technology. In L. Idol and B.F. Jones (Eds.), Dimensions of Thinking and Cognitive Instruction (pp. 121-138). Hillsdale, NJ: Erlbaum.

Collins, A. (1991b). The role of computer technology in restructuring schools. Phi Delta Kappan, 73(1), 28-36.

Collins, A. and Brown, J.S. (1988). The computer as a tool for learning through reflection. In h. Mandl and A. Lesgold (Eds.), Learning Issues for Intelligent Tutoring Systems (pp. 1-18). New York: Springer.

Coulouris, G. and Thimbleby, H. (1993). HyperProgramming: Building interactive programs with hypercard. New York: Addison-Wesley.

Dede, C. (1989). The evolution of information technology: Implications for curriculum. Educational Leadership, 47(1), 23-26.

Drucker, D.L. and Murie, M.D. (1992). QuickTime handbook. Carmet, IN: Hayden.

Farmer, L.S.J. and Hewlett, J. (1992). I speak HyperCard. Englewood, CO: Libraries Unlimited, Inc.

Fauske, I. (1986). Family focus home economics design: Wisconsin curriculum project. In J.F. Laster and R.E. Dohner (Eds.), Vocational Home Economics Curriculum: State of the Field (pp. 267-278). Peoria, IL: Bennett & McKnight Publishing Company, a Division of Macmillan, Inc.

Franklin, C. and Kinnell, S.K. (1990). Hypertext/hypermedia in schools: A resource book. Santa Barbara, CA: ABC-CLIO.

Galbreath, J. (1992). The educational buzzword of the 1990's: Multimedia, or is it hypermedia, or interactive multimedia, or...? Educational Technology, 32(4), 15-19.

Guide to curriculum planning in home economics. (1987). Madison, WI: Wisconsin Department of Public Instruction.

Hausafus, C.O. and Ralston, P.A. (1983). The development of EDITHE: A computer program for preservice home economics teachers. Journal of Vocational Home Economics Education, 1(3), 24-34.

Hultgren, F. and Wiskosz, J. (1986). Human goals and critical realities: A practical problem framework for developing home economics curriculum. Journal of Vocational Home Economics Education, 4(2), 135-154.

Johnson, D.W., Johnson, R.T., Holubec, E.J., and Roy, P. (1984). Circles of learning: Cooperation in the classroom. Alexandria, VA: Association for Supervision and Curriculum Development.

Kohn, A. (1986). No contest: The case against competition. Boston: Houghton Mifflin.

Lamb, A. (1993). IBM LinkWay plus LinkWay Live! Authoring tool for presentations, tutorials and information exploration. Orange, CA: Career Publishing.

Laster, J.F. and Dohner, R.E. (1986). Vocational Home Economics Curriculum: State of the Field. Peoria, IL: Bennett & McKnight Publishing Company, a Division of Macmillan, Inc.

Lehrer, R. (1993). Authors of knowledge: Patterns of hypermedia design. In S.P. Lajoie and S.J. Derry (Eds.), Computers as Cognitive Tools (pp. 197-228). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Lehrer, R, Erickson, J. and Connell, T. (1992). Assessing knowledge design. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Lengel, J.G. and Collins, S. (1990). HyperCard in education: Perspective from the field. In S. Ambron and K. Hooper (Eds.), Learning with Interactive Multimedia. Redmond, WA: Microsoft Press.

Longstreth, M., Kelly, M.E., & Paris, K.L. (1989). Microcomputer adoption and use among home economics teachers. Journal of Vocational Home Economics Education, 7(1), 80-91.

Marzano, R.J., Pickering, D., McTighe, J. (1993). Assessing student outcomes: Performance assessment using the dimensions of learning model. Alexandria, VA: Association for Supervision and Curriculum Development.

McCaslin, M. and Good, T.L. (1992). Compliant cognition: The misalliance of management and instructional goals in current school reform. Educational Researcher, 21(3), 4-17.

McClelland, J. (1983). How can we operationalize criteria for program evaluation? Journal of Vocational Home Economics Education, 1(4), 79-86.

Means, B. (Ed.) (1994). Technology and education reform: The reality behind the promise. San Francisco: Jossey-Bass.

Means, B., Blando, J., Olson, K., Middleton, T., Morocco, C.C., Remz, A.R., Zorfass, J. (1993). Using technology to support education reform. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

Moss, W.D. and Parrish, T. (1992). Home ec goes hi-tech. What's New in Home Economics, 25(4), 16-18.

Nix, D. (1988). Should computers know what you can do with them? In R.O. McClintick (Ed.), Computing and Education: The Second Frontier (pp. 67-79). New York: Teachers College Press.

Orta, J. (1984). Computer applications for the foods and nutrition professions: The state of the art. In P.J. Thompson, Ed., Home economics teacher education: Knowledge, technology, and family change (pp. 111-124). Bloomington, IL: Bennett & McKnight Publishing Company, a Division of Macmillan, Inc.

Rogers, N., Thompson, C., Cotton, M., & Thompson, D.E. (1993). Computer-aided instruction in secondary clothing and textiles courses. Journal of Vocational Home Economics Education, 11(2), 22-29.

Petrich, B. (1987). Computers in home economics teacher education: Survey data related to decision-making. Journal of Vocational Home Economics Education, 5(1), 51-58.

Pogrow, S. (1987). The HOTS program: The role of computers in developing thinking skills. TechTrends, 32(2), 10-13.

Ryba, K. and Anderson, B. (1990). Learning with computers: Effective teaching strategies. Eugene, OR: International Society for Technology in Education. (ED 327 157)

SCANS (1991). What work requires of schools. A SCANS report for America 2000. Washington, DC: U.S. Department of Labor, the Secretary's Commission on Achieving Necessary Skills.

Thompson, P.J. (1984). Home economics teacher education: Knowledge, technology, and family change. Bloomington, IL: Bennett & McKnight Publishing Company, a Division of Macmillan, Inc.

Van Horn, R. (1991). Advanced technology in education: An introduction to videodiscs, robotics, optical memory, peripherals, new software tools, and high-tech staff development. Pacific Grove, CA: Brooks/Cole Publishing Co.

Way, W.L. (1994, forthcoming). Family, work, and human development: An approach to developing curricula for middle school family and consumer education programs. In F. Smith and C. Hausafus (Eds.), Home Economics Teacher Education: The Education of Early Adolescents. Peoria, IL: Bennett & McKnight Publishing Company, a Division of Macmillan, Inc.

Way, W.L. and Bauer, B. (1992). A prototype for the use of hypermedia to foster higher level reasoning in family and consumer education: Final report. Madison, WI: Wisconsin Department of Public Instruction.

Wiggins, G. (1993). Assessment: Authenticity, context, and validity. Phi Delta Kappan, 75(3), 200-214,