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ABSTRACT

Multimedia allows computing to move from text and data into the realm of graphics, sound, images, and full-motion video, thus allowing both students and teachers to use the power of computers in new ways. Key elements of multimedia are natural presentation of information and non-linear navigation through applications for access to information on demand. Multimedia can be thought of as using the computer to provide a multisensory experience. Non-linear navigation is often termed hypermedia, the ability to move through information non-sequentially. Efficiency and effectiveness are reasons for using multimedia in instruction. This paper reviews numerous benefits of multimedia as well as various situations in which its use is appropriate, types of multimedia applications, ways of producing multimedia lessons, and strategies for using multimedia. Effective multimedia use in higher education depends on a faculty leader to provide vision and mediate a departmental connection, an administrative leader, and a computer support leader. To meet the multimedia development needs of educators, International Business Machines (IBM) has created the Advanced Academic System (AAcS), a personal computer preloaded with multimedia hardware, productivity software, and exclusive multimedia software. Applications such as the AAcS hold great promise in education and can be applied to virtually any subject matter. Appendix A lists CD-ROM, laserdisc, and video suppliers. Appendix B lists associations involved in multimedia development and related activities. (Contains 8 references.) (SLD)

An IAT Technology Primer

Introduction to Multimedia in Instruction

Diana Oblinger, Ph.D.

TPR-03

The Institute for Academic Technology
A program of the University of North Carolina at Chapel Hill

MULTIMEDIA IN INSTRUCTION

Diana Oblinger, Ph.D.

"Multimedia will be for the 90's what the personal computer was to the 80's" (McQuillan, 1991).

Overview

Multimedia. Some say it represents the biggest revolution in education and communications since the invention of the printing press. Others think it belongs only in the hands of the highly technical. Regardless of whether you have formed an opinion on multimedia, you may want to be knowledgeable about this educational and computing trend that so many instructors have found to be both valuable and easy to use. This paper is designed to help you begin to understand multimedia so that you can be part of the "multimedia computer revolution."

We all understand that computing has altered our ability to manage information. At its best, computing has shortened the distance between people and information. Multimedia allows computing to move from text and data into the realm of graphics, sound, images and full-motion video, thus, multimedia allows us to use the power of computers in new ways.

Although many definitions can be provided for multimedia, we have come to think of it as having two key elements:

1. natural presentation of information through text, graphics, audio, images, animation and full-motion video, and

2. non-linear navigation through applications for access to information on demand.

In short, multimedia can be thought of as using a computer to provide a multisensory experience. This "experience" is extremely useful in a lecture presentation, as part of a laboratory or as individualized instruction where the multimedia is controlled and managed by the participant's actions or decisions. (McQuillan, 1991)

Our traditional interaction with computer-based information has not been "natural", that is, it has been through text, primarily. In contrast, most of our daily experiences are through sound and images. Much of our education has been based on words and numbers. Although we are used to dealing with a text based world, it is not "natural" in the sense that text not only limits the scope of information we can grasp but text can make it more difficult for us to understand some topics because it requires the brain to continuously code and decode information. This limits the speed and range of our communication.

It would be more effective to communicate using text as well as images that can draw upon real-life experiences. Multimedia can help by bringing together sights, sounds, text and images in a single communication medium. Think of a textbook in biology as an example. No matter how colorful, a book is a poor substitute for the motions and sounds that abound in nature.

The second feature of multimedia mentioned above, non-linear navigation, is often termed "hypermedia." Hypermedia represents the ability to move through information non-sequentially and is freeing professors and students from linear movement through information, such as going from page to page in a textbook. Instead faculty can respond to spontaneous questions in class or students can chose a path more suited to their interests and abilities. The additional flexibility of hypermedia encourages students to return to lessons as many times as they need or want.

In general, there are three main characteristics of hypermedia systems:

1. Hypermedia systems allow huge collections of information in a variety of media, to be stored in extremely compact forms, as well as accessed quickly and easily. Thus, comprehensive and diverse materials can be assembled and delivered to learners.

2. Hypermedia is an enabling rather than directive environment, offering unusually high levels of control. Not only does hypermedia offer new ways to present and learn course content, it also introduces opportunities to diverge from a linear path; to juxtapose text, animation and sound; to use technology to aid in reviewing, studying and producing new interpretations of the content.

3. Hypermedia offers the potential to alter the roles of teachers and learners, and to enhance the benefits and frequency of their interaction. Hypermedia encourages students to become scholars, that is, more in control of their own learning. Teacher find their role more as coaches than as lecturers.

Historical Perspective

Interactive video and interactive education are terms applied to the forerunners of today's multimedia systems. A brief discussion on their features may help you to understand the design and functionality of current multimedia instruction.

The predecessor of multimedia was called interactive video. As its name implies, interactive video is a video message. controlled through a computer program, that has been designed to allow an individual to interact with it. Although the videotapes we view through VCRs can allow students to see the life of animals on a coral reef or to observe a medical procedure, the video message is usually passive. Rarely do learners have the opportunity to interact with the video. With interactive video, on the other hand, the computer lets individuals become active participants, rather than passive observers.

Interactive video has the potential to change the way people learn. With interactive video, the whole is greater than the sum of the parts. Although computers and video have existed for years, each individual medium may become boring to the learner. With interactive video, a video message is controlled through a computer program, allowing each medium to compensate for weaknesses in the other.

Applications of interactive video include visual databases. Faculty and students can use the power of the computer to access still or motion images that are needed to explain or understand a concept. The computer locates the images, and immediately presents them. If they include motion, the student can adjust the speed, move forward or backward, at will.

Another early application is called interactive education, where educational materials were developed using the interactive video format. These applications cover an unlimited range of disciplines. Simulations can use interactive video as well. Because the computer controls the "action" of the video, very complex processes can be simulated.

These forms of computer-assisted learning can now be made available on the PC you probably already use for word processing and are known as multimedia. An example of multimedia is a lesson that shows video of a heart attack victim in an emergency room. A medical student training on the computer is asked to make life or death decisions about the patient's care, but the student never actually runs the risk of making a potentially "fatal" mistake. So, from your desktop, you can study patient care, write a paper, send e-mail messages, use a spreadsheet or use other applications suited to your needs.

Multimedia can be combined with computer-assisted instruction to make learning highly individualized and interactive. The computer can be programmed to assess student skills, remediate, if necessary, and branch or accelerate as the individual progresses. A good program demands learner interaction, and it constantly assesses the individual learner's progress.

Most faculty see multimedia as a presentation tool for lectures. Not only will multimedia allow a variety of media to be merged for presentation, but the use of authentic material (such a a time lapse sequence of a cell dividing) is seen as a valuable addition to current lecture content. Students may see and hear "the real thing" when it is first introduced in lecture rather than having to wait for access to a student center or other facility. In some cases, the presentation of visual information helps students more effectively bridge from their current knowledge to understanding new information and terminology. Faculty find multimedia increases student interest in the subject matter and aids retention.

For those beginning to use multimedia, lectures or presentations can be developed in a short amount of time. Individualized computer-aided instruction using multimedia is highly effective, but requires more time for development and testing.

Effectiveness

The reasons for using multimedia in instruction are effectiveness and efficiency, in addition to offering a new and interesting approach to presenting materials. Study after study confirms the utility of interactions using sight, sound and simulated experiences in learning. Multimedia capitalizes on that interaction to educate in a way that has been shown to involve the learner.

It is well documented that we have short-term retention of about 20 percent of what we hear, 40 percent of what we see and hear and 75 percent of what we see, hear and do. Students complete courses in one-third of the time of traditional instruction when using multimedia, while reaching competency levels of up to 50 percent higher. In most cases the overall cost of instruction is lower, as well. (Department of Defense, 1991)

Other studies have focused on the educational effectiveness of technology in general. "In broad terms, computer-based instruction works. It offers a 10 to 20% improvement in performance over conventional teaching methods and a one-third reduction in time on task. They can reduce the amount of time that a student spends learning by one-third." (Molnar, 1990).

Benefits of Multimedia Use

Aside from being an effective form of instruction, there are other benefits to student learning through multimedia. For example: learning is self-paced; information is easier to access; learning becomes more interesting; and independent, discovery learning is fostered. More detail on the benefits of multimedia use is provided below:

- Multimedia mirrors the way in which the human mind thinks, learns and remembers by moving easily from words to images to sound, stopping along the way for interpretation, analysis and in-depth exploration.

- The combination of media elements in a multimedia lesson enables students to learn more spontaneously and naturally, using whatever sensory modes they prefer. For example, some people learn best by seeing, others learn best by seeing and hearing, still others learn best through manipulation or even kinesthetic exercises (the sense of touch).

- Combining media elements with well-designed, interactive exercises means that students are able to extend their experience -- to discover on their own so that they are no longer passive while information is "fed" to them. Although active learning is possible with any delivery mode, it often does not occur. By taking an active part in their learning and using their senses to experience new situations, students can begin to gain a broader, more in-depth understanding.

- Programs may include immediate feedback to help clarify misconceptions (before students become confused) and to provide reinforcement for correct responses.

- While there seems to be a limit on the number of times a student will raise his or her hand to ask a question, many multimedia programs are designed to let students stop and explore as often as they like. Students report that they often want to repeat a segment or go to another part of the program that offers a different kind of explanation, like a glossary, graphics, map or hypermedia function for cross-referencing to related information. Multimedia makes this type of digression easy for individuals without limiting the progress of the remainder of the students.

- With today's concern about literacy, multimedia brings another advantage. By combining words with pictures and graphics and audio, multimedia programs enable people with varying levels of reading skill to learn by using their multiple senses of sight, hearing and even touch. Some evidence suggests that using multimedia segments to set the context for students significantly aids their reading comprehension.

- Instructional technologies often help people to learn how to problem-solve by working in teams, which supports the development of teamwork and interpersonal skills.

- With an assistant in the form of a multimedia program, instructors can provide more individualized attention to students when they need it most. Instructors have time to focus on activities that demand participation while students are able to learn on their own.

Note that multimedia is not viewed as a replacement for teachers or traditional classroom methods, but as an important complement to the classroom instruction.

Situations where multimedia may be appropriate

If you wonder whether multimedia is appropriate for your instructional activities, the questions below may help you determine its usefulness in meeting your educational goals.

- *Could the subject you are teaching be enriched by interactive presentations or labs?* Multimedia will let you bring sights, sounds and text to the computer, allowing students to explore more fully, the material being taught.

- *Do your students represent a range of skills and learning speeds?* With multimedia, advanced students can explore to the limit of their ability; slower students can make strides at their own rate of comfort, without embarrassment or criticism. Students can work alone, in pairs or in small groups.

- *Is consistency of delivery, from section to section or instructor to instructor a challenge?* Multimedia will give instructors an advantage by helping them consistently and effectively convey information during each presentation.

- *Is it difficult to find knowledgeable, skilled instructors?* A multimedia program can capture the expertise of an expert or group of instructors. Then this information is readily available for other students.

- *Is your audience dispersed, either geographically or by the times they can access instruction?* Multimedia programs are easily distributed, overcoming problems with decentralized audiences.

Types of multimedia applications

Multimedia applications may take many forms, such as:

- curriculum products (such as, Exploring Chemistry - University of Illinois/ Falcon Software)

- reference materials (primarily delivered on videodisks or CD-ROMs, such as Compton's Multimedia Encyclopedia)

- instructor presentation tools which allow presentations that enhance textual material with pictures, sound and graphics

- student tools which allow students to develop projects, reports and term papers that embody sound, images and video.

Included in appendix A is a compilation of laserdisc and CD-ROM sources for use in developing multimedia applications. To work with others who share an interest in multimedia and its applications in higher education, contacting the organizations included in appendix B should be helpful.

Producing multimedia lessons

There are two general ways to produce lessons using multimedia -- by using existing instructional applications or by developing your own. In either case, a good place to start is with your computer support center. If they have a collection of instructional software, you might find existing packages that meet your needs. Your computer support center may also be able to identify other pre-existing software which would save you from "re-inventing the wheel."

If you are interested in developing your own instructional applications, a good way to begin is by adapting generic software tools for a course. Presentation aids and graphics packages, such as ToolBook and CorelDraw!, can be used to develop effective lecture materials in a minimum amount of time.

Just as with writing textbooks or laboratory manuals, learning to author multimedia materials takes time, effort and creativity. To justify the investment, most of us must be able to realize gains in terms of efficiency and effectiveness. There are also several books available describing the processes involved in developing applications.

Whether you use existing applications or develop your own, there are many advantages to preparing multimedia materials to help you teach (from Jensen, 1991):

- Instructors are forced into giving more thought and attention to course preparation and creative pedagogy.
- Material presented in class, as well as additional material, can be made available on campus computer networks for study outside the classroom.
- Instructors and students can randomly access lecture notes and other material for all or part of a course.
- Information inserted in a computer presentation at an earlier time is not erased (as in material written on a blackboard), and this information can easily be recalled in the same form in which it was originally presented.
- Real-life material can be incorporated. Instructors can choose to go on-site to videotape or photograph systems, people and processes, then incorporate those materials into multimedia presentations.
- Some course management software can be used to randomly select students to answer questions in class or respond in class discussions.
- If uniform coverage of topics in a course is desired, as when teaching assistants teach several sections of a course, the computer-assisted instruction can be extremely beneficial.
- Instructors can set up remedial lessons and tests that allow slow learners and students who miss class the needed opportunities for self help.
- Instructors can become part of a world-wide movement of innovators experimenting with new and creative ways to utilize modern technology in education.
- In addition to classroom teaching, research presentations can be enhanced.

- Instructors may become part of future efforts to educate people in other nations without having to physically leave their campuses.

- Instructors are better equipped to capture the attention of the current generation of students who have grown up with television, videos and electronic games.

Strategy for using multimedia

An effective multimedia solution does not begin with technical prowess. The right resources, faculty leadership and technical support must all be present in order to move a multimedia solution from desire to reality. After working with numerous institutions, the IAT suggests that three groups must be involved to make a multimedia initiative work:

1. a faculty leader to provide academic vision and mediate a departmental connection;

2. an administrative leader to seek funding and to promote system rewards; and

3. a computer support leader to create the technological infrastructure needed to support the faculty efforts.

In short, the success of the enterprise appears to depend more on the people involved than on the technology.

If this faculty/administrative/computer support team does not exist, your first job might be to build it. After the team is in place, we recommend the following steps to help rationalize the academic goals with the capabilities of the technology and available resources:

- Put pedagogy first. Don't let the "whiz-bang" capabilities of multimedia technology take you away from your real mission.

- Decide what types of media you need to incorporate into your application or presentations. Talk to other experienced faculty who have done multimedia development. They can offer guidance as hardware and software options multiply.

- Select the software that best meets your needs and resources. Talk to an academic user who has worked with the package. Be certain you understand the technical authoring skills and time requirements needed to reach your goals.

- Determine what hardware is supported by the selected software.

- Plan for staff and faculty training. The IAT sponsors customized planning sessions and a number of hands-on workshops for a variety of skill levels. These workshops offer an introduction to multimedia, give examples of how this technology can be used easily and effectively, and provide participants with the skills needed to produce useful materials for classroom presentation and courseware. (For more information, call the IAT at 919-560-5031).

The Advanced Academic System

To meet the specific multimedia development needs of educators, IBM has created the Advanced Academic System (AAcS), a system of off-the-shelf and custom software that has been integrated and adapted especially for use in higher education.

The AAcS is a PS/2 pre-loaded with multimedia hardware, a host of productivity software and exclusive multimedia software. In addition to a CD-ROM drive and a sound board, the system contains the IBM M-Motion Video Adapter. The M-Motion card is designed to process the output from a laserdisc player and to direct the resulting signal to the PS/2's display. Note that the most important feature of the system is a set of multimedia "clipmakers" that enables developers to integrate multimedia through a seamless cut-and-past technique. The clipmakers are not available off-the-shelf. They have been developed and validated with assistance from academics across the U.S. and Canada, and are integrated into the "menu bar" of the version of ToolBook (the Asymetrix authoring software) that ships exclusively with the AAcS. In this way, the AAcS version of TookBook provides an enriched environment for developing educational multimedia materials.

Support for the AAcS is available at the IAT and through IBM, and includes, for example four different IAT workshops on developing applications using ToolBook and the AAcS multimedia clipmakers.

With the software provided in the AAcS, you don't need to be a programmer to create a range of multimedia applications. The AAcS provides you with the tools so that the user can become the developer. "Clipmakers" (for video, CD-audio, digital audio and MIDI), designed for easy browsing and indexing of material, will allow you to create buttons of video or audio segments to paste into applications. For full-motion video, "pasting" the button onto a "page" where you have created a "video window" gives you full-motion video. It can be as easy as that.

A promise for the future

Multimedia holds great promise in education. It can be applied to virtually any subject matter as an enhancement for lecture, laboratory or self-study. Multimedia has the power to transform the way teachers teach and learners learn.

(revised 11/24/92)

Appendix A

CD-ROMs, Laserdiscs and Videos

Overview

Multimedia uses the power of the computer to combine voice, music, still pictures, full-motion video and text into an integrated, interactive package invaluable for teaching. Most educators, however, do not have the time or the money to create all their own resources as well as incorporate them into multimedia applications. There are abundant resources currently available for such people, created and stored in a variety of formats for the convenience of the developer. The following is a list of sources of CD-ROMs, laserdiscs, videotapes and other resources for multimedia instruction and development.

Sources

AIMS Media
9710 DeSoto Ave.
Chatsworth, CA
800-367-2467
Fax: 818-341-6700

American Chemical Society
1155 Sixteenth Street, NW
Washington, DC 20036
202-872-8734

Bureau of Electronic Publishing, Inc.
141 New Road
Parsippany, NJ 07054
800-828-4766
Fax: 201-808-2676

CD-ROM, Inc.
Century
1667 Cole Blvd., Suite 400
Golden, CO 80401
303-231-9373

Coronet/MTI Film & Video
108 Wilmot Road
Deerfield, IL 60015
800-621-2131

American Association of Physics Teachers
Publications
112 Berwyn Road
College Park, MD 20740-4100
301-345-4200

The Annenberg/CPB Collection
P.O. Box 2345
South Burlington, VT 05407-2345
800-532-7637

CD Book Publishers
767 Arbolado Dr.
Fullerton, CA 92635
714-526-6434

CEL Educational Resources
The Video Encyclopedia of the 20th

515 Madison Avenue, Suite 700
New York, NY 10022
800-235-3339

Decision Development Corp.
2680 Bishop Dr., Suite #122
San Ramon, CA 94583
800-800-4382

The Discovery Channel
The Discovery Interactive Library
7700 Wisconsin Avenue
Bethesda, MD 20814-3522
800-621-2131
Fax: 708-940-3640

Educational Technologies
7070 Brooklyn Blvd.
Brooklyn Center, MN 55429
800-362-3023
Fax: 612-560-0663

EISI
Educational Software Institute
2225 Grant Road
Los Altos, CA 94024
800-955-5570
Fax: 415-969-1544

Encyclopaedia Britannica
310 South Michigan Ave.
Chicago, IL 60604-9839
800-554-9862
Fax: 312-347-7903

Intellimation
130 Cremona Drive
P. O. Box 1922
Santa Barbara, CA 93116-1922
800-532-7637

Laser Learning Technologies
3114 37th Place South
Seattle, WA 98144
800-722-3505
Fax: 206-723-3497

Media Learning Systems
Educational Sales Department
P. O. Box 94334
Pasadena, CA 91109-9804
800-321-5936

Dr. T's Music Software
100 Crescent Road
Needham, MA 02194
617-455-1454
Fax: 617-455-1460

EDUCORP Computer Services
7434 Trade Street
San Diego, CA 92121
800-843-9497
Fax: 619-536-2345

Emerging Technology Consultants, Inc.
P. O. Box 120444
St. Paul, MN 55112
612-639-3973
Fax: 612-639-0110

Hoffman Educational Systems
1863 Business Center Drive
Duarte, CA 91010
818-359-0977
Fax: 818-359-0957

Knowledge Revolution
15 Brush Place
San Francisco, CA 94103
800-766-6615
Fax: 415-553-8012

Lucerne Media
37 Ground Pine Rd.
Morris Plains, NJ 07950
800-341-2293
Fax: 201-538-0855

MicroDataware
2894 Tribune Ave.
Hayward, CA 94542
510-582-6624
Fax: 510-582-8295

Modern Talking Picture Service
5000 Park Street North
St. Petersburg, FL 33709-9905
800-443-7393

Multimedia PC Marketing Council
1730 M. Street NW, Suite 700
Washington, DC 20036-4510
202-331-0494
Fax: 202-785-3197

Multimedia Products Corporation
300 Airport Executive Park
Spring Valley, NY 10977
914-426-0400
Fax: 914-426-2606

National Geographic Society
Educational Services
17th and M. Streets, NW
Washington, DC 20036
800-368-2728
Fax: 301-775-6141

Nautilis
7001 Discovery Blvd.
Dublin, OH 43017-3299
800-637-3472
Fax: 614-761-4110

NewMedia Source
3830 Valley Centre Dr., Suite 2153
San Diego, CA 92130
800-344-2621

Optical Data Corporation
30 Technology Drive
Warren, NJ 07059
800-524-2481

Optilearn, Inc.
P. O. Box 997
15 Park Ridge Dr., Suite 200
Stevens Point, WI 54481
715-344-6060
Fax: 715-344-1066

Passport
100 Stone Pine Road
Half Moon Bay, CA 94019
415-726-0280
Fax: 415-726-2254

PICS: The Project for International Communication Studies
270 International Center
The University of Iowa
Iowa City, IA 52242
319-335-2335

PIMA (Philips Interactive Media of America)
11111 Santa Monica Blvd., Suite 700
Los Angeles, CA 90025
310-444-6600
Fax: 310-479-5937

PsL
P. O. Box 35705
Houston, TX 77235-5705
713-524-6394
Fax: 713-524-6398

Public Affairs Information Service, Inc.
521 West 43rd St.
New York, NY 10036-4396
800-288-7247
Fax: 212-643-2848

Science for Kids
9950 Concord Church Rd.
Lewisville, NC 27023
919-945-9000
Fax: 919-945-2500

Sight & Sound
1275 Main St.
Waltham, MA 02154
617-894-8633

Sociological Abstracts, Inc.
P. O. Box 22206
San Diego, CA 92192-0206
619-695-8803
Fax: 619-695-0416

Teaching Technologies
P. O. Box 3808
San Luis Obispo, CA 93403-3808
805-541-3100
Fax: 805-461-1893

Tom Snyder Productions
90 Sherman St.
Cambridge, MA 02140
800-342-0236

Updata CD-ROM
1736 Westwood Blvd.
Los Angeles, CA 90024
800-882-2844
Fax: 310-474-4095

Quanta Press
2550 University Avenue West
Suite 245N
Saint Paul, MN 55114
612-641-0714
Fax: 612-644-8811

Science Horizons Laserdiscs
Silver Burdett & Ginn
P.O. Box 2649
Columbus, OH 43216
800-848-9500

SilverPlatter Information, Inc.
100 River Ridge Drive
Norwood, MA 02062-5026
800-343-0064
Fax: 617-769-8763

Starship Audio Industries
605 Utterback Store Rd.
Great Falls, VA 22066
703-430-8692
703-450-5780

TLTG
Texas Learning Technology Group
7703 North Lamar Blvd.
Austin, TX 78752
800-580-8584
Fax: 512-467-3618

21st Century Media
2101 Fourth Avenue, Suite 250
Seattle, WA 98121
800-528-3472
Fax: 206-441-9379

The Video Project
5332 College Avenue, Suite 101
Oakland, CA 94618
800-475-2638

Videodiscovery, Inc.
P. O. Box 85878
Seattle, WA 98109-1878
800-548-3472
Fax: 206-285-9245

Warner New Media
3500 Olive Avenue
Burbank, CA 91505
818-955-6499

World Library, Inc.
12914 Haster Street
Garden Grove, CA 92640
714-748-7197
Fax: 714-748-7198

Ztek Company
P. O. Box 1055
Lexington, KY 40593
800-247-1603
Fax: 502-584-9090

The Voyager Company
1351 Pacific Coast Hwy.
Santa Monica, CA 90401
800-446-2001
Fax: 213-394-2156

WINGS for Learning/Sunburst
Scotts Valley, CA
800-321-7511

Young Minds, Inc.
1910 Orangetree Lane
Redlands, CA 92374
714-335-1350
Fax: 714-798-0488

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Appendix B

Associations Involved in Multimedia Development and Related Activities

Overview

Multimedia draws on the power of computers to combine the building blocks of the information age -- text, music, voice, still and full-motion video and graphics -- into an interactive, instructional package. With multimedia, educators can transform formal communications into personal experiences. The associations below offer opportunities to meet others who share an interest in multimedia and to learn more about its various applications in higher education.

Associations

AECT
Association for Educational Communications and Technology
1025 Vermont Ave., NW, Suite 820
Washington, DC 20005
202-347-7839

AIIM
Association for Information and Image Management
1100 Wayne Ave., Suite 1100
Silver Spring, MD 20910
301-587-8202

AVC
Association of Visual Communicators
818-787-6800

Boston Computer Society
Hypermedia/Optical Disc Publishing Special Interest Group
One Center Plaza
Boston, MA 02108
617-367-8080

ICIA
International Communications Industries Association
3150 Spring St.
Fairfax, VA 22031-2399
703-273-7200

IIA
Information Industry Association
555 New Jersey Avenue, NW
Suite 800
Washington, DC 20001
202-639-8262

IICS
International Interactive Communications Society
Executive Office
P. O. Box 1862
Lake Oswego, OR 97035
503-649-2065

IMA
Interactive Multimedia Association
800 K Street, NW, Suite 440
Washington, DC 20001
202-408-1000
(formerly IVIA, Interactive Video Industry Association)

MPC
Multimedia PC Marketing Council
1730 M. Street, NW, Suite 700
Washington, DC 20036-4510
202-331-0494

National Council for Education on Information Strategies
P. O. Box 13376
Silver Spring, MD 20911-3376
301-587-9344 or 800-343-6944
Fax: 301-565-4062

SALT
Society for Applied Learning Technology
50 Culpepper St.
Warrenton, VA 22186
703-347-0055 or 800-457-6812

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"The IBM Multimedia Handbook," Steve Floyd, Brady Publishing, NY, 1991, 334pp.

Education Technology, November 1988 "Hypermedia and Learning: Freedom and Chaos" Gay Marchionini

T.H.E. Journal Supplement, 1992

"Why Do It? Advantages and Dangers of NewWays of Computer-Aided Teaching/Instruction" By Robert E. Jensen and Petrea Sandlin, Department of Business Administration, Trinity University, San Antonio TX 78212, 1991

"The Power Multimedia: A Guide to Interactive Technology in Education and Business" Joan C. Cash, Editor. 1990. Interactive Video Industry Association. 145pp.

"CD-ROM: Music, Megabytes, Multimedia" PC Sources January 1992 Hardin Brothers.

"Optical Explosion" PC Sources October 1991 Alice Hill and Thomas Mace.

JD. Feltcher, "Effectiveness and Cost of Interactive Videodisc Instruction in Defense Training and Education." *Multimedia Review*, Spring 1991 pgs. 33-42.

About the Institute for Academic Technology

The IAT is a national institute working to place higher education at the forefront of academic technology development and implementation. Operated by the University of North Carolina at Chapel Hill and funded through a grant from the IBM Corporation, the IAT strives to facilitate widespread use of effective and affordable technologies in higher education. To that end, the IAT conducts a number of briefings, workshops and planning sessions to keep academics informed about available technologies and to help explore the use of technology on individual campuses. For more information, contact:

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