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Media Services in Higher Education: A Delphi Study for the 1990s

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MEDIA SERVICES IN HIGHER EDUCATION:
A DELPHI STUDY FOR THE 1990S

by

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DEDICATION

TO MY FAMILY

To my wife, Mary, who provided the love, support, and encouragement during the last five years which made this work possible. Also to my daughters, Sarah and Margaret, who someday will understand how their love assisted this endeavor.

TO MY PARENTS

To Jack and Marjorie for encouraging me to develop an appreciation for learning and for their support and understanding throughout my academic career.

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A DELPHI STUDY FOR THE 1990S

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The purpose of this study was to predict the nature of future higher education media services in order to provide decision making information for use in long-range planning by instructional technologists and academic administrators. The study's objectives were: (1) to obtain expert opinion regarding future media services; (2) to identify innovative media services and applications of instructional technology; and (3) to provide researcher recommendations for implementing innovative instructional technologies.

The methodology used was the Delphi technique. Data collection sites were selected in two ways. First, 16 schools identified in the literature as innovative users of instructional technology made up the core of the sample. Second, an additional 37 institutions were randomly selected and stratified according to enrollment size. The data were collected by one demographic instrument and three rounds of Delphi instruments. Twenty-two panelists completed the third round.

Demographic questionnaire data were used in developing a profile of the Delphi panelists and their institutions.

The Delphi instruments collected data regarding implementation time frames, innovative nature, and priority for implementation of instructional hardware, organizational concerns, and instructional techniques. Panelist consensus was obtained for 46 of the original 49 Delphi items.

Key findings included:

1. Panelist consensus that ideal media services for the 1990s would be provided to the entire campus community by one centralized unit. The head of media services would report to an academic vice president. Oral lecture would be the primary information delivery mode, although its dominance would be challenged by interactive and distance learning technologies.
2. In addition to the institutions identified in the literature as being innovative users of instructional technology, the panelists identified 22 institutions as having the best and most innovative media services.
3. Computer networking and videodisc technologies were singled out by the panelists as the two most important new instructional technology tools.

Finally, based on his expert opinion, the researcher suggested recommendations and/or strategies for implementing new instructional technologies in higher education.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDIXES

CHAPTER I

INTRODUCTION

Statement of the Issues

American society is increasingly impacted by its transition from an Industrial Age to an Information Age. One of the results of this transition is the need to re-educate millions of American workers whose jobs will cease to exist in the relatively near future. It is apparent that instructional technology will have a major role to play in the process of retraining America's workforce.

Geraldine Clifford (1981) gives six reasons for change in education during the 1980s: (1) dissatisfaction with the way schools are now; (2) various financial difficulties; (3) an aging population and increasing emphasis on education for leisure; (4) the necessity of education for work (expecting vocational education being necessary for 49 million Americans); (5) increasing activism by the federal government in educational concerns; and, (6) accelerating judicial activism regarding education (p. 28). The retraining of America's workforce will be a key educational

issue for the remainder of the century. It seems clear that the coming of the Information Age is having a major effect on American society which will in turn create the need for change in our educational system. Instructional technology, by its very nature, will be especially impacted as new hardware and software breakthroughs are made.

The decade of the 1980s, with its contradiction of reduced resources and increased demand for educational technology, may also be a time of change and structural reorganization for media services in higher education. Educational media services have evolved dramatically since the days of lantern slides. As this evolution continues through the 1980s and into the 1990s, will new service units be created to provide delivery systems for the new technologies? Or will existing media organizations assume responsibility for implementing the new technologies?

Existing information services in higher education such as library, audiovisual, and computer services, are central elements of contemporary instructional technology. Although traditionally considered as providers of print services, college and university libraries provide a variety of computer related services such as on-line bibliographic searching or inter-library loans in addition to more traditional library services such as bibliography preparation, library instruction, reference service, collection development and maintenance, archives, etc. Academic computing services vary in their offerings: data

processing for business affairs; instruction in different aspects of computing; provision of hardware, software, and networking; repair services; telecommunications; word processing; program development; and documentation. Media services, sometimes a part of library operations, also offer a wide variety of user options: bibliographic services; film rentals; classroom and delivery services; instruction in media use; individualized mediated learning; audiovisual production; instructional design and courseware/curriculum development; software collection development and maintenance; hardware acquisition and maintenance; computer services; graphic arts services; closed circuit television; satellite networking and teleconferencing; repairs; and telecommunications. The types of professionals who work in these service areas are, respectively, librarians, instructional technologists, and computer specialists. Of course, within these general categories there is a variety of specialties.

Given the wide scope of information services in higher education and the nearly limitless possibilities for future applications, the opinions of information service experts would provide useful background information for long-range planning.

Objectives

This study had three primary objectives. The

objectives and questions important to them follow:

1. Obtain expert opinions as to the future of campus wide media services in higher education.
   a. What will be the typical organizational structure for media services in higher education?
   b. How will these media services be funded?
2. Identify innovative media services and applications of instructional technology which might provide service prototypes and strategies for the 1990s.
   a. What types of technology will be considered innovative in higher education?
   b. When will innovative technologies be implemented?
   c. Will innovative technologies be used to support instruction or as the primary delivery mode?
3. Develop recommendations for instructional technologists and academic administrators for their use in meeting the needs of the 1990s.
   a. What strategies will be effective in the selection, acquisition, and installation of instructional technology systems?
   b. What sort of promotion and training will be required for innovative information services to be accepted by students, faculty, and

administrators?

c. Will these new information services introduce special problems of access or maintenance?

There were several key components for objective one. The first concerns the organizational structure of media services in various institutions. Key organizational elements included general reporting structures and, especially, the relationships between media services, libraries, and computer services. For example, it would be important to identify a trend of organizing university academic and nonacademic information services (print, nonprint media, and computer) under a vice presidential level position. Other components for objective one include: existing and potential funding sources; budgeting procedures; and opinions as to the future of instructional technology.

In considering objective number two, the identification of innovative media services, a long list of media technologies can be compiled: teleconferencing (audio only, still-frame video, and full-motion video); computer assisted instruction (CAI), speech recognition, and other computer applications; television technologies (broadcast, cable, closed circuit, videotaping, videodisc, videotex and teletex, direct broadcast satellite etc); robotics; audio systems; graphics; photography; projection and other optical technologies; and hybrids of two or more of the above technologies. According to Ludwig Braun (1983), these

specific media fall into six major technology groups: "computers; educational television; videotex, data bases, and computer based telecommunications; video discs; intelligent video discs; and robotics" (p. 1). However, the presence of the most recent technology on a campus does not mean that media is being used innovatively, or even properly. The heart of objective two was to reveal the most promising future applications of instructional technology.

The third objective could be met by applying the results of data collected for the first two objectives. Objective three's recommendations could be based on the expert opinion of the researcher. The researcher would offer these recommendations within the framework of anticipated organizational structures, the identification of existing innovative media services that may become commonplace in the 1990s, and, of the resources available to implement innovative media services. When used in conjunction with the standards for media services in higher education developed by the Association for Education Communications and Technology (Association for Educational Communications and Technology [AECT], in press), these recommendations should prove especially helpful to decision makers. The AECT standards will be the first which are specifically designed to be applied to nonprint media services in four year institutions of higher education.

A Delphi study could be conducted to gather expert opinion as to the future of media services in higher

education. The Rand Corporation, under the sponsorship of the United States Air Force, developed the Delphi technique in the early 1950s as a way of forecasting future events, in that particular case, the effect of a Soviet nuclear attack on United States (Linstone & Turoff, 1975, p. 10). Since then, Delphi and other similar forecasting techniques have been used in numerous educational studies. One of the features which made a Delphi study especially suitable for this study is its emphasis on consensus building. As consensus building is an important element of leadership, it seemed appropriate to use Delphi for a study which is intended to provide decision making information to be used in planning media services for higher education in the 1990s.

Significance of the Study

In anticipation of the massive societal effects of the transition from an industrial age to information age, the United States Secretary of Labor set priorities for both retraining workers who have lost or will lose their jobs and for training today's youth for the jobs of tomorrow (Donovan, 1983, p. 101). Dorothy Deringer (1983) puts it this way: "As the United States changes from an industrial to an information economy, we as educators should consider these structural changes and ask if changes should be made in our educational system" (p. 110). Thus, a Delphi study

which would help to put into perspective the role of higher education media services in the new information age is important as part of an effort to help reduce future shock in higher education and in society generally.

Such a Delphi study touches on issues of leadership in education. A general case may be made for the leadership role in any study of new applications of educational technology (the application, not the technology itself). More specifically, one must consider the potential technological trend setting influence of higher education on the entire educational system. Ronald Havelock (1969) concurs with this role of higher education: "First we will note that the university is the primary source, storage point and cultural carrier of expert knowledge in all fields, basic and applied" (p. 3-2). Decision making information and educational leadership are especially needed now to help maintain balance between contemporary appeal and productivity and becoming involved in high technology fads which have minimal instructional substance. The general dearth of relevant decision making information is underscored by Elliot, Ingersoll, & Smith (1984): "A surprising lack of research is available for anyone who tries to determine trends in the use of instructional materials" (p. 19). This Delphi study also has leadership implications in helping educators do a better job of staying ahead of consumer acceptance of learning technology in the home than was the case when calculators and, more recently,

microcomputers were introduced.

This Delphi study served a consensus/community building function as well as one of data collection. The potential for the mutual uplifting of the goals of educators and educational technologists in particular was evident from some of the Delphi panelists' comments which revealed keen insight and a certain amount of imagination. The Delphi process created a network of media professionals in higher education during the course of the research. Although not a formal organization, this network combined with the consensus building nature of Delphi, has the potential to influence the development of the media services which these same people will be operating in the 1980s and 1990s. Second, the study also provided decision making information which should be useful for long-range planning (Cetron, 1969, p. 146). Lastly, the study raised further questions and additional research topics.

Definition of Terms

People in general, and educators in particular, seem to have difficulty in agreeing upon definitions. For example, one might think that there would be fairly universal agreement as to the name for operations which provide media services in higher education. On the contrary, as Michael Albright (1984) points out, of 196 responses to a survey of media centers in higher education, there were 54 unique

names for the centers (p. 14). Although there may be many labels for media services in higher education, it is the service itself which is important. Margaret Chisholm (1976) expands on this thought:

> Call it a library, a media center, an audiovisual center, a learning resources center, or an information center - the important factor is that the functions of identifying, acquiring, storing, retrieving, and making information available in a variety of formats are performed. (p. 11)

Specifying a widely accepted definition for instructional technology can be even more difficult than placing a label on a media service. The word technology often conjures up images of machinery or gadgets. However, most scholars take a much broader view in defining technology. For example, in reference to Harvard University's Program on Technology and Society, Emanuel Mesthene provides a terse definition: "In short, we define technology as the organization of knowledge for practical purposes" (Oettinger, 1969, p. ix).

The scope of definitions of educational technology are equally broad. Derek Rowntree (1982) speaks to this issue:

> For educational technology is as wide as education itself: it is concerned with the design and evaluation of curricula and learning experiences and with the problems of implementing and renovating them. Essentially it is a rational problem-solving approach

to education, a way of thinking skeptically and systematically about learning and teaching. (p. 1)

Given the variety of definitions possible for issues related to educational technology, the following definitions are offered to clarify the terminology as used in this study:

CONSENSUS: Agreement of at least 50% of the panelists for any given item on the Delphi instrument.

DELPHI STUDY: A Delphi study is one in which the consensus of experts concerning future occurrences is obtained through sequential questionnaires interspersed with feedback on responses for each of two or three rounds.

EDUCATIONAL TECHNOLOGIST: A trained professional, skilled in the use and management of various systems of organizing, accessing, and disseminating knowledge with the intent of increasing the knowledge and skills of others.

EDUCATIONAL TECHNOLOGY: Various systems of organizing, accessing, and disseminating knowledge with the intent of increasing the knowledge and skills of others.

EXPERTS: The participants in Delphi studies are generally selected because they are recognized as expert practitioners in the field of instructional technology because of their academic training, professional experience, and participation in

professional associations and activities.

INFORMATION AGE: The current epoch of human development characterized by society's service (rather than industrial) orientation and the resulting employment of more than 50% of the American workforce in information industries (Aspen Institute, 1980).

INNOVATIVE: A new method, technique, organizational structure, device; or a new approach to an established way of doing things.

INSTRUCTIONAL TECHNOLOGIST: A trained professional, skilled in the use and management of various systems of organizing, accessing, and disseminating knowledge with the intent of increasing the knowledge and skills of others.

INSTRUCTIONAL TECHNOLOGY: Various systems of organizing, accessing, and disseminating knowledge with the intent of increasing the knowledge and skills of others.

PANELISTS: The participants in Delphi studies.

TECHNOLOGY: Various systems of organizing, accessing, and disseminating knowledge.

Assumptions and Limitations

It must be kept in mind that the Delphi technique attempts to predict what will be. Of course, no one has a crystal ball, but Delphi has proven very effective as a

forecasting method. Gustafson (1983) reminds us that "...any forecast is better than none..." (p. 27). Several assumptions were made in this study:

1. The use of instructional technology in higher education is beneficial to the teaching, learning, and research processes.
2. Media and library directors have expertise in the selection, acquisition, introduction, and maintenance of instructional technology systems.
3. A sufficient number of responses (15-30) would be received in each of the rounds of the Delphi study.

There were two potential limitations of the study over which the researcher had no control. The first was that the Delphi technique cannot predict the future with complete accuracy. As such this study (and all other Delphi studies) are limited by the accuracy of expert opinion for predictions of the future. The second limitation concerned the possibility that consensus might not be obtained for all items under investigation. Where consensus was not obtained, the very lack of consensus provided valuable data particularly since the lack of consensus was limited to a small number of specific items.

CHAPTER II

REVIEW OF THE LITERATURE

A History Of Instructional Technology

Before considering current issues and theories of learning and technology, a short history of educational technology is in order. This abbreviated history relies on the work of Paul Saettler (1968). Saettler considers the Elder Sophists of Greece (450-350 BC) to be the starting point of instructional technology because of their modified tutorial approach and their use of costumes and stage effects (p. 13). According to Saettler (1968), programmed instruction can be traced back to the Elder Sophists (p. 251). Saettler's argument follows:

> The Elder Sophists appear to be the classical ancestors of modern instructional technology because they were the first professional teachers, who, by their systematic analyses of subject matter and organization of teaching materials, laid the groundwork for a technology of instruction. What is more important, when teaching was not commonly considered a profession, the Sophists viewed it as techne - in the old Greek sense - or a technology in which the

theoretical is combined with the practical. (p. 23) Other major educational technologies highlighted by Saettler (1968) include: Lancasterian monitorial instruction with its emphasis on mass instruction at low cost in American schools during the first half of the 1800s (p. 27); Dewey's concern with the psychology of learning (p. 53); and B.F. Skinner's theory of operant conditioning (p. 71).

A chronology of important firsts in modern educational technology is provided here. The references between 1905 and 1966 are provided by Saettler (1968), unless otherwise noted. Uncited items in the chronology are provided by the researcher.

1894 - Edison introduces the forerunner of motion picture projectors, the Kinetoscope, on April 14th (Ohles, 1984, p. 49).

1905 - The St. Louis Educational Museum opened on April 11th. The Museum made weekly deliveries of instructional materials to St. Louis schools via horse and wagon: some 5000 deliveries were made in 1905-1906 (p. 91). Similar museums were soon established in Reading, Pennsylvania (p. 93) and Cleveland, Ohio (p. 94).

1905 - Bell and Howell begins to market cameras, projectors and films for educational use (p. 99).

1910 - George Klein publishes the first instructional film catalog, Catalogue of Educational

Motion Pictures and Rochester, New York becomes the first school district to adopt films for regular use (p. 98).

1911 - Thomas Edison forms the Edison Film Library (p. 101).

1918 - The University of Minnesota offers the first course in visual instruction (p. 131) and Reel and Slide is the first journal devoted to visual instruction (p. 147).

1919 - Five national visual instruction societies are formed (p. 122).

1919 - The University of Wisconsin experiments with regularly scheduled radio programs (Ohles, 1984, p. 49).

1921 - The Latter Day Saint's University of Salt Lake City is the first educational institution to receive a radio broadcasting license from the Radio Division of the U.S. Department of Commerce (p. 195).

1923 - Kodak begins producing 16mm film and projectors (Ohles, 1984, p. 49). Valadimir Zworykin demonstrates the Iconoscope and Philo Farnsworth introduces the Dissector Tube, both forerunners of television (Ohles, 1984, p. 50).

1925 - 171 educational radio stations are on the air (Ohles, 1984, p. 50). Sidney L. Pressey, of

Ohio State University, develops a testing device which ushers in the age of programmed instruction (Ohles, 1984, p. 51).

1927 - Farnsworth demonstrates a working television system (Ohles, 1984, p. 50).

1936 - The British Broadcasting Corporation establishes public television service (Ohles, 1984, p. 50).

1940s- World War II provides a major impetus for the advancement of educational technology with the military's development of training, propaganda, and newsreel media: "The war effort brought the first significant convergence of the audio-visual tributary with the mainstream of instructional technology" (p. 180). After World War II, the introduction of FM radio causes a resurgence of educational radio stations (Ohles, 1984, p. 50). In the late 1940s the American Library Association and the American Association of School Librarians sponsor a joint study of the effects of merging print and nonprint materials (p. 187-188).

1949 - There are one million television sets in use in the United States (Ohles, 1984, p. 50).

1950s- This decade is noteworthy for the development of district, city, and county-wide AV programs (p. 183). Systems approaches to instruction

begin to gain popularity (p. 253). Televison begins to emerge as an instructional tool also.

1950 - Iowa State University puts WOI-TV on the air as the first non-experimental instructional television station (p. 231).

1951 - The Ford Foundation sponsors a five year educational television experiment in Maryland's Montgomery County School system (Ohles, 1984, p. 50).

1952 - The Federal Communications Commission sets aside 240 television broadcast channels for educational use (later raised to 309 channels) (Ohles, 1984, p. 50).

1954 - B.F. Skinner, of Harvard University, delivers a paper which renews interest in teaching machines: "The Science of Learning and the Art of Teaching" (Ohles, 1984, p. 51).

1957 - Only 38 educational radio stations remain on the air (Ohles, 1984, p. 50). B.F. Skinner uses programmed instruction in Harvard University psychology classes (Ohles, 1984, p. 51).

1958 - National Defense Education Act (NDEA) Title VII funds spur the growth of instructional technology in American schools (p. 320)

1960 - An elementary school in Winchester, Massachusetts begins to use teaching machines.

The Denver, Colorado school system prepares programmed instruction (Ohles, 1984, p. 51).

1961 - Midwest Program on Airborne Television Instruction uses an airplane to broadcast to hundreds of schools in six states (Ohles, 1984, p. 50).

1962 - There are 69 educational television stations in operation (Ohles, 1984, p. 50).

1964 - Educational Resources Information Center (ERIC) is founded (p. 351). 7,500 United States schools have language laboratories, mostly funded by NDEA grants (Ohles, 1984, p. 51).

1966 - The Educational Products Information Exchange (EPIE) begins to provide impartial evaluations of instructional technology hardware, software, and relevant legislation (p. 351). The Ford Foundation discontinues funding of educational television experiments and proposes a satellite distribution system to the Federal Communications Commission (Ohles, 1984, p. 50).

1970s- This decade was a period of giving up on failed ventures of the 1960s (dial access learning labs, for example) and experimentation with the first practical products of the technology revolution (ie: inexpensive color video equipment and microcomputers)

1971 - INTEL develops the silcon chip (Wicklein,

1981, p. 4). Tama New Town, Japan is built with a coaxial information system including 500 households cabled into a computer information system that offers facsimile transmission. Eighty of the homes are equipped with a broadcast response system primarily intended for English language and mathematics education but also used for interactive television news, history and cultural programming, shopping information, cakemaking courses, and medical programming (Wicklein, 1981, pp. 37-40).

1972 - Computer power costs approximately 1 cent per bit, a cost that will drop to about 1/1000 of a cent by the 1980s (Wicklein, 1981, p. 5).

1973 - Guidelines for media services in postsecondary two year institutions jointly published by the American Library Association, American Association of Community and Junior Colleges, and Association for Educational Communications and Technology (Merril & Drob, 1977, p. 50).

1974 - Based on the Ceefax system developed in 1972, the British Broadcasting Corporation offers teletex services to viewers. The system allows the viewer to freeze-frame pages of textual information which would otherwise scroll by once every 25 seconds (Wicklein, 1981, p. 74).

1976 - The first major revision to U.S. copyright law

since 1909 recognizes instructional technology and the ease of duplicating AV programs and clarifies issues relevant to higher education, especially those involving photocopying and interlibrary loan with the establishment of the fair use doctrine (Seltzer, 1978, p. 18).

1978 - Higashi-Ikona, Japan tests a home computer networking system using fiber optics and home keyboards to distribute and control interactive two-way audio and video communications (Wicklein, 1981, p. 40).

1979 - The British Post Office introduces the Prestel which makes 250,000 pages of textual material available, by random access, to subscribers in their homes (Wicklein, 1981, pp. 2-3).

1980s- Thus far this decade has seen the use of instructional technology in higher education influenced by trends such as: increasing simplicity of operation of hardware; decreasing hardware and software unit costs, especially those based on microprocessor technology; hardware miniaturization; the widespread introduction of new technologies such as videodisc; and a new emphasis on instructional technology resulting from perceived educational deficiencies in math and the sciences.

1980 - Warner Amex Cable Communications implements the

Qube interactive cable television system for 30,000 customers in Columbus, Ohio. The systems capabilities include: cable transmitted fire, police, and medical alarms; interactive talk shows; pornography; self-help courses; sports; and 10 regular (non-interactive) channels (Wicklein, 1981, pp. 15-33).

1981 - After two years of negotiations, an ad hoc group of the House Judiciary Subcommittee on Copyright, Trademarks, and Patents agrees upon specific guidelines for the recording and use of broadcast television programming by nonprofit educational institutions. In October, 1981, Congressman Robert Kastenmeier read the guidelines into the Congressional Record thus making them part of the legislative history of the Copyright Act of 1976 (Troost, 1982, p. 37).

1982 - Citing excessive costs, Warner Amex Cable Communications ceases interactive services in the Qube cable system of Columbus, Ohio.

1982 - The Annenberg Foundation grants $150 million dollars over 15 years to develop and deliver college level instruction using new telecommunication technologies.

1982 - Out of a total of 1,054 United States broadcast television stations, only 265 are public or

educational stations (Ohles, 1984, p. 50).

1984 - The Association for Educational Communications and Technology's Division of Educational Media Management publishes the results of its Task Force on the Status of Media Centers in Higher Education (Albright, 1984, pp. 4-18).

1986 - The Association for Educational Communications and Technology publishes the first set of guidelines for the use of educational technology in institutions of higher education: Technology in Instruction: Standards for College and University Learning Resources Programs (AECT, in press).

Since Saettler's book was published in 1968, one would have to include the following developments to bring the history of instructional technology up-to-date: the increasing popularity of instructional design for use in preparing instructional nonprint media programs; improved reliability of hardware; the revolution in computer technology which has resulted in widespread acceptance of computer assisted instruction (CAI) and the pervasive presence of microcomputers in American society; and telecommunications advances, including fiber optics, satellite networking, computer networking, etc.

Social Trends Affecting Higher Education

The Information Age

There are many trends at work in contemporary society which have a significant impact on education in America. Social change has occurred in recent years nearly as rapidly as have technological breakthroughs. Shane and Tabler (1981) comment: "...since 1940 we have had more gut wrenching changes occur than in the previous 600 years" (p. 6). Some of this dramatic change can be seen in the make up of the American workforce. As more industrial jobs disappear, more service or information oriented jobs take their place. Miller and Haenni (1983) concur:

> Little debate exists concerning the fact that technological advances are changing the American labor force and, conversely, requiring changes in the type and scope of education offered by higher education. New technology means not only new machines, systems, and procedures, but also changes in skill training, working conditions, and academic and professional requirements for employment. (p. 123)

Lipson (1983) underscores the need for education to respond to social change: "A high-technology society needs highly trained people to stay competitive" (p. 31).

Another trend working in conjunction with the trends of rapid social and technological change is the much discussed

information explosion. Harris (1985) suggests that dealing with information overload should be an important goal of education:

> Most educators are now beginning to recognize that we are living in a world that is driven by more information than can be taught. The average citizen, and certainly the well educated citizen as well, must therefore be capable of selecting and abstracting the information that is needed at any given time. (p. 69)

McDermott (1984) notes, "A recent study conducted by the Center for Social Research at the University of Minnesota estimates that 56% of American workers use computers or computer generated reports at work." The study also estimates that 37% of American workers are computer users or programmers (p. 16). Norton (1985) warns against taking too narrow a view of education's role in the information age:

> In short, in order to meet the challenges facing education, educators must both understand the impact of the information technologies on social organization, on thinking, and on world view AND be able to use them in furthering human development. (p. 15)

The impact of the information age on education should not be taken too lightly since "Some futurists have predicted that education will become the largest industry in the information society." (Smith & Dunn, 1985, p. 7) This section concludes with a list of six information trends

suggested by Dunn and Smith (1985):

1. Information will become available in increasingly multiple forms.
2. Non-textual information will be rendered with increasingly greater fidelity to the original.
3. Information will become available on demand with minimal time and/or place constraints.
4. Information will be provided in forms increasingly available to non-information experts.
5. Information will become available in forms allowing significant increases in user manipulation and control.
6. Information will become less expensive to obtain. (pp. 7-8)

Demographic Trends

Most educators have been aware for some time now that major demographic trends are affecting our educational system. The more obvious demographic trends include: an ever increasing percentage of older people in our population (and, conversely, a smaller percentage of traditional age college students); a major shift of population from both rural to urban areas, and from the "rust belt" to the "sun belt"; and increasing percentages of minority groups in the population, especially in the sun belt states.

Havighurst and Levine (1979) note that as we move from an industrial to an information society, we leave behind

characteristics such as youth centered society, an expanding population, family-centered society, highly unequal income distribution, and a petroleum based industry (p. 4). Although some of these characteristics and demographic trends may not seem directly related to education, their indirect effect on education make them important to keep in mind when considering the future of instructional technology in higher education.

Social Concerns Related to Instructional Technology

There are four areas of concern which should be mentioned, as background information, in a study of future uses of technology in higher education: (1) technological literacy or information haves and information have nots; (2) privacy in an increasingly computerized society; (3) the effects of for-profit education and corporate education on the traditional education system; and, (4), the preparation of teachers and other education professionals who will work in an increasingly technological environment. Even though these concerns were not directly investigated in this study, they represent issues which should be considered in planning future uses of instructional technology.

The first concern is related to literacy in general, as compounded by problems of technological literacy. As the popular media remind us, more and more Americans are becoming functionally illiterate. This growing segment of

our population can neither read well enough to obtain basic information related to day-to-day activities, nor perform basic arithmetic well enough to balance a checkbook. The problems of functional illiteracy are compounded by the introduction of new technology into everyday life. On one hand, many high-technology systems are designed to be simple enough so that the user does not have to know how to read or write to use them. For example, voice recognition, touch screens, and other technologies are in use in automated car rental systems which rely heavily on voice and picture prompts rather than reading or writing skills (Reeves, September 1985).

On the other hand, access to more sophisticated information will increasingly call for technological skills related to effective use of computer and video systems. Since we can assume that there will be people trained well enough to design and build such systems, the stage is set for the potential creation of information have and information have not social classes. These information haves/have not classes are likely to be extensions of existing economic classes with the poor assuming the additional burden of being information have nots, and the well-off comprising the information have class. This concern about technological literacy is mentioned not only because of the potentially debilitating effect on the quality of life for technological illiterates, but also out of a hope that values will guide educators in dealing with

the problem. Shane (1982) addresses this concern:

> For both educators and the general public, novel technological innovations and new solutions also create new problems, among them: ...educating the relatively few who master and direct the use of the new information technologies to use their advantage with prudence, integrity, and in the human interest.... (p. 306)

The second concern is related to privacy in the information age. As more and more computer data bases are created, there is a greater potential for invasion of privacy. Computer "hackers" have not only broken into school computers to change grades, but have also gained illegal access to commercial and military computer systems. The security of personal data in education and society in general will become an increasingly sensitive issue as more people gain the technological expertise to seek out personal data for improper use. Richard Neustadt (1982) sums up this concern: "By 1984, electronic publishing and home transaction services may well pose serious privacy problems...these services will collect and transmit vast amounts of personal information. Existing privacy rules are woefully inadequate to protect this data" (p. 103).

The third educational concern related to technology is the increasing prevalence of for-profit education and corporate training programs represent another trend which will have a greater effect on traditional education as time

goes on. In the early months of 1983, 200 profit motivated training institutions were started in the United States (Gubser, 1983, p. 10). Gubser (1983) comments on the slowness with which traditional education has responded to the changing needs of the information age: "We are all aware that some corporations have felt compelled to create their own universities, even awarding traditional graduate degrees to develop meaningful academic 'coin of the realm'" (p. 10). As noted earlier, education is expected, by some, to be the largest American industry in the information age. If traditional education is unable, or unwilling, to acknowledge the sweeping technological revolution and make appropriate curricular changes in a timely fashion, then alternative educational systems likely to have a narrow vocational focus will spring up to fill the void. Anandum and Kelly (1982) make an analogy of this potential situation with the rise of community colleges in response to universities' failure to reach the masses. They conclude that if educators don't harness educational technology, then outsiders will (p. 90).

Curtis and Biedenbach (1979) also cite the failure of educators to harness educational technology: "Many critics believe that education is the only major American industry which does not yet make intensive use of modern technology to reduce its costs and to increase the scope of its services" (p. 3). Norris (1984) concurs in his comments: "We have simply not responded to the great technology

development and its applications to educational practice" (p. 65). Norris (1984) also calls for a partnership between businesses and schools (p. 66). The partnership between business and education is a primary focus of the Annenberg grant mentioned in the History of Educational Technology section.

Smith and Dunn (1985) provide a final comment on the relationship of business and education in the information age:

> As increasing numbers of businesses adopt new information technologies, and as more firms become primary producers and dispensers of information, the workforce will increasingly require retraining in order to assume new roles and responsibilities. The resulting growth of inservice and adult education has been predicted by many futurists as a major educational phenomena of the 1980s and 1990s. (pp. 6-7)

The fourth, and final, concern to be addressed in this section is that of preparation of teachers and other educational professionals. It seems likely that teachers now entering the profession will make more use of educational technology than did their predecessors (Hawkridge, 1983, p. 118). The need for greater teacher technological literacy is complicated by the recent trend of those potential teachers most capable of effectively using technology preparing for higher paying jobs in business and

industry rather than preparing for teaching careers. This trend prompts the comments of Gubser (1985): "Within the next three years, according to a Rand Corp. report, we can expect a 20-percent shortfall in teacher supply; by the end of the decade, that figure will rise to 30 percent" (p. 12).

A shortfall of teachers will be exacerbated if teachers are not only in short supply, but if those who are available do not have adequate preparation for the use of educational technology. A primary reason for inadequate technological preparation is noted by Gubser (1985): "Most teacher educators, however, maintain that little or no room exists in the preservice curriculum for any more than a cursory treatment of modern educational communications and computer technology" (p. 14). In response to a crowded curriculum, the University of Kansas and the University of Florida have added a fifth year to their programs to incorporate technological training. Both grant a masters degree rather than a bachelors degree (Gubser, 1985, p. 14). Gubser (1985) reveals that only five states (Vermont, Utah, New Hampshire, Montana, and Massachusetts) and the District of Columbia require computer training for teacher certification (p. 14).

An increasing emphasis on educational technology is especially important since today's student teachers may be in the schools until 2025 when educational technology will be much more commonplace than it is now (Hawkridge, 1983, p. 118). Hawkridge (1983) thinks that inservice opportunities

which require the production of the teacher's own materials will be emphasized in the 1980s (p. 197). Podemski (1981), in an article on computers and teacher education, adds two other strategies for improving teacher awareness of new instructional technologies - survey courses in the use of computers in education and the incorporation of computers into existing courses (p. 29).

Clearly, much thought needs to be given to the long range effect of current curricula for programs preparing teachers and other education professionals. McMeen (1983) sums up the challenge of the information age:

> Just as public schools (K-12) must react to external pressures, universities and colleges that prepare mediated teachers and leaders in educational media must answer the challenge of the 'high tech' age by preparing tomorrow's educators who provide leadership in the integration and application of technology, as well as appropriate instruction for others. (p. 13)

Technological Change & Higher Education

Thus far, the history of educational technology and social trends affecting education have been discussed. The literature related to technological change in higher education will now be examined. Numerous articles dealing with the current state of education in America have appeared since the release of the report of the National Commission

on Excellence in Education (1983). Many have been critical of the quality of contemporary American education at all levels and some have proposed that instructional technology will have a major role to play in the improvement of education in our country. Although the focus of this study is instructional technology in higher education, it is important to look at the whole educational process because of the premise stated earlier that higher education influences the rest of education. After all, this study is concerned with the future of instructional technology in higher education, and higher education is responsible for training teachers to work in all levels of the educational system.

David Hawkridge published a book during 1983 which addresses many of these educational issues: New Information Technologies in Education. One concern of Hawkridge (1983) is the increase of home learning and nontraditional education mentioned earlier. New learning technologies are becoming increasingly available in the home. He goes on to say:

> Informal learning by children outside school is changing. They are learning more, and what they are learning is different from what it was 20 years ago. New information technology is in part responsible for these changes, and is likely to become more so. Educators in charge of formal learning cannot afford to ignore these trends. (p. 82)

Bork (1981) sees the computer as the primary delivery system for out-of-school education:

> We can, therefore, conceive of an educational future where schools will play a much less important role, even in formal education, than they do at present. The computer in the home and other public locations will become a major distribution mechanism for learning. (p. 4)

Levin and Kareev (1980) agree with Bork: "...more profound effects of personal computers in education may occur outside of schools" (p. 1). Reacting to alternative educational delivery systems, Rockart and Morton (1983) comment: "...the presence of increasing competition from two-year schools, the open university and commercially based education should assist in providing a positive incentive toward the introduction of more technology into four-year schools" (p. 230).

Perhaps a more basic issue is how technology might change the way in which people learn. People such as Papert (1980) and Thornton (1983) feel that children are learning differently from the ways they did prior to the introduction of technologies such as television, arcade games, computers, etc. Hawkridge (1983) confirms this idea: "...children are acquiring new mental sets, as well as new manipulative skills, through using the technology" (p. 79). Kelly and Anandum (1984) help to put into perspective the relationship between new technology and the way people learn:

> Higher education, like society in general, is in the midst of an awesome infusion of technology that is threatening the traditional foundations of academia. The threat is not so much whether the impact is positive or negative; it is more the eminence of dramatic changes in the organizational arrangements by which teachers teach and students learn. Although a number of colleges and universities operate much as they did at the turn of the century - with instructors and students clustered in classroom groups - the emerging technology clearly questions this model. (p. 63)

Barriers to Technological Innovation

Innovation in Education

Before discussing why innovation is prone to failure in education, it is important to understand organizational innovation. The literature reveals that personal interaction is a key element of organizational innovation. In a discussion of large innovative projects, Buitenhuis (1979) states:

> The development of new insights and standards will have to come about more as the result of activities between groups. In this way, the potential for innovation will be used to optimum effect. To achieve

> this, confrontations, penetrations and evaluations must play a part in the mutual projections in order to discover new possibilities. (p. 3)

House (1974) also stresses the role of personal interaction in the success of innovation: "...innovation is dependent on face-to-face personal contacts and that these contacts condition the occurrence and frequency of innovation" (p. 3). House (1974) lists conditions that are conducive to the development of innovative ideas: "...psychological security and freedom, diversity of input into the organization, internal commitment to searching for solutions, a moderate amount of structure to help define the problem, and a moderate amount of benign competition" (p. 172). Parker (1982) describes the importance of personal interaction in institutional innovation from a slightly different perspective: "...achieving innovation in an organization of any size involves energizing a large number of people with qualities normally associated with genius rather than corporate excellence" (p. xv).

Why Technological Innovation Fails in Higher Education

Ashby (1974) makes a general comment on how institutions react to societal pressure which underscores the institutional propensity toward being reactive rather than proactve: "Institutions of society, like species of animals, adapt themselves not in anticipation of changes in

environment but in response to changes that have already occurred" (p. 145). A bureaucratic view of institutions is shared by Lynton (1982) who also places some of the blame for innovative failure on faculty:

> In the first place, academic institutions are overly bureaucratized and cumbersome, taking months to respond to changing external needs with new programs. Most colleges and universities are resistant to innovation, slow to use educational technology and unwilling to adapt to evolving opportunities.... Faculties are usually unwilling to have a genuine sharing of responsibility for the design and development of educational programs. (p. 167)

Another barrier to technological innovation in higher education is the history of educational technology failing to deliver the vast potential promised by its promoters. Ohles (1984) cautions educators about blindly jumping on the microcomputer bandwagon based on past experiences with the introduction of motion pictures, radio television, language labs, and teaching machines (p. 49). Heinich (1983) expands upon the consequences of past failed or flawed experiments with educational technology: "are the administrators in our schools prepared to handle technically delivered instruction, or will they repeat our experience of the late 1950s and 1960s when televised and filmed courses and programmed textbooks were undermined by the traditional adoption process" (p. 26).

Senese (1984) offers numerous barriers to the adaptation of innovative electronic learning technologies:

> I should mention that we need to be aware of the disadvantages or limits on this breakthrough - educators unwilling to change may resist; special interests may lobby vigorously against it, fearing it will replace teachers; competitors may undermine it for their personal interest; an apathetic public may fail to respond; quality of courses may be compromised in seeking a greater quantity of students; and equalitarians may be dissatisfied with opportunities for access. (p. 95)

Shively (1982) suggests two approaches to improving technological innovation in education; one to increase faculty awareness, and the other to involve industry with education:

> As we educators move toward the 1990s, our task will be twofold. One will be to increase the awareness of all faculty about the potential usefulness of the new technology for classroom instruction. The second task will be to strengthen the bond, to bridge the gap, between industry and education for the most cost-effective use of the resources and talents of each. (p. 108)

Obviously, the expensive nature of technology can be a major reason for failure of innovation in higher education. This topic is addressed in the next section.

Financing Instructional Technology

If the new technologies are indeed changing the way in which people learn, then current educational practices should be re-examined. Lipson (1981) relates costs to curriculum design: "I propose that the curriculum has long been constrained by the cost of information" (p. 8). He compares the cost of information per bit for three media: the printed page containing 10,000 bits of information at a cost of 3 cents; a colored slide containing 250,000 bits of information at a cost of 50 cents; and a one-half hour motion picture containing 100,000,000 bits of information at a cost of 700 dollars. Lipson concludes: "As a result the curriculum has tended to emphasize what can be taught with words, symbols and line drawings" (p. 8).

Griffin (1983) points out that in the early 1970s education spent only 4% of its total budget on materials, including textbooks (p. 97). Keppel and Chickering (1981) underscore the reluctance to spend money on instructional technology that is not print oriented:

> Today in the United States it is a safe estimate that less than one fifth of 1 percent of school expenditures goes for the purchase of sophisticated communications technology; and, if one leaves out the use of such technology for scientific research, this figure is not much more for higher education. (p. 615)

It seems obvious that the reluctance to spend money on implementing new technologies in higher education is related not only to institutional priorities, but also to the expensive nature of instructional technology systems. However, the Carnegie Commission on Higher Education (1972) reports on the long-term economic advantages of using instructional technology:

> For financing authorities, the new instructional technology will eventually reduce instructional costs below levels using conventional methods alone, but in the short run, it will only increase costs. It will be financially prudent to concentrate early investments in areas with the greatest capability for wide use: (a) libraries, (b) adult education, (c) primary and secondary education, and (d) introductory courses in higher education where basic skills are involved, like mathematics and language. (pp. 3-4)

A final comment, by McCorkle and Archibald (1982) related to finances and leadership concludes this section: "A time of uncertainty allows leaders to make creative changes if they take advantage of opportunities that arise despite financial constraint" (p. 191).

Leadership for Technological Innovation

Some, such as Ellison (1972) feel that the head of a learning resources center should be neither librarian or

audiovisual specialist, but rather a change agent, facilitator, and specialist in movement of information from source to patron (p. 11). Given the numerous determents to technological innovation and the acknowledgement that personal interaction is essential to innovation, strong leadership will be required for there to be appropriate and successful technological innovation in higher education. Bush and Ames (1984) discuss the challenges involved:

> The next generation of leaders will need to maintain constant vigilance over emerging trends in technology and the application of these trends to administration and instruction.... They will also need to realize that anger and frustration are going to become a problem for the 1980s as postsecondary education becomes more technological and computerized and as large numbers of faculty, staff, and potential students using dated methods to address complex problems are left behind. (p. 78)

Mitchell (1981) is also concerned with the complexities of education in the information age:

> Increasing complexities in management, including the difficulties of processing masses of information, wise management of technology; coping with litigation, participating in collective bargaining, listening to the new stridency of student demand, and responding to public criticism, all will test severely the mettle of effective leadership. (p. 36)

The literature contains numerous appeals for educational leadership in this age of rapid technological advancement. One such appeal is made by McMeen (1983):

> The need for foreseeing curricular and progammatic responses to rapid change in "high tech" areas (computers and intelligent videodisc) is perhaps nowhere more apparent than in higher education, which has the responsibility for preparing tomorrow's leaders in educational technology. Given these problems, higher education must look to the future and involve educational technologists more fully in long-range decision-making, even beyond the parameters of educational technology as an academic discipline. (p. 12)

A similar appeal by McBeath (1983) concludes this section. This comment is important for its help in maintaining focus on the original reason for instructional technology - improving the quality of teaching and learning:

> Leadership is required whether we are concerned about the use of micro-computers in California, radios in Zambia or new teletext systems in Canada and Europe. Leadership is also required regarding the process which can lead to the overall improvement of teaching and learning. (pp. 5-6)

Institutions Making Innovative Use of Instructional Technology

Certain institutions are considered to be innovators in the application of new technologies. For example, Hawkridge (1983) cites three universities as innovators in high-technology: San Francisco State University (p. 119); Massachusetts Institute of Technology (p. 121); and the University of Iowa (p. 124). Joe Wyatt ("Innovator Interview," 1983) lists two categories of higher education innovators: those requiring computers for all incoming students and those with a general high-tech orientation. The three schools mentioned as requiring computers are Carnegie-Mellon, Drexel, and Clarkson (p. 37). Wyatt's seven high-tech schools are: Texas A&M; Stanford; University of Arizona; University of Georgia; University of Texas; University of South Carolina; and the University of Southern California (p. 37). Smith and Boehm (1983) add Dartmouth to the list of schools making innovative use of instructional technology for its uses of computers, educational television, and videodisc (pp. 13-14). The University of Nebraska-Lincoln must also be considered an innovator for its pioneering work in developing practical educational applications for videodisc technology (Tiedemann, in press).

Much of the literature citing colleges and universities for making innovative use of instructional technology does

so because of current use of computers, or near future plans related to computers. Asgood (1984) compiled a lengthy list of schools which have made a major commitment to implement computing activities across the curriculum. These schools include: Massachusetts Institute of Technology; Carnegie-Mellon University; Clarkson University; Stevens Institute of Technology; Rochester Institute of Technology; Rensselear Polytechnic Institute; Case Western Reserve University; Stanford University; University of Michigan; Drexel University; Brown University; Dartmouth College; Reed College; Dallas Baptist College; and Drew College of Liberal Arts (pp. 163-184). The Forum for Academic Computing and Teaching Systems (1983) also cites Union College as an innovator in instructional technology for its placement of a computer in every dormitory room (p. 4).

Clarkson University is a good example of innovative use of instructional technology as implemented with computers. Wilson (1983) notes that Clarkson merged its library, computing, and media services. Among the new services made possible by this arrangement are campus-wide access to electronic mail and word processing (p. 19). David Bray (1985) provides more recent information on Clarkson's use of personal computers which began in 1983 when all freshmen received Zenith Z-100PC computers (p. 81). By the spring of 1985, 2,600 Zenith PCs were in use by all faculty and many upperclass students (as well as the classes of 1988 and 1989). 4,000 of the microcomputers are expected to be in

use by 1987 (p. 81). The uses of personal computers at Clarkson University include: programming; word processing; study guides for required readings in humanities courses; delivery of student papers to professors via electronic mail rather than hard copy; and social interaction between user groups (pp. 82-83).

Temple University has begun the implementation of a comprehensive information utility with nodes in each classroom as described by Scanlon (1984):

> Over the last six months, Temple has undertaken procurement of a new, state-of-the -art telecommunications system supporting voice, data and video applications, as the first phase of an overall information technology plan designed to assist in meeting the numerous challenges and opportunities now confronting institutions of higher education. (p. 79)

Temple's plan also calls for integration of computers and communications throughout the curriculum (Scanlon, 1984, p.79).

Garrett and Goldwhite (1983) consider the Educational Technology Center of the University of California at Irvine to be an instructional technology innovator for its pioneering efforts with computers and videodisc during 14 years of National Science Foundation support (p. 1).

Some examples of innovative uses of instructional technology transcend individual campuses. Senese (1983) describes several projects which are administered by the

U.S. Department of Education's Office of Educational Research and Improvement. Project BEST (Basic Educational Skills Through Technology) disseminates information on applications of technology to over 40 state education agencies. The dissemination of information is enhanced by an electronic mail service which links the state agencies (p. 100). Project SLATE (State Leadership Assistance for Technical Education) provides workshops for top level state education officials, legislators, and staff in twenty states. The workshops are designed to provide aid in establishing technological applications to maximize learning possibilities (p. 100). Project VIM (Videodisc Interactive Microcomputer) is a network of 45 schools which use videodisc and microcomputer technology to share in the solution of common problems (p. 100). The objective of all three projects is to "provide State and local officials responsible for education policy with information on technology they can apply in their individual circumstances" (pp. 100-101).

The final example of innovative use of instructional technology is the Electronic University, a private venture of Telelearning Systems of San Francisco. Moss (1984) states that the Electronic University offers 170 courses, many of which were developed by users such as: University of Nebraska; Ohio University; San Diego State University; University of Wisconsin; American Open University; New York Institute of Technology; DeAnza College; and Central New

England College (p. 22). This computer network system features an electronic library, entire courses, individual lectures and seminars, and individualized academic counseling services. Assuming that a student already has a microcomputer and modem, the 1984 costs were $90.00 for Telelearning's Knowledge Module, $35 per credit hour tuition, $30 telecommunications charge, and the usual texts and materials (p. 23).

The Future Of Instructional Technology in Higher Education

This review of the literature has thus far covered the history of instructional technology, social trends affecting education, technological change and higher education, and institutions making innovative use of instructional technology. It is appropriate next to consider the future of instructional technology in higher education. If one considers, as does Williams (1982), that "Our schools with their assembly line instruction and even their bells, are a holdover from the industrial age of our country..." (p. 215) then it seems very likely that there will be many changes made to our educational system as the information age changes not only technology but also the way we live. Williams (1982) elaborates on this theme:

> We are changing. Not just in our institutions, the automobiles we buy, nor the fashions we wear, but in

> how we behave as human beings. The fundamental premise of The Communications Revolution is that the contemporary explosion in communications technologies - computers, satellites, tape, disc, microprocessors, and new telephone and radio services - are perceptibly changing the nature of our human environment. (p. 11)

While many scholars agree that this is a time of massive change, there is little agreement as to what the future holds. Ashby (1974) writes:

> We are now confronted by a fourth revolution in education. During this century, for the first time since the invention of printing, new technologies are being adopted in teaching which will certainly transform the whole process of education, though what the transformation will be is still a matter for speculation. (p. 34)

Wootton, Reynolds, and Gifford (1980) are in agreement that the new technologies will cause major changes in traditional education:

> The increasing use of technological developments in schools such as cable-television, closed-circuit television, teaching machines, computers and dial access retrieval systems insures that education will never be the same. (p. 15)

There are those who believe that the traditional methods of teaching must be modified to improve student results. For example, Bunderson (1982) states: "The

current educational delivery system - which for centuries has replicated information on printed pages and taught or communicated it orally - has reached the limits of its improvability" (p. 29). Lipson (1983) also comments that "The increase in productivity resulting from the use of high technology can help to support more advanced education, if we can agree to this" (p. 31). The Carnegie Commission on Higher Education (1972) is more specific in its predictions regarding future uses of instructional technology:

> Nevertheless, by the year 2000 it now appears that a significant portion of instruction in higher education on campuses may be carried on through information technology - perhaps in a range of 10 to 20 percent. It certainly will penetrate much further than this into off-campus instruction at levels beyond the secondary school - in fact it may become dominant at a level of 80 percent or more. (p. 4)

In a more recent work, Smith and Dunn (1985) predict: "By the year 2000 approximately 20% of the instructional hours of the core programs of the typical university will be delivered by the technologies" (p. 9). Other authors go beyond the limits of systems and machine technologies to predict future acceptance of bioengineering and pharmaceuticals to improve memory and learning (Gustafson, 1983, p. 29).

There is increasing consensus that one service organization will provide <u>all</u> information services on

campuses (Suprenant, 1982, p. 339). This centralized arrangement was recommended as early as 1972 in the Carnegie Commission on Higher Education's report The Fourth Revolution (DeBloois, 1983, p. 12). An organizational arrangement of one centralized information service certainly seems to be a logical approach, especially as telecommunications and computer technologies improve the capabilities of networking systems. Concentration of information is essential if people like James Martin (1978) are right in their predictions of the year 2040 presenting the dilemma of what to do with 200,000,000 book titles and where to find the room necessary for the 5,000 miles of shelves and 750,000 card catalog drawers required using today's methods (p. 116). Martin (1978) further predicts: "Many persons will learn two, three, or four careers in a lifetime as telecommunications, automation, and later, machine intelligence will cause entirely different work patterns. Electronics will create both the need and the tools for lifelong learning" (p. 223). Lipson (1983) carries the tool analogy further: "The computer and information technologies are powerful intellectual tools that can amplify our educational efforts to train minds just as machines in the past have amplified human muscle power" (p. 31).

Many educators are justifiably worried about the sometimes faddish nature of instructional technology. One, Ohles (1984) cautions against blindly embracing

microcomputers based on previous unsatisfactory experiences with educational experiments involving radio, television, language labs and teaching machines (p. 49). Scriven (1981) addresses similar concerns: "What will happen in the 1980s will depend on whether we do become more sensitive to our failures and their causes, or become inebriated by the rush of new technologies" (p. 240).

This present study was initiated on the basis of similar concerns. Some knowledge about an uncertain future is better than none in terms of being able to make decisions regarding the long range implementation of innovative technologies. The report of the Phi Delta Kappa Commission on Schooling for the 21st Century (1984) speaks eloquently to this point:

> The study of possible futures is important because it forces us to assess the desirability of possible trends and to recognize the values we bring to the assessment. Even if we gain no new knowledge about the probability of the occurrence of forecasted events, the process of developing the scenario gives us a clearer concept of the complex relationships among the events. We begin to assess the related events in conjunction with their central trends. This type of thinking is as important as trying to calculate the statistical probability of an isolated event occurring within the context of an obscure future. (p. 3)

Weaver (1972), in a mostly critical review of the Delphi technique, agrees that even if an accurate forecast is not obtained, it is important to get people to think about the future:

> Of equally great importance , however, our research also leads us to conclude that Delphi, in combination with other tools is a very potent device for teaching people to think about the future in much more complex ways than they ordinarily would....Delphi seems ideally suited to such a purpose.... (p. ii)

For reasons described in the next section, the Delphi technique was used to gather expert opinion as to the future of instructional technology in higher education.

The Delphi Study

The Delphi study is a relatively new methodolgy for exploring the future in order to provide leaders with relevant decision making information. The technique was developed by researchers at the Rand Corporation in the early 1950s (Linstone & Turoff, 1975, p. 10). The technique involves several rounds of questionnaires being responded to by experts in a given field. The questionnaires are alternated with feedback from previous rounds. Generally consensus is achieved after two or three rounds, thus providing a fairly reliable estimation of future events. Although this is the format for a traditional Delphi study,

one of the originators of the Delphi technique, Norman Dalkey (1967), comments: "This basic pattern has, of course, many possible variations, only a few of which have been tried" (p. 4).

Many of the advantages of Delphi studies revolve around psychological concerns of group meetings. These advantages include reducing the potential for the bandwagon effect, specious persuasion, and the likelihood of losing face while retracting public statements (Cetron, 1969, p. 92). The Delphi method reduces semantic noise (irrelevant or redundant material) which group meetings often generate (Dalkey, 1969, p. 14). Other unfavorable committee behaviors are eliminated by the use of the Delphi technique (Helmer, 1967, p. 7). Also, the opinions of people who are normally quiet at group meetings are weighed equally with those who tend to dominate meetings (Cornish, 1977, p. 119). Turn (1974) points out two other advantages of Delphi: (1) interaction with controlled feedback and (2) the opportunity for statistical group response (p. 24). Finally, Linstone & Turoff (1975) discussed three contexts in which Delphi studies have proven useful: (1) collecting historical or current data which are not accurately known or readily available; (2) planning university campus and curriculum development; (3) and evaluating possible budget allocations (p. 4).

On the other hand, Delphi studies do have certain disadvantages. In terms of psychological concerns, people

may want or need the recognition that can be gained by presenting their views in front of a group (Cornish, 1977, p. 120). Another disadvantage of Delphi studies is the heavy time investment required of panelists. They must consider and respond to not only the original Delphi document but also to subsequent rounds (Cetron, 1969, p. 147). The panelists may also find it somewhat difficult to respond to a blank questionnaire in the opening round. Some authors suggest that a brief scenario accompany the opening round to set the tone for the study (Cetron, 1969, p. 147; Linstone & Turoff, 1975, p. 386). Delbecq, Van de Ven, and Gustafson (1975) consider the three most critical conditions for Delphi research to be: "1) adequate time, 2) participant skill in written communication, and 3) high participant motivation" (p. 84). Linstone & Turoff (1975) detail some reasons for Delphi failure:

1. Imposing monitor views by overspecifying structure.
2. Using Delphi as a surrogate for all other communications.
3. Poor techniques in summarizing and presenting group response.
4. Ignoring, or not fully exploring, disagreements (this can cause disgruntled dissenters to drop out, resulting in an artificial consensus).
5. Failure to motivate or compensate panelists for their time commitment. (p. 6)

Specific strategies for avoiding these and other pitfalls are discussed in the Chapter III. Some other Delphi studies related to education were helpful in guiding this investigation. Examples of these studies are presented in chronological order. Eckert (1974) used the Delphi technique for the purpose of identifying the functions of a community/junior college model financial aid office. This study used a national sample of 68 community college financial aid officer panelists nominated by regional senior program officers of the United States Office of Education (p. iv). The study employed three Delphi rounds, the first of which was an open-ended questionnaire. The second Delphi round instrument listed 145 financial aid office functions which were culled from the responses to the first round. By the third round, the Delphi process had successfully identified functions of a model financial aid office in a community college (p. v).

Spitzer (1975) did a Delphi study titled, "Educational Media in the Year 2000: A Program for Research." For this study, 200 potential panelists were selected randomly and stratified according to geographic regions from the membership directory of the Association for Educational Communications and Technology. 100 panelists returned the open-ended round one Delphi instrument with nominations for significant trends. The round two instrument listed 68 distinct trends which had been extrapolated from round one responses. In round two, these trends were ranked for

importance, predicted increase, and accuracy of prediction, each on a scale of 1-5 (p. 7). The round three instrument was consolidated to 56 items and included the mean scores from round two. The round three results were summarized and fed back for a fourth and final round (p. 8). In terms of results: "The only reliable generalizations that seems to emerge is that respondents found hardware-related trends to be less important, in most cases, than software and process trends" (p. 8).

Spitzer's study differs from this present study in that his research tested "...the applicability of the Delphi technique to future-thinking in the field of educational media and technology..." (p. 7). Spitzer considered the study as "...only a small step on the way to validating the Delphi for use in encouraging future thinking about educational media and technology" (p. 8). The results of Spitzer's research and subsequent Delphi studies have shown the value of using Delphi techniques to predict the future. As such, it would seem appropriate that similar studies be conducted every two or three years to help instructional technologists and academic administrators cope with the rapid pace of technological change.

Schieman (1980) used the Delphi technique to study the current role of the media director as a change agent at Canadian universities. Of the 45 media directors invited to take part in the Delphi study, 32 participated in round one; and 31 in round two. The study resulted in a consensus as

to the actual current role of media directors (p.17).

Fuchs (1983) employed Delphi methodology to predict the use of microcomputers in Missouri secondary schools. Three separate but concurrent Delphi rounds were sent to Missouri secondary business educators, math educators, and library/media personnel in hopes of discovering: which discipline would be most receptive to computers, and why; and which discipline needs the most inservice training, and why (p. 6). The panelists were selected by the nomination of 25 names for each of the three disciplines by the Missouri Department of Education, appropriate professional associations, and the accrediting agency of the University of Missouri (p. 53). Panelists were asked to predict the year in which microcomputers would be indispensable in their curriculum or learning resource center (p. 58). After each round the panelists were sent a summary of the preceeding round and asked to re-evaluate and to revise their earlier responses, if appropriate. The study concluded that the discipline of business was most receptive to using microcomputers and that business educators should receive the first inservice training (pp. 92-93).

Spinelli (1983) did a Delphi study to forecast the long-range (ie: 20 years) general environment of higher education in the state of Michigan (p. 73). The Delphi panel was made up of 24 key influential persons, knowledgeable about factors influencing higher education, who had agreed by telephone to be active unpaid panelists

for as many as four Delphi rounds and for as long as three months (p. 74). Round one was an open-ended instrument on which the panelist forecasted 120 events. The round two instrument consolidated these 120 events into 34 commonly cited events and asked the panelists to evaluate the probability of occurrence (p. 75). Round three consisted of the 34 original events with round two responses summarized by a histogram to highlight the mode of each response (p. 76). Round four presented the round two responses and a summary of comments about forecasted events and asked the panelists to reconsider their responses and to provide a final estimate of the likelihood that the events would occur (p. 76). Findings of the study included: a decrease in "no judgement" responses between rounds two and four; "very probable" responses decreased between rounds two and four (especially between rounds three and four); there were more "probable" than "improbable" choices because of the open-ended beginning; and there was no significant convergence of opinion over the rounds (pp. 77-78).

The final Delphi study to be cited in this section was done by Rosenbaum (1983). This study used a panel of 144 people including experienced and recently hired video practicioners, telecommunications professors/instructors, and student interns (p. 4). The objective of the study was to "develop a college curriculum designed to prepare students for future careers as professional video communicators in non-broadcast private telecommunications"

(p. 1). Four rounds of questionaires were necessary before consensus was reached on the 23 most important curricular components (p. 9). The study resulted in a practical guideline for developing a college curriculum appropriate to the objective for the study.

The specific research and methodology design for this Delphi study is discussed in Chapter III.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

Design of the Study

The primary purpose of this study was to provide decision making information related to future media services in higher education for use by instructional technologists and academic administrators. Three main research objectives were determined to be necessary in order to gather useful decision making information. These principal research objectives are stated below:

1. obtain expert opinion regarding future media services in higher education
2. identify innovative media services and applications of instructional technology in higher education
3. make recommendations for implementing innovative instructional technology in higher education media services

The first objective was designed to elicit data on the implementation in higher education of certain instructional hardware, organizational structures, and instructional techniques. This data would allow development of a model of

media services in higher education for the 1990s. Identification of innovative media services and applications of instructional technology, as specified by the second objective, was made through a review of the literature and through the collection of expert opinion. The third objective was to make recommendations based on the data collected and the expert opinion of the researcher.

After considering various methodologies which could be used to meet the research objectives, the Delphi technique was selected for use in this study. Two main design concerns about using the Delphi methodology were potential researcher bias in preparing summaries of panelists' comments and the method for determining consensus of the panelists. In terms of researcher bias, Murray (1967) stresses the importance of unbiased maintenance of minority opinion (p. 34). The potential for researcher bias was reduced by having an independent party review summaries of round one panelists' comments party for accuracy. Some changes in comment summaries were made as a result of this review. For rounds two and three, panelist comments were quoted verbatim to avoid both researcher bias and the time consuming review process.

The second design concern was the selection of a method for indicating panelist consensus. Two accepted methods of indicating consensus in Delphi studies are the use of interquartile rank or median ratings (Cyphert & Gant,1970, p. 421; Murray, 1967, p. 47; and Rosenbaum, 1983, p. 7).

This study employed a simple majority percentage rating of 50% or more to indicate when consensus had been reached since the implementation time frame was clustered in multiple year periods. Although interquartile and median ratings are often used in Delphi studies, Dalkey (1969), one of the originators of the Delphi technique, concludes that: "...most forms of feedback beyond the simple statistical report of responses on the previous rounds are at best ineffective" (p. 78).

The Delphi Methodology

This study employed the Delphi technique to develop a forecast of the nature of media services in higher education during the 1990s. Although there are many forecasting techniques available (single-trend extrapolation, growth analogy, correlation analysis, personal judgement, trend analysis, etc.), the Delphi technique's consensus building approach made it particularly appropriate for use in this study. The building of consensus of expert opinion in a Delphi study provides a reliable estimation of future occurrences. The Delphi technique is a questionnaire based methodology characterized by feedback between the two to five rounds of questionnaires. Multiple rounds are used to allow panelists to reconsider their responses based on the summaries of previous rounds. The summaries include a statistical interpretation of responses and the comments of

the panelists. This process of iteration between the rounds of a Delphi study facilitates consensus building.

Because of the extremely rapid pace of technological breakthroughs and introduction, it is not considered fruitful to attempt to forecast beyond the year 2000 (Hawkridge, 1983, p. 189). Numerous researchers and scholars conclude that the Delphi technique is helpful in drawing scenarios of the future that are useful to long range planning and other leadership activities (Cetron, 1969, p. 146; Dalkey, 1967, p. 9; Hartman, 1981, p. 495; Helmer, 1966, p. 1; Judd, 1972, p. 173; McMeen & Wieking, 1983, p. 39; Murray, 1967, p. 12; Rockart & Morton, 1975, p. 241; Rockman, White & Rampy, 1983, p. 13; and Turn, 1974, p. 5).

More specific to the usefulness of Delphi studies for long-range planning are the comments of John Rosenbaum (1983) concerning some 1000 Delphi studies: "...the Delphi has become one of the most flexible and frequently-used means of anticipating changes in needs based on estimates of future events" (p. 2). Marvin Cetron (1969) talks about the value of Delphi studies: "...a technique that incorporates the consensus of participant experts should be of inestimable value in planning for the users allocation of research and development resources as well as other future-oriented requirements" (p. 146). Linstone and Turoff (1975) feel that Delphi is useful not only for evaluating possible budget allocations, but also for the planning of

university campuses and curricular development (p. 4).

Instrumentation

Two of the most frequently cited problems of Delphi studies are excessively long questionnaires (Judd, 1972, p. 184) and the time commitment on the part of the panelists (Delbecq, Van de Ven, & Gustafson, 1975, p. 84). Dodge and Clark (1977) also express concern with fatigue becoming a factor which makes the responses to long questionnaires suspect (p. 59). Another issue in questionnaire development is whether to design the first instrument in an open-ended or structured format. One opponent of the open-ended school is Cetron (1969) who feels that panelists dislike starting with a blank piece of paper and suggests that sample projections or scenarios would be helpful (p. 147). Others, such as Murray (1969), recommend that the first questionnaire be open-ended so as not to eliminate items merely because the researcher did not think of them while developing the questionnaire (p. 27). The Delphi instruments used in this study followed a modified structured format which also provided an open-ended approach with "additional item" options at the end of each of the instrument's three sections. The provision of the "additional item" options accommodated panelists who wished to add items not included by the researcher. The works of Rockart & Morton (1975), Murray (1969), and Linstone &

Turoff (1975) were used as guides in the development of the Delphi instrument.

The Delphi instrument for this study was developed with these issues in mind. The initial Delphi instrument was made as short as possible without jeopardizing its ability to elicit useful data. The instrument consisted of 49 items and sub-items in three sections: (1) instructional hardware; (2) organizational concerns; and (3) instructional techniques. In addition to current and recently introduced hardware, specific technologies predicted by Martin (1977) were included in the hardware section of the questionnaire: digital wall screens; portable radio transceivers with telephone and keyboards built in; 3D television; and others (pp. 379-401). The hardware items were selected in order to elicit decision making information in the form of consensus of an expert panel for use by instructional technologists and academic administrators. The same rationale was used in selecting the organizational concerns items related to the degree of centralization and scope of media services, as well as the items on reporting structures. The items in the instructional techniques section were chosen by similar criteria (see Appendix A).

On the Delphi instrument, panelists were asked to circle a range of years during which items related to instructional hardware, organizational concerns, and instructional techniques would be implemented in general higher education media services. For each item, the

panelists were also asked to circle a response to indicate whether or not they felt the item was innovative and to assess a low, medium, or high priority for the item's implementation in higher education media services. Percentage ratings of 50% or higher were used as indicators of panelist consensus.

The first items from the three sections of the Delphi instrument are presented in Table 1. The space for panelists to write in their reasons or comments for their responses has been deleted from these sample items. The reader is referred to the Appendices for closer examination of the original Delphi instrument for this study (see Appendix A) as well as the abbreviated round three instrument and its instructions (see Appendix B). Panelists were asked to circle an option to indicate their responses to the three categories for each item.

A demographic questionnaire, designed to gather information to be used in developing an overall profile of the panelists and their institutions, was sent to all 53 potential panelists in the first round of the Delphi study (see Appendix C). The data sought could be characterized as either personal or institutional in nature. Personal demographic items included: name; telephone number; panelist age; gender; membership in professional associations; attendance at professional conferences; panelist job category; panelist job functions and primary job function; and academic preparation. The institutional

Table 1

Delphi Sample Items

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY
INSTRUCTIONAL HARDWARE			
1. Audio units	NA	YES	LOW
	NOW		
	1986-87	NO	MEDIUM
	1988-90		
	1991-93		HIGH
	1994-96		
	1997-99		
	2000+		
ORGANIZATIONAL CONCERNS			
1. Centralization of media services:			
a. one campus-wide center	NA	YES	LOW
	NOW		
	1986-87	NO	MEDIUM
	1988-90		
	1991-93		HIGH
	1994-96		
	1997-99		
	2000+		
b. main center with subcenters all reporting to same office	NA	YES	LOW
	NOW		
	1986-87	NO	MEDIUM
	1988-90		
	1991-93		HIGH
	1994-96		
	1997-99		
	2000+		
c. schools/departments provide own services, no central coordination	NA	YES	LOW
	NOW		
	1986-87	NO	MEDIUM
	1988-90		
	1991-93		HIGH
	1994-96		
	1997-99		
	2000+		
d. other (specify)	NA	YES	LOW
	NOW		
	1986-87	NO	MEDIUM
	1988-90		
	1991-93		HIGH
	1994-96		
	1997-99		
	2000+		
INSTRUCTIONAL TECHNIQUES			
1. Independent study	NA	YES	LOW
	NOW		
	1986-87	NO	MEDIUM
	1988-90		
	1991-93		HIGH
	1994-96		
	1997-99		
	2000+		

data collected included: names of panelists' institutions; job titles; student enrollment at panelists' institutions; staff sizes (permanent and student) of central media services; central media services budget size; primary source of institutional income; most common modes of instruction; most promising instructional technology in use at panelist site; most promising anticipated instructional technology at panelist site; and panelist opinion as to the three best and most innovative media services at other institutions of higher education. The items related to the panelists' involvement with professional associations, their academic preparation, and the number of years in their current job categories and job functions were designed to verify the level of expertise required by a Delphi study. Panelists were asked to respond to the 17 items by filling in blanks, checking multiple choice options, and ranking options. The reader is referred to the Appendices for details regarding the demographic questionnaire and its summary (see Appendixes C and H).

After the Delphi and demographic instruments were developed, they were piloted in several ways. First, input was sought from the researcher's dissertation committee. The next level of refinement was piloting the instruments with instructional technology professionals from four San Diego area universities. Each of the four people from these institutions was asked to complete the questionnaires as if he had received them in the mail and were participating as a

panelist in the study. All were asked to indicate the amount of time it took to complete the questionnaires and to make comments or suggestions on how the instruments could be improved. The Delphi instrument was then modified on the basis of information obtained from the pilot study. Some of the modifications included: elimination of 1984 from the implementation category; enlargement of the space provided for panelists' comments; and inclusion of the open ended "other" and "additional item/concern/technique" options.

Selection Of The Sample

There is some evidence that the need for a Delphi study sample to be broadly representative is not as critical as in other types of studies. For example Murray (1967) states:

> ...that in this kind of survey of expert opinions and estimates, since it is not a statistical survey of the Gallup type, it is immaterial whether the experts be a representational sample; what matters is merely that the viewpoints of persons from all the major relevant backgrounds have a chance of being voiced. (p. 30)

Although the Delphi technique is intended to gather expert opinion, the degree of expertise will vary among the panelists. Dalkey (1969) does not think that varying degrees of expertise is a hinderance to a Delphi study: "The experiments suggest that it is no great loss to include less knowledgeable individuals, since they are more likely

to improve on iteration than the more informed (or at least the more accurate) individuals" (p. 76).

One approach to the selection of Delphi panelists mentioned in the literature is to start with a small group and ask them to suggest additional panelists (Scheele, 1975, p. 68). However, this approach might not yield as representative a sample as the stratified technique. Therefore the nominating technique was not used in this study. The selection of panelists for this study's data collection was determined partly through the review of the literature to make certain that instructional technologists at innovative universities were given an opportunity to participate. In addition to these 13 identified innovators, other institutions were selected by a stratified random sampling technique based on undergraduate enrollments. A stratified technique helped to insure that the sample would be representative of contemporary American higher education, public and private. For selection purposes, a minimum student enrollment of 5,000 was chosen on the assumption that larger schools will, in general, have budgets capable of supporting state-of-the-art technological applications.

Grant and Snyder (1983) compiled data which indicated that 720 American colleges and universities had enrollments in excess of 5,000 students (p. 104). Extrapolation of this data revealed the following student enrollment proportions for these 720 institutions: 16% with more than 20,000; 32% between 10,000 and 20,000; and 52% between 5,000 and 10,000.

The actual selection was made from a listing of institutions of higher education categorized by enrollment in National College Data Bank (Hegener, 1981, pp. 110-115). The 13 schools identified in the literature were included in the stratification process for the 50 institutions to be selected. An additional 37 institutions were randomly selected, by manual methods, according to the proportions described above, from the list in the National College Data Bank. After this process had been completed, three more institutions, identified in the literature as innovators in the use of instructional technology, were added to the sample, making a total of 53 potential data collection sites.

These 53 institutions were selected in the hopes of having 20-30 panelists see the Delphi study through to is completion. Delphi studies typically have fewer than 50 panelists (Cyphert & Gant, 1970, p. 421; & Murray, p. iii). In fact some major Delphi studies conducted by the Rand Corporation had as few as 12 panelists (Rosenbaum, 1983, p. 3). Delbecq, Van de Van, & Gustafson (1975) suggest a maximum sample of 30 panelists: "Our experience indicated that few new ideas are generated in a homogeneous group once the size exceed thirty well-chosen panelists" (p. 89).

Data Collection

There seems to be agreement that Delphi studies

should be limited to three rounds (Brockhoff, 1975, p. 320; Cyphert & Gant, 1970, p. 423; Linstone & Turoff, 1975, p. 229). Some think that two rounds are adequate (Schieman, 1980, p. 19). Indeed, some, such as Rockart & Morton (1975) feel that one round is sufficient (p. 241). Although this study was originally designed with the option of lasting for either two or three rounds, a full three rounds were necessary to obtain sufficient consensus. A mailing list from the Association for Educational Technology and Communication's (AECT) Division of Educational Media Management (DEMM) was employed, as well as AECT's general membership directory (AECT, 1984), in addressing the Delphi study to specific instructional technology professionals. Telephone calls were made to the data collection sites identified in the literature to verify the addressee information and to encourage participation in the study. To help motivate members to participate, the president of DEMM agreed to co-sign the round one cover letter which was printed on University of San Diego School of Education letterhead (see Appendix D). Each panelist received two copies of the round one Delphi instrument: one to complete and return; and one to retain to allow cross referencing between the instruments throughout the three rounds (Murray, 1967, p. 34).

For rounds two and three, respectively, a summary of the panelists' responses and comments for rounds one and two was sent to the panelists along with the blank Delphi

instrument (see Appendixes E and F). The round three summary (see Appendix G) was sent to the panelists who completed round three along with a summary of the responses to the demographic questionnaire (see Appendix H). Each of the Delphi summaries also included researcher's comments designed to summarize panelists' responses to the previous rounds and to focus the panelists' reconsideration of their responses for the next round. A sample item from the round one summary is presented in Table 2. As the researcher's comments have been deleted from the sample item, the reader is referred to the round one Delphi summary in the Appendixes for full details (see Appendix E).

A number of techniques were used to improve panelist motivation during this six month study. Scheele (1975) was consulted for his suggestions for improving respondent motivation: the use of prestigious sponsors, colorful materials, emotive language, and vernacular expressions (p. 69). The possibility of being mentioned in a future publication also provided panelist motivation. All panelists were contacted by telephone prior to the mailing of each of the three rounds. The cover letters for rounds two and three included a personal note from the researcher to each of the panelists (see Appendix I). The personalized notes generally referred to telephone conversations between the researcher and the panelists, to panelists' responses or comments, or expressed appreciation for an early return of the previous round. Follow up letters (see Appendix J) and

Table 2

Sample Round One Delphi Summary Item

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY
INSTRUCTIONAL HARDWARE			
1. Audio units	5% NA 95% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	15.79% YES 84.21% NO	44.44% LOW 44.44% MEDIUM 11.12% HIGH

PANELISTS' COMMENTS:

a. "Though 'audio' is not new or innovative per se, its use for particular applications may represent a significant instructional advance at a particular institution such as a Level III lab for spontaneous + consecutive translation."

b. it is already in place, and serves "purposes other technologies do not in more cost effective ways"

c. traditional formats have been in use for a long time and the audio disc (ie: compact disc or digital audio disc) is "more of a consumer item rather than instructional tool"

d. because audio units appeal to only one sense not rated innovative and given medium priority

telephone calls were made to encourage panelists who had not returned completed questionnaires by the deadlines to do so at their earliest convenience. Panelist motivation was also enhanced by an offer to rebate $25 of the $60 workshop fee for a Delphi presentation by the researcher at AECT's 1986 national conference. Additional motivation was provided by the researcher's offer to meet panelists personally and treat them to coffee or a cocktail at the 1986 AECT conference (see Appendix J). The final motivating technique was to abbreviate the round three Delphi instrument. By not asking panelists to respond to items for which consensus had been obtained in the first two rounds, the round three Delphi instrument was shortened from 12 to 8 pages (see Appendix B).

Data Analysis

As the panelists returned their Delphi instruments for each round, their responses to each item were tallied on a blank Delphi instrument. After the cut off date for each round, the responses were compiled. Although panelists' comments from returns after the cut off dates were included in the next round's summary, only the round three summary reflects panelists' responses to the implementation, innovative, and priority categories from the late round three returns. Percentages for responses to the implementation, innovation, and priority categories for each

item were then calculated to be included in the summaries of each round. The summaries were returned to the panelists along with the materials for the next round. As each of the three rounds was summarized, response percentage ratings of 50% or higher were used to indicate consensus. Comments of the panelists, which were either summarized by the researcher or quoted verbatim, were also included in the Delphi summaries (see Appendixes E, F, and G).

Responses to the demographic questionnaire were also tallied as they were received. After the results were compiled, calculations were made for the mean of responses and rank orders. The demographic questionnaire summary included these calculations as well as raw data (ie: the number of responses for various options) and textual information. The demographic questionnaire summary was sent to the panelists along with the round three Delphi summary at the study's conclusion. The reader is referred to the demographic questionnaire summary in the Appendixes for full details (see Appendix H).

After the data was analyzed, the information was used to develop recommendations for use by instructional technologists and academic administrators in planning media services for the next decade. The trends identified in the analysis of data were used as the basis of a workshop agenda which was accepted for presentation at AECT's 1986 national meeting. The workshop was designed to provide practical guidelines for using the Delphi technique to develop long

range plans for media services in higher education. The agenda for the one-half day workshop had three major components, each comprising approximately one-third of the workshop: Delphi research - general research design, history of the Delphi technique, Delphi methodology, and examples of educational application of the Delphi technique; case study - using this study to examine the principles covered in the first part such as sample selection, cover letters, motivational techniques, follow up procedures, analysis of results, and practical use of results; and questions/answers - brainstorming of workshop participants' Delphi research needs and continuing the dialogue begun by this study with any of its panelists who was present.

Strategy suggestions for policy issues such as the selection, acquisition and implementation of innovative instructional technology were also offered based on both the research findings and the personal expert opinion of the researcher. These strategy suggestions and general recommendations are discussed in Chapter V.

CHAPTER IV

FINDINGS OF THE STUDY

The primary purpose of this study was to provide decision making information for use by instructional technologists and academic administrators in preparing long range plans for future media services in higher education. The data collection sites were selected by two methods. The first group of 16 potential sites was selected from a review of the literature which identified these institutions as being innovative in their use of instructional technology. The second group of 37 institutions of higher education was randomly selected with stratification for student enrollment size. The membership directory of the Association for Educational Communications and Technology was used to obtain the name of the individual at each site with campus-wide responsibilities for nonprint media services (AECT, 1984). The data was then collected by mail between February and July 1985 using one demographic questionnaire and three rounds of Delphi instruments (see Appendixes A, B, and C). Twenty-two panelists remained in the study through the conclusion of the third round. Eight (36.4%) of the panelists were from institutions identified in the

literature as being innovative users of instructional technology and 14 (63.4%) were from other institutions described above.

Demographic Analysis

The demographic questionnaire was designed to elicit information specific to the panelists and their sites. Twenty-two of the panelists participating in this Delphi study returned completed demographic questionnaires. There are, however, 23 responses to items 1.(b) - your institution, 1.(c) - public or private, and 3. - your sex reported in the analysis. The 23rd responses for these three items are based on information gathered in a telephone conversation between the researcher and a panelist who did not return the demographic questionnaire.

Before analyzing the demographic data, three items related to the analysis should be mentioned. First, although 22 panelists returned the demographic questionnaire, all 22 did not respond to each and every item. For example, some felt that they did not have sufficient information to respond accurately to item 12. - Central Media Services Budget - so they left it blank. Second, all percentages have been rounded to the nearest tenth or hundredth, as appropriate. The numbers in the tables represent the number of responses to an option or item. Third, the reader is referred to the Demographic

Questionnaire Summary in the Appendixes for more detailed information regarding the results of the demographic questionnaire (see Appendix H).

Panelist Data

Age

Since panelists were guaranteed anonymity, information from items 1.(a) - Your Name and 1.(e) - Your Telephone Number - will not be reported in this analysis. A breakdown of the age categories is shown in Table 3.

Table 3

Age of Panelists (N = 22, mean = 45.9 years)

Responses	Age Range
0	20-30
6	31-40
10	41-50
4	51-60
2	61-70
0	70 +

The obvious weighting toward the older age brackets (ie: 72.73% over 40 years of age) reflects the years of experience needed to reach the level of expertise required by the jobs addressed in this study.

Gender

Responses to item 3. - your sex - show that 20, or 86.96%, of the panelists were men and 3, or 13.96% were women. This seems to be in line with the general preponderance of men in top management in the American workforce (although this unbalanced proportion of men to women in top management positions seems to be gradually leveling out).

Professional Associations

Item 4. - professional associations to which you currently belong - indicates all of the professional associations to which the panelists belonged. The responses are summarized in Table 4. A total of 51 responses for 27 different professional associations were checked off or written in. Nineteen, or 37.25% of the associations were unique write ins. That is to say, each of the 19 associations was mentioned only once, all by different panelists. The Association for Educational Communications and Technology (AECT) had more member panelists than any other association: 13 responses, or 25.49%. This is probably so because many of the panelists were members of AECT's Division of Educational Media Management (DEMM), whose president co-signed the original cover letter.

The fact that 19 associations, each unique in this

study, were mentioned by 19 different panelists indicates a great deal of diversity among associations that cater to the needs of instructional technologists. However, if one discounts the the 19 unique organizations, 60% of the panelists belonged to either the Association for Educational Communications and Technology (40.63%) or the American Library Association (18.75%). This makes sense since AECT and ALA are two of the larger professional associations which cater to the general needs of people working with instructional technology.

Table 4

Professional Associations (N = 22)

Responses	Association
2	American Association for Training and Development
6	American Library Association
13	Association for Educational Communications & Technology
2	International Association for Learning Labs
4	International Television Association
1	National Society for Performance in Instruction
2	Northwest College and University Council for Managers of Educational Technology
2	Society of Motion Picture & Television Engineers
19	various associations, each mentioned only once

Attendance At Professional Conferences

Item 5. - national or regional conferences related to

instructional technology which you have attended in the last year - elicited an interesting response from the panelists. Of the 30 responses for 19 different conferences mentioned, 15 (50%) were various conferences, each mentioned only once. The remaining 15 responses are listed in descending order: 7, or 23.33%, attended AECT's national conference; 4, or 13.33%, attended ALA's national conference; 2, or 6.67%, attended the International Television Association's national conference; and 2, or 6.67%, attended regional conferences of Northwest College and University Council for Managers of Educational Technology.

Job Category

Twenty-two panelists responded to item 6A - your job category. The responses were split fairly evenly between the five options, as shown in Table 5. The greatest response was for option (d) - media specialist, with 6 panelists, or 27.27%. None of the panelists selected the computer specialist job category - 6A.(b). The results for item 6B. - years in this job category - indicated that the panelists had a mean of 13.1 years in the job category selected in 6A. The response to 6C. - years at this site - reflected an 8.8 year mean for the indicated job category at the panelists' current site.

Table 5

Job Category (N = 22)

Responses	Job Category
5	administrator (Dean or Vice President level)
0	computer specialist
5	librarian
6	media specialist
6	other - 2 responses for Director, and 4 various job categories, each mentioned only once

Table 6

Job Function (N = 22)

Responses	Job Function
16	AV production
8	cataloging
11	collection development
12	finances
5	institutional research
13	instructional design
10	programming
7	reference
12	other - 9 responses for administration, and 3 various job functions, each mentioned only once

Table 7

Primary Job Function (N = 22)

Responses	Primary Job Function
9	other, specifying administration
3	AV production
2	instructional design
2	other, specifying circulation control
6	various primary job functions, each mentioned only once

Job Function

For item 7A. - your job function - panelists were asked to check all of the job functions which applied to their current position. Of the 94 responses, 16, or 17.02%, indicated AV production. The other responses are shown in Table 6.

The greatest number of responses to 7B. - your primary job function - was 9, or 40.91%, for other, specifying administration. The other responses can be seen in Table 7. Finally, for item 7C. - years in this primary job function - the mean was 9.5 years.

Academic Preparation

In response to item 8 - academic degree(s) you have

Table 8

Academic Preparation (N = 22)

Responses	Degrees: and Major or Specialization
1	associate: photography
22	bachelor: 4 English; 3 History; 3 Mathematics; and 2 each - Science, Education, R-TV/Communications; and 6 various bachelor degrees, each mentioned only once.
20	master: 7 Educational Technology; 5 Library Science; 2 Education; and 6 various master degrees, each mentioned only once
11	doctorate: 6 Education; 3 Educational Technology; and 1 each - Communications & Linguistics
2	other: 1 teaching credential, 1 post graduate coursework in instructional technology

earned, the 22 panelists indicated that they had earned a total of 56 academic degrees. The percentage breakdown of the 56 degrees was: 39.29% bachelor; 35.71% master; 19.64% doctorate; and 1.79% each - associate, teaching credential, and post graduate work in instructional technology. Thus, 100% of the 22 panelists had bachelor degrees, 90.91% had master degrees, 50% had doctorate degrees, 9.09% indicated "other," and 4.55% had associate degrees. More detailed information regarding th academic preparation of the panelists is available in Table 8.

Panelist Profile

From the data presented above, a profile of the average panelist in this study has been developed. The average panelist is a 46 year old man with a masters degree in the field of educational technology and a doctorate in education. He is a member of AECT who attended COMMTEX 1985, AECT's national conference. The average panelist has worked in a media specialist job category for 13.1 years in general and 8.8 years at his current place of employment. His job functions include AV production, instructional design, finances, collection development, and programming. He considers his primary job function for the past 9.5 years to be administration. Although not indicated by the demographic data, his perseverance through the six months of

this Delphi study shows a strong sense of commitment and a desire to participate in research that can help to improve his knowledge of instructional technology and improve the profession in general.

The information gathered by the demographic instrument indicates that the average panelist was indeed an expert in the use and management of instructional technology in higher education. Collectively, the 22 panelists responding to the demographic questionnaire had earned 56 academic degrees. Of the 22 panelists, 20 (90.9%) had masters degrees and 11 (50%) had doctorates. They belonged to 27 different professional associations. Their professional involvement is evident in the fact that 7 (23.3%) of the 22 panelists attended AECT's 1985 national conference and 4 (13.3%) attended ALA's 1985 national conference. The panelists had a collective total of 274 years of experience in their job category, or a mean of 13.1 years (194 years total at their current sites). Finally, the panelists had a total of 190 years experience in their primary job functions, or a mean of 9.5 years.

Institutional Data

The Institutions

The panelists worked at 23 different institutions (the 23rd panelist did not submit a demographic questionnaire but

the name of that panelist's institution is included). An alphabetical listing of the institutions from item 1.(b) - your institution - follows: Boston College; California State University at Dominguez Hills; Clarkson University; Drexel University; Loyola Marymount University; Massachusetts Institute of Technology; Northwestern University; Olympic college; San Francisco State University; Santa Monica College; Syracuse University; Temple University; Texas A&M University; University of Arizona; University of Dayton; University of Georgia; University of Iowa; University of Mississippi; University of Oregon; University of South Alabama; University of South Carolina; University of Southern California; and University of Virginia. Fifteen, or 65.22%, of the institutions were public and 8, or 34.78%, private.

Job Titles

The panelists' job titles - item 1.(d) - were as varied as their institutions: 3, or 13.64% had the title "Audiovisual Center Director;" 3, or 13.64%, "Library Director;" and 16, or 72.73%, various titles, each mentioned only once. These unique job titles included: Director, Arts & Sciences Media Learning Center; Director/Assistant to Dean of Humanities; Assistant Library Director; Media Specialist; Director, Administrative Services and the Instructional Media Center; Assistant Director, Division of

Media & Instructional Services; Director, College of Arts and Sciences Language Laboratories; Director, Instructional Media Center; Coordinator of Instructional Television; Media Coordinator; Director, Instructional Services Center; Director, Communication and Resource Center; Director, Instructional Resources Center; Manager, Audio-Visual Resources; Head, Instructional Media Center; Director, Audiovisual Services; Director, Learning Resource Center; and Head, Media Services.

As with the panelists' memberships in professional associations, there is a great deal of diversity in both the names institutions choose for their central media services and the titles they select for the positions responsible for the operation of those services. This diversity of names and titles suggests that there are many different philosophies regarding the offering of media services in higher education. The demographic data suggests three main organizational approaches to media services in higher education: a centralized library/media, or print/nonprint service; centralized but separate print and nonprint media services; and centralized library services co-existing with decentralized media services designed to meet the specific needs of the schools or departments in which they operate. The decision as to which approach a university takes depends on many variables, including: institutional mission or philosophy; curriculum; size of the institution; and funding environment.

Enrollment

Responses to item 9. - student enrollment at your institution - were fairly evenly distributed. Seven panelists each (31.82% each) reported enrollments of 5001 - 15,000 and 25,000 or more. A mean student enrollment of 16,363 was derived from the enrollment range midpoints. The random stratified sampling technique was effective since the mean enrollment is roughly in the middle of the 5,000 or less and 25,000 or more enrollment ranges. Enrollment details are given in Table 9.

Table 9

Student Enrollment (FTE, N = 22, mean = 16,363)

Responses	Enrollment Range	Percentage
3	5,000 or less	13.64%
7	5,001 - 15,000	31.82%
5	15,001 - 25,000	22.73%
7	25,000 or more	31.82%

Staff Size

There was less variety in central media services staff sizes. The greatest number of responses to item 10. - central media services staff size (permanent) - was 8 (47.06%) for option (a) which indicated a permanent full-time/40 hour per week staff of 5 or less. The mean

permanent staff size was 8, again determined from the midpoints of the staff size ranges. The other responses to item 10. are summarized in Table 10.

Table 10

Permanent Staff Size (FTE, N = 17, mean = 8)

Responses	Permanent Staff Size Ranges
8	5 or less
2	6-10
5	11-15
0	16-20
0	21-25
2	25 or more

Item 11. - central media services staff size (student) -

Table 11

Student Staff Size (FTE, N = 16, mean = 13)

Responses	Student Staff Size Ranges
5	5 or less
1	6-10
5	11-15
3	16-20
1	21-25
1	25 or more

asked panelists to indicate the number of undergraduate and graduate student workers (based on a full-time/40 hour per

week equivalent) employed by their institutions' central media services. By combining the extremes and the range midpoints a mean of 13 student employees was calculated. A breakdown of the 16 responses to item 11. is found in Table 11.

Budget & Funding

Item 12. - central media services budget - asked panelists to indicate the range for their total central media services budget. The panelists were asked to include salaries, benefits, hardware, rentals, maintenance and software in their indications of a total budget range for the current year. Nearly one-half of the 18 panelists responding to item 12., 8 panelists, or 44.44%, chose option (a) - $1-100,000. A mean budget of $255,572 was calculated

Table 12

Central Media Services Budget (N = 18, mean = $255,572)

Responses	Budget Ranges
8	$ 1 - 100,000
2	$ 100,000 - 200,000
2	$ 200,000 - 300,000
1	$ 300,000 - 400,000
3	$ 400,000 - 500,000
0	$ 500,000 - 750,000
0	$ 750,000-1,000,000
2	$1,000,000 or more.

from the midpoints of the budget ranges. Table 12 shows the other responses to item 12.

Information on funding sources was solicited by item 13. Panelists were asked to rank the three primary sources of funds for their institution, using 1 for the largest source and 3 for the smallest. The summary of the rank order was determined by a simple majority of responses. The funding sources are listed Table 13. As might be expected, governmental and tuition were the most common sources of funds.

Table 13

Funding Sources (N = 19)

Rank	Sources
1	governmental
2	tuition
3	grants
4	gifts
5	generate own funds

Modes Of Instruction

Item 14. - modes of instruction used at your school - asked panelists to rank modes of instruction. As with item 13. - funding sources for your institution - the summary of the rank order was determined by a simple majority of panelists' responses. The summary in Table 14 uses 1 to

indicate the most common instructional mode and 6 for the least common. This item provided a validity cross check with the Delphi instrument section on Instructional Techniques as will be discussed in the Delphi analysis section of this chapter.

Table 14

Modes of Instruction (N = 21)

Rank	Modes of Instruction
1	lecture
2	print
3	film (still and motion)
4	television
5	computer
6	audio

Most Promising Instructional Technology In Use At Panelist Site

Item 15. of the demographic questionnaire asked the panelists to identify the most promising instructional technology currently in use at their institutions. All 21 of the responses to this item were related to either computer (54.55%) or video (45.45%) technologies. Of the 12 computer related responses, 7 were for unspecified general uses of computer technology. The other five responses for instructional uses of computers were specified for: computer assisted instruction; graphics; language

instruction; word processing; and an on-line library catalog and computer retrieval system. It is interesting to note that none of the 12 computer related responses were mentioned more than once. Although this may suggest a diversity of computer applications, it might also be concluded that instructional technologists are not sure as to how computers fit into their operations. The diversity of response regarding computer usage might also indicate that most academic computing operations are independent of media services.

A breakdown of the 10 video related responses follows: 3 interactive video; 2 general video; 2 Instructional Television Fixed Services (ITFS); and 1 each for cable television, case study with videocassettes, and small video formats. There seems to be more consensus as to the promise of video than was seen in the responses for computer use. This is probably because the panelists are more familiar with video technologies than with computer technologies.

Most Promising Anticipated Instructional Technology At Panelist Site

Item 16 asked the panelists to identify the most promising instructional technology anticipated for use at their sites within the next five years. As with the previous item, the responses were split between technologies related to computers and video. However, the proportions of

video to computer responses were opposite to the responses to item 15. In item 16, there were 17 (68%) video related responses: 4 each for interactive video and teleconferencing or satellite technologies; 2 each for broadband systems and cable television; and 1 each for general video, ITFS, small format video, videocassettes, and videotex. Again, this data suggests more panelist familiarity with video technology. The responses indicate a future focus on interactive video and satellite telecommunications.

The 8 (32%) computer related responses are summarized, in descending order: 4 computer assisted instruction; 2 networks; and 1 each for general and requires computers for all students. The obvious panelist focus for future technological applications is computer assisted instruction.

Best And Most Innovative Media Services At Other Sites

The final item of the demographic questionnaire asked the panelists to identify three colleges or universities which, in their opinion, have the best and most innovative media services. The panelists were also asked to give a brief reason for their choices. Indiana University, long known for its instructional technology programs, was the only institution to be cited by more than two panelists. The responses to item 17. are given in Table 15.

Table 15

Innovative Media Services (N = 13)

Citations	Institution (Reasons for Citation)
3	Indiana University (old AV program with talented staff; good usage; and good staff, funding, administrative support, equipment and facilities)
2	Boise State University (well managed with service philosophy; and low budget computer graphics)
2	Brigham Young University (extensive hardware and research; videodisc)
2	Stanford University (ITFS engineering; and microcampus concept)
2	University of Nebraska - Lincoln (interactive videodisc; and interactive videodisc)
2	University of Utah - Salt Lake City (interactive videodisc; and interactive video & computer assisted instruction)
2	Washington State University (high-end computer graphics)
1	Central Washington University (good relations with administration)
1	Florida State University (CAI and instructional design)
1	Golden West College (computers)
1	Illinois State University - Normal (small yet diverse)
1	Kent State University (good staff, funding, administrative support, equipment, and facilities)
1	Miami Dade Community College (outreach programs, cable utilization, and self study programs)
1	Miami University - Oxford, Ohio (good staff, funding, administrative support, equipment, and facilities)
1	Purdue University (none given)
1	University of California - Los Angeles (WANDAH writing program on personal computers)
1	University of Illinois - Urbana Champaign (PLATO system)
1	University of Portland (mediated classrooms by design)
1	University of South Carolina (TV)
1	University of Southern California (comprehensive program)
1	Utah State University (interactive videodisc)
1	Worchester Polytechnic Institute (none given)

Institutional Profile

A profile of the average institution at which the panelists for this study worked has been drawn from the institutional data presented above. The average institution is public with an enrollment of 16,663 FTE students. Although three of the institutions use Audiovisual Center Director and three use Library Director as job titles for the panelists, there is no way to determine a typical job title for the panelists. There is more certainty in describing the average institutions central media services staff size: 10 permanent employees and 13 student workers (both FTE averages). The average total annual budget for central media services is $255,572. The two greatest sources of funding are the government and tuition. Lecture and print formats represent the two most common instructional modes at the average institution. Most institutions feel that computers are the most promising instructional technology currently used, but feel that video technologies hold greater promise for the next five years. Finally, Indiana University is considered to have the best and most innovative media services.

Delphi Analysis

The Delphi instrument for this study was divided into three parts: Instructional Hardware; Organizational

Concerns; and Instructional Techniques. The panelists were instructed to circle their responses to the three categories (Implementation, Innovative, and Priority) for each of the 49 items. Their responses were to be given from a general perspective of the field of instructional technology rather than from the specific perspective of their own institutions. Choices for items in the three categories were: implementation - a range of years or NA for not appropriate; innovative - yes or no; and priority - low, medium, or high. Panelists were also asked to avoid using the "not appropriate" (NA) category unless they had no knowledge of the item on which to base an opinion or guess.

The first round, consisting of a cover letter (see Appendix D), two Delphi instruments (see Appendix A), one demographic questionnaire (see Appendix C), and an addressed/stamped envelope, was mailed to 53 potential panelists on February 15, 1985. Panelists were requested to return their completed questionnaires no later than March 1, 1985. A letter of acknowledgement was mailed to those panelists responding by the deadline (see Appendix J). A follow-up letter was mailed to those panelists who missed the deadline (see Appendix J). The researcher also made a follow-up telephone call to panelists who hadn't returned materials on time. Round one was completed by 23 panelists yielding a return rate of 43.4% (two of the panelists returned round one after its summary and the Delphi instrument for round two had been mailed so their comments

were added in the round two summary).

Prior to mailing round two, all round one participants were telephoned to encourage their continued participation in the study. On April 26, 1985 the round two package was mailed to the 21 panelists who had completed round one. The round two package included: a cover letter (see Appendix I); instructions for round two (see Appendix A); a round two Delphi instrument (see Appendix A); a 17 page round one summary (see Appendix E); and an addressed/stamped envelope. The round two return deadline was May 10, 1985. Follow-up telephone calls were made to encourage panelists to return round two. Round two was completed by 18 panelists, or 85.7% of the 23 panelists who completed round one.

Again, prior to the mailing of round three, all round two panelists (and a few round one panelists who dropped out for round two) were contacted by telephone to thank them for their efforts thus far and to encourage them to complete the third and final round. In the third Delphi round panelists were asked not to respond again to the 35 items for which consensus had already been obtained in all three categories. The abbreviated round three Delphi instrument was shortened from 12 to 8 pages (see Appendix B). Panelists were, however, encouraged to continue their dialogue and reconsideration of these 35 items by writing comments in the additional item blanks at the end of each of the three sections. Apparently the panelists felt satisfied with the second round ratings for these 35 items since no one

re-entered them as additional items in the third round. Round three materials included: a cover letter (see Appendix I); instructions for round three (see Appendix B); the abbreviated round three Delphi instrument (see Appendix B); a 19 page round two summary (see Appendix F); and an addressed/stamped envelope. Round three was mailed to 23 panelists (including the two who had dropped out of the study during round two) on June 8, 1985 with a requested return date of June 21, 1985. Follow-up letters were mailed to panelists not meeting this deadline (see Appendix J). Round three was returned by 22 panelists, or 95.7% of the round one panelists.

On July 9, 1985 the 9 page final round three Delphi summary (see Appendix G) and the demographic summary (see Appendix H) were mailed to the 22 panelists who had completed round three. One final communication was sent to the panelists on August 13, 1985 to notify them of AECT's acceptance of the workshop and to give them details on the rebate plan (see appendix J).

Items from Instructional Hardware, Organizational Concerns, and Instructional Techniques sections will be analyzed in clusters from each of the three sections. Although summary tables are provided in the text, the reader is referred to the three Delphi summaries in the Appendixes for detailed information related to each item (see Appendixes E, F, and G).

Instructional Hardware

The 26 Instructional Hardware items which were specified on the Delphi instrument by the researcher have been clustered into four groups of similar items to facilitate discussion of the findings of the study. The four clusters of similar items are Audiovisual and Miscellaneous Instructional Hardware, Computer-Related Instructional Hardware, Telecommunications Instructional Hardware, and Television Instructional Hardware. The Audiovisual and Miscellaneous Instructional Hardware items will be discussed first.

Audiovisual and miscellaneous instructional hardware

A summary of panelist responses to the four items in this cluster is presented in Table 16. The first two items, audio units and film, are traditional instructional technologies of long-standing use in higher education; thus the unanimous now implementation for both items. There was also unanimous agreement that neither audio units nor film were innovative. In light of the above, it is not surprising that both were considered to have a medium priority. Although this data is not particularly revealing, two of the panelists' comments regarding audio units are instructive. The first comment was a positive one regarding the common availability of audio units and the fact that

they "serve purposes other technologies do not in more cost effective ways." The second comment was related to the fact

Table 16

Audiovisual and Miscellaneous Instructional Hardware: Delphi Consensus Summary for Implementation (Impl.), Innovative (Innov.), and Priority Categories; With an Indication of the Round (Rd.) in Which the Most Significant Consensus Was Obtained in All Three Categories

Delphi Item	Rd.	Impl.	Innov.	Priority
1. audio units	2	now	no	medium
10. film	3	now	no	medium
11. holography	2	91-93	yes	low
12. pharmaceutical learning enhancements	2	NA	yes	low

that audio units appeal only to one sense. Instructional theory acknowledges that the more senses which are engaged, the greater the learning potential becomes.

It took three rounds to reach even a marginal consensus (50%) on the priority for item 10., film. Most of the panelists' comments were related to the under-utilization of film in disciplines for which vast amounts of materials are available and the belief that film would soon be replaced by video which is less costly than film and more flexible in terms of its use.

The other two items in this cluster, holography and pharmaceutical learning enhancements, were far more controversial than were the first two items. Although both were considered innovative, they both received low priorities. Holography received a low priority primarily because general implementation was predicted to be more than five years in the future. Also it was seen by some of the panelists as a mere extension of existing instructional technologies. The important implication of the panelists' responses to holography item is that instructional technologists should be actively considering appropriate instructional uses of this technology which will probably be a part of higher education media services by the year 1992. Pharmaceutical learning enhancements was the only item in the Instructional Hardware section to receive a consensus as not appropriate for implementation. This rating was based on concerns related to ethics, morality, and the potential for physiological and psychological damage.

Two comments by panelists illustrate opinions about pharmaceutical learning enhancements. The first, a round two comment, accepts the inevitability of pharmaceutical learning enhancements: "Will eventually be used. Chemical engineering, genetic engineering are progressing relatively rapidly." The second comment, from round one, is more representative of the panelists' consensus that pharmaceutical learning enhancements are not appropriate for use in instructional technology: "If this means 'drugs' the

benefits are outweighed by the possible abuse and disadvantages likely to result from the use of such agents. Do not see how drugs fit into instructional technology as presently perceived."

Computer-related instructional hardware

This section groups six computer-related technologies for discussion and analysis. A summary of the panelists' responses to these items is found in Table 17.

Table 17

Computer-Related Instructional Hardware: Delphi Consensus Summary for Implementation (Impl.), Innovative (Innov.), and Priority Categories; With an Indication of the Round (Rd.) in Which the Most Significant Consensus was Obtained in All Three Categories

Delphi Item		Rd.	Impl.	Innov.	Priority
3.	computer networks	2	now	yes	high
4.	computer based telecommunications	3	86-87	yes	medium
5.	computer graphics	2	now	yes	medium
6.	computer voice recognition	3	91-93	yes	low
7.	data base programs	2	now	no	medium
14.	robotics	3	88-90	yes	medium

Consensus was obtained for one-half of these six items by the second round. It took three rounds to achieve consensus on the other half of the computer-related items. This gradual building of consensus is a good example of the convergence of opinion that occurs between rounds of a Delphi study. Convergence of opinion between Delphi rounds one and two is especially evident in the responses to item 3. - computer networks. For each of the three categories for computer networks there was increased consensus between rounds one and two: implementation - 52.38% for "now" in round one, 76.47% in round two; 85% for "innovative" in round one, 100% in round two; and 71.43% for "high" priority in round one, 76.47% in round two. As with the other items for which consensus had been obtained in all three categories by round two, the panelists were not required to reconsider computer networks in round three.

Two other general observations can be made about the panelists' responses to the computer-related items. First, all of the items were considered to be innovative except data base programs. The panelists' consideration of data base programs as not innovative is probably because, unlike the other five items, data base applications are already fairly routine in media services (even if those applications were seen as more administrative than instructional by some of the panelists). The second general observation is that the panelists assigned medium priorities to four of the six computer-related items. The items which were given the

extreme priority ratings of high and low merit additional discussion.

Computer networks was assigned a high priority by the panelists for several reasons including cost savings for shared software and simultaneous use during instruction, exchanging useful programs, facilitating instruction throughout the university, and the exchange of tested teaching ideas. The panelists did, however, have some reservations about the instructional uses of computer networks. One expressed concerns regarding overloading systems, down time, and costs. Another commented that computer networks are "...more important administratively than instructionally at present, and because of the impersonal nature of it - will probably not challenge face to face instruction with faculty. But for interoffice/intercampus correspondence, data/library access it is highly valuable." Thus, computer networks should be considered by instructional technologists as a high priority part of media services in higher education.

The other item receiving an extreme priority rating (low) in this cluster was computer voice recognition. The round one implementation responses were spread across seven of the eight options. It took three rounds before the panelists achieved consensus (57.14%) for implementation between 1991 and 1993. This item had a consistently strong consensus for the innovative category throughout the three rounds. In terms of priority, there was no consensus in the

first Delphi round. A consensus for low priority was obtained in round two and strengthened in round three. Although panelists cited applications for language instruction, special education, and interactive video; many felt that computer voice recognition technology was currently too imperfect and costly, especially when keyboard entry could suffice. The overall conclusion is that computer voice recognition will not be implemented in higher education media services until around 1992. However, given the long-range nature of planning and budget processes, instructional technologists would be well advised to consider instructional applications of this technology for which a breakthrough is likely in the near future.

There are two significant implications in the data presented above. The first is that computer networks, computer graphics, and data base applications are already implemented in higher education media services. Those institutions not already making instructional uses of these technologies should consider doing so particularly with the high priority computer network item. Institutions already using them should consider both how to improve their applications and sharing information that would be useful for implementation in the non-using institutions. The second overall implication is that computer based telecommunications, computer voice recognition, and robotics should be thoroughly studied in terms of the appropriateness of their implementation as part of higher education media

services between the years 1986 and 1993.

Telecommunications instructional hardware

Six of the ten items in the telecommunications cluster

Table 18

Telecommunications Instructional Hardware: Delphi Consensus Summary for Implementation (Impl.), Innovative (Innov.), and Priority Categories; With an Indication of the Round (Rd.) in Which the Most Significant Consensus was Obtained in all Three Categories

Delphi Item		Rd.	Impl.	Innov.	Priority
2.	audio teleconferencing	2	now	no	medium
9.	fiber optics	3	*	yes	medium
13.	radio transceiver (portable with keyboard)	3	88-90	yes	low
15.	satellite (direct broadcast)	2	now	yes	medium
16.	satellite earth station	3	now	yes	*
17.	satellite uplink	3	now	yes	medium
22.	teletex	2	now	yes	medium
24.	video teleconferencing (full motion)	2	now	yes	medium
25.	video teleconferencing (still frame)	2	now	no	low
26.	videotex	2	now	yes	low

* Consensus not obtained

are related to satellite technology. The other four items (9., 13., 22., & 23) are related to the transmission of information by means other than satellites. The responses of the panelists seem fairly conservative in this cluster. Consensus was obtained by round two for six of the ten items; and in round three for the other four items. The consensus for implementation was "now" for eight items, 1988-1990 for the ninth item, and no implementation consensus for the tenth. Only two of the items (2. & 25) were not considered to be innovative. In terms of priorities, six items were rated medium, three low, and consensus was not obtained for the tenth item. This data is detailed in Table 18.

Consensus could not be obtained in one category for two of the items in this cluster. The first of these two items, fiber optics, narrowly missed implementation consensus for "now" with 47.37% of the panelist selecting this option in round three. (This is especially interesting in light of the 52.38% consensus for a "now" implementation in round one. Although consensus was shifted from one option to another and weakened between rounds in several Instructional Hardware Delphi items, fiber optics implementation is the only item to lose a previously established consensus.) The other 52.63% of the panelists responding to this item in round three anticipated implementation of fiber optics between the years 1986 and 1993. Thus, we can expect to see fiber optics technology implemented in higher education

media services in the very near future. Many of the panelists commented favorably on fiber optics' capacity to transmit voice, computer, and video on one system. However, the initial costs of installing a fiber optic system probably dampened panelist enthusiasm. Two panelists commented that until existing transmission systems are saturated or in need of replacement and until the costs of fiber optics decrease, they would not assign a high priority to this item.

The other item for which consensus was not obtained in each of the three categories was satellite earth station. Although there was consensus for a now implementation and innovative rating, the panelists could not agree to a priority. After three rounds panelists gave equal weight to medium and high priorities (45.45%, each) while 9.09% indicated a low priority. The lack of panelist consensus for priority is illustrated by two round three comments. the first supports a medium priority: "There are still other more pressing concerns, therefore, in terms of priority, medium still seems to be O.K." The second comment supports a high priority: "I insist on keeping the priority at 'high'. International implications for education and understanding is [sic] too important." In light of the strong consensus for implementation and innovation, one might consider the priority to be fairly important to the panelists.

Only two of the ten telecommunications items were not

considered to be innovative technologies: audio teleconferencing and video teleconferencing (still frame). This "not innovative" rating was based, in part, on the superiority of full motion video teleconferencing which links remote sites via satellite with real-time video and audio.

Three items in the telecommunications cluster received low priority ratings. Video teleconferencing (still frame) received its low priority rating for the reason discussed above. Another item with a consensus for low priority was radio transceiver (portable with keyboard). Since the largest number of round one implementation responses was for "not appropriate" (44.44%) and 25% of the panelists still chose "not appropriate" in round two, the round two summary defined this item as "an ultra-portable microcomputer capable of networking to other computers without being hardwired to them (and without modems)." One panelist's comment captures the reason for the low priority: "A convenience but not very necessary." The third item in this cluster to receive a low priority was videotex. Again, a panelist comment is indicative of the consensus for low priority: "convenient, time saving, not terribly exciting."

The overall implication of the data collected on the telecommunications items is that they are currently in use in higher education media services (with the exception of radio transceivers) and of medium priority (with the exceptions of radio transceivers, still frame video

teleconferencing, and videotex). The lack of consensus for a high priority for any of the items in this cluster reflects the high capitalization costs and the high level of technical and engineering support required by these technologies, particularly those which use satellite transmission.

Television instructional hardware

Six items related to instructional television hardware make up this final cluster of instructional hardware items. Only one of these items, 3D television, required three rounds to obtain consensus. A second item was considered for three rounds by the panelists, who never reached consensus on a priority for broadcast television. Four of the six items achieved consensus for a "now" implementation, while the other two items are anticipated for implementation between 1988 and 1993. The panelists considered four items to be innovative and two not innovative. Priorities were mixed for the five items which achieved consensus: three medium; one low; and one high. Table 19 presents a detailed summary of the panelists' responses to the items in this cluster.

Three items in this cluster merit discussion: broadcast television because of the lack of priority consensus; 3D television for its low priority; and videodisc for its high priority. Throughout the three rounds there

was panelist consensus for broadcast television implementation (now) and innovative (no) but not for priority. There was nearly consensus for a high priority in the first round with 47.06% of the panelists selecting a high priority for the item and 35.29% for low priority. By the third round, the panelists had reversed themselves with 45% opting for low priority, 20% for medium, and 35% for high. Two panelists' comments help to explain why the

Table 19

Television Instructional Hardware: Delphi Consensus Summary for Implementation (Impl.), Innovative (Innov.), and Priority Categories; With an Indication of the Round (Rd.) in Which the Most Significant Consensus Was Obtained in All Three Categories

Delphi Item	Rd.	Impl.	Innov.	Priority
8. digital wall screens	2	88-90	yes	medium
18. television, broadcast	3	now	no	*
19. television, cable	2	now	yes	medium
20. television, closed-circuit	2	now	no	medium
21. television, 3D	3	91-93	yes	low
23. videodisc	2	now	yes	high

* Consensus not obtained

largest number of responses in round three (45%) were for a

low priority: "limited selection of programs appropriate to higher education;" and "Less useful for formal education than general interest and information." A round three panelist comment supports 35% of the panelists who selected a high priority in round three:

> Television is too persuasive and too important not to have a high priority - local and educational TV are important vehicles for upgrading the educational level of the entire population. Local universities can have a major impact on broadcast TV programming.

Another item which merits discussion is 3D television which obtained a panelist consensus for low priority. The consensus for low priority became stronger in each round until 84.21% of the panelists opted for a low priority in round three. Many of the panelists' comments indicated their opinion that 3D television is an unnecessary enhancement of existing television technology. One even cited the failure of 3D movies in the mid 1950s. Although 3D television may have some instructional applications in fine arts, as indicated by one panelist, the consensus for low priority is an indication that 3D television may have more fad appeal than instructional applications.

Videodisc had the strongest consensus for high priority of all the items in the instructional hardware section of the Delphi instrument: 81.25%. It is also noteworthy that 100% of the panelists' responses in the first two rounds were for the innovative category. The fact that so many of

the panelists commented about the great potential of videodisc in instructional applications should make this medium of special interest to all instructional technologists.

Additional instructional hardware items added by the panelists

The panelists specified six additional hardware items in response to item 27. of the Instructional Hardware section of the Delphi instrument. As three of these panelist' specified items were mentioned in more than one round, there were a total of ten additional hardware item responses. Detailed information regarding the hardware items specified by the panelists is given in Table 20.

Several of these additional items require definition. Multi-image is generally considered to be a slide/tape system which is sometimes augmented with video or motion picture images. Although two slide projectors synchronized with an audio track constitutes a multi-image system, large productions often use twenty or more computer-controlled slide projectors. The integrated video display is a one-piece portable system which combines a video projector, television tuner, video recorder, and public address system. The panelist specifying the integrated video display in round two gave it a high priority because of its ability to "replace overhead, slide, and opaque projectors...." VHS

with microcomputer was specified as an interactive video tape system with the program on a VHS video recorder being controlled by an external microcomputer.

All six of the items were considered to be innovative by the panelists. Only telefacsimilie had a projection for

Table 20

Additional Instructional Hardware Items, As Specified by the Panelists: Delphi Summary for Implementation (Impl.), Innovative (Innov.), and Priority Categories; With an Indication of the Round (Rd.) in Which the Items Were Added

Delphi Item	Rd.	Impl.	Innov.	Priority
multi-image	1	now	yes	medium
telefacsimilie	1	91-93	yes	medium
integrated video display	2	now	yes	high
microcomputer graphics	2	now	yes	high
multi-image (2 responses)	2	now	yes	medium
VHS with microcomputer	2	now	yes	high
flat-screen TV	3	86-87	yes	medium
integrated video display	3	now	yes	medium
multi-image (2 responses)	3	now	yes	medium
VHS with microcomputer	3	86-87	yes	high

implementation in higher education media service more than five years in the future. The other items are either

already implemented or anticipated to be implemented within the next two years. All of the items were rated as either medium or high priorities. It is interesting to note that the panelist who rated integrated video display as a high priority in round two, downgraded the priority to medium in round three. Finally, the addition of multi-image hardware is significant for two reasons: first, it was the only item specified by more than one panelist; and second, multi-image was the only additional hardware item retained in all three rounds.

Instructional hardware summary

After three Delphi rounds there was consensus in all three categories for 23 of the 26 Instructional Hardware items. This represents panelist consensus in all categories for 88.46% of the hardware items. The items for which panelist consensus was not obtained in all three categories did, however, show consensus in two categories: 9. fiber optics (consensus for innovative and priority, but not for implementation); 16. satellite earth station (consensus for implementation and innovative, but not for priority); and, 18. broadcast television (consensus for implementation and innovative, but not for priority). At the conclusion of the study these three hardware items were the only ones, out of the original 49 specified Delphi items and sub-items, not to obtain panelist consensus in all three categories. The lack

of consensus for these three items should warn instructional technologists to carefully consider fiber optics, satellite earth stations, and broadcast television before implementing these technologies in their media service programs.

It is somewhat surprising that there was panelist consensus for high priority for only two of the original hardware items: computer networks and videodisc. The high priority, innovative rating, and now implementation consensus for these two items suggest a desire for broader implementation and more effective use of computer networks and videodisc before utilizing the other technologies which received lower priorities or future implementation time frames. It should also be noted that three of the additional hardware items specified by the panelists indicated high priority: integrated video display; microcomputer graphics; and VHS with microcomputer. However, generalizations should not be made from the high priority ratings for these items since they represent the feelings of individual panelists rather than the consensus of the Delphi panel.

There was panelist consensus for low priority on seven of the Instructional Hardware items: computer voice recognition; holography; pharmaceutical learning enhancements; radio transceivers (portable with keyboard); 3D television; still-frame video teleconferencing; and videotex. With the exception of still-frame video teleconferencing, all of these items obtained panelist

consensus as being innovative. In terms of implementation, only one item was considered not appropriate: pharmaceutical learning enhancements. There was consensus for now implementation of two items receiving low priorities: still-frame video teleconferencing; and videotex. There was panelist consensus for implementation of the other four hardware items in the next three to eight years. Prior to implementing any of these technologies which had low priority panelist consensus, instructional technologists are advised to consider why there was consensus for low priority. The reasons for low priority consensus by the panelists, which were discussed in detail in the analysis of each of the four Instructional Hardware item clusters, include: moral and ethical concerns; high costs; perception of the technology as a mere extension of existing technology; convenience rather than significant improvement; and the availability of better methods.

Organizational Concerns

The Organizational Concerns section of the Delphi instrument contained 5 items which included 17 sub-items. These items have been clustered into two groups to facilitate analysis and discussion: Degree of Centralization and Scope of Media Services; and Reporting Structure. Although tables designed to summarize the data are provided, the reader is referred to the Delphi summaries

in the Appendixes for more detailed information (see Appendixes E, F, and G).

Degree of Centralization and Scope of Media Services

Items 1. and 5. in the Organizational Concerns section of the Delphi instrument were designed to elicit information related to the degree of centralization and the scope of media services. The responses of the panelists to these items are summarized in Table 21.

The responses indicate panelist consensus for a now implementation for all six of the options for items 1. and 5. The panelists were uniform in their consensus that none of the six options in this cluster was innovative. More specifically, panelist response to item 5. indicates a preference for a high degree of centralization as afforded by one campus-wide center. The high priority option was chosen by 60% of the panelists. Nearly the same percentage of panelists, 65% indicated a low priority for option b. - main center with subcenters all reporting to the same office. The consensus for a high degree of centralization of media services is reinforced by the fact that the panelists were unanimous in their selection of a low priority for option c. (schools/departments provide own services, no central coordination). Although some of the panelists commented that a completely centralized facility might not be responsive enough to the needs of individual

departments, most agreed that the centralized approach was the most cost-effective in that it reduces duplication of resources.

Table 21

Organizational Concerns, Degree of Centralization and Scope of Media Services: Delphi Consensus Summary for Implementation (Impl.), Innovative (Innov.), and Priority Categories; With an Indication of the Round (Rd.) in Which the Most Significant Consensus Was Obtained in All Three Categories

Delphi Item	Rd.	Impl.	Innov.	Priority
1. Centralization of media services				
a. one campus-wide center	2	now	no	high
b. main center with sub-centers all reporting to the same office	3	now	no	low
c. schools/departments provide own services, no central coordination	3	now	no	low
5. Services				
a. to entire university	2	now	no	high
b. to academic departments only	2	now	no	medium
c. to non-university groups	2	now	no	low

The responses to the three options for item 5. - services - indicate a strong panelist preference that media services be provided to the entire university. As with item 1. - centralization of media services - the priority consensus for the three options to item 5. bear out this preference: 85.71% of the panelists selected a high priority for option a. - services to entire university; there was marginal consensus (53.85%) for medium priority for option b. - service to academic departments only; and another strong consensus (85.71%) for low priority of services to non-university groups - option c. It is interesting to note that in option a. - services to entire university - panelist consensus for innovative reversed between rounds one and two, from yes to no. Thus, based on the panelists' responses to these two items, a centralized media service for the entire university is the preferred approach in higher education.

Reporting Structure

The remaining three items in the Organizational Concerns section deal with the reporting structure for the heads of computer, library, and media services. Again, the reader is referred to the Delphi summaries in the Appendixes for information more detailed than that which is summarized in Table 22 (see appendixes E, F, and G).

The panelists concurred that it was inappropriate for

the heads of computer, library, and media services to report directly to either the board of trustees or to the president

Table 22

Organizational Concerns, Reporting Structure: Delphi Consensus Summary for Implementation (Impl.), Innovative (Innov.), and Priority Categories; With an Indication of the Round (Rd.) in Which the Most Significant Consensus Was Obtained in All Three Categories

Delphi Item	Rd.	Impl.	Innov.	Priority
2. Computer head reports to:				
a. board of trustees	2	NA	no	low
b. president	2	NA	no	low
c. vice president	2	now	no	high
d. librarian	1	NA	no	low
3. Library head reports to:				
a. board of trustees	1	NA	no	low
b. president	2	NA	no	low
c. vice president	2	now	no	high
4. Media head reports to:				
a. board of trustees	2	NA	no	low
b. president	2	NA	no	low
c. vice president	2	now	no	high
d. librarian	3	now	no	low

of the university. The panelists were also in uniform agreement that none of these reporting structures was innovative. There was consensus for low priority for all of the reporting structures except those with the computer, library, and media heads reporting to an academic vice president. These three reporting structures received high priorities. The data in the reporting structure cluster seems to be clearer than the data from the Instructional Hardware Delphi item clusters. The panelists feel strongly about their preference for the heads of computer, library, and media services to report directly to the academic vice president. The reasons for this high priority reporting structure are captured by two panelists' comments: "reportage/management decisions must be available at the highest practical level - unified, well organized management is essential because of expense and equipment diversity;" and "best overall planning possible." In round two of the Delphi study the panelists were asked to use item 6. - Additional Organizational Concerns - to comment on the reporting structure for media directors in higher education which they thought would be most appropriate for the 1990s. The comments of the six panelists who responded can be found in the Delphi Round 2 Summary in the Appendixes (see Appendix F). One of the more thought provoking comments is presented below:

> Ideally in order to exert the most influence, the media director would report to the highest level of

> the administration possible, e.g. the president. In practical terms, it is not necessarily the position to which one reports, but the sensitivity of the supervisor to technology as applied in the educational context which makes a difference, be s/he librarian, dean, V.P., or president.

Additional Organizational Concerns

Ample opportunity was provided for the panelists to add items not specified by the researcher in the Organizational Concerns section of the Delphi instrument. In addition to item 6. - Additional Organizational Concerns - each of the five items included an "other" option. The comments of the panelists in response to these opportunities are detailed in the Delphi summaries which can be found in the Appendixes (see appendixes E,F, and G). Some, however, are quoted below since they deal with significant concepts. In round one, a panelist made the following comment in the "other" option to item 1. - centralization of services:

> A 'collegial' system appears best with various centers specializing. eg: 1 - a large 'end user' facility where students come to see, listen, interact; 2 - equipment loan center; 3 - production center, etc. The end user facility would include the media library.

Also in round one, a panelist commented in each of the "other" options to the reporting structure items (2., 3.,

and 4.):

> A high level committee of media director (s), computer director (s), reporting directly to vice president - necessary for technically qualified, professional decisions. Centralization of expenses - purchasing, cable, satellite, etc. enhanced.

One final comment from round three, item 6. is presented: "Comments from round two are very good. Summary is that media units need to be strong, well funded, cost effective and accountable."

Organizational concerns summary

The responses to the five items in Organizational Concerns section of the Delphi instrument were very uniform in the implementation and innovative categories. There was panelist consensus for now implementation for all items which the panelists did not rate as not appropriate. None of the items achieved consensus for being innovative. There was little middle ground for priority consensus. There was high priority panelist consensus for one campus-wide center, service to the entire university, and for the heads of computer, library and media services to report to a vice presidential position. With the exception of item 5.b. - service to academic departments only - which had a marginal consensus for medium priority, every other item indicated panelist consensus for low priority. Thus, from the data

presented above, the ideal media service in higher education is one which operates campus-wide from one center and provides services to the entire university community. The head of media services (computer and library services as well) reports to an academic vice president.

Instructional Techniques

The final section of the Delphi instrument, Instructional Techniques, contained six researcher specified items. Panelist responses to these items are summarized in

Table 23

Instructional Techniques: Delphi Consensus Summary for Implementation (Impl.), Innovative (Innov.), and Priority Categories; With an Indication of the Round (Rd.) in Which the Most Significant Consensus Was Obtained in All Three Categories

Delphi Item	Rd.	Impl.	Innov.	Priority
1. Independent study	2	now	no	medium
2. In-home, broadcast	3	now	yes	medium
3. In-home, correspondence	2	now	no	low
4. In-home, nonbroadcast telecommunications	3	now	yes	medium
5. Programmed instruction	2	now	no	low
6. Oral lectures	2	now	no	high

Table 23. For more details related to these items, the reader is referred to the three Delphi summaries in the Appendixes (see Appendixes E, F, and G).

Only two of the items, 2. - in-home, broadcast and 4. - in-home, nonbroadcast telecommunications - required three rounds to obtain panelist consensus in all three categories. The panelists agreed that all of the techniques were implemented now. Only two of the items had panelist consensus as being innovative. As such, increasing utilization of in-home broadcast and nonbroadcast telecommunications can be anticipated for future media services in higher education. These two technologies will be utilized increasingly as more emphasis is placed on distance learning in higher education. A good example of an application of these technologies for distance learning is the two semester physics course, The Mechanical Universe. This video course was funded by the Annenberg Foundation and began to be broadcast throughout the United States in the fall of 1985. Numerous universities have arranged the use of this programming as a telecourse, complete with on-campus sessions with instructors, to supplement the broadcast offerings, and academic credit.

In terms of priorities for these six researcher specified instructional techniques, both correspondence and programmed instruction had panelist consensus for low priorities. Only oral lectures received consensus for a high priority. This response serves as a validity cross

check to the demographic item in which panelists ranked modes of instruction at their institutions. Oral lectures was ranked as the most common mode of instruction by the panelists responding to that item in the Demographic instrument. It seems that, despite some of the disparaging remarks by the panelists, that the oral lecture will remain the primary instructional delivery mode in higher education for the foreseeable future.

Additional instructional techniques added by the panelists

Although eight instructional techniques were mentioned in the 15 comments made by the panelists in response to item 7. (additional instructional techniques), all but one of them could be included with the six researcher specified instructional techniques. The one exception is in-class use of video and computer assisted instruction. The other panelist specified techniques could be included in the following items: in-home, broadcast - distance learning and television talkback; in-home nonbroadcast telecommunications - 7 panelist responses for interactive video (5 specifying interactive videodisc), teleconferencing, and distribution methods; and programmed instruction - computerized instruction and computer assisted instruction.

Instructional techniques summary

Two major conclusions can be drawn from the data presented above. The first conclusion is that the oral lecture format will remain the dominant instructional delivery system in higher education even with the implementation of new technologies. The second major conclusion is that increased utilization of broadcast and telecommunications technologies may be anticipated as more colleges and universities use distance learning to reach nontraditional students.

Delphi Summary: Model 1990s Media Services in Higher Education

Using the data compiled in this Delphi study, a model of media services in higher education for the 1990s can be suggested. It should be kept in mind that all future predictions are somewhat tentative. However, as pointed out in Chapter II, the Delphi technique is considered to be capable of providing a fairly accurate estimation of future events based on the consensus of expert opinion by Delphi panelists. It is with these parameters that the model is presented.

Media services in the 1990s will rely heavily on both traditional and emerging instructional hardware to meet changing needs in higher education. There will be continued

use of more traditional instructional hardware such as: audio units; film (still and motion); closed-circuit and cable television; and video (including new display formats such as digital wall screens). Many refinements which will improve the reliability and convenience of traditional instructional hardware can be expected.

Among the most significant hardware trends will be the increased use of interactive technologies. This trend will see a general focus on the separate use of both computer and video technologies. However, the specific focus will be on the combination of the two technologies into sophisticated interactive videodisc systems. Another major hardware trend which can be forecast based on the Delphi data is the increased use of computer networks in general and graphics and data base applications in particular.

Although higher education media services in the 1990s will be hardware intensive operations, the following instructional hardware will see, at best, gradual or cautious implementation: broadcast television; computer based telecommunications; computer voice recognition; direct broadcast satellite; fiber optics; holography; robotics; satellite earth station; satellite uplink; 3D television; video teleconferencing (full motion); and videotex. More study of the instructional benefits of these expensive and sophisticated technologies will be required before the majority of institutions of higher education embrace them for their media services. The implementation of these

technologies may be hastened, however, by hardware/software breakthroughs, cost reductions, and more essential rationales for supporting the curriculum with technology..

Another group of instructional hardware will probably either not be implemented, or be superseded by better technologies: audio teleconferencing; electronic or pharmaceutical learning enhancements; radio transceivers (portable with keyboard); teletex; and video teleconferencing (still frame). It should be noted that an overwhelming business, industrial, or consumer acceptance of these technologies may improve the likelihood of implementation in higher education media services.

In terms of the organizational structure of media services in higher education for the 1990s, it would appear that there will be one central operation providing services to all elements of the campus community. This arrangement may be mandated by the sophistication and expense of installing, operating, and maintaining instructional technology systems. The heads of computer, library, and media services will all report to the same position, most likely an academic vice president. This reporting structure will become more and more practical for coping with both the information explosion and the sophisticated technological systems required to deliver vast amounts of information to students, faculty, and staff.

Oral lecture will continue to be the dominant delivery mode in higher education. However, instructional hardware

delivery systems will begin to challenge the dominance of the oral lecture. Distance and in-home learning techniques will also challenge the oral lecture's dominance as higher education seeks to serve more nontraditional students in off-campus locations, especially in business and home settings. Thus we can expect the media service of the 1990s to continue to supplement the oral lecture, but with increasing attempts at distance learning and the use of courseware designed for both personal enrichment and individualized academic study.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

An Overview of the Study

Background Issues

The emerging Information Age, with its accompanying information explosion, is causing major changes in society in general and in the American education system in particular. Most of these changes are related to the transition from an industrial based society to one based on service. Some of the changes are related to new learning styles which are surfacing in response to exposure to interactive technologies such as computers and videodiscs; and yes, perhaps even in response to electronic arcade games.

Numerous demographic changes are accompanying these changes caused by the transition to a service society. As industrial careers disappear, retraining of workers is necessary. Some predictions call for five or six career retrainings being forced upon workers in one lifetime because the technology is changing so fast. There are also major population shifts to contend with: not only shifts of

the population from rural to urban and from rust belt to sun belt; but also the population has a rapidly increasing percentage of older people and minorities. These population shifts will make significant differences in the types of students served by higher education in the future.

The educational system has a major role to play in this time of wrenching societal change. Some of the educational concerns for the information age include: technological literacy; coping with the narrow focus of for-profit and industrial education; preparing students to cope with life in the information age; and the preparation of teachers and other educational professionals who will be leading the educational system for the next 30 to 40 years.

Objectives of the Study

The purpose of this study was to predict the nature of future media services in higher education in order to offer long-range planning information. To help provide guidelines for the use of educational technologists and administrators in higher education in meeting the needs of the future, this study had three primary objectives:

1. to obtain expert opinion regarding future media services in higher education
2. to identify innovative media services and applications of instructional technology in higher education

3. to make recommendations for implementing innovative instructional technologies and nonprint media services in higher education

Methodology

The Delphi technique was chosen as the methodology best suited for meeting the objectives. Delphi is a questionnaire based technique characterized by feedback and iteration between two to five rounds. The Delphi technique has been proven to provide a reasonable estimation of future occurrences. The Delphi prediction relies on expert opinion and the building of consensus through the rounds of the study. The Delphi instrument for this study was designed and piloted during the fall of 1984 (see Appendix A). A Demographic questionnaire was sent with the round one Delphi instrument. The demographic instrument was designed to gather data to be used in creating a profile of the panelists and their institutions (see Appendix C).

In selecting the sample, only institutions with a full time equivalent enrollment of over 5,000 students were considered. Sixteen schools, identified in the literature as innovators in the use of technology, made up the core of the sample. An additional 37 institutions were randomly selected. All of the data collection sites were stratified according to enrollment size. The Association for Educational Technology and Communication's membership

directory was consulted to determine specific individuals with campus-wide responsibilities for instructional technology at each of the sites (AECT, 1984).

This Delphi study consisted of three rounds which were conducted between February and July of 1985. There was a return rate of 43.4% for Delphi round one (23 returns from the 53 individuals invited to participate). Once 23 panelists had agreed to the study, there was little panelist attrition: 18 of the 23 round one panelists completed round two (85.7% return rate); and 22 panelists completed round three (95.7% return rate).

Findings and Conclusions

The achievement of consensus in this study promoted a generative interaction among leaders in instructional technology. This generative interactivity helped to bring planning efforts to increasingly higher levels as professional expanded their thinking in considering the implementation of new technologies in higher education. Consensus not only provided decision making information but should also help unite instructional technologists in making their needs known more clearly to the producers of instructional hardware and software. General findings of the study also helped identify and make possible the avoidance of costly technological pitfalls. These pitfalls are costly not only in terms of dollars but time,

credibility, and reputation as well, especially in this era of rapid technological change.

Organizational Concerns

The analysis of the Delphi results and responses to the demographic questionnaire allow a prediction of the nature of media services in higher education during the 1990s. In terms of the organizational structure, media services will be provided by one centralized unit which will provide services to the entire campus community (academic and non-academic units). The head of media services will report to the vice president for academics, as will the heads of computer and library services. Most likely, funding for media services will come primarily from governmental or tuition sources. Oral lecture will continue to be the primary information delivery mode in higher education, although its dominance will be challenged by interactive and distance learning technologies. One example of the challenge to oral lectures as the dominant information delivery mode in higher education is the increasing use of distance learning technologies, especially telecourses. The Mechanical Universe is a recent example of a telecourse broadcast in many American cities under the sponsorship of colleges and universities as part of their academic credit bearing curriculum.

Innovative Institutions

The review of the literature identified institutions of higher education making innovative user of technology. Some of these institutions are cited as being innovative for their general high-tech orientation: San Francisco State University (Hawkridge, 1983, p. 119); Massachusetts Institute of Technology (Hawkridge, 1983, p. 121); University of Iowa (Hawkridge, 1983, p. 124); Stanford University; Texas A&M; University of Arizona; University of Georgia; University of Texas; University of South Carolina; and University of Southern California ("Innovator Interview," 1983, p.36). Other institutions are cited for their computer requirements: Carnegie-Mellon University; Drexel University; and Clarkson University ("Innovator Interview," 1983, p. 36). Two other schools are cited for their use of educational television and videodisc: Dartmouth College (Smith & Boehm, 1983, p. 13-14) and University of Nebraska-Lincoln (Tiedemann, in press). In addition to these schools, the panelists for this study identified 22 institutions as having the best and most innovative media services, including: Indiana University; Boise State University; Brigham Young University; University of Utah; and Washington State University. Instructional technologists and educational administrators are advised to become acquainted with media services at some of these institutions, particularly those that are near enough to

visit. Some of them will serve as good role models for the type of media service which will prevail in the 1990s.

Innovative Technologies

Panelists' perception as to which technologies are innovative will help guide long-range planning for media services in the 1990s. There was panelist consensus that 19 of the 26 researcher specified instructional hardware items were innovative. The panelists considered only two hardware items to be both innovative and to have a high priority for use in higher education: computer networks and videodisc. It is recommended that institutions not already using these technologies make plans to do so at their earliest opportunity. Based on a strong panelist consensus of more than 75% for medium priority, computer based telecommunications, fiber optics, and robotics technologies should also be given serious consideration for implementation in the very near future.

Institutions should be cautious about implementing the five innovative hardware items which had consensus for low priority: computer voice recognition; pharmaceutical learning enhancements; radio transceivers (portable with keyboard); 3D television; and videotex. Caution might also be exercised regarding the implementation of broadcast television and satellite earth station technologies, the only instructional hardware items for which there was no

panelist consensus for priority.

Implementation Time Frames

In terms of implementation time frames, the real message is that most of the technologies which comprised the instructional hardware section of the Delphi instrument have already been implemented in higher education media services (15 of 26). Those that haven't already been implemented will be implemented in the very near future. The panelists predict that computer based telecommunications will be implemented in higher education media services between 1986 and 1987. The other technologies are not far behind: implementation in 1988-1990 predicted for digital wall screens, radio transceivers (portable with keyboard), and robotics; and 1991-1993 for computer voice recognition, holography, and 3D television. The only instructional hardware item for which panelist implementation consensus was not obtained was fiber optics. Although approximately 47% of the panelists indicated a now implementation and nearly 16% predicted implementation in 1986-1987, the other panelists chose implementation time frames no later than 1993. Finally, only pharmaceutical learning enhancements were considered inappropriate to media services in higher education because of ethical and moral concerns.

Recommendations for Instructional Technologists and Academic Administrators

A primary purpose of this study was to provide long-range planning information for use by educational technologists and academic administrators. The results of this study clearly indicated that one centralized media center providing services to the entire university community is the preferred organizational and philosophical approach to nonprint media services in higher education. The data also indicated the organizational benefits of having the heads of computer, library, and media services report directly to an academic vice president. The advantages for these organizational arrangements include: more cost-effective selection, acquisition, installation, operation, and maintenance of hardware and software systems; consistency of the quality of services to all elements of the university; and the practical expediency of being able to make decisions related to information services at the highest practical level.

It is recommended that serious consideration be given to current uses or future uses of all of the instructional hardware items which received panelist consensus as being either innovative or for having a high priority (see Tables 16, 17, 18, and 19). Since only two items - computer networks and videodisc - had panelist consensus in both of these categories as well as for a now implementation, it is

recommended that these be the first two technologies considered for implementation by institutions of higher education not already using them in their media services. After computer networks and videodisc technologies have been considered, it makes sense to either re-assess current uses or to plan future uses of the instructional hardware which received panelist consensus for now implementation. The obvious next step would be to consider the other instructional hardware for which there was panelist consensus for future implementation dates in chronological sequence.

Recommendations and/or strategies are offered by the researcher for use by instructional technologists and academic administrators. These recommended strategies for implementing new technology in higher education include: selection strategies; acquisition and installation strategies; strategies for acceptance of new technologies in the campus setting; and problems of access and maintenance.

1. Once an institution begins to consider the implementation of a new instructional technology (or an new application of existing instructional technology), four steps are recommended as part of a selection strategy:

    a. A needs assessment must be done to determine factors related to the new technology such as: curricular needs; instructional benefits; faculty, student, and staff attitudes; hardware ease of use and maintenance; and cost-

effectiveness of the new technology compared to the current methods.

b. After the need for the new technology has been determined, the institution should be guided by the expertise of the campus media manager, research data (such as that presented by this study), and a review of relevant literature.

c. Seek the advice and opinions of instructional technologists who have already researched or implemented the technology in question. This third step might include a site visit or the engaging of a consultant.

d. Determine the specific hardware manufacturer(s) and model(s) which best suit the institution's needs.

2. The strategies of acquisition and installation are much more obvious than those of the selection process since they rely on common business procedures. The primary concern here is to carefully prepare specifications for bid or price quotation. A well prepared specification includes: exacting general hardware specifications or the specification of a particular make and model, if possible; detailed installation data if the system is to be installed by the selling vendor or another contractor; maintenance and/or loaner provisions if coverage beyond the manufacturer's warranty is desired; payment terms; and the possibility of a penalty clause for a vendor responsible for

late or faulty installation.

3. Strategies for the acceptance of the new technologies by faculty, students, and staff should be considered a continuation of the original needs assessment. If an appropriate and wanted selection has been made, there should be little difficulty regarding acceptance of the new technology. However, it does help if there are certain perceptions about new technology: students should perceive it as a better way of doing things and as user friendly; faculty should perceive it as an improvement to the instructional process (one that improves their teaching or reduces their work load to allow more time for individualized instruction and/or research); and administrators should perceive new technology as something which either improves the instructional process or does the same job more cost-effectively than previous methods. As pointed out by the Carnegie Commission on Higher Education (1972), institutions should not take a short-term view of the cost effectiveness of new technologies.

4. The final strategy recommendations are related to access to and maintenance of new technologies. There are several issues relevant to access to new technologies: technological literacy; privacy; data base integrity; and users of the new technologies. Unless highly specialized applications such as flight simulation technology warrant use by only a select and highly trained clientele, it is recommended that access to new technologies be open to all

members of the campus community. The recommendation for maintaining new high-tech systems is that either staff be hired (or existing staff trained) to properly maintain the university's investment in technology, or that an appropriate service agreement be made with an experienced vendor.

Recommendations for Future Research

Although the objectives for this study were met, the researcher would suggest some changes if the study were to be replicated. The first suggestion relates to the sample size. A larger initial sample of as many as 75 potential panelists would help to insure a sample large enough to conduct the research without being so large as to make the study unwieldy for the researcher. Unless a Delphi study is undertaken by more than one researcher, it is recommended that no more than 100 panelists be invited to participate in the first round because Delphi results are not significantly improved once the panel becomes larger than 30 members. Also, Delphi studies are very labor intensive for both researchers and panelists so to a certain degree it is better to have smaller, more manageable panels.

The other changes which the researcher would recommend in a similar study are related to the instrumentation. Rather than alphabetizing Delphi items, they should be clustered in the same groups for the instrument as for

analysis. Although interesting comments were obtained for traditional instructional hardware items such as audio units and film, they might be excluded in a replication in favor of newer emerging technologies for which long-range planning information would be more useful. Finally, items added by the panelists should be formally integrated into the Delphi instrument to elicit panelist response in succeeding rounds.

The researcher offers five general recommendations for research into the future of media services in higher education.

1. It would be useful, given the rapid pace of technological advancement, for a study of this nature to be conducted every two or three years.

2. A large scale questionnaire study based on panelists' responses to a Delphi study could provide further decision making information useful to the long range planning process.

3. Panelist interaction and prompt response might be facilitated by using a D-NET. A D-NET is similar to the Delphi technique employed in this study. However, rather than collect data with written instruments, a D-NET would place the panelists on-line to allow them to respond and interact in a computer network or bulletin board arrangement. It should be noted that unless the researcher can provide panelist access to a computer, modem, and telecommunications software that random selection would not be possible.

4. Use of the Delphi technique at the institutional level is to be encouraged. The instrumentation could be scaled down and made site specific in order to elicit decision making information most relevant to a particular institution. Although it would be difficult to maintain panelist anonymity in such a study, it would be especially useful in predicting faculty needs and desires relevant to instructional technology.

5. Finally, research is needed to provide data on how to implement specific strategies related to the application of new technologies in higher education. Case study or historical research methodologies might be useful in examining institutions of higher education which have been successful in implementing large scale instructional technology systems.

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DELPHI INSTRUMENT
for Media Services in Higher Education: A Delphi Study for the 1990s
by David A. Tiedemann

Please indicate your opinions about the uses of instructional hardware, organizational concerns in instructional technology, and different instructional techniques by responding as follows.

FIRST, determine the time frame for implementation of the item by circling the appropriate response under IMPLEMENTATION.
SECOND, indicate whether the item can be considered innovative (that is whether it is new or a new use of an old technology or method) by circling yes or no under INNOVATIVE.
THIRD, indicate the priority for implementation by circling low, *medium*, *or high under PRIORITY*.

Your responses should reflect your assessment of the entire field of instructional technology rather than the specific situation at your institution. Give reasons in the space provide to the right of each item. Use the reverse side of the page if desired. Add any other items as the last entry in the particular section. *Your help is greatly appreciated. Thank you.*

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
INSTRUCTIONAL HARDWARE:				
1. Audio units (or systems)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
2. Audio teleconferencing	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
3. Computer networks	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
4. Computer based tele-communications	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
5. Computer graphics	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
6. Computer voice recognition	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
7. Data base programs	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
8. Digital wall screens	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
9. Fiber optics	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
10. Film (still and motion)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
11. Holography	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
12. Pharmaceutical learning enhancements	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
13. Radio transceivers (portable with keyboard)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
14. Robotics	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
15. Satellite (direct broadcast)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
16. Satellite earth station	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
17. Satellite uplink	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
18. Television, broadcast	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
19. Television, cable	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
20. Television, closed-circuit	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
21. Television, 3D	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
22. Teletex	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
23. Videodisc	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
24. Video teleconferencing (full motion)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
25. Video teleconferencing (still frame)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
26. Videotex	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
27. Additional hardware item (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
ORGANIZATIONAL CONCERNS:				
1. Centralization of media services:				
a. one campus-wide center	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
b. main center with sub-centers all reporting to same office	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
c. schools/departments provide own services, no central coordination	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
d. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
2. Computer head reports to:				
a. board of trustees	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
b. president	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
c. vice president	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
d. librarian	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
e. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
3. Library head reports to:				
a. board of trustees	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
b. president	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
c. vice president	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
d. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
4. media head reports to:				
a. board of trustees	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
b. president	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
c. vice president	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
d. librarian	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
e. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
5. Services				
a. to entire university	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
b. to academic departments only	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
c. to non-university groups	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
d. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
6. Additional organizational concerns (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
INSTRUCTIONAL TECHNIQUES:				
1. Independent study	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
2. In-home, broadcast	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
3. In-home, correspondence	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
4. In-home, nonbroadcast telecommunications	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
5. Programmed instruction	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
6. Oral lectures	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
7. Additional instructional techniques (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

Media Services in Higher Education: A Delphi Study for the 1990s
by David A. Tiedemann

INSTRUCTIONS FOR DELPHI ROUND 2

1. I have enclosed the following items: instructions for round 2; one Delphi round 1 summary; one blank Delphi instrument; and a stamped envelope for your use in returning the completed round 2 Delphi instrument.

2. Start by reading the summary of round 1.

   a. Round 1 showed panelist consensus on many items in the Delphi instrument. I encourage you to pay special attention to those items which did not generate clear majorities in the implementation, innovation, or priority categories. The reason for multiple rounds in a Delphi study is to strive for panelist consensus which yields greater certainty about the future, based on expert opinion.

   b. Percentage ratings are indicated for each item responded to. The percentages are based on from 2 - 22 responses per item. The average number of responses for any given item were 17.2 for implementation, 13.3 for innovative, and 13.6 for priority.

   c. Under the Researcher's Comments heading I have included a statement or question designed to summarize round 1 responses or to focus your round 2 responses.

   d. There is no need to return this summary.

3. Then fill out the blank Delphi instrument.

   a. Please remember that **your responses should be made from the general perspective of the field of intructional technology rather than being specific to your institution.**

   b. **DO NOT use the NA implementation category unless you have no knowledge of the item on which to base an opinion or guess.** One of the purposes of this Delphi study is to stretch the imagination so that a scenario of the future may be developed.

   c. Your comments on the appropriateness of the implementation years, innovativeness, and priorities receiving the highest percentage of responses from round 1 would be appreciated. Please feel free to address the other panelists' comments.

   d. Finally, for item 6. of the Organizational Concerns section (page 10 of the Delphi instrument) please indicate the reporting structure for media directors in higher education which you feel to be most appropriate for the 1990s. The rationale for your selection would also be appreciated.

   e. Please try to return your round 2 responses by **May 10, 1985.**

THANK YOU!

Appendix B

Delphi Instrument for Round Three, With Instructions

Media Services in Higher Education: A Delphi Study for the 1990s
by David A. Tiedemann

INSTRUCTIONS FOR DELPHI ROUND 3

1. I have enclosed the following items: instructions for round 3; one Delphi round 2 summary; one abbreviated blank Delphi instrument; and a stamped envelope for your use in returning the completed round 3 Delphi instrument.

2. Start by reading the summary of round 2.

   a. Round 2 indicates increased panelist consensus. The summary format is the same as the one used to summarize round 1.

   b. Percentage ratings are indicated for each item responded to. The percentages are calculated on the basis of 11 - 17 responses per item.

   c. Under the Researcher's Comments heading I have included a statement or question designed to summarize round 2 responses or to focus your round 3 responses.

3. Then fill out the blank Delphi instrument.

   a. Please remember that your responses should be made from the general perspective of the field of intructional technology rather than being specific to your institution.

   b. DO NOT use the NA implementation category unless you have no knowledge of the item on which to base an opinion/guess or unless you truly feel that the item is not appropriate to consider using in higher education instructional technology during the next 15 years. One of the purposes of this Delphi study is to stretch the imagination so that a scenario of the future may be developed.

   c. I have deleted the rating scales and comment spaces for those items showing a simple majority consensus in round 2 for implementation, innovative, and priority. However, I included the Delphi statement to maintain the numbering scheme for easy reference to earlier rounds. Please use the blanks at the end of the INSTRUCTIONAL HARDWARE, ORGANIZATIONAL CONCERNS, and INSTRUCTIONAL TECHNIQUES sections if you wish to comment further, change your round 2 ratings, or include additional items.

4. Please try to return your round 3 responses by June 21, 1985.

THANK YOU FOR YOUR EFFORTS THROUGHOUT THIS STUDY!

ROUND 3 DELPHI INSTRUMENT
for Media Services in Higher Education: A Delphi Study for the 1990s
by David A. Tiedemann

Please indicate your opinions about the uses of instructional hardware, organizational concerns in instructional technology, and different instructional techniques by responding as follows.

FIRST, determine the time frame for implementation of the item by circling the appropriate response under IMPLEMENTATION.
SECOND, indicate whether the item can be considered innovative (that is whether it is new or a new use of an old technology or method) by circling yes or no under INNOVATIVE.
THIRD, indicate the priority for implementation by circling low, medium, or high under PRIORITY.

Your responses should reflect your assessment of the entire field of instructional technology rather than the specific situation at your institution. Give reasons in the space provide to the right of each item. Use the reverse side of the page if desired. Add any other items as the last entries in the particular section. Your help is greatly appreciated. Thank you.

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
INSTRUCTIONAL HARDWARE:				
1. Audio units (or systems)	Consensus achieved for this item. See round 2 summary for details.			
2. Audio teleconferencing	Consensus achieved for this item. See round 2 summary for details.			
3. Computer networks	Consensus achieved for this item. See round 2 summary for details.			
4. Computer based tele-communications	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
5. Computer graphics	Consensus achieved for this item. See round 2 summary for details.			
6. Computer voice recognition	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
7. Data base programs	Consensus achieved for this item.			See round 2 summary for details.
8. Digital wall screens	Consensus achieved for this item.			See round 2 summary for details.
9. Fiber optics	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
10. Film (still and motion)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
11. Holography	Consensus achieved for this item.			See round 2 summary for details.
12. Pharmaceutical learning enhancements	Consensus achieved for this item.			See round 2 summary for details.
13. Radio transceivers (portable with keyboard)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
14. Robotics	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
15. Satellite (direct broadcast)	Consensus achieved for this item.			See round 2 summary for details.

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
16. Satellite earth station	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
17. Satellite uplink	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
18. Television, broadcast	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
19. Television, cable	Consensus achieved for this item.			See round 2 summary for details.
20. Television, closed-circuit	Consensus achieved for this item.			See round 2 summary for details.
21. Television, 3D	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
22. Teletex	Consensus achieved for this item.			See round 2 summary for details.
23. Videodisc	Consensus achieved for this item.			See round 2 summary for details.
24. Video teleconferencing (full motion)	Consensus achieved for this item.			See round 2 summary for details.
25. Video teleconferencing (still frame)	Consensus achieved for this item.			See round 2 summary for details.

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
26. Videotex	Consensus achieved for this item. See round 2 summary for details.			
27. Additional hardware item (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
28. Additional hardware item (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
29. Additional hardware item (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
30. Additional hardware item (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
ORGANIZATIONAL CONCERNS:				
1. Centralization of media services:				
a. one campus-wide center	Consensus achieved for this item. See round 2 summary for details.			

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
b. main center with sub-centers all reporting to same office	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
c. schools/departments provide own services, no central coordination	Consensus achieved for this item. See round 2 summary for details.			
d. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
2. Computer head reports to:				
a. board of trustees	Consensus achieved for this item. See round 2 summary for details.			
b. president	Consensus achieved for this item. See round 2 summary for details.			
c. vice president	Consensus achieved for this item. See round 2 summary for details.			
d. librarian	Consensus achieved for this item. See round 2 summary for details.			
e. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
3. Library head reports to:				
a. board of trustees	Consensus achieved for this item. See round 2 summary for details.			
b. president	Consensus achieved for this item. See round 2 summary for details.			
c. vice president	Consensus achieved for this item. See round 2 summary for details.			

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
d. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
4. media head reports to:				
a. board of trustees	Consensus achieved for this item. See round 2 summary for details.			
b. president	Consensus achieved for this item. See round 2 summary for details.			
c. vice president	Consensus achieved for this item. See round 2 summary for details.			
d. librarian	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
e. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
5. Services				
a. to entire university	Consensus achieved for this item. See round 2 summary for details.			
b. to academic departments only	Consensus achieved for this item. See round 2 summary for details.			
c. to non-university groups	Consensus achieved for this item. See round 2 summary for details.			

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
d. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
6. Additional organizational concerns (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
7. Additional organizational concerns (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
INSTRUCTIONAL TECHNIQUES:				
1. Independent study	Consensus achieved for this item. See round 2 summary for details.			
2. In-home, broadcast	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
3. In-home, correspondence	Consensus achieved for this item. See round 2 summary for details.			
4. In-home, nonbroadcast telecommunications	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	REASONS/COMMENTS
5. Programmed instruction	Consensus achieved for this item. See round 2 summary for details.			
6. Oral lectures	Consensus achieved for this item. See round 2 summary for details.			
7. Additional instructional techniques (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
8. Additional instructional techniques (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
9. Additional instructional techniques (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

Appendix C

Demographic Questionnaire

DEMOGRAPHIC QUESTIONNAIRE
for Media Services in Higher Education
A Delphi Study for the 1990s
by David A. Tiedemann

Your responses to the following items are requested for the development of an overall profile of the panelists and intitutions participating in this Delphi study. Your specific responses will be kept anonymous in the development of this general profile. Responses to this questionnaire should be made in terms of situation at your site rather than in terms of your perceptions of the field in general. Please check categories or fill in the blanks, as appropriate. Thank you!

1. (a) YOUR NAME: _____

   (b) YOUR INSTITUTION: _____

   (c) _____ PUBLIC, or _____ PRIVATE (check one)

   (d) YOUR JOB TITLE (specify): _____

   (e) YOUR TELEPHONE NUMBER: _____

2. YOUR AGE (check one):

   _____(a) 20-30; _____(b) 31-40; _____(c) 41-50;
   _____(d) 51-60; _____(e) 61-70; _____(f) 70 +.

3. YOUR SEX (check one):

   _____(a) female; _____(b) male.

4. PROFESSIONAL ASSOCIATIONS TO WHICH YOU CURRENTLY BELONG (check all that apply and add any not listed):

   _____(a) American Library Association;
   _____(b) Assn. for Educational Communications & Technology;
   _____(c) International Council for Computers in Education;
   _____(d) International Television Association;
   _____(e) Interuniversity Communications Council;
   _____(f) National Society for Performance in Instruction;

   _____(g) other - _____

   _____(h) other - _____

   _____(i) other - _____

5. NATIONAL OR REGIONAL CONFERENCES RELATED TO INSTRUCTIONAL TECHNOLOGY WHICH YOU HAVE ATTENDED IN THE LAST YEAR (list):

_____

_____

_____

_____

6A. YOUR JOB CATEGORY (check the primary one):

_____(a) administrator (Dean or Vice President level);
_____(b) computer specialist;
_____(c) librarian;
_____(d) media specialist;
_____(e) other (specify);_____.

6B. _____ years in this job category;

6C. _____ years at this site.

7A. YOUR JOB FUNCTION (check all that apply):

_____(a) AV production
_____(b) cataloging;
_____(c) collection development;
_____(d) finances;
_____(e) institutional research;
_____(f) instructional design;
_____(g) programming;
_____(h) reference;

_____(i) other (specify) _____.

7B. _____indicate the letter of your primary job function from 7A

7C. _____years in this primary job function.

8. ACADEMIC DEGREE(S) YOU HAVE EARNED (check all that apply and indicate major or specialization, and school):

	DEGREE	MAJOR	SCHOOL
_____(a)	associate	_____	
_____(b)	bachelor	_____	
_____(c)	master	_____	
_____(d)	doctorate	_____	
_____(e)	other	_____	

9. STUDENT ENROLLMENT AT YOUR INSTITUTION (full-time equivalent):

_____(a) 5,000 or less; _____(b) 5,001 -15,000;
_____(c) 15,001 - 25,000; _____(d) 25,000 or more

10. CENTRAL MEDIA SERVICES STAFF SIZE (permanent full-time/40 hour per week equivalent):

_____(a) 5 or less; _____(b) 6-10;
_____(c) 11-15; _____(d) 16-20;
_____(e) 21-25; _____(f) 25 or more.

11. CENTRAL MEDIA SERVICES STAFF SIZE (under graduate and graduate student workers full-time/40 hours per week equivalent):

_____(a) 5 or less; _____(b) 6-10;
_____(c) 11-15; _____(d) 16-20;
_____(e) 21-25; _____(f) 25 or more.

12. CENTRAL MEDIA SERVICES BUDGET (total for current year, including salaries, benefits, hardware, rentals, maintenance, software, and so forth):

_____(a) $1-100,000; _____(b) $100,000-200,000;
_____(c) $200,000-300,000; _____(d) $300,000-400,000;
_____(e) $400,000-500,000; _____(f) $500,000-750,000;
_____(g) $750,000-1,000,000;
_____(h) $1,000,000 or more.

13. FUNDING SOURCES FOR YOUR INSTITUTION (rank top 3, using 1 for largest source and 3 for smallest source):

_____(a) tuition; _____(b) grants;
_____(c) governmental; _____(d) gifts;
_____(e) generate own funds

_____(f) other (specify) _____

14. MODES OF INSTRUCTION USED AT YOUR SCHOOL (rank 1 - 6, using 1 for most common and 6 for least common):

_____(a) audio; _____(b) computer;
_____(c) film (still and motion); _____(d) lecture;
_____(e) print; _____(f) television;

_____.g) other, (specify) _____

15. IDENTIFY THE MOST PROMISING INSTRUCTIONAL TECHNOLOGY IN USE AT YOUR SITE; IN WHAT SCHOOL OR DEPARTMENT IS IT BEING USED; AND HOW IS IT BEING USED:

16. IDENTIFY THE MOST PROMISING INSTRUCTIONAL TECHNOLOGY ANTICIPATED FOR USE AT YOUR SITE IN THE NEAR FUTURE (NEXT FIVE YEARS); WHY DO YOU CONSIDER IT TO BE PROMISING:

17. IDENTIFY THREE COLLEGES OR UNIVERSITIES WHICH YOU FEEL TO HAVE THE BEST AND THE MOST INNOVATIVE MEDIA SERVICES (INCLUDE BRIEF REASONS FOR YOUR OPINION):

Appendix D

Delphi Cover Letter for Round One

University of San Diego

SCHOOL OF EDUCATION
DIVISION OF LEADERSHIP & ADMINISTRATION

February 15, 1985

We are writing to ask your participation in a Delphi study of media services in higher education in the 1990s. This research will provide valuable decision making information for instructional technologists and academic administrators. The provision of decision making information is important to the continuation of the leadership role of the Association of Educational Communications and Technology's Division of Educational Media Management. The Spring 1984 Media Management Journal special issue, "The Status of Media Centers in Higher Education," is a good example of DEMM's leadership role in the field of instructional technology.

This study's primary objectives are: to obtain expert opinions as to the future of campus-wide media services in higher education; to identify innovative media services and applications of instructional technology which might provide service prototypes and strategies for the 1990s; and to develop recommendations for media directors and academic administrators to use in meeting the needs of the 1990s. This research is being conducted to meet the requirements for the educational leadership doctoral program of the University of San Diego's School of Education.

This Delphi study consists of up to three rounds of questionnaires interspersed with summary feedback from the previous round. The feedback is provided as a means by which the Delphi panelists may reconsider their original responses and to allow an opportunity to change those responses so that a meaningful consensus may be obtained. There is also a demographic questionnaire which will be distributed only in the first round to gather data which will be used to develop an overall profile

Alcalá Park, San Diego, California 92110 619/293-4538

of the panelists and their institutions. Although the demographic questionnaire asks for very specific information, panelists and their institutions will not be identified or linked to specific responses unless prior written authorization is granted.

The results of this study will be presented in three ways: one, a dissertation to be published by University Microfilms; two, an article reporting the study; and, three, a workshop proposal. The article and workshop are related to the Association for Educational Communications and Technology's Division of Educational Media Management. An article summarizing the results of the study will be submitted to Media Management Journal. A pre or post convention workshop will be proposed for the 1986 AECT Conference. Panelists who participate for the duration of the study will be offered a discounted workshop registration fee.

The demographic questionnaire and the Delphi instruments are enclosed. The second Delphi instrument is provided for your use in cross-referencing your responses between the rounds. A stamped and addressed envelope is enclosed for your use in returning the instruments. The amount of time that participants spend in the course of this study is greatly appreciated. The results will provide valuable direction for educational technology in higher education over the next 10-20 years. If you have any questions related to the study, please call David Tiedemann at (619) 260-4567 (work) or (619) 277-6176 (home).

Please mail your responses to this first round no later than March 1, 1985 to allow sufficient time for summarization prior to the mailing of the second round. Thank you for your willingness to participate in this study.

Sincerely yours,

David A. Tiedemann
Director of the University of San Diego Media Center
DEMM member and doctoral candidate

Thomas L. Russell
North Carolina State University Instructional Technology Services Coordinator
AECT's DEMM President

DELPHI ROUND 1 SUMMARY
for Media Services in Higher Education: A Delphi Study for the 1990s
by David A. Tiedemann

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
INSTRUCTIONAL HARDWARE:				
1. Audio units (or systems)	5% NA 95% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	15.79% YES 84.21% NO	44.44% LOW 44.44% MEDIUM 11.12% HIGH	The responses show strong consensus for the implementation and innovative categories, but what about priority?
PANELISTS' COMMENTS: a. "Though 'audio' is not new or innovative per se, its use for particular applications may represent a significant instructional advance at a particular institution such as a Level III lab for spontaneous + consecutive translation." b. it is already in place, and serves "purposes other technologies do not in more cost effective ways" c. traditional formats have been in use for a long time and the audio disc (ie: compact disc or digital audio disc) is "more of a consumer item rather than instructional tool" d. because audio units appeal to only one sense not rated innovative and given medium priority				
2. Audio teleconferencing	20% NA 50% NOW 25% 1986-87 1988-90 5% 1991-93 1994-96 1997-99 2000+	55.56% YES 44.44% NO	36.86% LOW 47.37% MEDIUM 15.79% HIGH	There doesn't seem to be a consensus for the priority. What happens with the NA category eliminated?
PANELISTS' COMMENTS: a. we used it in the 1970s and discarded it "because it represents a technological hinderance to the spontaneous interchange possible say, at a 'language table' in the cafeteria; audio vs video teleconferencing is impersonal and more boring." b. done by campus TV station c. medium priority since "funds for professional development very tight" d. "will continue to be useful for information exchange not requiring visuals" e. "could be more than just conference calling" f. " many 'discovering' that courses may be taught by audio only with a little preplanning" g. low priority since it does not allow visualization h. "Can bring many institutions together - learning purposes - conferences, etc - efficient"				
3. Computer networks	NA 52.38% NOW 42.86% 1986-87 1988-90 4.76% 1991-93 1994-96 1997-99 2000+	85% YES 15% NO	9.52% LOW 19.05% MEDIUM 71.43% HIGH	These responses seem indicate a clear consensus.

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

PANELISTS' COMMENTS:
a. "...more important administratively than instructionally at present, and because of the impersonal nature of it - will probably not challenge face to face instruction with faculty. But for interoffice/intercampus correspondence, data/library access it is highly valuable."
b. "aid in communication process; exchange of tested teaching ideas"
c. "The possibility of switching from one data base to another expands available information resources. Concerns would be overloading, down time, and cost."
d. "currently happening with LANS" (local area networks)
e. "This approach as a delivery system is both innovative and because of the availability of both hardware and software is high in priority."
f. "Would facilitate instruction throughout the university - rely less on workstudy students"

---

4. Computer based tele-communications	19.05%	NA	88.89% YES	11.12% LOW	Only innovative shows consensus.
	33.33%	NOW			
	19.05%	1986-87	11.11% NO	44.44% MEDIUM	
	23.81%	1988-90			
	4.76%	1991-93		44.44% HIGH	
		1994-96			
		1997-99			
		2000+			

PANELISTS' COMMENTS:
a. "Similar to No. 3. Use will continue to expand."
b. "see little difference between this and computer networking"
c. "Before the end of this decade, I would expect to see rather widespread use of this approach. It would serve to reinforce the computer."

---

5. Computer graphics		NA	95.24% YES	15% LOW	Note positive comments on instructional applications.
	63.64%	NOW			
	18.18%	1986-87	4.76% NO	60% MEDIUM	
	13.64%	1988-90			
	4.55%	1991-93		25% HIGH	
		1994-96			
		1997-99			
		2000+			

PANELISTS' COMMENTS:
a. "The use of computer graphics will become an essential part of education in both the classroom + individual study in the Humanities as well as the natural sciences - stage + costume design are two innovative applications not yet in common use. Use of computer graphics at...is very rudimentary."
b. "Valuable tool in visualizing concepts in areas of science, engineering, architecture, etc. Useful for graphs, charts, and other similar visuals."
c. "lowers costs, can animate at low cost"
d. may be utilized before 1991-93, "But probably because of low priority will not be considered until the next decade."

---

6. Computer voice recognition	25%	NA	93.33% YES	46.67% LOW	Can we narrow the implementation ratings to project a time period during which we might expect general instructional applications?
	5%	NOW			
	5%	1986-87	6.77% NO	40.00% MEDIUM	
	15%	1988-90			
	35%	1991-93		13.33% HIGH	
	5%	1994-96			
		1997-99			
	10%	2000+			

STATEMENT:		IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
	PANELISTS' COMMENTS: a. "Will be increasingly used for language instruction. Will make possible interaction with a computer or robot with perfect recall of virtually all the facts. Could be especially helpful during testing oral mode and with the capability to present the score/grade immediately." b. "Application as an aid rather than a tool. Could be developed as extremely useful tool for handicapped or persons with disabilities." c. "technology still imperfect & expensive"				
7. Data base programs		NA 94.44% NOW 5.66% 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	44.44% YES 55.66% NO	11.76% LOW 52.94% MEDIUM 35.29% HIGH	The reponses indicate consensus for this item.
	PANELISTS' COMMENTS: a. "Important because of research, archival, data manipulation capability - will be developed as computer based dictionaries - encyclopedias for ready access. Obvious uses in media library cataloging/classification schemes, inventory control, equipment utilization data, etc." b. "manipulation of statistics is becoming increasingly more important." c. "Require special vocabulary and training to use; expensive."				
8. Digital wall screens	33.33%	NA NOW 5.56% 1986-87 33.33% 1988-90 16.67% 1991-93 1994-96 5.56% 1997-99 5.56% 2000+	84.62% YES 15.38% NO	38.46% LOW 46.15% MEDIUM 15.38% HIGH	Matsushita (ie: Technics, Panasonic, & Quasar) has produced a 10" diagonal screen that is only 4" thick. This technology can be used for larger picture tubes. Consensus is lacking in the implementation and priority categories.
	PANELISTS' COMMENTS: a. more consumer oriented than for instructional purposes; concern about compatability of existing software b. "television ala new techniques" c. "Just around the corner, but not a high priority yet."				
9. Fiber optics	9.52%	NA 52.38% NOW 19.05% 1986-87 14.29% 1988-90 1991-93 4.76% 1994-96 1997-99 2000+	94.44% YES 5.56% NO	15.79% LOW 52.63% MEDIUM 31.58% HIGH	Some of the panelists disagree.
	PANELISTS' COMMENTS: a. "increased capability and speed for data/voice transmission" b. "Cost effective method/system of combining video and audio." c. "Cost too high for wide spread use in short hauls or with many terminals." d. "The technology is available, but until some of the earlier types of systems are saturated, this may not see widespread use."				

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
10. Film (still and motion)	NA 19.05%	YES	15% LOW	The lack of unanimous consensus for implementation is surprising.
	95.24% NOW			
	1986-87 80.95%	NO	45% MEDIUM	
	4.76% 1988-90			
	1991-93		40% HIGH	
	1994-96			
	1997-99			
	2000+			

PANELISTS' COMMENTS:
a. "still dreadfully underutilized especially in social sciences + humanities where documentaries + dramatic productions are not being properly utilized."
b. "As instructional tool slowly being replaced by other more advanced/innovative forms."
c. "tried and true"
d. "Nothing especially innovative about this approach, however, it is still an important way to present information."

---

11. Holography	25.00% NA	100% YES	46.15% LOW	Please reconsider the implementation time frame.
	6.25% NOW			
	12.50% 1986-87	NO	30.77% MEDIUM	
	12.50% 1988-90			
	12.50% 1991-93		23.08% HIGH	
	6.25% 1994-96			
	6.25% 1997-99			
	18.75% 2000+			

PANELISTS' COMMENTS:
a. "Will have intense application in architecture, the plastic arts + the performing arts in terms of set + costume design."
b. "interesting possibilites for pedagogy"
c. "holds promise to replace film"
d. "an interesting concept, but may not be absolutely necessary for educational use."

---

12. Pharmaceutical learning enhancements	52.63% NA	90% YES	45.45% LOW	Would the panelists who indicated a NOW implementation please comment?
	21.05% NOW			
	1986-87	10% NO	27.27% MEDIUM	
	5.26% 1988-90			
	5.26% 1991-93		27.27% HIGH	
	1994-96			
	1997-99			
	15.79% 2000+			

PANELISTS' COMMENTS:
a. "If this means 'drugs' the benefits are outweighed by the possible abuse and disadvantages likely to result from the the use of such agents. Do not see how drugs fit into instructional technology as presently perceived."
b. "much testing necessary"
c. "I hesitate to place a high priority on the use of drugs to enhance learning without more research"
d. "...I would imagine that this can wait until the 21st century."

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13. Radio transceivers (portable with keyboard)	44.44% NA	63.6% YES	63.6% LOW	If NA isn't selected, when would implementation be feasible?
	11.11% NOW			
	1986-87	36.4% NO	18.2% MEDIUM	
	22.22% 1988-90			
	22.22% 1991-93		18.2% HIGH	
	1994-96			
	1997-99			
	2000+			

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

PANELISTS' COMMENTS:
a. "More a consumer item than an instructional tool."
b. "The use of this kind of audio system will have a place, but it may always have a low priority especially when considering the alternatives."

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14. Robotics

IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
28.57% NA	93.33% YES	33.33% LOW	Please reconsider the implementation and priority categories.
19.05% NOW			
1986-87	6.67% NO	26.67% MEDIUM	
23.81% 1988-90			
9.52% 1991-93		40.00% HIGH	
4.76% 1994-96			
4.76% 1997-99			
9.52% 2000+			

PANELISTS' COMMENTS:
a. "Voice activated robots will serve as the ultimate 'user friendly' computer, they will be designed to look very human + the interchange can be all oral just as if sitting to discuss with a friend."
b. "Although useful in industry, do not see application in education."
c. "no application I know"
d. "An interesting concept, but may relate more toward entertainment value as opposed to education."

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15. Satellite (direct broadcast)

IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
19.05% NA	94.12% YES	5.88% LOW	A tie for priority and little consensus for implementation.
38.10% NOW			
4.76% 1986-87	5.88% NO	47.06% MEDIUM	
23.81% 1988-90			
4.76% 1991-93		47.06% HIGH	
9.52% 1994-96			
1997-99			
2000+			

PANELISTS' COMMENTS:
a. "Essential for timely, pertinent input for international studies, political science, + language/cultural instruction."
b. "Use in continuing education"
c. "Rapid information transfer; possibility of information services directly to homes, offices, etc. from libraries and information centers."
d. "Low cost for mass coverage area, limited by imagination"
e. "I think that there are some very interesting uses of this approach that will occur before the end of the decade."

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16. Satellite earth station

IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
15% NA	88.24% YES	26.67% LOW	Please reconsider implementation of this receive only technology.
50% NOW			
5% 1986-87	11.76% NO	33.33% MEDIUM	
10% 1988-90			
10% 1991-93		40% HIGH	
5% 1994-96			
5% 1997-99			
2000+			

PANELISTS' COMMENTS:
a. "see number 15" (2 responses, a. & c.)
b. "use with conferencing, rural education problems"
c. "need to join the rest of the world"
d. "If you will allow me some degree of levity - I think this approach is on the horizon, and may be a reality in more widespread use this century."

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
17. Satellite uplink	15% NA 40% NOW 10% 1986-87 20% 1988-90 5% 1991-93 5% 1994-96 5% 1997-99 2000+	87.5% YES 12.5% NO	18.75% LOW 37.50% MEDIUM 43.75% HIGH	We agree that it is innovative, but can we agree on the implementation time frame and priority?

PANELISTS' COMMENTS:
a. "see number 15" (response a.)
b. "professional conferencing"
c. "Shared information; national or international conferences without the need for participants to travel (which is costly and time consuming)."
d. "need to use 16 above"
e. "this one (17.), and the one above (16.) will probably go 'hand-in hand', in terms of their importance to this field."

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18. Television, broadcast	9.52% NA 85.71% NOW 4.76% 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	35.29% YES 64.71% NO	35.29% LOW 17.65% MEDIUM 47.06% HIGH	Please focus your response from a general perspective of instructional technology in higher education.

PANELISTS' COMMENTS:
a. "see 10" (response a.)
b. "Quality of programs geared to larger audiences (Mass Media)." (for low priority and not innovative)
c. "The use of T.V. for broadcast has its place, but in terms of priority it may fall behind 19 & 20."

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19. Television, cable	5% NA 80% NOW 15% 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	61.11% YES 38.89% NO	5.56% LOW 50.00% MEDIUM 44.44% HIGH	Not a strong consensus for priority.

PANELISTS' COMMENTS:
a. "see 10" (response a.)
b. "Could be continuing growth in information services by way of specialized programs geared to specific audiences."
c. "an immediate cost effective way to distribute instruction"
d. "The use of this kind of transmission may be more advantageous, in some situations, than 18."

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20. Television, closed-circuit	14.29% NA 71.43% NOW 14.29% 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	47.06% YES 52.94% NO	17.65% LOW 41.18% MEDIUM 41.18% HIGH	Should this item be a medium or a high priority?

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

PANELISTS' COMMENTS:
a. "Will continue to serve as a cost effective way for 1 lecturer to address large +/or multiple remote locations"
b. "intra campus service"
c. "Limited by being generally a one-way transmission from distribution point to receiver(s). Advantage is that user is not restricted to a site."
d. "proven"
e. "The limitation of the boundaries of a T.V. signal to a closed-circuit may be more desirable than 19, or 18 in some instances."

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21. Television, 3D	40% NA 10% NOW 1986-87 10% 1988-90 5% 1991-93 15% 1994-96 10% 1997-99 10% 2000+	78.57% YES 21.43% NO	73.33% LOW 13.33% MEDIUM 13.33% HIGH	The comments reflect the consensus for low priority. Please reconsider the implementation time frame.

PANELISTS' COMMENTS:
a. "a visual non-essential enhancement of 10/18/19/20 applications"
b. "enhance 15-20 above"
c. "There will probably be a place for this kind of T.V. in the future, but it may continue to be a low priority approach."
d. "What impact did 3D movies in mid 1950s have on general public - Was it effective? - No."

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22. Teletex	40% NA 30% NOW 10% 1986-87 15% 1988-90 5% 1991-93 1994-96 1997-99 2000+	77% YES 23% NO	41.7% LOW 48.3% MEDIUM HIGH	Not much consensus for implementation or priority.

PANELISTS' COMMENTS:
a. "Innovative in possibility of information services provided into user's home from a variety of data banks."
b. "cost of land line may be prohibitive"
c. "This approach may exist as an 'option' for many educational centers, but it may not be a 'standard' item that will play an important role."

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23. Videodisc	14.29% NA 57.14% NOW 4.76% 1986-87 14.29% 1988-90 4.76% 1991-93 4.76% 1994-96 1997-99 2000+	100% YES NO	10.53% LOW 31.58% MEDIUM 57.89% HIGH	One of only two items in this section with a unanimous response (see also No. 11).

PANELISTS' COMMENTS:
a. "When programming + editing costs are reduced + when it becomes voice activated/interactive it will become an essential part of instructional media."
b. "great potential"

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

c. "Used in conjunction with a microprocessor the random access, stop frame, single step, slow motion, hi speed forward and reverse functions could be a valuable instructional device or information source."
d. "need to lower cost to be truly effective"
e. "The ability to be flexible in terms of the presentation of pre-recorded information is one of the most important features of this approach."

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24. Video teleconferencing (full motion)	14.29% NA 47.62% NOW 14.29% 1986-87 19.05% 1988-90 4.76% 1991-93 1994-96 1997-99 2000+	66.67% YES 33.33% NO	22.22% LOW 38.89% MEDIUM 38.89% HIGH	Only innovative shows consensus. Please reconsider implementation and priority.

PANELISTS' COMMENTS:
a. "It will remain a boring alternative to 'being there' but its obvious cost savings + convenience benefits will increase its use."
b. "creative possibilities still exist"
c. "Course offering from nearby universities presently available to local industries."
d. "much talk - little content"
e. "This approach is very sophisticated...but its use may not prove to be as innovative as it could."

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25. Video teleconferencing (still frame)	35.29% NA 52.94% NOW 5.88% 1986-87 5.88% 1988-90 1991-93 1994-96 1997-99 2000+	46.15% YES 53.85% NO	46.15% LOW 38.46% MEDIUM 15.38% HIGH	Comments show lack of interest reflected by innovative and priority ratings.

PANELISTS' COMMENTS:
a. "Will become antiquated soon in light of the alternatives."
b. "Should become more widely used as use of microcomputers increases."
c. "same as 24 above but lower cost"
d. "To me, this kind of use may be almost like using just an overhead projector for the presentation of a visual, but this approach may not be creatively used."

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26. Videotex	33.33% NA 33.33% NOW 5.56% 1986-87 16.67% 1988-90 1991-93 5.56% 1994-96 1997-99 5.56% 2000+	75% YES 25% NO	33.3% LOW 41.7% MEDIUM 25.0% HIGH	Please reconsider the implementation category.

PANELISTS' COMMENTS:
a. "convenient, time saving, not terribly exciting"
b. "With the development of inter-active capabilities, general or specific information could be available."
c. "could make better use of the spectrum"
d. "This may be just a step beyond 22 above."

STATEMENT:		IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
27. Additional hardware item (specify)		NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

PANELISTS' COMMENTS:
a. multi-image was added by one panelist with a now implementation, innovative rating, and a medium priority.

ORGANIZATIONAL CONCERNS:

1. Centralization of media services:						
a. one campus-wide center	18.75% 62.50% 12.50% 6.25%	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	33.33% 66.67%	YES NO	27.78% 16.67% 55.56%	LOW MEDIUM HIGH	Is there agreement on this ranking of priorities?

PANELISTS' COMMENTS:
1) "Tried this many times and central admin bungled it, No more further interest from this college, although I had taken the lead in the past."
2) "Never"
3) an existing departmental center may become a campus wide center at some point in the future
4) "Advantage: Centralization of services (media and equipment) to faculty, students, staff. Would have to be subdivided into media services, equipment circulation and maintenance, production services, and computer services thereby providing better services in a cost-effective way."
5) "cost effective"
6) "...A centralized type organization might serve to bring about greater coordination between sub-centers."

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b. main center with sub-centers all reporting to same office	27.78% 50.00% 11.11% 5.56% 5.56%	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	35.71% 64.29%	YES NO	40.00% 26.67% 33.33%	LOW MEDIUM HIGH	Only the innovative category shows strong consensus.

PANELISTS' COMMENTS:
1) "Never"
2) "most effective use of resources"

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
c. schools/departments provide own services, no central coordination	57.1% NA 42.9% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES 100% NO	75.0% LOW 12.5% MEDIUM 12.5% HIGH	One of seven unanimous responses in this section (see also 2.a., 2.d., 3.a., 4.a., and 5.a.)

PANELISTS' COMMENTS:
1) "As long as units continue to operate independently, there is little cooperation and even less coordination. This often results in too much duplication of efforts."

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d. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	Any other ideas?

PANELISTS' COMMENTS:
1) "A 'collegial' system appears best with various centers specializing. eg: 1 - a large 'end user' facility where students come to see, listen, interact; 2 - equipment loan center; 3 - production center, etc. The end user facility would include the media library."
2) several centers, but not in all areas of the university
3) library, AV, video, computers all report to the learning resources dean or vice president
4) "...after a coming together (a.) followed by a spreading out (b.) had occurred on a single campus, the next phase would call for additional spreading out to other remote/regional campuses to provide some sort of innovative network."

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2. Computer head reports to:

a. board of trustees	83.33% NA NOW 1986-87 1988-90 8.33% 1991-93 8.33% 1994-96 1997-99 2000+	50% YES 50% NO	100% LOW MEDIUM HIGH	A tie in the innovative category.

PANELISTS' COMMENTS:
1) "never"

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b. president	43.75% NA 37.50% NOW 6.25% 1986-87 1988-90 12.50% 1991-93 1994-96 1997-99 2000+	45.45% YES 54.55% NO	41.67% LOW 25.00% MEDIUM 33.33% HIGH	Only the innovative category reflects a consensus.

PANELISTS' COMMENTS:
1) "This is the present arrangement on this campus, and it seems to be a logical scheme."

STATEMENT:		IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
c. vice president	14.29%	NA	30% YES	15.38% LOW	From the responses, this would appear to to the preferred organizational structure.
	85.71%	NOW			
		1986-87	70% NO	7.69% MEDIUM	
		1988-90			
		1991-93		76.92% HIGH	
		1994-96			
		1997-99			
		2000+			

PANELISTS' COMMENTS:
1) "reportage/management decisions must be available at the highest practical level - unified, well organized management is essential because of expense and equipment diversity."
2) "better overall planning possible"
3) "To Academic Vice President, if a separate unit that providos academic support."

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d. librarian	100%	NA	16.67% YES	100% LOW	There isn't much disagreement here.
		NOW			
		1986-87	83.33% NO	MEDIUM	
		1988-90			
		1991-93		HIGH	
		1994-96			
		1997-99			
		2000+			

PANELISTS' COMMENTS:
1) "If part of a campus-wide center involved in academic support then the head of the computer center should report to the librarian who heads all print and non print services."

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e. other (specify)		NA	YES	LOW	Any other thoughts on the reporting structure?
		NOW			
		1986-87	NO	MEDIUM	
		1988-90			
		1991-93		HIGH	
		1994-96			
		1997-99			
		2000+			

PANELISTS' COMMENTS:
1) "A high level committee of media director(s), computer director(s), reporting directly to vice president - necessary for technically qualified, professional decisions. Centralization of expenses - purchasing, cable, satellite, etc. enhanced."
2) "Provost - computer head and library head are the same"

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3. Library head reports to:

a. board of trustees	88.89%	NA	33.33% YES	100% LOW	The comment certainly reflects the consensus for priority.
		NOW			
		1986-87	66.67% NO	MEDIUM	
		1988-90			
	11.11%	1991-93		HIGH	
		1994-96			
		1997-99			
		2000+			

PANELISTS' COMMENTS:
1) "Never"

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
b. president	53.85% NA 38.46% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 7.69% 2000+	42.86% YES 57.14% NO	50% LOW MEDIUM 50% HIGH	Any comments?
PANELISTS' COMMENTS: none				
c. vice president	7.69% NA 92.31% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	27.27% YES 72.73% NO	16.67% LOW 33.33% MEDIUM 50.00% HIGH	Again, this seems to be the preferred organizational structure.
PANELISTS' COMMENTS: 1) "reportage/management decisions must be available at the highest practical level - unified, well organized management is essential because of expense and equipment diversity." 2) "better overall planning possible" 3) "Reports to Academic Vice President or president of academic affairs since library is part of academic support." 4) "This is the present arrangement on this campus, and it seems to be a logical scheme."				
d. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	Any other ideas?
PANELISTS' COMMENTS: 1) "A high level committee of media director(s), computer director(s), reporting directly to vice president - necessary for technically qualified, professional decisions. Centralization of expenses - purchasing, cable, satellite, etc. enhanced." 2) "Provost - computer head and library head are the same" 3) "Dean of Faculties" 4) "Provost"				
4. media head reports to:				
a. board of trustees	90% NA NOW 1986-87 10% 1988-90 1991-93 1994-96 1997-99 2000+	50% YES 50% NO	100% LOW MEDIUM HIGH	Is this innovative or not?
PANELISTS' COMMENTS: 1) "Never"				

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
b. president	90% NA NOW 1986-87 10% 1988-90 1991-93 1994-96 1997-99 2000+	40% YES 60% NO	80% LOW 20% MEDIUM HIGH	Responses are not very different from 4.a.
PANELISTS' COMMENTS: 1) "Never" 2) "would free media head to pursue unlimited use of technology"				
c. vice president	23.08% NA 69.23% NOW 7.69% 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	41.67% YES 58.33% NO	23.08% LOW 23.08% MEDIUM 53.85% HIGH	Once again, apparently the preferred oganizational structure.
PANELISTS' COMMENTS: 1) "Reportage/management decisions must be available at the highest practical level - unified, well organized management is essential because of expense and equipment diversity." 2) "Never" 3) "better overall planning possible" 4) "To Academic Vice President, if a separate unit that provides academic support." 5) "...would give non-print some kind of parity in terms of allowing the potential for growth...might allow for more creativity and innovation to occur without having to wade through as much bureaucracy. Equipment and progammmatic needs might be better met."				
d. librarian	46.15% NA 46.15% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 7.69% 2000+	14.29% YES 85.71% NO	42.86% LOW MEDIUM 57.14% HIGH	The consensus for priority seems inconsistent with the implementation ratings.
PANELISTS' COMMENTS: 1) "If the center is non print unit of library." 2) "...There are many problems in terms of prioritizing already limited resources. There re many times when print concerns over-ride non-print concerns. The recognition that the two areas complement each other in many ways is an important consideration, yet, when the two have to compete for the same money, because of the organizational arrangement the print needs always takes precedence over non-print."				

STATEMENT:		IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
e. other (specify)		NA	YES	LOW	Other ideas?
		NOW			
		1986-87	NO	MEDIUM	
		1988-90			
		1991-93		HIGH	
		1994-96			
		1997-99			
		2000+			

PANELISTS' COMMENTS:
1) "A high level committee of media director(s), computer director(s), reporting directly to vice president - necessary for technically qualified, professional decisions. Centralization of expenses - purchasing, cable, satellite, etc. enhanced."
2) reports to University Relations Vice President now, formerly to University Librarian, Provost, and Graduate Dean
3) "reports to Director of Educational Resource Center"
4) "...the final outcome might be to bring about a more autonomous operation, and at the same time create a center that was in many ways still interdependent."
5) "no specific media head - several at different levels"

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5. Services

a. to entire university		NA	55.56%	YES	11.76% LOW	The high degree of consensus is reflected in the comments.
	100%	NOW				
		1986-87	44.44%	NO	17.65% MEDIUM	
		1988-90				
		1991-93			70.59% HIGH	
		1994-96				
		1997-99				
		2000+				

PANELISTS' COMMENTS:
1) "A 'collegial' system appears best with various centers specializing. eg: 1 - a large 'end user' facility where students come to see, listen, interact; 2 - equipment loan center; 3 - production center, etc. The end user facility would include the media library."
2) services should be available to the whole university
3) "better use of available resources"
4) "Instructional materials should be available to all - faculty, students, and staff as part of the educational process or for staff development."
5) "must serve all of the community...research, instruction, student and community non university groups to be responsive to all needs"
6) "Limited resources in both staff and finances, coupled with a lack of commitment from higher levels in the administration make it difficult to perform effectively."
7) "Include dorm use - video screens, student organization, and students for class projects"

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b. to academic depart-	58.33%	NA	14.29%	YES	28.57% LOW	The priority and implementation categories don't seem to match.
ments only	41.67%	NOW				
		1986-87	85.71%	NO	57.14% MEDIUM	
		1988-90				
		1991-93			14.29% HIGH	
		1994-96				
		1997-99				
		2000+				

PANELISTS' COMMENTS:
1) "The academic departments are presently being served, to a limited extent, but I don't think they should ever exclude the other areas."
2) "as well as non-academic"

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
c. to non-university groups	25.00% NA 68.75% NOW 1986-87 6.25% 1988-90 1991-93 1994-96 1997-99 2000+	25% YES 75% NO	66.67% LOW 25.00% MEDIUM 8.33% HIGH	The consensus here seems to be that academic services takes priority over service to non-university groups even though it may be provided.
PANELISTS' COMMENTS: 1) "as tax exempt status allows, if not free" 2) only when using the student union building 3) "To non-university groups if the university aims/goals are not compromised" 4) "This could provide a valuable...link with the surrounding community, and allow the university to reach out, and allow the community to reach in. Both groups would benefit." 5) "Special conferences, events on campus - occassional off-campus events"				
d. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
PANELISTS' COMMENTS: none				
6. Additional organizational concerns (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	Please use this section to comment on the reporting structure for media directors in higher education that you think will be most appropriate for the 1990s.
PANELISTS' COMMENTS: 1) staff development for implementation in 1986-87, rated innovative, and ranked as a high priority				
INSTRUCTIONAL TECHNIQUES:				
1. Independent study	10.53% NA 78.95% NOW 1986-87 10.53% 1988-90 1991-93 1994-96 1997-99 2000+	35.29% YES 64.71% NO	35.29% LOW 64.71% MEDIUM HIGH	These responses seem clear.
PANELISTS' COMMENTS: a. "Opportunity to be innovative or creative is limited only by the resources available to student and the cooperative planning between professor and student."				

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
2. In-home, broadcast	31.58% NA 52.63% NOW 5.26% 1986-87 5.26% 1988-90 1991-93 1994-96 1997-99 5.26% 2000+	66.7% YES 33.3% NO	43.75% LOW 37.50% MEDIUM 18.75% HIGH	Please reconsider the implementation and priority categories.
PANELISTS' COMMENTS: a. "has been tried, but not good use of the spectrum"				
3. In-home, correspondence	44.44% NA 44.44% NOW 1986-87 11.11% 1988-90 1991-93 1994-96 1997-99 2000+	50% YES 50% NO	53.85% LOW 38.46% MEDIUM 7.69% HIGH	No real consensus for implementation and priority categories.
PANELISTS' COMMENTS: a. "As 2. tends to expand, it would appear that this process could become more two-way."				
4. In-home, nonbroadcast telecommunications	33.33% NA 33.33% NOW 1986-87 16.67% 1988-90 16.67% 1991-93 1994-96 1997-99 2000+	76.9% YES 33.1% NO	28.57% LOW 50.00% MEDIUM 21.43% HIGH	Please reconsider the implementation time frame.
PANELISTS' COMMENTS: a. numbers 1-4 could conform to the "Open University" model and be a high priority b. "use of CATV technology available - better use of spectrum - narrow casting" c. "...The ability to check out materials and programs as per a more individual schedule has some value."				
5. Programmed instruction	22.22% NA 72.22% NOW 1986-87 5.56% 1988-90 1991-93 1994-96 1997-99 2000+	28.6% YES 71.4% NO	71.4% LOW 21.4% MEDIUM 7.2% HIGH	A clear consensus for this item.
PANELISTS' COMMENTS: a. "only as integrated with other technologies and human interaction" b. "Chief value presently seems to be for rote learning or remedial work." c. "...more concentrated attention could be directed along these lines with all of the elaborate hardware and software now available, and becoming even more available in the future because of price declines."				

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
6. Oral lectures	5.6% NA 94.4% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	18.8% YES 81.2% NO	25.0% LOW 18.8% MEDIUM 56.2% HIGH	Consensus in all categories.

PANELISTS' COMMENTS:

a. "Can be innovative depending on individual faculty. While instructional technology enhances teaching/education, the human element will always be primary."
b. "cheap, low effort, low cost method - poor but standard"
c. "There will always be a place for an outstanding oral lecture, however, we are recognizing that there is are also other effective and efficient ways to transmit knowledge."

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7. Additional instructional techniques (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	Any additional instructional techniques or comments on those offered by the panelists?

PANELISTS' COMMENTS:

a. interactive videodisc
b. teleconferencing
c. distance learning by video, mail, phone, & correpsondence
d. computerized instruction - interactive learning
e. in-class video/CAI

THANK YOU!

DELPHI ROUND 2 SUMMARY
for Media Services in Higher Education: A Delphi Study for the 1990s
by David A. Tiedemann

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
INSTRUCTIONAL HARDWARE:				
1. Audio units (or systems)	NA 100% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES 100% NO	18.75% LOW 68.75% MEDIUM 12.50% HIGH	The responses indicate a clear consensus in all categories.
2. Audio teleconferencing	5.88% NA 76.47% NOW 17.65% 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	37.5% YES 62.5% NO	37.50% LOW 56.25% MEDIUM 6.25% HIGH	There is consensus in all categories. Note the reversal in the innovative rating.

PANELISTS' COMMENTS:

1.
a. (Round 1 comment) "Can be innovative if instructor will make tapes interactive. Instructors need to test students on their performance in language lab."
b. "traditional medium"
c. "Seems to be a dying use factor on campus, even in language lab situations."
d. "Still, in 1985, some colleges do not have even the basic language lab; some, even in California, still use one or two portable cassette recorders for their language lab! This basic language + music appreciation instruction method should have a general high priority so as to ensure the minimal technological assistance to all students."
e. "Agree to medium priority based on comments from others: i.e. value for particular applications, cost effective."
f. "There are still many creative ways to use audio, however, in terms of priority the use of these systems appears to fall between the extremes." (rated medium priority)
g. "Still very useful for Language Study."
h. "Already implemented in most places and serving specific needs."
i. "Maybe some of the difficulty over priority is the vagueness of 'audio units' as they may be construed as components of other systems, thus variability in response."

2.
a. "Lack of visual stimulus is our concern. No non-verbal behavior to monitor."
b. "If this is seen as valuable it should be instituted now; it is relatively inexpensive and available. It's priority however is low because it is a technology that has been overtaken by the more valuable video conferencing and because remote audio conferencing in this visually oriented society is just not as interesting or valuable as face to face or video. In language study it can actually be a hinderance to communication - the visual aspects of language are too important."
c. "With more formats offering visual as well as aural, this has limited appeal."
d. "Many possibilities exist for more effective ways to utilize this approach, but very often various other systems may receive a higher priority."

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

e. "Teleconference application more likely use than instructional."
f. "NA may result from this technology being seen as a business communications system. Priority is base on limitations of audio only. Innovative due to changes in satellites/telephone systems, etc."

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3. Computer networks

IMPLEMENTATION		INNOVATIVE	PRIORITY	
5.88%	NA	100% YES	LOW	A much stronger consensus than in round 1.
76.47%	NOW			
17.65%	1986-87	NO	23.53% MEDIUM	
	1988-90			
	1991-93		76.47% HIGH	
	1994-96			
	1997-99			
	2000+			

PANELISTS' COMMENTS:
a. (Round 1 comment) "Computer networks are good if they can exchange programs that are useful."
b. "Not a part of AV department however."
c. "As lowering cost of hardware and expansion of database services increase, wider educational use will develop."
d. "The priority for computer networks should remain a top priority throughout the '90's."
e. "Research uses, organizational rather than instruction."
f. "Cost savings for shared software & simultaneous use during instruction."

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4. Computer based telecommunications

IMPLEMENTATION		INNOVATIVE	PRIORITY	
11.76%	NA	100% YES	6.25% LOW	Please reconsider the implementation time frame. Also note the marginal consensus for priority.
17.65%	NOW			
35.29%	1986-87	NO	50.00% MEDIUM	
	1988-90			
	1991-93		43.75% HIGH	
	1994-96			
	1997-99			
	2000+			

PANELISTS' COMMENTS:
a. (Round 1 comment) "It would be interesting to use computer to generate response to callers on TV or telephone."
b. "Television/visuals/animation graphics will greatly enhance the value of computer telecommunications. It's use in education for engineering modeling, design concepts, etc. will probably not be as important as in the business world where computer modeling + graphics telecommunicated will be highly valuable for design approval, concept presentation prior to a more expensive actual production or film/video presentation."
c. "Appears to be an extension of 3 above; see 3 above." (3. c.)
d. "Although this is an innovative approach, in terms of priority, I think that for the time frame indicated" (1988-90) "medium priority is OK."

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5. Computer graphics

IMPLEMENTATION		INNOVATIVE	PRIORITY	
5.88%	NA	100% YES	LOW	In the second round the consensus is stronger in all categories except priority.
70.59%	NOW			
11.76%	1986-87	NO	56.25% MEDIUM	
11.76%	1988-90			
	1991-93		43.75% HIGH	
	1994-96			
	1997-99			
	2000+			

PANELISTS' COMMENTS:
a. (Round 1 comment) "Graphics can enhance a learning program, but can't save it."
b. "Dependent on funding, applications exist now"

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

c. "Very limited use in studio generated video tapes."
d. "See 4 above" (4. b.) "The use of computer graphics will become an essential part of education in both classroom + individual instruction. The creation of visual models without having to actually film or videotape an actual setting or construct a physical model + be able to change it at will with a few keystrokes offers exciting potential."
e. "From the literature, use of computer graphics is more prevalent in industry. Use of computer graphics for the Humanities should be explored and developed."
f. "A very worthwhile technique, but only medium priority for this period of implementaion." (1988-90)
g. "Costly, time consuming to develop yet great potential for instruction."

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6. Computer voice recognition

IMPLEMENTATION		INNOVATIVE		PRIORITY	
17.65%	NA	100%	YES	56.25%	LOW
	NOW				
	1986-87		NO	37.50%	MEDIUM
29.41%	1988-90				
47.06%	1991-93			6.25%	HIGH
5.88%	1994-96				
	1997-99				
	2000+				

RESEARCHER'S COMMENTS: Please reconsider implementation.

PANELISTS' COMMENTS:
a. (Round 1 comment) *"could be interesting for interactive program"*
b. "Use specific, not all programs will have applications."
c. "Uses limited in instruction, keyboard entry can suffice."
d. "Will help overcome the resistance to computers on the part of those who do not/cannot typm + eliminate keystroke errors."
e. "Strong instructional implications in special education - for disabled/handicapped or learning disorders. Some applications presently in use.
f. "During the next decade we may see greater use of this very innovative procedure, but priority is low."
g. "Applications need more study for instruction: if linked with interactive videodisc - great potential."

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7. Data base programs

IMPLEMENTATION		INNOVATIVE		PRIORITY	
	NA	41.18%	YES	5.88%	LOW
88.24%	NOW				
11.76%	1986-87	58.82%	NO	58.82%	MEDIUM
	1988-90				
	1991-93			35.29%	HIGH
	1994-96				
	1997-99				
	2000+				

RESEARCHER'S COMMENTS: Consensus in all three categories.

PANELISTS' COMMENTS:
a. (Round 1 comment) "Useful for insrtuctors to store tests, administration"
b. "Library field & data base has come full circle - back to where hard copy of everything exists."
c. "Very valuable for research, archival and data sources. Some require special vocabulary and training to use. Cost is a factor to consider."
d. "A very worthwhile arrangement, but not especially innovative or much of a priority."

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8. Digital wall screens

IMPLEMENTATION		INNOVATIVE		PRIORITY	
25.00%	NA	92.86%	YES	28.57%	LOW
	NOW				
	1986-87	7.14%	NO	64.24%	MEDIUM
62.50%	1988-90				
6.25%	1991-93			7.14%	HIGH
6.25%	1994-96				
	1997-99				
	2000+				

RESEARCHER'S COMMENTS: The panelists have reached consensus in all categories.

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

PANELISTS' COMMENTS:
a. "Same problems as now - just a different distribution scheme."
b. "Large screen presentations could enhance classroom use as opposed to present small (25") video screens."
c. "Even though the technology is presently available, because of the current overall size, their use as a wall screen may be some time away."
d. "Would have classroom application to replace wall screens/video monitors for permanent installation."

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9. Fiber optics

IMPLEMENTATION		INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
18.75%	NA	100% YES	LOW	We lost consensus for implementation; please reconsider this category.
37.50%	NOW			
18.75%	1986-87	NO	80% MEDIUM	
25.00%	1988-90			
	1991-93		20% HIGH	
	1994-96			
	1997-99			
	2000+			

PANELISTS' COMMENTS:
a. "Expensive capital investments limit implementations now."
b. "Combined data, audio, telephones, and cable TV on 1 system."
c. "Increased capability for video and audio."
d. "Increased channel capacity for all types of data - cost effectiveness will increase dramatically once widespread usage is attained."
e. "It would appear that this approach is still a few years away although there may be advantages of this kind of technology."
f. "Currently being installed to produce own phone/video/data communication system on campus. (more cost effective)

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10. Film (still and motion)

IMPLEMENTATION		INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
	NA	YES	23.53% LOW	Complete consensus for implementation and innovative. Please reconsider priority.
100%	NOW			
	1986-87	100% NO	41.18% MEDIUM	
	1988-90			
	1991-93		35.29% HIGH	
	1994-96			
	1997-99			
	2000+			

PANELISTS' COMMENTS:
a. "History and social sciences have tons of materials available, but don't know the light bulb has been invented yet!"
b. "Since it is 'tried + true' + much is available its priority for implementation should be high."
c. "Still valid tool; large inventory on many, varied topics available from countless sources (distributors/producers)."
d. "Could be innovative but video will supplant."
e. "There are still many people who value highly the use of film, and even though it's use is not necessarily very innovative, it's use is still presently important."
f. "video more flexible and efficient."
g. "It is still very under utilized and can be a very effective instructional resource."
h. "Remains a very viable means of communicating."

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11. Holography

IMPLEMENTATION		INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
11.76%	NA	94.12% YES	70.59% LOW	We gained consensus for implementation and priority.
5.88%	NOW			
	1986-87	5.88% NO	23.53% MEDIUM	
5.88%	1988-90			
58.82%	1991-93		5.88% HIGH	
	1994-96			
	1997-99			
17.65%	2000+			

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

PANELISTS' COMMENTS:
a. "Possible future use in education."
b. "3-D imaging will dratically change our perception as it relates to instructional technology."
c. "There are many potential uses of holography which would prove to be very innovative, but widespread use seems to be low until 2000+."
d. "Find it hard to imagine use for instruction within time period of 2000+."

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12. Pharmaceutical learning enhancements	62.50% NA NOW 1986-87 1988-90	81.12% YES 18.18% NO	100% LOW MEDIUM	There is consensus that implementaion is not appropriate as well as consensus for the innovative and priority categories.
	6.25% 1991-93 1994-96 6.25% 1997-99 25.00% 2000+		HIGH	

PANELISTS' COMMENTS:
a. "This area is too problematic to respond to without discussion."
b. "Feel strongly that abuses and disadvantages outweigh applications to education."
c. "Will eventually be used. Chemical engineering, genetic engineering are progressing relatively rapidly."
d. "Still a rather futuristic concept that would appear to be low in priority, although it's use could be considered innovative. Are we talking about mind altering drugs?"
e. "Dangerous! Unethical?"

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13. Radio transceivers (portable with keyboard)	25.00% NA 6.25% NOW 1986-87 37.50% 1988-90 31.25% 1991-93 1994-96 1997-99 2000+	85.71% YES 14.29% NO	85.71% LOW 7.14% MEDIUM 7.14% HIGH	Perhaps the implementation ratings will not be so scattered if this item is defined as a ultra-portable micro computer capable of networking to other computers without being hardwired to them (and without modems). Please reconsider the implemenation time frame.

PANELISTS' COMMENTS:
a. "A possible application for handicapped."
b. "The next decade may present some additional reasons for wanting to use these systems."
c. "What is it? Broadcast capability? Response assumes this meaning."

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14. Robotics	29.41% NA NOW 5.88% 1986-87 41.18% 1988-90 11.76% 1991-93 5.88% 1994-96 5.88% 1997-99 2000+	100% YES NO	25% LOW 50% MEDIUM 25% HIGH	Still no consensus for implementation. Please use NA only if you have no conceptual knowledge of robotics.

PANELISTS' COMMENTS:
a. "Change to high when taken as a general priority..."
b. "No present application to education."
c. "The use of robotics may have a place in certain specialized areas like engineering, but the priority will probably remain low."

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
d. "Some applications in engineering, design, etc."				
e. "In technical fields for application to production, but not directly to instructional problems."				
15. Satellite (direct broadcast)	5.88% NA 52.94% NOW 11.76% 1986-87 29.41% 1988-90 1991-93 1994-96 1997-99 2000+	100% YES NO	LOW 62.5% MEDIUM 37.5% HIGH	Consensus has been obtained.
PANELISTS' COMMENTS:				
a. (Round 1 comment) "Very few programs apply to many colleges."				
b. "Service directly to homes, offices, etc. from libraries and information centers yet to be developed."				
c. "Just looking around at all of the satellite dishes in current use by other than educational agencies should indicate the widespread use of this kind of technology, however, educational centers (possibly because of the lack of funds) may still lag behind in terms of the priority at this time for greater implementation. Most people in education recognize the advantages of this kind of 'connection,' but in view of some other systems this technology may not be as much of a priority as some others."				
d. "Demand for that system is not there yet."				
16. Satellite earth station	NA 82.35% NOW 1986-87 5.88% 1988-90 11.76% 1991-93 1994-96 1997-99 2000+	92.14% YES 5.88% NO	17.65% LOW 41.18% MEDIUM 41.18% HIGH	Strong consensus for implementation and innovative. Please reconsider priority.
PANELISTS' COMMENTS:				
a. "Use in continuing education for older student, or for remote areas."				
b. "My reaction here is very much the same as my comments for the previous statement." (15. c.)				
c. "Much information now communicated via such systems, ie: PBS and telecourse materials."				
17. Satellite uplink	11.76% NA 47.06% NOW 17.65% 1986-87 11.76% 1988-90 11.76% 1991-93 1994-96 1997-99 2000+	100% YES NO	18.65% LOW 43.75% MEDIUM 37.50% HIGH	Please reconsider implementation and priority from a general perspective of instructional technology in higher education.
PANELISTS' COMMENTS:				
a. "Professional conferencing; shared information without expense/inconvenience of travel."				
b. "'Tis better to give than receive,' is an expression that may be true in most cases, but as far as education is concerned a satellite uplink may be a rather low priority at this time, at least, in terms of widespread use. Therefore we may need to alter the quote to read 'Tis better to receive....'"				

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
18. Television, broadcast	6.25% NA 93.75% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	20% YES 80% NO	40% LOW 20% MEDIUM 40% HIGH	No consensus for priority, please reconsider.

PANELISTS' COMMENTS:
a. "Limited selection of programs appropriate to higher education."
b. "It seems strange that we place a high priority on the use of this technology, but at the same time are willing not to be innovative in terms of our use of this system."
c. "Less useful for formal eduation than general interest + information."

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19. Television, cable	5.88% NA 94.12% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	56.25% YES 43.75% NO	6.25% LOW 62.50% MEDIUM 31.25% HIGH	Consensus in all categories.

PANELISTS' COMMENTS:
a. (Round 1 comment) "Cable offers chance to reach specific audience of learners. Can be interactive."
b. "Medium priority due to present materials/programs available."
c. "On the other hand, because of the actual 'connections' that have to be made, the use of cable T.V. may tned to be more innovative than broadcast T.V. Maybe the 'level of difficulty is in some way related to what we think of as being innovative."
d. "Can be more geared to local interest and educational programming."

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20. Television, closed-circuit	5.88% NA 94.12% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	31.25% YES 68.75% NO	6.25% LOW 50.00% MEDIUM 43.75% HIGH	Consensus for all categories.

PANELISTS' COMMENTS:
a. (Round 1 comment) "Can be useful for observation or expanding audience when hall is filled."
b. "Cost-effective; one-way transmission; can service large and/or remote locations."
c. "The advantages of this kind of delivery system should be given a high priority as an effectve transmission vehicle."
d. "ditto to 19" (19. d.) "Where both are more cost effective than broadcast to serve local formal education needs."
e. "Most institutions can't afford system upkeep."

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
21. Television, 3D	25.53% NA NOW	93.33% YES	80.00% LOW	Please reconsider the implementation time frame and use NA only if you have no knowledge of the concept of 3D television.
	5.88% 1986-87	6.67% NO	13.33% MEDIUM	
	23.53% 1988-90			
	23.53% 1991-93		6.67% HIGH	
	17.65% 1994-96			
	5.88% 1997-99			
	2000+			
PANELISTS' COMMENTS: a. (Round 1 comment) "Value will depend on presentation." b. "Might have limited use in instruction - i.e. arts, fine arts, etc." c. "This can wait until, at least, the next decade."				
22. Teletex	18.75% NA	86.67% YES	26.67% LOW	Consensus in all categories this round.
	50.00% NOW			
	12.50% 1986-87	13.33% NO	73.33% MEDIUM	
	12.50% 1988-90			
	6.25% 1991-93		HIGH	
	1994-96			
	1997-99			
	2000+			
PANELISTS' COMMENTS: a. "No actual knowledge but can be important for access to central data storage facility." b. "Cost might not justify use considering availability of other options for instructional centers." c. "The technology that makes this possible is sophisticated, however, the use made of this kind of system may not be very innovative."				
23. Videodisc	5.88% NA	100% YES	LOW	Once again, a unanimous consensus for this item's innovative category.
	76.47% NOW			
	5.88% 1986-87	NO	18.75% MEDIUM	
	11.76% 1988-90			
	1991-93		81.25% HIGH	
	1994-96			
	1997-99			
	2000+			
PANELISTS' COMMENTS: a. (Round 1 comment) "Offers great potential for interaction, storage. Too expensive and not flexible enough." b. "Interactive with keyboard is sure to be effective." c. "Applications and use continue constantly." d. "This is an example of an idea whose time has come. This technology offers a unique combination of features."				
24. Video teleconferencing (full motion)	5.88% NA	75% YES	31.25% LOW	Consensus has been reached.
	70.59% NOW			
	5.88% 1986-87	25% NO	50.00% MEDIUM	
	11.76% 1988-90			
	1991-93		18.75% HIGH	
	1994-96			
	5.88% 1997-99			
	2000+			

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

PANELISTS' COMMENTS:
a. "Stronger applications for industry than for higher education."
b. "Although this kind of system is available now, it seems to me that some date in the future may still need to be associated with this approach."
c. "Cost too high."

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25. Video teleconferencing (still frame)	11.76% NA 76.47% NOW 5.88% 1986-87 1988-90 5.88% 1991-93 1994-96 1997-99 2000+	43.75% YES 56.25% NO	62.50% LOW 31.25% MEDIUM 6.25% HIGH	Consensus in all categories.

PANELISTS' COMMENTS:
a. "Possible at slightly more start-up cost than an audio loop."
b. "Similar to 24 above." (24. a.)
c. "Don't really see any advantage in using this system."
d. "Not as 'sexy' or desirable."

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26. Videotex	11.76% NA 58.82% NOW 23.53% 1986-87 5.88% 1988-90 1991-93 1994-96 1997-99 2000+	93.75% YES 6.25% NO	50.00% LOW 43.75% MEDIUM 6.25% HIGH	Much stronger consensus than in round 1.

PANELISTS' COMMENTS:
a. "Similar feelings as 22." (no comment for 22., 1991-93 implementation, innovative, and low priority)
b. "Can be important for access + display of centrally stored data.
c. "See 22 above." (22. b.)
d. "This could be used innovatively, but will it be??"

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27. Additional hardware item (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH

PANELISTS' COMMENTS:
a. Multi-image was added by two panelists, both indicating a now implementation, innovative rating, and a medium priority.
b. Micro computer graphics was added by one panelist with a now implementation, innovative rating, and a high priority.
c. "The use of an integrated video display system to replace overhead, slide, and opaque projectors (similar to the new SONY product) is a welcome addition to an electronic classroom." - now implementation, innovative rating, and high priority (i.e. Sony Vidimagic combination video projector, tuner, Betamax recorder, and public address system)

STATEMENT:	IMPLEMENTATION		INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
ORGANIZATIONAL CONCERNS:					
1. Centralization of media services:					
a. one campus-wide center	6.67%	NA	6.67% YES	33.33% LOW	Consensus for all categories.
	73.33%	NOW			
	6.67%	1986-87	93.33% NO	6.67% MEDIUM	
	13.33%	1988-90			
		1991-93		60.00% HIGH	
		1994-96			
		1997-99			
		2000+			
PANELISTS' COMMENTS:					
1) "Central unit is cost-effective but campus politics too strong to make it work properly."					
2) "Completely central facility not sufficiently responsive to needs/concerns of individual departments/programs."					
3) "Better service; cost-effective; with departments for various services."					
4) "This approach would do much to reduce the independent nature of media centers, to lessen the dependent nature of those areas with little on those areas that have a lot, and bring about a more independent operation."					
5) " 1 depends upon other factors; size of campus, nature of services, past history. Cannot give generalized response."					
b. main center with sub-centers all reporting to same office	12.50%	NA	20% YES	43.75% LOW	Please reconsider the priority rating.
	68.75%	NOW			
	6.25%	1986-87	80% NO	25.00% MEDIUM	
	6.25%	1988-90			
	6.25%	1991-93		31.25% HIGH	
		1994-96			
		1997-99			
		2000+			
PANELISTS' COMMENTS:					
1) "Better but provides only more access, not necessarily a wider range of services."					
2) "Not as effective as centralization."					
3) "This could be an extension of a 'mainframe' operation. Satellite centers revolving around a 'mother ship.'"					
c. schools/departments provide own services, no central coordination	40%	NA	YES	100% LOW	There seems to be consensus that this arrangement occurs, but that it is not desirable given the unanimous response for innovative and priority.
	60%	NOW			
		1986-87	100% NO	MEDIUM	
		1988-90			
		1991-93		HIGH	
		1994-96			
		1997-99			
		2000+			
PANELISTS' COMMENTS:					
1) "Too expensive, redundant, not enough skilled personnel for each department to have good support."					

STATEMENT:		IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
d. other (specify)		NA	YES	LOW	
		NOW			
		1986-87	NO	MEDIUM	
		1988-90			
		1991-93		HIGH	
		1994-96			
		1997-99			
		2000+			

PANELISTS' COMMENTS:
1) (Round 1 comment) "You are asking the wrong questions. If centralized media services means checking out equipment and programs to faculty, that's fine. But students need a staff of people who understand subjects to help them use learning programs. We need leraning centers, not media centers."
2) "Seem to be so many different structures and name changes, someone has tried everything."
3) (Round 1 comment repeated and elaborated) "A 'collegial' system appears best with various centers specializing. e.g. 1. a large 'end user' facility where students come to see, listen, interact. 2. equipment loan center. 3. production center, etc. The end user facility would include the media library." "This is best, allows for intensification within specialty/allows diversity campus-wide."
4) "There may be many modifications that could be considered, but why make things more complicated with additional choices. We need to agree on one of the approaches now being recommended and do an effective job implementing this approach in an effort toward greater efficiency."

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2. Computer head reports to:

a. board of trustees	86.67%	NA	33.33% YES	100% LOW		Consensus for all categories.
		NOW				
		1986-87	66.67% NO		MEDIUM	
		1988-90				
	6.67%	1991-93			HIGH	
		1994-96				
		1997-99				
	6.67%	2000+				

PANELISTS' COMMENTS:
1) "May need to report to a lower level in the organizational plan. The board of trustees may not be in close enough contact on a day-to-day basis."
2) "Impossible"

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b. president	50.00%	NA	16.67% YES	83.33% LOW		Again, consensus in all categories.
	35.71%	NOW				
		1986-87	83.33% NO	16.67% MEDIUM		
	7.14%	1988-90				
	7.14%	1991-93			HIGH	
		1994-96				
		1997-99				
		2000+				

PANELISTS' COMMENTS:
1) "The actual head of the computer center may report to a V.P. for administrative services who reports to the president, but the V.P. is, in fact, in charge of computer operations."

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
c. vice president	NA	13.33% YES	13.33% LOW	Except for priority, an even stronger overall consensus than in round 1.
	93.75% NOW			
	1986-87	86.67% NO	20.00% MEDIUM	
	6.25% 1988-90			
	1991-93		66.67% HIGH	
	1994-96			
	1997-99			
	2000+			

PANELISTS' COMMENTS:
1) "Decision-making level - this is where information can be used."
2) "The actual label given to the layers may be an example of this kind of organization." (i.e. 'MIGH' typographical error for MEDIUM in the original Delphi instrument)
3) "Academic VP?"

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d. librarian	80.00% NA	23.08% YES	92.31% LOW	Slightly less consensus than in round 1.
	6.67% NOW			
	1986-87	76.92% NO	7.69% MEDIUM	
	1988-90			
	1991-93		HIGH	
	1994-96			
	6.67% 1997-99			
	6.67% 2000+			

PANELISTS' COMMENTS:
1) "Never, hope not but librarians seem to be gaining in use of computers and campus power - too bad."
2) "See no advantage of this arrangement."
3) "Not enough of a global outlook for the institution."

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e. other (specify)	NA	YES	LOW	NOW
	1986-87	NO	MEDIUM	
	1988-90			
	1991-93		HIGH	
	1994-96			
	1997-99			
	2000+			

PANELISTS' COMMENTS:
1) (Round 1 comment) "Assistant Dean for Instructional Resources."
2) "The comments previously suggested in round one, number one, may have some merit in certain situations."

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3. Library head reports to:

a. board of trustees	86.67% NA	33.33% YES	100% LOW	There is little disagreement here.
	6.67% NOW			
	1986-87	66.67% NO	MEDIUM	
	1988-90			
	1991-93		HIGH	
	1994-96			
	1997-99			
	6.67% 2000+			

STATEMENT:	IMPLEMENTATION		INNOVATIVE	PRIORITY		RESEARCHER'S COMMENTS
PANELISTS' COMMENTS: 1) "Hope not!" 2) "Not Appropriate."						
b. president	53.33%	NA	23.08% YES	76.92%	LOW	Consensus for all categories.
	33.33%	NOW				
	13.33%	1986-87	76.92% NO	7.69%	MEDIUM	
		1988-90				
		1991-93		15.38%	HIGH	
		1994-96				
		1997-99				
		2000+				
PANELISTS' COMMENTS: 1) Not Appropriate. This may be too direct, and the president may not be in a position to fully understand certain functional activities of the operation of the library. Even if the president is aware of these aspects of operation, his position may make him too unavailable for frequent access (as is often required)."						
c. vice president	6.25%	NA	7.14% YES	7.14%	LOW	As in round 1, strong consensus for this approach.
	93.75%	NOW				
		1986-87	92.86% NO	14.29%	MEDIUM	
		1988-90				
		1991-93		78.57%	HIGH	
		1994-96				
		1997-99				
		2000+				
PANELISTS' COMMENTS: 1) "Seems to be the most appropriate and workable arrangement for all parties concerned." 2) "Academic VP."						
d. other (specify)		NA	YES	LOW		
		NOW				
		1986-87	NO	MEDIUM		
		1988-90				
		1991-93		HIGH		
		1994-96				
		1997-99				
		2000+				
PANELISTS' COMMENTS: 1) "Assistant Dean for Instructional Services." 2) "An elevation of the position to the level of other deans might be acceptable in some situations."						

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
4. media head reports to:				
a. board of trustees	86.67% NA 6.67% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 6.67% 2000+	33.33% YES 66.67% NO	100% LOW MEDIUM HIGH	The responses leave no doubt that this is an undesirable reporting structure.
PANELISTS' COMMENTS: 1) "I wish!" 2) "Not practical."				
b. president	60.00% NA 26.67% NOW 1986-87 13.33% 1988-90 1991-93 1994-96 1997-99 2000+	30.77% YES 69.23% NO	92.31% LOW 7.69% MEDIUM HIGH	Not much difference between the responses for this item and those of 4. a.
PANELISTS' COMMENTS: 1) "Not practical."				
c. vice president	6.25% NA 81.25% NOW 6.25% 1986-87 6.25% 1988-90 1991-93 1994-96 1997-99 2000+	35.71% YES 64.29% NO	LOW 30.77% MEDIUM 69.23% HIGH	An even stronger preference for this arrangement than in round 1.
PANELISTS' COMMENTS: 1) "Same comment as 5 from round one. The sooner this arrangement is accepted and implemented, the sooner we can begin to have more potential to have even greater impact on the entire system." 2) "Academic VP"				
d. librarian	40.00% NA 46.67% NOW 1986-87 6.67% 1988-90 1991-93 1994-96 6.67% 1997-99 2000+	7.69% YES 92.31% NO	53.85% LOW 30.77% MEDIUM 15.38% HIGH	The priorities have reversed since round 1. Please reconsider implementation.
PANELISTS' COMMENTS: 1) "God forbid!"				

STATEMENT:		IMPLEMENTATION		INNOVATIVE		PRIORITY	RESEARCHER'S COMMENTS
2) "Library priorities seem to favor print over non-print."							
3) "This practice should be modified in an effort to allow greater attention to be directed to both print and non-print."							
e. other (specify)		NA		YES		LOW	
		NOW					
		1986-87		NO		MEDIUM	
		1988-90					
		1991-93				HIGH	
		1994-96					
		1997-99					
		2000+					
PANELISTS' COMMENTS:							
1) "The comments mentioned in round one, number one for this item along with the comments for 2.E. may have some merit, but I doubt it!"							
5. Services							
a. to entire university		NA	42.86%	YES		LOW	A slight weakening of consensus for implementation and a reversal in innovative.
	93.75%	NOW					
		1986-87	57.14%	NO	14.29%	MEDIUM	
	6.25%	1988-90					
		1991-93			85.71%	HIGH	
		1994-96					
		1997-99					
		2000+					
PANELISTS' COMMENTS:							
1) "A/V equipment/media or instructional technology offer additional options in the teaching/learning process that should be available to all."							
2) "Justify existance!"							
b. to academic departments only	40.00%	NA		YES	46.15%	LOW	Consensus for all categories.
	53.33%	NOW					
		1986-87	100%	NO	53.85%	MEDIUM	
	6.67%	1988-90					
		1991-93				HIGH	
		1994-96					
		1997-99					
		2000+					
PANELISTS' COMMENTS:							
1) "Should not be limited to academics only."							
c. to non-university groups	12.50%	NA	28.57%	YES	85.71%	LOW	Strong consensus in all categories.
	81.25%	NOW					
		1986-87	71.43%	NO	14.29%	MEDIUM	
		1988-90					
	6.25%	1991-93				HIGH	
		1994-96					
		1997-99					
		2000+					

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

PANELISTS' COMMENTS:
1) "Only if goals/aims of university are not compromised."
2) "Within the university first, then possibly without. First things, first!"
3) "Only for meetings on campus, we charge equipment rental."
4) "'community service'...PR!"

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d. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO 	LOW MEDIUM HIGH 	

PANELISTS' COMMENTS:
1) (Round 1 comment) "Services offered to students in a learning center" was given a now implementation, innovative rating, and high priority by one panelist who commented: "Can be innovative if you have support of instructors and a highly trained staff who can tutor and help students with programs."
2) "Not Advocated."
3) "Staff development" was suggested by one panelist who indicated a 1986-87 implementation, innovative rating, and medium priority.
4) "Continue in vein as noted under 4. c." (ie: now implementation, innovative, and high priority)

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6. Additional organizational concerns (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO 	LOW MEDIUM HIGH 	In round 2 this section was used to comment on the reporting structure for media directors in higher education that would be most appropriate for the 1990s. The comments are very interesting.

PANELISTS' COMMENTS:
1) "Ideally in order to exert the most influence, the media director would report to the highest level of the administration, e.g. the president. In practical terms, it is not necessarily the position to which one reports, but the sensitivity of the supervisor to technology as applied in the educational context which makes a difference, be s/he librarian, dean V.P. or president!"
2) "Should have media head report to VP level person to have power needed to fight for large budget necissary to run unit."
3) "Librarian, video director, AV director, computer director" all on same level and reporting to "VP or Associate VP for learning resources."
4) "As we move into an increasingly technologically sophisticated world, we are going to have to stay on the cutting edge in terms of what 'turns people on.' If we are going to compete with other non-educational agencies for the attention of our students, then we are going to have to 'get on the stick.' For too long education has been on the trailing edge, during the next decade we need to be on the leading edge. If this arrangement, as suggested in 4. c. works, then stick with it until you get results. We can't wait until the 21st century to wake up to the value of non-print in terms of it's impact on the manner in which people respond to the information presented."
5) "For facilities and resources to be used effectively, a functioning two-way communication process between the media center and users must exist. Such centers must provide comprehensive support services for users, not just equipment, for the sucessful integration of media and technology into the pedagogical process."
6) "Cooperative ventures between media groups on campuses need strengthening rather than monolithic central unit with no room for individual academic concerns + priorities."

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

INSTRUCTIONAL TECHNIQUES:

1. Independent study

IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
6.25% NA	25% YES	18.75% LOW	An even stronger consensus than in round 1.
87.50% NOW			
1986-87	75% NO	81.25% MEDIUM	
1988-90			
1991-93		HIGH	
6.25% 1994-96			
1997-99			
2000+			

PANELISTS' COMMENTS:
a. (Round 1 comment) "Offers great potential if done properly."
b. "Most students lack sufficient discipline for this technique. Individual study requires more time of faculty since the same counselling, advising, dates must be repeated individually instead of passing it all on the entire class at one time."
c. "Provides curricular flexibility."

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2. In-home, broadcast

IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
12.50% NA	80% YES	46.67% LOW	Please reconsider priority.
68.75% NOW			
6.25% 1986-87	20% NO	40.00% MEDIUM	
6.25% 1988-90			
6.25% 1991-93		13.33% HIGH	
1994-96			
1997-99			
2000+			

PANELISTS' COMMENTS:
a. (Round 1 comment) "Programs are little more than documentaries. Broadcasters need large audience, lowest denominator."
b. "Cable is more efficient + lower cost."
c. "Convenient for students; too difficult administratively."

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3. In-home, correspondence

IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
12.50% NA	20% YES	86.67% LOW	Strong consensus for all categories.
75.00% NOW			
6.25% 1986-87	80% NO	13.33% MEDIUM	
1989-90			
1991-93		HIGH	
6.25% 1994-96			
1997-99			
2000+			

PANELISTS' COMMENTS:
a. (Round 1 comment) "If no other means exist, correspondence can work with the right person doing the correcting. Takes more effort than normally given."
b. "Boring, time consuming, not as effective as face to face or video."

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
4. In-home, nonbroadcast telecommunications	12.50% NA 56.25% NOW 1986-87 18.75% 1988-90 12.50% 1991-93 1994-96 1997-99 2000+	86.67% YES 13.33% NO	26.67% LOW 46.67% MEDIUM 26.67% HIGH	We lost consensus for priority, please reconsider.
PANELISTS' COMMENTS: a. (Round 1 comment) "If we can produce good interactive instructional programs on VHS, we can teach almost anything." b. "Increasingly important. Course segments taped and played back at home under pacing control more effective than broadcast T.V." c. "NA the result of definition of term; is vague technique."				
5. Programmed instruction	12.50% NA 81.25% NOW 6.25% 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	25% YES 75% NO	62.50% LOW 18.75% MEDIUM 18.75% HIGH	Consensus in all categories.
PANELISTS' COMMENTS: a. (Round 1 comment) "Instruction must fit in with classroom teaching to be accepted. Need interaction with student + staff." b. "... used by military - not much more effective, but allows students to discover answers more quickly + serves to emphasize important material." c. "Could be used for all basic work in any discipline as CAI will prove." d. "bad image"				
6. Oral lectures	NA 100% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	6.25% YES 93.75% NO	12.50% LOW 6.25% MEDIUM 81.25% HIGH	Consensus has become stronger since round 1.
PANELISTS' COMMENTS: a. (Round 1 comment) "This is what instructors and administrators understand." b. "The old standby. Effectiveness depends on the ability + delivery + knowledge of the lecturer. Much more attention should be given to improving faculty delivery style. c. "Comments "a" and "c" seem more redeeming than letter "b" because it is low cost does not mean the approach has to be poor!"				

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
7. Additional instructional techniques (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	

PANELISTS' COMMENTS:

a. "CAI" was specified by one panelist who indicated a now implementation, innovative rating, and high priority.
b. "Distribution Methods" was specified by another panelist with a now implementation, innovative rating, and high priority. Comment: "For what we spent on broadcast TV, we could loan each student a VCR and a set of tapes."
c. "Any interactive technology" was rated now implementation, innovative, and high priority by a panelist.
d. "During the next decade, I would hope that all of the comments previously mentioned will become more widely used." (1991-93, innovative, low priority)
e. "interactive video" (no ratings)
f. "Integration of learning alternative from oral lectures to interactive videodisc. No course should be all one technique."

THANK YOU AGAIN!

DELPHI ROUND 3 SUMMARY
for *Media Services in Higher Education: A Delphi Study for the 1990s*
by David A. Tiedemann

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
INSTRUCTIONAL HARDWARE:				
1. Audio units (or systems)	Consensus achieved for this item. See round 2 summary for details.			
2. Audio teleconferencing	Consensus achieved for this item. See round 2 summary for details.			
3. Computer networks	*Consensus achieved for this item. See round 2 summary for details.*			
4. Computer based telecommunications	4.76% NA 4.76% NOW 61.90% 1986-87 28.57% 1988-90 1991-93 1994-96 1997-99 2000+	90.91% YES 9.09% NO	9.09% LOW 81.82% MEDIUM 9.09% HIGH	The responses indicate consensus in all three categories with an indication that this technology will be implemented in higher education during the next two years.
PANELISTS' COMMENTS: a. (Round 2 comment) "Does this mean sharing programs through modem?" (yes, as well as direct satellite broadcasting and transmission by microwave - DAT) b. "With the expanded role that computers play in almost all areas, it would seem logical that this is just around the corner - next year!" c. "The maximum potential for this is in individually paced learning programs." d. "Have changed my implementation from 'now' to 1986-87 to come in line with others. 'Now' and 86 are almost the same given time frames and budget approval processes."				
5. Computer graphics	Consensus achieved for this item. See round 2 summary for details.			
6. Computer voice recognition	4.76% NA NOW 9.52% 1986-87 19.05% 1988-90 57.14% 1991-93 9.52% 1994-96 1997-99 2000+	90.91% YES 9.09% NO	57.14% LOW 38.09% MEDIUM 4.76% HIGH	Although the innovative rating is no longer unanimous, there is consensus in all three categories.
PANELISTS' COMMENTS: a. (Round 2 comment) "Could offer some interesting possibilities in ESL + foreign language." b. "Will need technological breakthrough to be really useful, presently memory intensive." c. "The next decade will usher in this kind of hardware and although it will be very innovative, the priority will no doubt remain low." d. "Our ease with the keyboard will grow faster than this technology." e. "Useful for inquiry of online computer systems, such as library catalogs."				
7. Data base programs	Consensus achieved for this item. See round 2 summary for details.			
8. Digital wall screens	Consensus achieved for this item. See round 2 summary for details.			

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
9. Fiber optics	NA	90% YES	5.26% LOW	There is more agreement for implementation than in round 2, but still no consensus. Those not indicating now implementation anticipate implementation, for the most part, within the next 5 years.
	47.37% NOW			
	15.79% 1986-87	10% NO	84.21% MEDIUM	
	31.58% 1988-90			
	5.26% 1991-93		10.53% HIGH	
	1994-96			
	1997-99			
	2000+			

PANELISTS' COMMENTS:
a. "Cost is still high for LAN use, must improve cost-effectiveness of 'on/off' devices for network access."
b. "We have it, it's innovative, but not a priority in either direction."
c. "This is a logical step which will occur as prices drop and worn out hardware is phased out."

10. Film (still and motion)	NA	13.64% YES	27.27% LOW	Although the unanimous round 2 ratings for implementation and innovative were lost, there is now consensus in all three categories.
	95.45% NOW			
	1986-87	86.36% NO	50.00% MEDIUM	
	4.55% 1988-90			
	1991-93		22.73% HIGH	
	1994-96			
	1997-99			
	2000+			

PANELISTS' COMMENTS:
a. "Films, when properly used, don't have to take a 'back seat' to any other approach, however, because of the size of the projected image a back seat still gives a good picture."
b. "Existing stores of film libraries and our societal respect for film will keep it around but new production will fall far behind video, etc."
c. "Transfer of materials on film to a video medium would provide a much more flexible medium to work with."

11. Holography	Consensus achieved for this item. See round 2 summary for details.

12. Pharmaceutical learning enhancements	Consensus achieved for this item. See round 2 summary for details.

13. Radio transceivers (portable with keyboard)	5% NA	90.48% YES	60% LOW	Consensus has been achieved in all areas. However, consensus is weaker for priority than in round 2.
	NOW			
	20% 1986-87	9.52% NO	20% MEDIUM	
	65% 1988-90			
	10% 1991-93		20% HIGH	
	1994-96			
	1997-99			
	2000+			

PANELISTS' COMMENTS:
a. "This is a re-definition...right?" (or perhaps a clearer definition - DAT)
b. "Before the end of this decade we will probably see greater use of this kind of hardware - which is very innovative - but priority is low."
c. "A convenience but not very necessary."

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
14. Robotics	4.76% NA 9.52% NOW 4.76% 1986-87 76.19% 1988-90 4.76% 1991-93 1994-96 1997-99 2000+	95.24% YES 4.76% NO	15% LOW 80% MEDIUM 5% HIGH	Consensus is stronger in all categories with the exception of innovative which lost its unanimous rating.

PANELISTS' COMMENTS:
a. "Used at present in our Engineering School but only to train in subject of robotics - not as a learning device."
b. "Before the next decade begins, more and more attention will be given to the kinds of simulated activities that are possible using this approach."
c. "Effective use of this technology will require a lot of specific system design."
d. "I'm willing to change from high to medium since robotics application is rather esoteric but I see that in special education among handicapped it could have very helpful applications as well as in various research areas."

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15. Satellite (direct broadcast)	Consensus achieved for this item. See round 2 summary for details.			

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16. Satellite earth station	4.76% NA 90.48% NOW 1986-87 4.76% 1988-90 1991-93 1994-96 1997-99 2000+	90.48% YES 9.52% NO	9.09% LOW 45.45% MEDIUM 45.45% HIGH	Although there is more agreement than in round 2, consensus is still lacking for priority.

PANELISTS' COMMENTS:
a. "There are still other more pressing concerns, therefore, in terms of priority, medium still seems to be O.K."
b. "Saturation of satellite belt with variety of programming makes this an essential tool."
c. "Insist on keeping the priority at 'high.' International implications for education and understanding is too important."

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17. Satellite uplink	4.76% NA 52.38% NOW 33.33% 1986-87 4.76% 1988-90 4.76% 1991-93 1994-96 1997-99 2000+	90.91% YES 9.09% NO	9.52% LOW 71.43% MEDIUM 19.05% HIGH	Consensus has been achieved in all three categories.

PANELISTS' COMMENTS:
a. "Probably will have one in service in a few years but instructional use and needs lag behind."
b. "This approach may help us solve many problems in terms of the delivery of information, but as of yet it is still not a high priority."
c. "Availability of this system makes it the best system for some types of education."
d. "Am willing to change to medium since implementation rating of 'now' is reflection of an actual high priority and low/medium/high are quite subjective."

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18. Television, broadcast	NA 100% NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	4.76% YES 95.24 NO	45% LOW 20% MEDIUM 35% HIGH	Although there is more panelist agreement in all areas, there is no consensus for priority.

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

PANELISTS' COMMENTS:
a. "Can be innovative if done right."
b. "The use of the medium should make us realize that it is still a high priority avenue that can 'turn people on!'"
c. "Big dollars associated with this have gotten in the way of efficient use. It still has one of the greatest potentials."
d. "Television is too persuasive and too important not to have a high priority - local and educational TV are important vehicles for upgrading the educational level of the entire population. Local universities can have a major impact on broadcast TV programming."

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19. Television, cable — Consensus achieved for this item. See round 2 summary for details.

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20. Television, closed-circuit — Consensus achieved for this item. See round 2 summary for details.

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21. Television, 3D

14.29%	NA	89.47% YES	84.21% LOW	There is consensus in all three categories.
	NOW			
	1986-87	10.53% NO	15.79% MEDIUM	
23.81%	1988-90			
52.38%	1991-93		HIGH	
9.52%	1994-96			
	1997-99			
	2000+			

PANELISTS' COMMENTS:
a. "Very, very low need item."
b. "This can wait until the next decade. There are still many things yet to explore with 2D television."
c. "Educational use will follow commercial broadcast."
d. "3D TV is an esoteric-application refinement of low priority."

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22. Teletex — Consensus achieved for this item. See round 2 summary for details.

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23. Videodisc — Consensus achieved for this item. See round 2 summary for details.

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24. Video teleconferencing (full motion) — Consensus achieved for this item. See round 2 summary for details.

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25. Video teleconferencing (still frame) — Consensus achieved for this item. See round 2 summary for details.

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26. Videotex — Consensus achieved for this item. See round 2 summary for details.

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27. Additional hardware item (specify)

NA	YES	LOW
NOW		
1986-87	NO	MEDIUM
1988-90		
1991-93		HIGH
1994-96		
1997-99		
2000+		

PANELISTS' COMMENTS:
a. (Round 1 comment) "Telefacsimile" was added by one panelist with a 1991-93 implementation, innovative rating, and medium priority.
b. (Round 2 comment) "VHS with microcomputer" was added by another panelist who rated it now implementation, innovative, and high priority.
c. "Multi-image" was specified by two panelists, both indicating a now implementation, innovative rating, and a medium priority.

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

d. "Flat screen TV" was specified by a panelist who commented: "enable use of TV in training and information settings not now possible - airplanes, hallway monitors, etc." Rated 1986-87 implementation, innovative, and medium priority.
e. "There are many unique combinations that could be considered, and who knows what the future holds."
f. "Integrated video display" was specified by a panelist who gave it a now implementation, innovative rating, and medium priority.
g. "Combination of VHS and microcomputer" was specified with a 1986-87 implementation, innovative rating, and high priority.

ORGANIZATIONAL CONCERNS:

1. Centralization of media services:

a. one campus-wide center — Consensus achieved for this item. See round 2 summary for details.

b. main center with sub-centers all reporting to same office	5.56%	NA	5.26%	YES	65% LOW	This round indicates consensus for all categories, including priority.
	83.33%	NOW				
	5.56%	1986-87	94.76%	NO	20% MEDIUM	
		1988-90				
		1991-93			15% HIGH	
		1994-96				
	5.56%	1997-99				
		2000+				

PANELISTS' COMMENTS:
1) "On a large campus this works for certain functions (video studios located in three locations) but certain functions weaken when split."
2) "Better than completely central but provides only more access, not necessarily a wider range of services."

c. schools/departments provide own services, no central coordination — Consensus achieved for this item. See round 2 summary for details.

d. other (specify)	NA	YES	LOW	
	NOW			
	1986-87	NO	MEDIUM	
	1988-90			
	1991-93		HIGH	
	1994-96			
	1997-99			
	2000+			

PANELISTS' COMMENTS:
1) (Round 2 comment) "Need to develop programs for individual needs", rated now implementation, innovative, and high priority.
2) "Central service - avoid duplication" was specified by one panelist who commented: "As costs increase, there are more small department media operations that are convenient but not cost effective." Rated now implementation, not innovative, and high priority.
3) "Hardly see a need to further cloud this issue with additional choices, although other approaches might work."

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

4) "Multi-campus (9) system with one main center and support facilities at each other location" was specified by a panelist who commented: "coordinator at each campus to provide service or direct to main center." Rated now implementation, not innovative, and high priority.
5) "Schools, departments provide specialized needs - center provides all else" was specified by a panelist who indicated the following rating: now implementation, innovative, and high priority.
6) "Library centered" was specified by a panelist and rated 1986-87 implementation, innovative, and medium priority.
7) "Need for Learning Center with paraprofessionals to interface with students and programs" was added with a rating of now implementation, not innovative, and high priority.
8) "A collegial system with various centers specializing: end user center; equipment loan center; production center."

2. Computer head reports to:

a. board of trustees	Consensus achieved for this item. See round 2 summary for details.			
b. president	Consensus achieved for this item. See round 2 summary for details.			
c. vice president	Consensus achieved for this item. See round 2 summary for details.			
d. librarian	Consensus achieved for this item. See round 2 summary for details.			
e. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO 	LOW MEDIUM HIGH 	

PANELISTS' COMMENTS:
1) "Dean of Instruction" was specified by a panelist and rated now implementation, not innovative, and high priority.

3. Library head reports to:

a. board of trustees	Consensus achieved for this item. See round 2 summary for details.			
b. president	Consensus achieved for this item. See round 2 summary for details.			
c. vice president	Consensus achieved for this item. See round 2 summary for details.			
d. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO 	LOW MEDIUM HIGH 	

PANELISTS' COMMENTS:
1) "Dean of Instruction" was specified and given a rating of now implementation, not innovative, and high priority.

4. media head reports to:

a. board of trustees	Consensus achieved for this item. See round 2 summary for details.			

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
b. president	Consensus achieved for this item. See round 2 summary for details.			
c. vice president	Consensus achieved for this item. See round 2 summary for details.			
d. librarian	45% NA 50% NOW 1986-87 5% 1988-90 1991-93 1994-96 1997-99 2000+	11.76% YES 88.24% NO	64.71% LOW 17.65% MEDIUM 17.65% HIGH	Consensus for all categories (although marginal for implementation).

PANELISTS' COMMENTS:
1) "ditto - 'God Forbid.'"
2) "Never - it means the end of the media program. I speak from personal experience."
3) "Enjoyed the single comment on summary 2, and I really do think it's time for not only 'God to forbid,' but for us to forbid too!!"
4) "Should not be the case."
5) "The integration of print and non-print materials make a unified management essential."
6) "Media personnel (visual/image) oriented more aggressive sorts should not have to report to print-oriented more passive librarian types. Read Vlcek, Charles. 'Library-media program: together we all love' in Media in Higher Education: The Critical Issues. Pullman, Washington: Information Futures, 1976."

e. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH

PANELISTS' COMMENTS:
1) "Let's don't even consider any other choices!"
2) "Dean of Instruction" was specified and rated now implementation, not innovative, and high priority.

5. Services

a. to entire university	Consensus achieved for this item. See round 2 summary for details.		
b. to academic departments only	Consensus achieved for this item. See round 2 summary for details.		
c. to non-university groups	Consensus achieved for this item. See round 2 summary for details.		
d. other (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH

PANELISTS' COMMENTS:
1) (Round 2 comment) "Use of LRC to deliver services" was specified and rated now implementation, innovative, and high priority.

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS

2) "The primary mission should be to concentrate on various services within the institution and not without."

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6. Additional organizational concerns (specify)

NA / NOW / 1986-87 / 1988-90 / 1991-93 / 1994-96 / 1997-99 / 2000+

YES / NO

LOW / MEDIUM / HIGH

PANELISTS' COMMENTS:

a. "All telecommunications directors/coordinators should report to Assistant Vice President - all should be on the same level in the organizational chart." Rated 1988-90 implementation, innovative, and high priority.

b. "As reinforcement to comment 1 of round 2, it would seem that the creative use of technology depends not so much upon hardware, as upon the commitment of a facility to provide adequate resource support for the use of technology in an educational setting."

c. "Cost effectiveness" was specified by a panelist who wrote: "Comments from round two are very good. Summary is that media units need to be strong, well funded, cost effective and accountable." Rated now implementation, innovative, and high priority.

INSTRUCTIONAL TECHNIQUES:

1. Independent study — Consensus achieved for this item. See round 2 summary for details.

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2. In-home, broadcast

5.26% NA
94.74% NOW
1986-87
1988-90
1991-93
1994-96
1997-99
2000+

75% YES
25% NO

30.09% LOW
61.90% MEDIUM
HIGH

There is now consensus for all three categories.

PANELISTS' COMMENTS:

a. (Round 2 comment) "We are not making use of radio."

b. "Broadcast programs needed but cable is more cost effective - especially for on campus traditional students."

c. "These programs tend to be watered down on content to maximize general viewer interest. Contact hours are also low."

d. "Similar to Section I 18. This as well as 4 below is becoming increasingly important for handicapped and remote areas. The use in England is an example of success. We resist it in the U.S. because there is not an effective way to give credit and to make changes ($)."

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3. In-home, correspondence — Consensus achieved for this item. See round 2 summary for details.

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4. In-home, nonbroadcast telecommunications

5.26% NA
78.95% NOW
10.53% 1986-87
1988-90
5.26% 1991-93
1994-96
1997-99
2000+

90% YES
10% NO

15% LOW
55% MEDIUM
30% HIGH

Consensus for priority was regained in round 3. Consensus is stronger for the other categories as well.

STATEMENT:	IMPLEMENTATION	INNOVATIVE	PRIORITY	RESEARCHER'S COMMENTS
PANELISTS' COMMENTS: a. (Round 2 comment) "I assume we are talking about VHS." b. "Video cassette? Cable?" (Yes, as well as beta, 8mm video, videodisc, teletex, videotex, and computers with modems - DAT) c. "Most likely via tape cassette but cable effective also." d. "Great potential if used for the right course material. The Jane Fonda Workout tapes have proved the market is there. Now reach it!"				
5. Programmed instruction	Consensus achieved for this item. See round 2 summary for details.			
6. Oral lectures	Consensus achieved for this item. See round 2 summary for details.			
7. Additional instructional techniques (specify)	NA NOW 1986-87 1988-90 1991-93 1994-96 1997-99 2000+	YES NO	LOW MEDIUM HIGH	
PANELISTS' COMMENTS: a. "Methods shown in round 2" was specified by a panelist and rated now implementation, innovative, and high priority. Comment: "All the methods cited in round 2 are an improvement over lecture method. Interactive video via disc or VHS with computer will probably increase." b. "Television talkback" was specified by a panelist who rated it now implementation, innovative, and high priority. Comment: "We use a system of live closed circuit to regional sites with two way audio so that students may converse with each other and instructor. This, in effect, allows us to have a 'statewide classroom.'" c. "Interactive video - both tape and disc" was also specified by a panelist who rated it now implementation, innovative, and high priority. d. "Interactive video" was specified by another panelist who rated it 1986-87 implementation, innovative, and high priority.				

The data collection phase of my study is complete.

Thank you all very much for your participation as panelists!

CONSENSUS BUILDING THROUGH THE THREE DELPHI ROUNDS

ROUND 1: Of the original 49 specified items (and sub-items), consensus in all three categories (ie: implementation, innovative, and priority) was obtained for 22 of these items (44.9%).

ROUND 2: By the end of round 2, there was consensus in all three categories for 35 of the 49 specified items (71.43%).

ROUND 3: In round 3, consensus was achieved for 11 of the 14 remaining items for which consensus had not been obtained in earlier rounds (consensus for 46 of the original 49 items, or 93.88%). The three items not showing complete consensus were from the Instructional Hardware section: 9. Fiber optics (consensus for innovative and priority, but not for implementation); 16. Satellite earth station (consensus for implementation and innovative, but not for priority); and, 18. Television, broadcast (consensus for implementation and innovative, but not for priority).

Appendix H
Demographic Questionnaire Summary

DEMOGRAPHIC QUESTIONNAIRE SUMMARY
for Media Services in Higher Education
A Delphi Study for the 1990s
by David A. Tiedemann

This is the summary of responses from 22 Delphi panelists who returned the deomographic questionnaire. Items 1.(b), 1.(c), and 3. reflect 23 responses based on a telephone conversation with a panelist who did not return the demographic questionnaire. The number of panelists responding to any given item or option is indicated in the blanks before each item. For items dealing with age or a length of time, the number given is the average number of years.

1. (a) YOUR NAME:

   (b) YOUR INSTITUTIONS: Boston College; California State University-Dominguez Hills; Clarkson University; Drexel University; Loyola Marymount University; Massachesetts Institute of Technology; Northwestern University; Olympic College; San Francisco State University; Santa Monica College; Syracuse University; Temple University; Texas A&M University; University of Arizona; University of Dayton; University of Georgia; University of Iowa; University of Missippi; University of Oregon; University of South Alabama; University of South Carolina; University of Southern California; and University of Virginia.

   (c) 15 PUBLIC, and 8 PRIVATE

   (d) YOUR JOB TITLE (specify): 3 Audiovisual Center Directors; 3 Library Directors; and 16 various titles, each mentioned only once.

   (e) YOUR TELEPHONE NUMBER:

2. YOUR AGE (check one): (45.9 years, average age)

   (a) 20-30; 6 (b) 31-40; 10 (c) 41-50;
   4 (d) 51-60; 2 (e) 61-70; (f) 70 +.

3. YOUR SEX (check one):

   3 (a) female; 20 (b) male.

4. PROFESSIONAL ASSOCIATIONS TO WHICH YOU CURRENTLY BELONG (check all that apply and add any not listed):

   6 (a) American Library Association;
   13 (b) Assn. for Educational Communications & Technology;
   (c) International Council for Computers in Education;
   4 (d) International Television Association;
   (e) Interuniversity Communications Council;
   1 (f) National Society for Performance in Instruction;
   2 (g) American Association for Training and Development;
   2 (h) International Association for Learning Labs;
   2 (i) Northwest College and University Council for Managers of Educational Technology;
   2 (j) Society of Motion Picture & Television Engineers;
   15 (k) various associations, each mentioned only once.

5. NATIONAL OR REGIONAL CONFERENCES RELATED TO INSTRUCTIONAL TECHNOLOGY WHICH YOU HAVE ATTENDED IN THE LAST YEAR (list):

7 attended Association for Educational Communications and Technology; 4 attended American Library Association; 2 attended International Television Association; 2 attended Northwest College and University Council for Managers of Educational Technology; and 15 attended various conferences, each mentioned only once.

6A. YOUR JOB CATEGORY (check the primary one):

5 (a) administrator (Dean or Vice President level);
(b) computer specialist;
5 (c) librarian;
6 (d) media specialist;
6 (e) other (specify); 2 responses for Director, and 4 various job categories, each mentioned only once.

6B. 13.1 (average) years in this job category;

6C. 8.8 (average) years at this site.

7A. YOUR JOB FUNCTION (check all that apply):

16 (a) AV production;
8 (b) cataloging;
11 (c) collection development;
12 (d) finances;
5 (e) institutional research;
13 (f) instructional design;
10 (g) programming;
7 (h) reference;
12 (i) other (specify) - 9 responses for administration, and 3 various job functions, each mentioned only once.

7B. i indicate the letter of your primary job function from 7A:
9 responses for "other" (i) specifying administration,
3 for "AV production" (a),
2 for "instructional design" (f),
2 for "other" (i) specifying circulation control
6 various primary job functions, each mentioned only once

7C. 9.5 (average) years in this primary job function.

8. ACADEMIC DEGREE(S) YOU HAVE EARNED (check all that apply and indicate major or specialization):

	DEGREE	MAJOR(S)
1 (a)	associate	photography
22 (b)	bachelor	4 English; 3 History; 3 Mathematics; 2 each - Science, Education, R-TV/Communications; and 6 various bachelor degrees, each mentioned only once.
20 (c)	master	7 Educational Technology; 5 Library Science; 2 Education; and 6 various master degrees, each mentioned only once

11 (d) doctorate — 6 Education; 3 Educational Technology; and 1 each - Communications, Linguistics
2 (e) other — 1 teaching credential, 1 post graduate coursework in instructional technology

9. STUDENT ENROLLMENT AT YOUR INSTITUTION (full-time equivalent):

3 (a) 5,000 or less; 7 (b) 5,001 -15,000;
5 (c) 15,001 - 25,000; 7 (d) 25,000 or more

10. CENTRAL MEDIA SERVICES STAFF SIZE (permanent full-time/40 hour per week equivalent):

8 (a) 5 or less; 2 (b) 6-10;
5 (c) 11-15; (d) 16-20;
(e) 21-25; 2 (f) 25 or more.

11. CENTRAL MEDIA SERVICES STAFF SIZE (under graduate and graduate student workers full-time/40 hours per week equivalent):

5 (a) 5 or less; 1 (b) 6-10;
5 (c) 11-15; 3 (d) 16-20;
1 (e) 21-25; 1 (f) 25 or more.

12. CENTRAL MEDIA SERVICES BUDGET (total for current year, including salaries, benefits, hardware, rentals, maintenance, software, and so forth):

8 (a) $1-100,000; 2 (b) $100,000-200,000;
2 (c) $200,000-300,000; 1 (d) $300,000-400,000;
3 (e) $400,000-500,000; (f) $500,000-750,000;
(g) $750,000-1,000,000;
2 (h) $1,000,000 or more.

13. FUNDING SOURCES FOR YOUR INSTITUTION (rank order determined by simple majority of responses, using 1 for largest source and 5 for smallest source):

2 (a) tuition; 3 (b) grants;
1 (c) governmental; 4 (d) gifts;
5 (e) generate own funds

14. MODES OF INSTRUCTION USED AT YOUR SCHOOL (rank order determined by simple majority of responses, using 1 for most common and 6 for least common):

6 (a) audio; 5 (b) computer;
3 (c) film (still and motion); 1 (d) lecture;
2 (e) print; 4 (f) television;

15. IDENTIFY THE MOST PROMISING INSTRUCTIONAL TECHNOLOGY IN USE AT YOUR SITE:

12 computer related responses: 7 general; and 1 each - CAI, graphics, language instruction, word processing, and on-line library catalog and computer retrieval system.

10 video related responses: 3 interactive video; 2 general; 2 Instructional Television Fixed Services (ITFS); and 1 each - cable, case study with videocassettes, small format video.

16. IDENTIFY THE MOST PROMISING INSTRUCTIONAL TECHNOLOGY ANTICIPATED FOR USE AT YOUR SITE IN THE NEAR FUTURE (NEXT FIVE YEARS):

17 video related responses : 4 each - interactive video, teleconferencing/satellite technologies; 2 each - broadband systems, cable; and 1 each - general, ITFS, small format video, videocassettes, videotex.

8 computer related responses: 4 CAI; 2 networks; and 1 each - general, requires computers for all students.

17. IDENTIFY THREE COLLEGES OR UNIVERSITIES WHICH YOU FEEL TO HAVE THE BEST AND THE MOST INNOVATIVE MEDIA SERVICES (INCLUDE BRIEF REASONS FOR YOUR OPINION):

3 panelists cited
Indiana University (old AV program with talented staff/ good usage/ good staff, funding, administrative support, equipment and facilities);

2 citations each
Boise State University (well managed with service philosophy/ low budget computer graphics),
Brigham Young University (extensive hardware and research/ videodisc),
Stanford University (ITFS engineering/ microcampus concept),
University of Nebraska - Lincoln (interactive videodisc/ interactive videodisc),
University of Utah - Salt Lake City (interactive videodisc/ interactive video and CAI),
Washington State University (high-end computer graphics);

1 citation each
Central Washington University (good relations with administration),
Florida State University (CAI and instructional design),
Golden West College (computers),
Illinois State University - Normal (small yet diverse),
Kent State University (good staff, funding, administrative support, equipment, and facilities),
Miami Dade Community College (outreach programs, cable utilization, and self study programs),
Miami University - Oxford, Ohio (good staff, funding, administrative support, equipment, and facilities),
Purdue University (none given),
University of California - Los Angeles (WANDAH writing program on PCs),
University of Illinois - Urbana Champaign (PLATO system),
University of Portland (mediated classrooms by design),
University of South Carolina (TV),
University of Southern California (comprehensive program),
Utah State University (interactive videodisc),
Worchester Polytechnic Institute (none given).

Appendix I

Cover Letters for Delphi Rounds One and Two

David A. Tiedemann
2972 Kobe Drive
San Diego, CA 92123
April 26, 1985

Thank you for agreeing to be a panelist for my Delphi study of media services in higher education for the 1990s. I am truly impressed by the credentials of the 21 panelists. Collectively you have 243 years experience in your current job categories (an average of 12.8 years). I will send a complete summary of the demographic questionnaire at the end of the study with the final Delphi summary. This second Delphi round is intended to refine the results of the first round and to allow an opportunity to reach greater consensus on the various items. If significant consensus is achieved in round 2, further rounds will not be necessary.

Since Delphi studies use a relatively small sample of experts, your participation is critical to the completion of my research and the writing of my dissertation. I would appreciate it very much if you would mail round 2 to me on or before May 10, 1985 so that the schedule for this study may be maintained. Instructions for round 2 are attached to your copy of the round 1 summary.

Again, I would like to express my gratitude for your efforts in this study! I know that it is difficult to find the time to respond to studies such as this, especially toward the end of an academic year. However, I think that by participating in research such as this, you are helping to make significant advances for instructional technology in higher education.

I would also like to acknowledge the continuing encouragement and support of Thomas Russell, DEMM President for AECT. I have formally submitted a proposal to the 1986 AECT convention planning committee for a fee workshop, "Use of the Delphi technique to plan future media support service programs in higher education." I have received authorization from AECT to offer those of you who complete this study and pre-register for the workshop an on-site $25.00 rebate. Whether or not you attend the workshop, I would like to treat you to coffee or a cocktail if you attend the convention in Las Vegas. This offer is intended as a small token of my appreciation for your time and efforts as a panelist in my Delphi study.

I hope that you will be able to complete this second round by May 10, 1985 and that you will plan to participate in my proposed workshop for the 1986 AECT convention. Thanks very much!

Sincerely yours,

David A. Tiedemann
(619) 260-4567 (work)
(619) 277-6176 (home)

David A. Tiedemann
2972 Kobe Drive
San Diego, CA 92123
June 8, 1985

Thank you for continuing as a panelist for my Delphi study of media services in higher education for the 1990s. I think that the study is showing some very interesting results as you'll see in the enclosed summary of round 2. This third (and final) Delphi round is intended to refine the results of the second round and to provide an opportunity to reach consensus on the remaining items for which there wasn't consensus in all three categories.

I am concerned with the fact that only 17 panelists remain in the study. This is only two more than called for as a minimum in my research design. I hope that you appreciate the fact that the loss of any panelists during round 3 may invalidate this study and all of your time-consuming efforts so far. So please bear with me for this final round. To reduce any unnecessary inconvenience to you, I have prepared an abbreviated round 3 instrument which eliminates the need for you to respond to the items for which consensus is already indicated. The instructions for round 3 are attached to your copy of the round 2 summary. Please try to mail round 3 back to me by June 21, 1985.

AECT's Division of Educational Media Management has acknowledged the receipt of my proposal for a workshop, "Use of the Delphi technique to plan future media support service programs in higher education." The AECT conference Planning Committee Meeting will be held June 28-30. Notification of workshop acceptance will be made soon after the meeting. I hope to have word from the Planning Committee in time to let you know the status of my workshop proposal when I mail the demographic survey and round 3 Delphi summaries to you. You should receive these materials around the beginning of August (give or take a few weeks depending on the timing of the birth of our second child, now scheduled for mid-July).

Thank you again for your patience and participation in this study. I hope that I will be able to thank you in person at the 1986 AECT Convention. I would like once again to acknowledge the support and encouragement given to me during the course of my research by Thomas Russell, DEMM President for AECT.

I look forward to receiving your round 3 responses.

Sincerely yours,

David A. Tiedemann
(619) 260-4567 (work)
(619) 277-6176 (home)

Appendix J

Researcher Correspondence with the Panelists, Including Acknowledgement, Follow-up, and Rebate Letters

David A. Tiedemann
2972 Kobe Drive
San Diego, CA 92123
(619) 277-6176
March 24, 1985

Thank you for your response to round 1 of my Delphi study of media services in higher education for the 1990s. I am writing to acknowledge receipt of your response since it will take me several weeks to summarize the results for distribution in round two of the study.

I expect to mail round two of the Delphi study to you by the middle of April. Hopefully you will be able to return it to me during the week after you receive it. I plan to mail a final summary of the study to you (or perhaps a third round if the panelists haven't reached consensus) around the middle of May.

Thank you again for your response to round 1 and your continuing particpation in this Delphi study. I'll be in touch with you soon.

Sincerely yours,

David A. Tiedemann

David A. Tiedemann
2972 Kobe Drive
San Diego, CA 92123
(619) 277-6176
March 15, 1985

I had the pleasure of speaking with you on the telephone during the week of February 11th regarding my Delphi study of media services for higher education in the 1990s. During our conversation you agreed to participate in the study. The demographic and Delphi instruments were were mailed to you on February 13, 1985.

Although my cover letter requested that participants in the study mail their responses to me by March 1, 1985, I left the start date for round two of the Delphi study open. There is still time for you to send your response for round one to me. In fact your response is critical to the sucess of the study for two reasons. First, a minimal number of responses is required for the study to proceed (and for me to be able to finish my doctoral studies). Also as the number of participants in the study increases, the more generalizable the study's results become. The second reason for the importance of your reponse is related to the current innovative uses of instuctional technology at . As I mentioned on the phone, has been cited in the literature for its innovative use of media and/or computers. Input from institutions exhibiting leadership in applying instructional technology will make the study more useful to the profession.

If you have already mailed your response, thank you for participating in this study. If you haven't mailed your response yet, I hope that you will be able to do so during the next week. If your situation has changed since our conversation several weeks ago when you indicated your willingness to participate, please let me know at your earliest convenience so I may begin round two of the Delphi study. Feel free to call me at home or at work: (619) 260-4567.

I hope to hear from you soon.

Sincerely yours,

David A. Tiedemann

David A. Tiedemann
2972 Kobe Drive
San Diego, CA 92123
June 28, 1985

I am writing to inquire about the status of the third and final round of my Delphi study which was mailed to you on June 8, 1985. I understand that it is especially difficult at this time of the year to find time to participate in such research because of work demands and vacation schedules. However if you have not already returned your round 3 response, it is not too late to do so. If you have already mailed your response, thank you for participating throughout the study's three rounds.

In order for me to begin to analyse the data (and to conclude this study), I need to receive either your completed round 3 response or an indication that you will not be able to return round 3. I would appreciate hearing from you one way or the other within a weeks time from your receipt of this letter.

Please feel free to call me at home or at work. I hope to hear from you soon. Thank you very much!

Sincerely yours,

David A. Tiedemann
(619) 277-6176 (home)
(619) 260-4567 (work)

David A. Tiedemann
2972 Kobe Drive
San Diego, CA 92123
July 9, 1985

Thank you very much for completing your role as a panelist for my research, *Media Services in Higher Education: A Delphi Study for the 1990s*. I have enclosed summaries of the demographic questionnaire and responses to the Round 3 Delphi instrument. Round 3 was returned by 19 panelists in time for the tabulation of responses represented by the summary. A brief analysis of how consensus developed during the three rounds is given at the end of the summary.

It seems remarkable to me that such a diverse group of professionals reached consensus (ie: at least 50% in agreement) on all but 3 of 49 items. I think that these three instructional hardware items (fiber optics, satellite earth station, and broadcast television - as well as those items for which panelist consensus was marginal) warrant an especially thorough analysis before they are further implemented in higher education.

I plan to list your institution, much the same as I have in the demographic summary, in my dissertation and any subsequent publications. However, as indicated in my original cover letter, I will not name any individuals in any publication without their prior authorization. Would you mind if I released your name and address to other panelists who express a desire to correspond? May I assume that it is all right for me to release this information to other panelists if I do not hear otherwise from you? If you have any objections to this, or to my giving your name to AECT for the workshop rebate (assuming that the workshop is offered), please let me know so that I may respect your wishes.

I haven't heard yet from AECT's 1986 Convention Planning Committee regarding its decision on my workshop proposal. I will write to you once I know the status of the proposal. I hope that as many of the panelists as possible will be able to meet in Las Vegas this January whether or not the workshop is offered. Finally, on the subject of AECT, I would like to take this last opportunity to express my appreciation for the support of my research by Thomas Russell and the Division of Educational Media Management.

I hope that your participation in this study will be of some aid to you in your future planning efforts. Thank you again for serving as a panelist for my Delphi study.

Best Wishes,

David A. Tiedemann
(619) 260-4567 (work)
(619) 277-6176 (home)

David A. Tiedemann
2972 Kobe Drive
San Diego, CA 92123
August 13, 1985

I was recently notified that my proposal for a workshop, "Use of the Delphi technique to plan future media support services in higher education," has been accepted by the AECT Program Planning Committee. Assuming that there is a minimum enrollment of 15, the workshop will be held from 9:00 a.m. to 12:00 noon on Friday, January 17, 1986.

I made final arrangements for the panelist rebate today with Craig Caldwell, AECT's Convention Coordinator. In order for the rebate plan to work, **you must save this letter to register for the workshop.** If you pre-register for the workshop, enclose this letter with a $35.00 registration fee ($60.00 workshop fee less the $25.00 rebate). If you register on-site, present the letter along with the $35.00 fee. I have sent AECT a list of panelist names and addresses to confirm your eligibility for the rebate.

I hope that you will attend the workshop so that we may examine the Delphi technique in greater detail and continue the dialogue begun in the three Delphi rounds. I will try to stay in the AECT headquarters hotel in Las Vegas, so please try to contact me there (whether or not you attend the workshop) so that we may make plans to get together for coffee or a cocktail.

Thanks again for your valued participation in my research.

Sincerely,

David A. Tiedemann
(619) 260-4567 (work)
(619) 277-6176 (home)

cc: Craig Caldwell