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ABSTRACT

Based on the findings of a content analysis of representative literature on educational technology, this report examines the trends and issues in the field, beginning in 1988 and continuing into 1989. It is noted that trend analysis, particularly year-to-year analysis which reveals less variability than decade-to-decade analysis, reveals topics of current interest and is more a reflection of the status quo than a prediction of the future. The following trends are identified and discussed: (1) concern for the design and development of instructional products and procedures dominates the professional literature; (2) evaluation is becoming an integral part of the instructional design and development process; (3) there is increasing use of research and development knowledge to solve current problems of teaching and learning; (4) computers can be found in almost every public school in the United States; (5) interactive video is widely accepted as a research and development product, but not in schools and higher education; (6) distance education has become established as a major vehicle for instruction at all levels of education and training; (7) the definition, conduct, and status of professional education in the field continues to preoccupy practitioners; (8) the impact of technology on individuals in the society at large continues to be considered by educational professionals; (9) the applications of telecommunications used in the society at large are reflected in the schools and in postsecondary institutions; (10) the results of research do not appear to have much effect on applications and operations of educational technology; and (11) the curriculum support function is an important element of educational technology programs. The report concludes with a discussion of the methodology used to identify the trends; it was written by Glenn LeBlanc. (39 references) (DB)

TRENDS AND ISSUES IN

Educational Technology 1989

ERIC
CLEARINGHOUSE
ON INFORMATION
RESOURCES

SYRACUSE
UNIVERSITY
1989

IR-86

TRENDS AND ISSUES IN

Educational Technology

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The primary reviewers of the literature for the content analysis on which this review is based were Glenn LeBlanc and Crystal Yancey, both of whom are graduate students in Instructional Design, Development, and Evaluation at Syracuse University. Glenn LeBlanc is also the author of the description of the study methodology which is appended to this report.

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Preface

Since trends are difficult to determine from year to year, the analysis which began in 1988 continued in 1989. A report is now planned for every other year. The next trends report will be published in 1991. Last year was the starting point for analyzing trends and issues in the field of educational technology (Ely, 1988). This year's report builds on that initial effort in an attempt to create a database for longitudinal analysis of trends in the field over the years. The only previous attempt to discern trends in the field for ERIC was reported by Allen (1970).

As we might expect, many of the 1989 trends are the same as those in 1988. Year-to-year trends are not as variable as decade-to-decade trends. The fact that certain trends are repeated is, in a sense, a confirmation of their importance. Confidence is increased as a trend appears over several years.

The trends as reflected in the literature are more a reflection of the *status quo* than a prediction of the future. Content analysis usually reveals the topics of current interest, perhaps with a lag time between the events reported and their appearance in the publication The trends should be viewed from this perspective.

Introduction

The reader who is interested only in educational technology trends may omit this section. Trends begin on page 9.

The way in which trends are determined may be as valuable as the trends themselves. This section describes the procedures used in reaching the conclusions that are the focus of this study.

A rationale for content analysis as the vehicle for determining trends is given first. Then the specific procedure used by the author is described. Trends in 1988 and 1989 are compared, and the literature sources are named. Finally, the rank order of topics for 1988 and 1989 are listed. The Introduction and Appendix A constitute a comprehensive description of the methodology used to identify the trends.

Why Content Analysis?

To insure consistency, the same procedures, with minor revisions, were followed in 1989 (see Appendix A for details). A modified content analysis was used for determining the trends. A careful look at *what* professionals in the field are saying in their own professional writings seems to be one of the best ways to identify trends. Even though the focus on content of publications, convention programs, doctoral dissertations, and ERIC input means looking backward, it was this retrospective look that provided specific, measurable content units upon which to base extrapolations of future movements. One alternative for eliciting trends is to use the informed specialist (as Allen did in 1970) to name trends from that person's vantage point. It would seem that one person's viewpoint, as unbiased as that person may try to be, is open to criticism for its subjectivity. As with individuals, the best predictors c future performance in professional fields would seem to be past behaviors.

Beyond Content Analysis

Frequency counts of content units serve as the basis for the trends in 1989 (see Appendix E). These quantitative results have been complemented and supported by position papers, policy statements, and ongoing state-of-the-art studies issued by opinion leaders and organizations they represent: professional associations, state and federal governmental offices, and quasi-governmental non-profit bodies. Statistics gathered and reported by organizations who specialize in such data collection have been used to provide quantitative profiles of growth and direction and to confirm the content analysis. Using these sources, the author generated the trends. The categories created for the content analysis sometimes directly influenced the determination of a trend and sometimes indirectly influenced it. The complementary literature was used to enhance, explain, and provide examples related to the trends. The reader should note that there is no *direct* relationship between the quantitative categories and the trends. They are used as *indicators* of trends and are interpreted by the author to tease out trends.

Top Topics

The trends for 1989 are more qualitative than those of 1988. This publication points out the subtle shifts and probes some of the reasons for the directions in which the field of educational technology appears to be heading. For example, in reviewing the trends, "Instructional Processes" (which includes instructional design) leads the coverage many times over its nearest competitor, "Technical Developments," which moved from third place last year to second place this year (see Table 1) In an attempt to be more specific about "Instructional Processes," our team created new subcategories so that specific elements of each category could be broken out for further analysis The "Personnel" category fell from second position in 1988 to sixth position (out of 8) for 1989. When categories showed consistency in retaining their position (all except "Personnel"), further exploration was made to determine *why*. Then supplementary documents, not included in the formal content analysis, were used for getting "behind" the data to determine the political, social, and economic reasons for the findings

Table 1. Rank Order of Content Analysis Categories

	1988	1989
Instructional Processes	1	1
Personnel	2	6
Technical Developments	3	2
Management	4	3
The Field	5	4
Services	6	5
Society and Culture	7	7
Research/Theory	8	8

External Pressures

Educational technology seems to be on the tongues of more educators every year. Lay people are more involved and newspaper reporters actively seek information about technological innovations in education and training settings. The general feeling seems to be that many new technologies, primarily those using computers and telecommunications, are going to be an integral part of our culture, and that the schools ought to be preparing young people to be intelligent producers and users of the information technology hardware and software. Newspapers, magazines, and broadcasting are making people aware of the potentials of technology and many adults often ask, "Why not in the schools?" This question is beginning to haunt educators and appears more often in the literature than ever before. There is an accounting for such attitudes in the trends.

Limitations

One limitation of this study that must be recognized is that the trends identified in it were created largely by people who are in the field of educational technology. If the journals, conventions, and dissertations are used as the basis for analysis, it stands to reason that these sources attract contributions from people *within* the field. It is only when the general literature created by opinion leaders and visible organizations is factored into the equation that the strong influence of professionals in the field is tempered by the broader perspectives and opinions of other educators and policy makers. Even with this observation, it seems reasonable to say that the literature mainly reflects the trends as seen by those who spend their daily lives working within the field.

Rationale for Identifying Trends

The rank order of each trend was determined by using its frequency in the literature, i.e., the topic that is the subject of the most articles, papers, and documents is listed as trend number one. This ranking was further substantiated by examples from the literature, statistics from reliable sources, and policy statements from opinion leaders and rganizations. Each trend grew out of the topics and subtopics as classified in Table 2. This procedure permits both quantitative and qualitative data to be interpreted for determination of trends. Ultimately, the author's responsibility is to identify the trends and to write the supporting rationale.

Issues

In the process of analyzing data to identify trends, there are likely to be varied points of view on topics of importance to professionals in the field. In this report, an *issue* is a problem or question for which there are two or more points of view. An attempt is made to state each point of view without resolution.

Future Trends

This study is not an exploration of "futures." As trends are identified they should be monitored to determine their future potential force and direction. Predictions about the future can only be valid by using trends over a period of years. The ERIC effort to identify trends has just begun and therefore it is difficult to make predictions based on data from only two years. However, in the absence of soothsayers or crystal balls, these trends can serve as points of departure for extrapolations leading to future movements within the field.

Methodology

Sources for the content analysis used in this study were four leading professional journals in educational technology; papers given at annual conventions of three professional associations; dissertations from five universities that have a high level of doctoral productivity; and the educational technology documents that have been placed into the ERIC database (Figure 1). The 1989 report covers the period from October 1, 1988, through September 30, 1989.

Figure 1. Content Sources

Journals

British Journal of Educational Technology
Educational Technology
Educational Technology Research and Development (a merger of the *Journal of Instructional Development* and *Educational Communications and Technology Journal,* both of which were analyzed separately in 1988)
TechTrends

Dissertation Sources

Arizona State University
Florida State University
Indiana University
Syracuse University
University of Southern California

Conferences

Association for Educational Communications and Technology
Educational Technology International Conference (United Kingdom)
National Society for Performance and Instruction

ERIC Input

All documents in the area of Educational Technology put into the ERIC system from October 1, 1988, to September 30, 1989.

Independent reviews of each item from each source were made by at least two reviewers who then compared their analyses, usually in the presence of the author of this report, and collectively made decisions about classification using a form with 49 recording units. (A recording unit is a designated label for subject matter content, e.g., for the category, "Evaluation," there are four recording units, one of which is "Product Evaluation.") The classification scheme duplicated the 1988 procedure with minor modification of recording units (see Appendix D). Several topics were assigned additional recording units to permit finer distinctions of subject matter. Several recording units used in 1988 were eliminated because of infrequent use. The rank order of the top 13 recording units is given in Table 2. The complete compilation of frequencies by topic and source is in Appendix E.

Table 2. Rank Order of Top 13 Recording Units

	1988 n=1443	1989 n=1514
Design and Development	448	259
Evaluation	97	99
Status (of the field)	61	95
Computer Related	82	90
Interactive Video	29	83
Distance Education	61	81
Curriculum Support	25	79
Professional Education	145	72
Society and Culture	72	71
Telecommunications	14	
Research/Theory	45	57
Roles and Responsibilities	51	38
Logistics	43	32
Others (36 recording units)	270	387

Additional sources used to confirm the quantitative data were policy papers and reports published in 1989 by organizations with high public visibility that are in a position to influence public and professional opinion. For example, *Linking for Learning: A New Course for Education*, issued by the Office of Technology Assessment of the U.S.

Congress, *Results in Education 1989: The Governors' 1991 Report on Education*, released by the National Governors' Association, and statements of the National Education Association were used in the analysis.

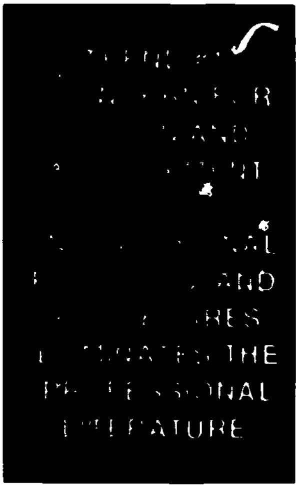
Appendix A provides a more detailed report on the procedures. It was written by Glenn LeBlanc, who assisted in both the 1988 and 1989 studies.

Glenn LeBlanc and Crystal Yancey served as data analysts.

Trends in Educational Technology 1989

Caution

Trends can be described in the same way that the five blind men described the elephant—each perceived the animal differently depending on the place of contact. Likewise, it is difficult to determine trends for an entire field like educational technology since the field is often interpreted differently by persons with varied perspectives. Part of the problem is the broad definition of the field and part is in its multiple manifestations at various levels and in many locations. Thus, a trend applicable to elementary and secondary schools may not be visible in postsecondary institutions. A professional working with artificial intelligence and expert systems sees the field quite differently than the specialist working in the creation of video products. When educational technology principles and practices are applied in medical and business training sectors, the trends look considerably different than in training for adult literacy or learning English as a second language even though basic premises and procedures may be the same. The purpose of this disclaimer is to point out the potential misinterpretations that could emerge from wholesale acceptance of each trend that follows. Each statement should be screened with a contextual filter to be sure that it applies in the setting where it is intended to be used.



Design and development are concerned with several subtopics: needs assessment, task analysis, learner characteristics, message design, product development, and motivational strategies. The dominance of these topics in the literature of 1989 is brought about by an increasing recognition of the importance of instructional material design and the strategies used to deliver information. It is a swing away from a preoccupation with hardware that dominated the field in its early days toward a concern for the systematic development of software. Much of the literature in this area emphasizes the design of products using new tools such as HyperCard. HyperCard has emerged as one of the most frequently discussed topics at professional conferences and has become the subject of articles in every journal reviewed for this study. One journal initiated a regular HyperCard column in 1989. This specific interest in the use of an authoring program to create instructional materials is indicative of the heightened interest in the process of instructional design and development.

There is usually a distinction between instructional *design* and instructional *development*. Instructional design focuses on the product itself and the lesson is the unit of analysis; instructional development is broader and usually deals with the course as the unit of analysis. The terms are often used interchangeably, but the distinction is important to practitioners and theoreticians alike. Instructional designers are likely to look at the "micro" level of instruction and use knowledge and skills of task analysis, interpreting learner characteristics, message design, and motivational strategies. Professionals who practice instructional development work at the "macro" level and are more concerned with needs assessment, goal definition, systematic arrangement of components, delivery systems, evaluation, and management of the enterprise. In practice, some of the specific areas of interest for instructional designers are artificial intelligence and expert systems, interactive video, and problem solving. All three of these areas are frequently found in the literature and conference programs of 1989. Instructional developers, on the other hand, are involved in distance education and course development, which also frequently appear in the 1989 literature.

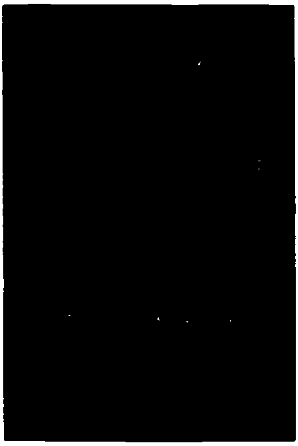
When discussing instructional design and development, the medium is usually secondary. To be sure, the medium *is* important and is sometimes the starting point for instructional designers and developers. The ideal case would determine the most appropriate medium *after* decisions about goals, objectives, and context of use have been made. Analysis of learners and task analysis should also precede the selection of a medium. Many practitioners tend to focus on the medium because it is a visible delivery system; the hardware has more public appeal and is more observable than the software. For example, the literature speaks of "the computer" or "interactive video," which then produces a mindset of the devices that deliver the information rather than the information itself. (In this content analysis, the items that emphasize *equipment* are placed in the "Technical Developments" category; those that describe *materials* or *software* are placed in the "Design and Development" category.)

There continues to be a concern for the proper balance of hardware and software in teaching and learning. The Center for Technology in Education at the Bank Street College of Education has a mission "to conduct research and development leading to an understanding and demonstration of how technology can improve student achievement, and consequently school productivity" (Fox & Saunders, 1989). In this instance, technology is interpreted as hardware and software in a school setting.

Results in Education: 1989 (National Governors' Association, 1989) reports a growing concern among educators that "regardless of the current emphasis placed on computer use instruction, schools do not appear to be taking advantage of the unique uses of technology in teaching subject matter and in helping students develop higher-order thinking skills. . . . The predominant focus seems to be on expanding access to technology with little or no attention given to using technology to restructure schools or to teach higher-order thinking." Even with extensive coverage of the design and development function in the educational technology literature, there still remains a public perception that it has not yet reached a creative and sophisticated level.

Issues

- Under what conditions should the medium of instruction be selected *before* or *after* the design process?
- How can the distinction between instructional *design* and instructional *development* be made clearer?
- Is there a direct relationship between software quality and the use of specific design models and/or procedures?
- How can instructional materials be designed to help learners use higher order thinking skills?
- How can technology be applied to assist learners in problem-solving?



Evaluation has always been an integral part of the instructional design and development process but it is currently enjoying an increased recognition in the professional literature of educational technology. Like the many faces of instructional design and development, evaluation can be subdivided into at least four areas: product evaluation, process evaluation, cost-effectiveness (productivity) evaluation, and formative evaluation. Product evaluation (summative evaluation of instructional materials or software) and formative (or en route) evaluation during the design and development process are often included in the literature of instructional design and development.

During 1989, there were many articles and conference papers that highlighted evaluation. The dominant theme for most of these papers was product evaluation, most frequently discussing the effectiveness of computer programs used in schools and colleges. Many of the papers were case studies of the outputs of design and development efforts. The process evaluation area also included program evaluation; that is, the summative conclusions reached after a program or project has concluded. Evaluation of teaching and impact of technology fall into this category.

Evaluation seems to be emerging as a distinct area within the larger category of instructional design and development and has established itself within the field of educational technology. Seventy-four percent of the professional academic programs now include courses in evaluation as part of the curriculum (Johnson, 1989).

Issues

- Should evaluation of instructional products be medium specific or generic? (i.e., should there be one evaluation procedure for computer assisted instruction and another for audiotapes, or could one evaluation protocol serve all instructional resources?)
- Should evaluation competencies be developed independently of design and development competencies? (i.e., is evaluation separate or integral to the process of instructional design and development?)
- When should evaluation be used? When should research be used?

> [illegible]

Much of the literature of 1989 seemed to draw upon earlier works. Summaries of research and development findings, meta-analyses of research in specific areas, and reports of case studies reflected recognition of existing work as useful for current efforts. Educators have often complained that information that is already known is not used, and the wag says, "There's nothing new under the sun." However, when existing knowledge is synthesized it often becomes more useful than separate and isolated facts. When successful programs are publicized, they are more likely to be adopted.

Most of the existing knowledge derived from the literature and case studies focuses on the use of educational technology principles and practices in teaching and learning. For example, 40 of the programs out of the 250 listed in the 1989 National Diffusion Network (NDN) catalog, *Programs That Work*, are technology-oriented. After these programs have gone through a rigorous review process, they are listed in the NDN catalog with a "seal of approval." A national review panel looks at the programs and carefully judges them according to set criteria. Schools across the nation adopt and implement these programs.

More specific to the subject of this report on trends is *Tapping the Potential of Educational Technology*, published by the Southeastern Educational Improvement Laboratory. This catalog of 105 educational technology projects was created with information gathered from state education agencies. The introduction says that:

> Some projects appear to be disarmingly simple, while others are at the forefront of new ways to incorporate technology in the classroom to meet a critical need. But all add to our understanding of how technological capacities can be harnessed to address the instructional needs of all students. (Southeastern Educational Improvement Laboratory, 1989)

The 49 entries for computers are proportionate to the general literature of the field. Other categories reflect less emphasis but are nonetheless indicative of current activities in many of the nation's schools: CD-ROM (7 entries); Distance Learning Technologies (9 entries); Robotics (5 entries); Telecommunications (14 entries); Videodisc (10 entries); Video Production (6 entries), and Videotape (5 entries).

Issues

- To what extent are existing research findings and case study results applicable in new settings?
- How can research findings be made more generalizable?
- What research questions appear to be paramount today in the field of educational technology?

Quality Education Data (1989) reports that 76,395 of the 79,693 public schools in the United States have two or more microcomputers. When the total number of microcomputers is calculated, there are 1,596,715 units, or an average of 19.8 units per school. A more revealing figure is the average microdensity of 25.4 students per microcomputer. (Microdensity is the term that indicates the number of students in a school or school system divided by the number of microcomputers available for instructional purposes.) Schools with a microdensity of one to nine students per computer number 5,228. In spite of improvements in these figures every year, the fact remains that "the average student spends only about one hour per week on the computer" (National Governors' Association, 1989).

Nonpublic schools do not fare as well. Of the 23,026 Roman Catholic and other private schools, 8,440 report that microcomputers are available. Microdensity has not been calculated.

The Apple II series dominates the market with 84% of the schools having access to this brand; 21% of the schools have access to Radio Shack; 25% to Commodore; and 15% to IBM. The 1989 figures show that IBM-compatible and Macintosh have less than 2% availability in the schools. All of the above figures show double counts when more than one brand is available in a school (Quality Education Data, 1989).

There is no doubt that use of the computer in schools at all levels continued to dominate the literature in 1989 as it did in 1988. Journals specifically dedicated to computers in schools were not included in the content analysis since they would skew the findings. There are at least thirteen journals that specifically address the use of computers in education. If those sources were used, computer literature would be far above any other category in this study. It seems appropriate, therefore, to review some of that literature separately to augment the general review of educational technology literature.

Electronic Learning has surveyed state education agencies annually since 1980. The ninth annual survey of all 50 state education agencies (plus the District of Columbia and Puerto Rico) revealed that 77% of the states are planning new, technology-related programs and 93% of the states provide in-service computer education for certified teachers. Computer courses in teacher education programs are required for certification in 23 states and the District of Columbia. This survey also indicated that factors which are likely to hinder the development of educational technology (defined here as use of computers and video technologies) are funding and teacher education. "Funding" was named by 64% of the states as a major impediment to continued growth, and "teacher training" was reported to be a limiting factor by 21% of the states. In regard to special problems for which technology provided some solutions, 35 states named special education as receiving the most support and 27 reported the use of technology with gifted and talented programs. Twenty-one states use technology to address equity issues (*Ninth Annual Survey...*, 1989).

More professional educators and associations appear to be endorsing technology in the schools. The National Education Association's Special Committee on Educational Technology reported to the Representative Assembly in 1989. "Today every teacher needs a computer," the report stresses, "because teaching now also means handling administrative tasks, spurring the technological revolution in learning, reforming the curriculum, and restructuring the schools." One NEA officer said, "The focus must be on technology as a means to restructure the school environment—not as a piecemeal appendage grafted onto the current school structure and curriculum, and not as a way to further routinize learning" (Weiss, 1989).

The momentum for computer use in education is accelerating. Administrative and clerical applications have become routine in most schools. Universities have varied mixes of computer access—mainframes, microcomputer clusters, and individual personal units, but most of the use appears to be for management of the institution, research, and writing. The computer does not constitute a major movement in the process of teaching and learning. The most common use of microcomputers in elementary and secondary schools is to teach computer "literacy." Other primary uses are for word processing and to provide "drill and practice" exercises. There is some indication that schools are not buying as much microcomputer software. Hope

Reports (1989) calculated a sharp increase in microcomputer software sales from 1982 until 1985 and then a significant decline each year through 1988. There may be several explanations. First, school budgets are tighter and purchasing may have been reduced. Second, those who purchase software may not know what is available. Third, if people know what is available, they may feel that it is not appropriate to the needs of a school or that it is insufficient in quality.

The potential for computers in teaching and learning has not been advancing. The lack of progress can be attributed to the lack of teacher knowledge and skills, the lack of time to create and adapt materials, and the lack of support for introducing ideas. Mary Futrell, Immediate Past President of the National Education Association (NEA) said, "In the future we also need to do a better job of training teachers to use instructional technologies. Whether the technology is a calculator, computer, VCR, or laser, we need to help teachers integrate technology into the curriculum" (Futrell, 1989). The NEA's Special Committee on Educational Technology says only half of the nation's teachers report that they have used a computer, and only a third indicate that they have had up to 20 hours of computer training.

One finding coming out of a five year research program at the Educational Technology Center (ETC) at Harvard University's Graduate School of Education underscores the need for greater teacher involvement in the use of technology in schools.

Involving experienced teachers as partners in collaborative research requires time and explicit efforts to link the work of the schools with the work of universities. ETC established laboratory sites in several schools to learn what implementation of the Center's innovations entails. This research revealed that incorporating technology-enhanced guided inquiry approaches into regular classrooms requires changes not only in technology but also in curriculum and teaching approaches. (Fox & Saunders, 1989)

Schools are not the only educational institutions lacking in computer applications to teaching and learning. Frank Newman, President of the Education Commission of the States, said in a keynote address to CAUSE 89:

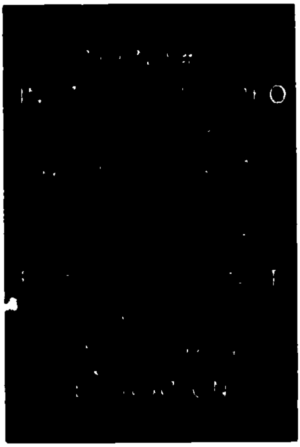
In the teaching and learning function of the university, we are still in the category [of computer use] that we in the academic world euphemistically call "potential." That is to say we have made practically no progress. To put it in perspective, the average university in this country, in terms of its use of information technology in teaching, is substantially behind the typical elementary and secondary school. (Newman, 1989)

Concerns about computers in the schools led to an international conference sponsored by Unesco in 1989—Education and Informatics: Strengthening International Co-operation. The ten day conference produced a series of conclusions, recommendations, and suggestions for action. The 500 delegates also issued a "declaration" which calls for a:

New impetus to the consultations that are so urgently needed in this field and to take steps to ensure that the international community gives sufficiently high priority to international plans and programmes aimed at co-operation on new information technologies in education to ensure that they cater for all countries expressing needs for assistance. (Unesco, 1989)

Issues

- How can more attention be directed to the teaching and learning functions of computers in education settings?
- How can schools provide access, training, and time for teachers to gain computer skills?
- What constitutes "good" computer software?
- How can computer-assisted instruction be integrated into the curriculum?
- How can access to computers be enhanced for *all* learners?



In 1989 there were three times as many articles in the interactive video category as in 1988. The increasing activity in this area reflects growth in the production and use of laser discs. The more common laser discs for computer use, CD (compact disc—audio) and CD-ROM (compact disc-read only memory), have increased interest in the larger format videodisc which stores more visual information. The videodisc has been around for almost ten years with applications limited largely to commercial motion pictures for home use. Using a digitized format, and combining it with microcomputer control, the videodisc has become an interactive system with potential for individualized teaching and learning. A frequent combination reported in the literature is the use of HyperCard software with a videodisc. This combination permits exploration of concepts in depth and use of an inquiry approach to learning through the hierarchical structure of HyperCard, supported by computer graphics with still and moving images stored on the videodisc. In some cases the computer is coordinated with a videotape recorder as a less expensive, and slower, interactive video system.

For Education, it is clear that interactive video is still in its infancy and is more a research and development product than one that is ready for wholesale adoption. Quality Education Data (1989) reports only 1,177 schools with videodisc players. Of that number, only 805 have an interactive capability. In actual numbers, Hope Reports (1989) estimates that there are 3,500 videodisc players in the schools and 3,900 in the colleges. Other estimates are much more optimistic. Pollak (1989) says, "There are 125,000 to 150,000 videodisc systems currently in use in the non-consumer arena. Of these, it is estimated that 30,000 are in use in education." Clearly, there are major discrepancies between the data and the estimates. Regardless of the number of units, it is highly likely that only a relatively small percentage are being used interactively in Education, even though the medium is frequently used in military and industrial training.

In the *Electronic Learning* survey (1989), all of the 31 states reporting on the use of technologies (other than the computer) said that television was available in 80-100% of their K-12 schools and that videotape recorders were almost as ubiquitous. Videodisc players and CD-ROM were found in the smallest percentage of schools.

The potential contributions of interactive video were reported in the research findings of the Educational Technology Center (ETC) (Fox & Saunders, 1989). In science, "Computer simulations that visually represent normally unobservable aspects of scientific phenomena can help students to change their deeply rooted everyday ideas. . . and to more readily grasp important accepted scientific theories and concepts." In mathematics, "Results so far suggest that the external visual representations presented by the software help students to construct more sophisticated mental representations of the target mathematical ideas."

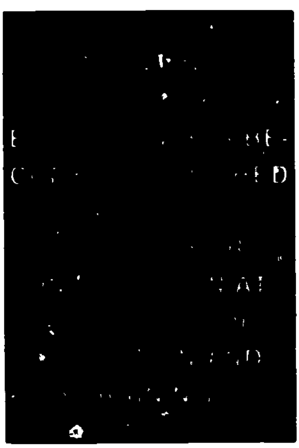
There are schools where interactive video is being used. Ten existing projects in ten states are described in *Tapping the Potential of Educational Technology* (Southeastern Educational Improvement Laboratory, 1989). These projects would have to be called "pilot" since they are using products that are custom-made or not widely available. The interactive video developments build on the interactive characteristic of computers. It is a marriage of two basic hardware systems with specialized software to provide increased access to resources in a minimum time.

The *potential* of interactive video is recognized by educational technologists and educational leaders alike. Seymour Papert, of the M.I.T. Media Lab, says: "We will stop making distinctions between computers and video. We will probably have computer-controlled systems that use video and databases and involve interaction" (Papert, 1989). Ruth Randall, former chief state school officer of Minnesota, shares Papert's perspective: "Video, along with live interactive television, will also play a larger role in distance learning. Instructional video can bring many experiences to schools that are isolated, or that don't have teachers with expertise in every area" (Randall, 1989).

It is important to distinguish between *interactive video* and videodiscs. It appears that more videodiscs are available than ever before. The 1989-1990 *Videodisc Compendium for Education and Training* contains over 700 videodisc titles from 93 producers, an increase of 61 from the previous edition. Most of the titles are in the science and computer areas. The strongest areas of growth are in art, language arts, and the social studies (Pollak, 1989).

Issues

- Can interactive video be justified as a cost/effective teaching tool?
- How can more than one learner use an interactive video workstation at the same time?
- What is the role of CD-I (compact disc-interactive)?
- Who will prepare the sophisticated interactive video software for schools?



Distance education is prominent in the educational technology literature. The organization and management of distance education encompasses much more than the delivery systems that are so visible. Yet it is delivery systems that establish the relationship between distance education and educational technology. There is virtually no distance education program that does not involve some aspect of hardware and software as well as the design and development of courseware. The emphasis on design of course materials is critical for learners who are working independent of face-to-face contact with a teacher. Much of the literature falls into the field of educational technology.

There are journals devoted specifically to distance education (*The American Journal of Distance Education, The Canadian Journal of Distance Education*, and several published outside of North America.) None of these journals were part of the content analysis. A cursory review of these specialized journals reveals that many of the articles are devoted to organization, management, retention, evaluation, and other topics that tend not to emphasize communication technology. There appeared to be no one technology that exceeded others in frequency. Broadcasting and telecommunications media were used as frequently as microcomputer discs and multimedia packages. Broadcasting involves open channel stations, point-to-point satellite, cable, and low power transmission (Instructional Television Fixed Service—ITFS). Telephone lines are used for computer networking, two-way audio, and graphic display (electronic chalkboard). Some programs are self-contained on microcomputer discs for individual learning and still others offer a combination of textbook, workbooks, audio cassette, and various video materials (video cassette, slides, illustrations). Some distance education programs have created various media configurations using some of each of the technologies. No one technology or system works for every situation. Trend #9 provides further information about telecommunication delivery systems.

The 1989 publication of *Linking for Learning: A New Course for Education*, by the Office of Technology Assessment (OTA) of the U.S. Congress, signified a current and growing interest in distance education. The OTA report includes the results of a survey describing distance education activities of almost every state at the elementary/secondary and postsecondary levels. The dominant theme is technology delivery systems with dozens of case studies described in detail and comprehensive cost/effectiveness results. This level of interest confirms an earlier estimate that distance education may be a viable response to many problems facing American education, e.g., shortage of teachers especially in rural areas, increased demand for specialized instruction not available in all schools, and opportunities to learn without the timebound and placebound restrictions of formal educational institutions. The OTA *Brief Report* (1989) points out that, "The Star Schools Program, begun in 1988 to develop multistate, multi-institutional K-12 distance education, has helped to focus attention on distance learning." It also credits the National Telecommunications Information Administration and the Rural Electrification Administration with support for distance education through their funding mechanisms. As is usual with OTA reports, a series of recommendations are made. They focus on *telecommunications policy; research, evaluation and dissemination; support for teachers*; and *expansion of the infrastructure*.

Other countries have discovered the potentials of distance education, especially at the postsecondary level. The Open University in Great

Britain has been well-established for more than 20 years. Many developing nations of the world have embraced distance education as one solution for providing increased access to education. A briefing paper for a Unesco-International Council on Distance Education round table (Timmers, 1989) summarized the trends in developing nations and spelled out the needs for the future. The United States has become a recent adopter of this innovation. To be sure, there had been correspondence courses and self-study programs before, but not in such an organized and comprehensive fashion as the current programs demonstrate. State governors have been tracking this development, and, in their 1989 report (National Governors' Association, 1989), they confirm increasing activities in distance education:

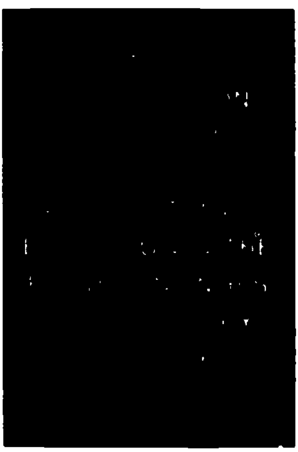
> Continuing the trend of the past two years, distance learning, which brings educational instruction via television, satellite, cable, or microwave, is the most prominent area of state involvement in technology. Distance learning initiatives and expansions were reported by thirty-seven states. States are either implementing, expanding, studying, or funding distance learning programs to provide special courses to schools with at-risk students, to enhance teacher education, and/or to offer instruction in locations where there are insufficient teachers or very low enrollments. (p 31)

It is possible that educational technology and distance education may be closely related. Distance education starts with the individual learner and designs learning materials for one person at a time—one premise of design and development in educational technology. Distance education uses a full spectrum of media resources to deliver content—another dimension of educational technology. Distance education requires a management system that tracks each student—and educational technology uses the concept of system in most of its work. Distance education has a major evaluation component with feedback mechanisms—and educational technology considers evaluation an integral part of its definition. Many educational technologists have found their way into distance education and it is likely that more will be needed.

The most common unit for distance education appears to be the course. Some courses are packaged to create a complete degree (or certificate) program at a distance. Open universities in Europe, Asia, and the Far East are already offering the entire degree program at a distance. Whether or not university level distance education in the United States will reach the numbers involved in other parts of the world remains to be seen. The fact is, in most parts of the United States there is adequate access to postsecondary education institutions, which is not the case in Europe or in many developing nations of the world. It may be that *access* determines the need for education at a distance.

Issues

- Which face-to-face instructional functions can effectively be replaced by distance education materials?
- For what type of subjects and what type of learner is distance education most appropriate?
- What is the lowest educational level for which distance education can be effectively used?
- How does the instructor's role change when distance education is used?



Professionals in any field are usually concerned about the status of their field. They ask questions about their changing roles and responsibilities. They worry about the education of future professionals and upgrading of current practitioners. They look for recognition, especially from external colleagues, and they try to identify leadership from among their ranks. Certification or licensing are means to preserve standards of professional competence. The field of educational technology is no exception. The literature in 1989 included items on all of these topics, but especially *professional education* and *roles and responsibilities* of professionals in the field.

Most of the concerns were expressed at professional meetings. Such meetings are probably the place to "sound off" about professional matters because attendees come from many parts of the country, and if actions are eventually called for, it would be the professional association that would likely initiate and implement actions related to status, roles, certification, and professional education. Conferences serve as a forum for such expressions of concern. Again, the field of educational technology is no exception. One such conference of Professors of Instructional Design and Technology (PIDT) focused on four major themes: (1) redefining the field; (2) improving graduate studies; (3) conducting research; and (4) identifying the role of educational technologists outside academic programs (Klein, 1989). These themes are consistent with much of the current literature.

Academic programs in higher education are often the genesis of professional concerns. This fact occurs because professors are questioning the content of their courses and are concerned about placement of their graduates. Professors also tend to write more for the professional journals and are more likely to attend national conventions than practitioners. Annual surveys are conducted each year by Logan. In 1989, he queried the chairs of academic programs about trends that they saw in their programs. One major trend has to do with increased placement in business and industry settings, with fewer graduates going to academic settings. Another trend refers to curricular emphasis. There is much more activity (courses, interest, product development) with computers in education and in the area of instructional design and development. These emphases seem to be at the expense of more traditional activity in media production and management. The complete listing of Master's and Doctoral programs in the field is found in the *Educational Media and Technology Yearbook 1989*. Also appearing in 1989 was the Third Edition of *Master's Curricula in Educational Communications and Technology: A Descriptive Directory* (Johnson, 1989a). An analysis of the publication (Johnson, 1989b) compares academic programs and makes comparisons between the Second and Third Editions. For example, 44 of the 213 master's programs listed in 1985 are no longer being offered; but 23 new doctoral programs have begun since 1985. She also notes that terminology describing the programs has changed.

Hutchinson and Rankin (1989) published a salary survey of Association for Educational Communications and Technology (AECT) members. Similar studies, published in 1984 and 1987 by the same authors, provided some basis for comparison. Such studies provide one but 23 new doctoral programs have begun since 1985. She also notes that terminology describing the programs has changed.

Hutchinson and Rankin (1989) published a salary survey of Association for Educational Communications and Technology (AECT) members. Similar studies, published in 1984 and 1987 by the same authors, provided some basis for comparison. Such studies provide one measure of professionals in the field. They reported that: "The average AECT member is 45.5 years of age, has been employed in the field for 15.5 years, has held his or her position for 8.9 years, and is paid $40,316." Since the last study, salaries have increased more than 16%, but the 12.5% inflation rate wiped out much of the gain. Other findings report on level of education, number of months worked each year, types of positions held, and salary comparisons between men and women.

Issues

- What changes are necessary in the programs to prepare professionals for service in the field of educational technology in light of the many technological changes that have occurred recently?
- Is there a role for the educational technologist in the K-12 schools? If so, what is it?
- Should educational technology practitioners be certified? If so, by whom?
- Where are the future educational technologists coming from?

> TREND #[illegible]
> THE [illegible] OF TECHNOLOGY ON INDIVIDUALS IN THE SOCIETY AT LARGE CONTINUES TO BE CONSIDERED BY EDUCATIONAL TECHNOLOGY PROFESSIONALS

One sign of professional growth is that people within the field of educational technology are asking questions about the consequences of their efforts on individuals who use the products and systems created by educational technology procedures. For example, one of the perennial concerns raised by people inside and outside the profession is the effect of commercial television on young

U.S. Department of Education. The authors examined nine common assertions about the effects of television on children and report their findings on each assertion. They conclude that the research literature is sparse but they offer responses to the common assertions:

- There is no evidence that television has a mesmerizing effect on children's attention caused by color, movement, and visual changes.
- While preschool and early elementary school-age children's comprehension of television can be fragmented, this holds primarily for relatively complex adult-level dramatic presentations.
- Even preschool children demonstrate frequent inferential activities while television viewing.
- There is no evidence that children generally get overstimulated by television.
- There is little evidence that television viewing displaces valuable cognitive activities.
- The assertion that television viewing shortens attention span is difficult to test since the term "attention span," as commonly used, has no certain technical meaning.
- There is no clear evidence that television influences imaginativeness, but one study indicates that television may negatively affect verbal "ideational fluency," i.e., ability to think of alternative uses for an object.
- There is some weak evidence that television availability reduces reading achievement.
- There is no evidence that television asymmetrically influences brain development. (Anderson & Collins, 1988)

Helping students (and others) to interpret what they see and hear via mass media continues to be the subject of some of the literature in this category. *Visual literacy* is the term attached to this movement and, though interest in it peaked during the late 1970's, there is still a residue of writing about how it is taught in schools and colleges (Wood, 1989).

After more than 500 people from 93 countries and 29 international organizations met in Paris for an International Congress on Education and Informatics, they issued a *Declaration* (Unesco, 1989) that highlights some of the societal concerns raised in other quarters. Several statements from that document are illustrative of the concerns held by participants in that Congress:

- We strongly feel that with the introduction of new information technologies in education, educational disparities may further grow within and between countries unless immediateand determined steps are taken to avoid such development by adopting corrective measures both nationally and internationally.
- We declare that, by virtue of its important role in everysociety, new information technologies should form part of the culture available to the entire population.
- We recognize the multiplicity of the roles new information technologies play not only as a tool in education but as a new approach and culture for effective transaction in teaching and learning, management of information, and accelerated development of society.

These are healthy concerns of reflective practitioners who view "ends" as being as important as "means." In both 1988 and 1989 there were many such items in the literature, most of them coming from documents entered into the ERIC database.

Issues

- How can learners of all ages be taught critical viewing and listening skills?
- What are the consequences of using technology in the school for learners?
- How can home use and school use of technology be brought together for productive results?

• What special roles can technology fulfill that teachers cannot do as well?

[illegible]

Telecommunications is defined here as the electronic connection between a receiver and a sender. Either receiver or sender could be a person or an electronic device. At the simplest level, there is the telephone, which has permitted telelectures (an individual speaking from a remote location to a group or groups using an amplified speaker at the receiving end) and teleconferences (groups meeting simultaneously at two or more locations with audio or audio/video communication). Telephonic connections also permit computer conferencing, searching remote databases with a personal computer, using computer-based bulletin boards, and communicating with electronic mail. More recent technologies include video connections with regular and low power broadcasting, cable distribution, and satellite. Very often combinations of several telecommunications systems are used to deliver information

Previous trends reported in this paper have referred to telecommunications in relation to computer utilization. Mainframe and microcomputers often use telecommunications for connection to other people and information resources. The distinction is blurring as these two technologies become mutually dependent upon each other. However, in educational settings, video is still a distinct medium

There are 377,700 videotape recorders (VCRs) in the 102,719 public and nonpublic schools in the United States. Colleges and universities own 50,200 units (Hope Reports, 1989) There are 1.5 million videotapes in 79,693 videotape collections and television receivers in practically every school. Eighty-six percent of all the schools indicate that they will purchase the same or more hardware in 1989-1990, and 96% say they will purchase the same or more software during the same period (Quality Education Data, 1989). These data confirm the penetration of television in the schools.

There are no data on the number of cable connections, but the current literature reports that some school districts have arrangements with local cable companies to use one public channel for educational programming.

Perhaps the most visible and controversial use of television in the schools occurred in 1989 when Whittle Communications announced free availability of a 15-minute daily television newscast *with commercials*. For schools that are willing to cooperate, Whittle Communications' "Channel One" provides television monitors for every classroom, two videotape recorders, and an installed satellite dish. "Channel One" is designed to present a teenage perspective on news and current affairs to students in grades 6 through 12. The program was piloted for five weeks during the spring of 1989 in five secondary schools and one middle school, and a comprehensive evaluation was completed (*Overview of Whittle Communications Educational Network*, 1989). The results were generally favorable and the commercials did not appear to distract from the educational value of the newscasts. Despite continuing controversy, 500 schools in 24 states have subscribed for the service, which is scheduled to begin in March 1990. The Whittle organization predicts that about 8,000 schools with a potential audience of about six million pupils will be using the service by December 1990.

The Turner Broadcasting System began "CNN Newsroom" on August 14, 1989. This daily 15-minute commercial-free program, geared to middle and high schools, is broadcast at 3:45 A.M. EST each weekday. Participating schools are permitted to tape record the programs free of charge. CNN and major cable operators will absorb the costs for connecting schools to the cable. The Discovery Channel began "Assignment: Discovery" on September 18, 1989, with a one-hour daily program geared to middle and high schools. Each hour is made up of two 20-25 minute segments that can be videotaped for later use. Each day follows a specific theme: Monday: *Science and Technology*, Tuesday: *Social Studies*; Wednesday: *Natural Science*; Thursday: *Arts and Humanities*; and Friday: *World Events and Contemporary Issues*. There are no commercials.

Each of the broadcasting services provides teacher guides and other support material to augment the programs. Each of these three new services will be watched and studied during 1990. Results will be reported in future trends papers.

Another important component of the telecommunications picture is satellite delivery of instruction to schools, colleges, and training settings. By 1989, 10,476 schools had installed satellite dishes (Quality Education Data, 1989). The Star Schools projects, funded by the U.S. Department of Education, uses satellite communication to deliver most of the courses. A number of states and consortia are now operating distance education programs and courses by satellite in Oklahoma, Washington, Missouri, Texas, and Kentucky (Jordahl, 1989). Some satellite-based programs have grown to multi-state operations. The Texas Interactive Instructional Network (TI-IN) serves 20 states and broadcasts over 100 hours of live secondary level courses every week. In Kentucky, 250 secondary schools receive televised instruction via satellite, much of it interactive. The Oklahoma Arts and Sciences Teleconferencing Service offers courses to 102 schools in eight states. Other states have satellite delivery of instruction in various stages of development. Coupled with distance education developments, satellite-based communication is clearly one of the growth areas of educational technology.

In higher education, the National Technological University (NTU) continues to offer courses to students in remote locations via satellite. NTU is a consortium of more than twenty engineering schools that broadcasts about 5,500 hours of credit and noncredit courses to about forty corporate sites across the United States. Growth to this level has occurred in the five years since its beginning (Mays & Lumsden, 1989)

Issues

- What types of connections should schools be able to make (e.g., cable satellite, low power broadcasting)?
- What are the appropriate uses of networks among schools and colleges?
- Should schools use programs during the school day that contain commercial messages?

- What is the appropriate role of the school in producing instructional programs for transmission to other schools and colleges?
- What are the cost/benefits of connecting schools to other schools and communication sources?

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Translating research and theory into practice is a problem that has always been expressed by educators. In part, the problem is perceived differently by researchers and practitioners and its resolution is still waiting. Researchers wonder why practitioners do not use the results of their scholarly efforts, and practitioners wonder why researchers do not provide useful principles that are expressed in understandable terms which can be used directly in day-to-day classroom activities. These positions, which are not new, are nevertheless incorporated into the 1989 trends report because there seems to be a preponderance of reports on *practice* in the current literature and very little on research and theory. Where research and theory are the subjects of articles and papers, they tend to emphasize *models*. Models, in these cases, are usually diagrammatic representations of instructional design and development procedures. Some models are based on research but most seem to use empirical observations as the rationale to support the generalizations represented by each model.

One of the conclusions of the Harvard Educational Technology Center research program (1989) focuses on the need to link teacher knowledge with research findings. "Teachers [should] collaboratively rethink educational goals, strategies, and roles and invent ways to connect their own wisdom with the products of educational research." This position places the responsibility directly on the doorstep of teachers. While teachers wait for "the products of educational research," researchers are calling for more research in order to be able to provide the results that will be directly useful. For example, Anderson and Collins (1989) in their comprehensive study on the influence of television on learners' cognitive development, say:

> The research literature provides little support for most of the common beliefs about the influence of television. For a number of reasons, however, it is difficult to conclude that television has no major effects. First, there has been almost no research on a number of major issues, including the influence of entertainment television on children's academically relevant knowledge. Second, considerations of what is known about tele vision viewing suggest possible negative effects (for example, on listening skills) that have not been explored in research. Third, some of the existing research can be challenged on methodological grounds. (p. 5)

Many of the 40 papers submitted to the 1989 annual convention of the Association for Educational Communications and Technology, Division of Research and Theory, were based on doctoral dissertations and make little attempt to derive principles for practice. In contrast, the major conference in the United Kingdom, Educational Technology International Conference 1989, presents mostly case studies of educational technology applications with almost no mention of research or theoretical bases. It appears that the translation process is lacking and that the dichotomous positions are being maintained by both researchers and practitioners. Educational technology is not unique in this matter.

There is another potential for confusion in the matter of research and practice, and that is the interpretation of *evaluation* as research. Misunderstanding of the purpose and procedures of evaluation may lead to erroneous conclusions. Usually, the purpose of evaluation is to gather data to help make decisions, e.g., to continue a program, to market a product, to hire a new staff member. The purpose of research is to explore new areas or test hypotheses in order to discover new facts or to revise existing knowledge. It may or may not have direct practical applications. Evaluation and research often use the same or similar procedures in gathering data. Both report findings and come to conclusions. It is understandable that they are confused. Such confusion is not clarified in the literature so that evaluation often passes for research and vice versa.

Issues

- Where do teachers go to get information about teaching and the design of learning materials?
- In what form would research findings be both responsible and useful?
- How can teachers be built into research and evaluation activities?
- Who facilitates the translation of research into practice?

In the 1950s and 1960s, when the educational media movement was in place, practitioners placed a lot of emphasis on the organization and management of programs in schools and colleges. One important maxim was the "3 R's:" the Right material and equipment, in the Right place, at the Right time!

As the field evolved and there was a gradual shift toward instructional design and development, the emphasis and urgency of **administrative matters** seemed to wane. However, the literature of educational technology in 1989 still displays the residue of this earlier function. The terminology has changed to "curriculum support" and the locus of activity has shifted to the school library *media* center, but the management and logistics concept remains. Authors in 1989 report on ways in which they facilitated the use of educational media and technology activities in their settings. They describe the nature of the services and special procedures that they have introduced to make programs operate more effectively and efficiently. Some of the papers describe ways in which teachers and learners have been taught skills to use the resources that are available in schools and colleges today. Some specify new information services that are intended to help teachers and learners to become more responsible for their own learning. These are the functions that help educators and students to implement and use the hardware and software that are being introduced under the umbrella of educational technology.

The importance of curriculum support services is noted in the research report of the Harvard Educational Technology Center: "Implementation assistance must therefore include. . . logistical help with issues such as schedules, equipment, and curriculum materials" (Fox & Saunders, p.4). The Center for Technology in Education at the Bank Street College of Education stresses the same concern in its research program funded by the U.S. Department of Education: "A program of 'design experiments will be carried out collaboratively with schools to design and study the optimal conditions for the integration of technology into schools under varying constraints" (Fox & Saunders, p. 177).

Recognition of the need for curriculum support is evident in the joint publication of *Information Power* by the American Association of School Librarians and the Association for Educational Communications and Technology. This publication presents the "standards" for media and technology in schools. It is beginning to be discussed in the educational technology literature, mostly in publications related to school library media programs. Its focus is on curriculum support.

Issues

- Which management functions formerly performed by educational technologists in the school can be handled by school library media specialists?
- What incentives have to be offered to involve professional educators in the process of curricular integration of media and technology resources?
- What hardware and software ought to be available in every classroom and which from a central location?
- How can the profession monitor effectiveness in the use of media and technology in formal education environments?

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Appendix A: The Methodology Used in this Study

Glenn LeBlanc

Introduction

The Educational Resources Information Center (ERIC) is periodically charged with synthesizing the literature from various disciplines contributing to the field of education in order to provide an indication of trends and issues in these fields.

The ERIC Clearinghouse for Information Resources at Syracuse University specializes in the fields of educational technology and library and information science. During 1988, this Clearinghouse conducted two parallel studies of trends and issues using this methodology. Findings from these studies are reported in IR No. 81, *Trends and Issues in Library and Information Science 1988* and in IR-82, *Trends and Issues in Educational Technology 1988*. Both are available from Information Resources Publications, 030 Huntington Hall, Syracuse University, Syracuse, New York 13244-2340.

This study had three main goals: (1) to identify trends and issues in the field of educational technology in 1989; (2) to establish a "baseline" for future studies by extending the database started during the 1988 study; and (3) to refine the methodology used in the 1988 study. A *trend* is considered to be a cumulative indicator of activities or products that shows direction. An *issue* is considered to be a problem or a question for which there are multiple points of view.

The Methodology

Content Analysis as a Research Methodology

Bernard Berelson, in a classic work on the content analysis methodology, described content analysis as "a research technique for the objective, systematic, and quantitative description of the manifest content of communication" (Berelson, 1952). Any form of communication can be used as a source of data. While written materials are usually used, other forms such as music, pictures, or even gestures are likely candidates for analysis using a content analysis methodology (Borg & Gall, 1983). The main criterion is that the communication must be observable. Janowitz (1976) applied the content analysis methodology in a study to determine socio-political trends in the United States. As a data source, he used a sample of American newspapers.

Studies using content analysis usually aim at achieving one of the following objectives: (1) producing descriptive information; (2) cross-validating research findings; and (3) testing hypotheses (Borg & Gall, 1983). This study is an example of the first objective, as it synthesizes various sources of information in educational technology in an effort to identify emerging trends and issues.

Planning a content analysis study involves the following steps:

(1) specify objectives; (2) locate the data relevant to the objectives; (3) gather contextual evidence (involving the establishment of an empirical link between the data and the inferences to be made—a link which justifies the use of the data sources selected); (4) develop a data sampling plan; (5) develop coding procedures; and (6) plan analysis procedures (Borg & Gall, 1983).

Content Analysis Adapted for this Study

The procedures used in this study parallel those outlined above. The methodology was adapted for particular use in this study. While traditional content analysis involves the analysis of smaller units of the data sources, this study used the author's topical emphasis in writing the article or paper as a basis for classification. Given time and personnel constraints, it was not possible to analyze the large volume of material used in the study as would have been done using a traditional content analysis procedure. Thus, rather than concentrating on the length of discussion or particular use of concepts, the number of times that certain concepts were mentioned was used as a prime source of data.

The steps used included:

- *Revision of the conceptualization of recording units/categories used in the 1988 study.* Chisholm and Ely (1976) discussed the functions performed by media personnel and developed a conceptual scheme reflecting the definition of educational technology used by the

Association for Educational Communications and Technology (1977). This conceptual scheme provided the basis for a new scheme which was developed for recording content units. The general areas included in the new scheme are: the Field, Personnel, Management, Technical Developments, Instructional Processes and Services, Information Services, and Research and Theory. These broad areas were used as content units during the 1988 study.

Most of the content units were subsequently expanded into subcategories. For example, the "personnel" content unit was subdivided into roles and responsibilities, recognition, certification, leadership, and professional education. The deductive approach was used in selecting content units at the beginning of the study to increase the efficiency of the data collection process. It is important to note, however, that significant revision of the conceptual scheme followed as the data collection process got underway. One major content unit, "Society and Culture," was added during the 1988 study. Experience with the 1988 scheme suggested further revisions for the 1989 study (see Appendix C). For example, the "design and development" subcategory under the "instructional processes and services" concept unit was itself subdivided into seven categories: needs assessment, task analysis, individual differences and learner characteristics, message design, course development, product development, and motivational strategies. This change helped to increase the specificity of content and facilitated the final analysis of the data.

- *Determination of sources to be reviewed.* Journal articles, dissertation abstracts, ERIC documents, and professional conference programs were selected as the primary data sources. These sources report on activities that have actually been completed, and are considered to be a more valid data source than key informants' projections.

The journals selected were those that had been identified by Moore (1981) and Moore and Braden (1988) as five of the "most influential" journals in the field: *Tech Trends*, *Educational Technology*, and *The British Journal of Educational Technology*. Also included was *Educational Technology Research and Development*, a journal resulting from the merger of *The Educational Communication and Technology Journal* and *The Journal of Instructional Development*, which were also included in Moore and Braden's "top five."

The Journal of Instructional Development, which were also included in Moore and Braden's "top five."

Dissertations included in the study were those produced at the universities identified by Moore (1981) and Moore and Braden (1988) as being the "most prestigious institutions" in the field of educational technology: Arizona State University, Florida State University, Indiana University, Syracuse University, and the University of Southern California.

Input to ERIC's *Resources in Education* represents the most timely document literature produced by professionals with a wide range of interests within the field of educational technology. ERIC is an internationally recognized information system for Education.

It was expected that conference presentations would represent the latest developments in the field. The gap between submission and publication of journal articles is eliminated in conference presentations. Three conference programs were included: the Association for Educational Communications and Technology (AECT), the National Society for Performance and Instruction (NSPI), and the Educational Technology International Conference (ETIC). The A :CT and NSPI conferences are considered to be the most prestigious in the United States. The AECT Conference is attended by those with academic interests in the field of educational technology, while the NSPI Conference is attended primarily by practitioners in the training industry. In order to provide a more global outlook, the ETIC Conference, held annually in the United Kingdom, was included.

All data sources have passed through careful review processes before being included. Journal articles are typically reviewed by editorial boards before they are published. Conference papers are refereed before they are included in conference programs. Input to ERIC's *Resources in Education* also passes through a careful selection process by content experts. Dissertations are reviewed carefully by dissertation committee members and outside readers, including methodologists and content area specialists.

- *Revision of instruments from the 1988 study* Three instruments were developed for the study. The "Content Analysis Recording Sheet" (Appendix B) was used for recording all journal articles A separate instrument (Appendix C) was used to record data from *Resources in Education* (*RIE*), dissertations, and conference programs. The "Recording Units: Trends and Issues Study" instrument (Appendix D) reflects the revisions made to the 1988 version of the conceptual scheme. This instrument was used as a guide for the data collection process and to tabulate data from all sources for final analysis.

- *Data collection procedures.* The data analysts, both graduate students in the Syracuse University School of Education Instructional Design, Development, and Evaluation program, participated in a training session which focused on locating the data sources; identifying the main purpose of an article by reading the introduction, abstract, and conclusions; using the recording units instrument to reliably classify the data sources; and using the appropriate tabulation instrument. To insure maximum inter-rater reliability, it was decided that each data analyst would designate two categories for articles that seemed especially difficult to classify according to the conceptual scheme. Regular meetings were held with the senior author of this report, who served as the referee. In cases where the data collectors disagreed, the referee offered his opinion and discussion followed until consensus was reached. In some cases, both categories were retained and those items were so designated. The final tabulation reflects this decision, which is a revision of the 1988 procedure in which only one category was used.
- *Data analysis.* Upon completion of the data collection phase of the study, the data collectors tabulated results separately for each group of data sources (dissertations, journal articles, *RIE*, and conference programs) to facilitate the analysis of the data across sources. Final tabulations took the form of frequency counts for each concept unit.

The senior author of this monograph used the tabulations and factored in the findings of major reports and position papers released within the time period of the study when writing the manuscript

Comparison of the Methodology with Other Studies to Reveal Trends.

Allen's study (1970) for the ERIC Clearinghouse on Educational Media and Technology at Stanford University was designed to determine trends and problems in instructional technology. An open-ended questionnaire was sent to media and technology leaders and was completed by 40 respondents. The responses were studied and tabulated, and the summaries sent to an advisory council which met in Washington, DC. Using the questionnaire responses as a point of departure, the panel discussed educational technology trends, issues, and problem solutions. Questionnaire responses and advisory council discussions were used to write the final report.

Although the study made no claim to using a random sample of respondents, some efforts were made to insure the quality and representativeness of responses. Respondents were key informants, including officers of professional organizations, journal editors, and department chairs. Using a referential sampling procedure, younger informants were identified in order to avoid an "old guard, establishment" bias.

While key informants in Allen's study were asked to make projections of *anticipated* trends, the approach used in this year's study is to examine what has *actually* been produced.

Lard (1979) studied trends in educational technology over the 20-year period from 1956 to 1976 using a content analysis procedure. Like the present study, Lard's study relied on published sources. Lard examined *Audiovisual Communications Review (AVCR)* and *Audiovisual Instruction (AVI)* (the official journals of the Association for Educational Communications and Technology at that time) and educational technology dissertation abstracts cited in *Dissertation Abstracts* from five institutions, i.e., Indiana University, University of Southern California, Michigan State University, Syracuse University, and Florida State University.

Lard's goal was quite different from that of the present study. She set out to trace the development and evolution of three paradigms that had been identified from the literature: learning resources (media movement), systems technology, and learning behavior (behavioral technology). While it provided a gross description of trends, the study provided little information on the "units" contributing to each of the paradigms that were traced.

Strengths of the Study

- The sources sampled for this study represent work that has actually been completed. Unlike the Allen study, it does not rely solely on projections which may or may not have been realized. The distinction between a *trend* and a *projection* is an important one; by establishing a baseline and doing follow-up studies at regular intervals, it is possible to limit the inquiry to a specified time period. Determining trends implies the comparison of two sets of data and making a determination as to what has changed. The Allen study was not built on such a baseline. This study extends the original baseline that was started in 1988 during the "Trends and Issues in Educational Technology 1988" study.
- The study relies on the work of a large number of individuals rather than on a selected few key informants. All of the material reviewed has been evaluated before inclusion in conferences and journals.
- "Cutting edge" topics are included by virtue of using sources such as dissertations, conference presentations, and ERIC's *RIE* input. The usual one- to two-year delay associated with publication of journal articles is compensated for by the inclusion of these alternative sources, as the delay between receipt of a document and dissemination for *RIE* is from 6 to 8 months, and delays for conference presentations are about the same.
- This study provides a more detailed profile of trends than did the Lard study. While Lard's approach suited her goal of tracing paradigm shifts, it did not allow a detailed account of specific concept units. The present study examined not three, but 49 distinct concept units. In addition, it sampled a wider variety of materials. Lard's study relied exclusively on journal articles.
- The study benefits from the fact that the methodology itself is in its second iteration. Based on experiences with last year's study, some revisions have been made. New concept units have been added to refine the classification process. While much of the conceptual scheme was generated deductively, it was also recognized that a number of recording units would emerge as the process continued The methodology allowed for the inclusion of emerging categories,

resulting in somewhat more precision and reliability. It is safe to say that this year's revisions represent an inductive generation of concept units.

- The sampling plan emphasized "general" rather than "specialty" publications. It avoided journals devoted exclusively to such topics as computer applications so as not to present a heavily-skewed account of trends and issues. In some cases, "general" publications devoted entire issues to special topics, e.g., hypermedia and training of teachers in technology applications. Because the decision to produce such special issues was motivated by the recognition of the critical importance of certain topics, these "special issues" were thought to represent real trends, and they were not eliminated from the sample.

Limitations of the Study

The limitations of this study include:

- The methodology employed was not that of a traditional content analysis. While some 49 conceptual units were identified and followed during the review of data sources, the methodology permitted no more than a simple tabulation. For example, while it was possible to say that 16 conference papers dealt with some aspect of interactive video, the data does not permit the further analysis of the topic. For example: What were the specific applications of interactive video? What were some of the major problems? What were the major successes?
- Despite efforts made to insure inter-rater reliability, only two data analysts were used. While much of the data collection process was done in collaboration with the senior author serving as referee (resulting in three separate judgments), his participation in all phases was not possible due to time restrictions.
- Most of the sources reviewed represented the interests of academic applications of educational technology. The Performance and Instruction Conference Proceedings is the only source that exclusively represents the interests of those working in the training

field in business and industry. The result may be a bias in favor of academic applications.

- The use of conference programs in a content analysis study has no precedent. Some of the conference presentations were difficult to classify, as in some cases, novel titles of presentations were the only information available. These items were eliminated.
- The study relied almost exclusively on a single methodology. The author's factoring in of major position papers may have been useful in cross-validating the findings, but could not compensate for the limitation.
- A final limitation of the study results from the effort to improve the methodology. By adding new concept units to enhance the scheme used in the 1988 study, it becomes difficult to make some detailed comparisons between the 1988 and 1989 studies.

Recommendations for Follow-up Studies

- Further refinement of the conceptual scheme used to classify data will eliminate some of the difficulties experienced during the preparation of both the 1988 and 1989 versions of the study. Content units with exceptionally low frequencies in both 1988 and 1989 might be eliminated from the scheme.
- Consideration of the data sources may be in order. The use of more sources would provide a more representative account of trends and issues. The inclusion of a journal such as *Performance and Instruction* would better represent business and industry applications of educational technology. The inclusion of a greater variety of international sources would present a more global account, but the language barrier remains a problem.
- The use of other methodologies would be useful in cross-validating the data.
- The availability of more data analysts would further increase the inter-rater reliability. Rather than having two data collectors working in collaboration, the use of two separate teams working independently would increase the confidence in the data

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Appendix B

Journal Title ____________

Article title	1st [illegible]	2nd [illegible]

Appendix C

TRENDS REVIEW - ARTICLE LOG

#	Title	Source	Date	Category

Appendix D

RECORDING UNITS: TRENDS AND ISSUES STUDY
TRENDS
The Field
History
Status
Future
Ethics
Legal Aspects
The Standards
Personnel
Roles/Responsibilities
Recognition
Certification
Leadership
Professional Education
Management
Organization
Logistics/Operations
Procedures/Policies
Facilities
Finance/Budget
Planning Processes
Diffusion
Implementation
Technical Developments
Computer Related
Telecommunications
Video
Audio
Photography/Holography

Appendix D (continued)

Instructional Processes/Services
Distance Education
Simulations/Games
Problem Solving
Interactive (video)
AI/Expert Systems
Design and Development
Needs assessment
Task analysis
Indiv. differences/learner characteristics
Message design
Course development
Product development
Courseware design
Hypermedia
Motivational Strategies
Evaluation
Product evaluation
Process evaluation
Cost-effectiveness evaluation
Formative evaluation
Services
Literature and Reading Guidance
Curriculum Support
Skills Instruction
Information Services
Research and Theory
Research Methodologies
Theory and Model Construction/Application
Society and Culture

Appendix E.

TRENDS BY TOPIC AND SOURCE

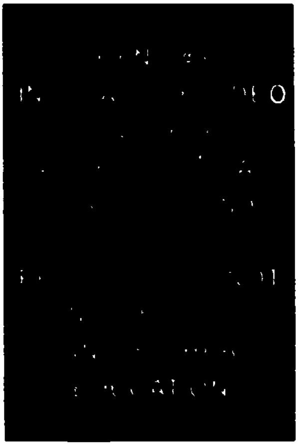
	Journals	Disser-tations	Confer-ences	RIE	Total
THE FIELD					
History	4	0	0	1	5
Status	10	0	38	47	95
Future	4	0	2	8	14
Ethics	1	0	3	10	14
Legal Aspects	1	0	2	3	6
The Standards	1	0	8	0	9
PERSONNEL					
Roles/Responsibilities	7	0	24	7	38
Recognition	0	0	1	1	2
Certification	0	0	0	2	2
Leadership	0	0	2	0	2
Professional Education	21	0	33	18	72
MANAGEMENT					
Organization	1	0	4	0	5
Logistics/Operations	3	0	20	9	32
Procedures/Policies	2	0	13	13	28
Facilities	1	0	3	3	7
Finance/Budget	1	0	6	1	8
Planning Processes	4	0	6	11	21
Diffusion	6	2	12	18	38
Implementation	7	1	22	18	48
TECHNICAL DEVELOPMENTS					
Computer Related	19	0	20	51	90
Telecommunications	2	0	10	59	71
Video	3	0	7	19	29
Audio	0	0	3	4	7
Photography/Holography	0	0	0	0	0

TRENDS BY TOPIC AND SOURCE (continued)

	Journals	Dissertations	Conferences	RIE	Total
INSTRUCTIONAL PROCESSES/SERVICES					
Distance Education	5	0	48	28	81
Simulations/Games	4	1	9	4	18
Problem Solving	3	0	9	13	26
Interactive Video	11	0	53	19	83
AI/Expert Systems	7	1	16	22	46
Design and Development					
Needs assessment	0	0	20	3	23
Task analysis	1	0	5	3	9
Indivd. differences/ learner characteristics	3	6	12	17	38
Message design	7	1	22	6	36
Course development	4	0	11	9	24
Product development	5	0	34	10	49
Courseware design	9	0	8	5	22
Hypermedia	11	0	20	5	36
Motivational strategies	3	2	17	0	22
Evaluation					
Product evaluation	11	0	24	28	63
Process evaluation	2	0	11	7	20
Cost-effectiveness evaluation	2	0	3	1	6
Formative evaluation	2	0	3	5	10
SERVICES					
Literature and Reading Guidance	0	0	0	1	1
Curriculum Support	12	1	23	43	79
Skills Instruction	3	0	9	6	18
Information Services	2	0	12	9	23

TRENDS BY TOPIC AND SOURCE (continued)

	Journals	Disser-tations	Confer-ences	RIE	Total
RESEARCH AND THEORY					
Research Methodologies	1	0	4	6	11
Theory and Model Construction/Application	8	.	25	12	46
SOCIETY AND CULTURE	5	0	6	60	71
GRAND TOTAL					1,514



In 1989 there were three times as many articles in the interactive video category as in 1988. The increasing activity in this area reflects growth in the production and use of laser discs. The more common laser discs for computer use, CD (compact disc—audio) and CD-ROM (compact disc-read only memory), have increased interest in the larger format videodisc which stores more visual information. The videodisc has been around for almost ten years with applications limited largely to commercial motion pictures for home use. Using a digitized format, and combining it with microcomputer control, the videodisc has become an interactive system with potential for individualized teaching and learning. A frequent combination reported in the literature is the use of HyperCard software with a videodisc. This combination permits exploration of concepts in depth and use of an inquiry approach to learning through the hierarchical structure of HyperCard, supported by computer graphics with still and moving images stored on the videodisc. In some cases the computer is coordinated with a videotape recorder as a less expensive, and slower, interactive video system.

For Education, it is clear that interactive video is still in its infancy and is more a research and development product than one that is ready for wholesale adoption. Quality Education Data (1989) reports only 1,177 schools with videodisc players. Of that number, only 805 have an interactive capability. In actual numbers, Hope Reports (1989) estimates that there are 3,500 videodisc players in the schools and 3,900 in the colleges. Other estimates are much more optimistic. Pollak (1989) says, "There are 125,000 to 150,000 videodisc systems currently in use in the non-consumer arena. Of these, it is estimated that 30,000 are in use in education." Clearly, there are major discrepancies between the data and the estimates. Regardless of the number of units, it is highly likely that only a relatively small percentage are being used interactively in Education, even though the medium is frequently used in military and industrial training.

In the *Electronic Learning* survey (1989), all of the 31 states reporting on the use of technologies (other than the computer) said that television was available in 80-100% of their K-12 schools and that videotape recorders were almost as ubiquitous. Videodisc players and CD-ROM were found in the smallest percentage of schools.

The potential contributions of interactive video were reported in the research findings of the Educational Technology Center (ETC) (Fox & Saunders, 1989). In science, "Computer simulations that visually represent normally unobservable aspects of scientific phenomena can help students to change their deeply rooted everyday ideas. . and to more readily grasp important accepted scientific theories and concepts." In mathematics, "Results so far suggest that the external visual representations presented by the software help students to construct more sophisticated mental representations of the target mathematical ideas "

There are schools where interactive video is being used. Ten existing projects in ten states are described in *Tapping the Potential of Educational Technology* (Southeastern Educational Improvement Laboratory, 1989) These projects would have to be called "pilot" since they are using products that are custom-made or not widely available. The interactive video developments build on the interactive characteristic of computers. It is a marriage of two basic hardware systems with specialized software to provide increased access to resources in a minimum time.

The *potential* of interactive video is recognized by educational technologists and educational leaders alike. Seymour Papert, of the M.I T. Media Lab, says: "We will stop making distinctions between computers and video. We will probably have computer-controlled systems that use video and databases and involve interaction" (Papert, 1989). Ruth Randall, former chief state school officer of Minnesota, shares Papert's perspective: "Video, along with live interactive television, will also play a larger role in distance learning. Instructional video can bring many experiences to schools that are isolated, or that don't have teachers with expertise in every area" (Randall, 1989).

It is important to distinguish between *interactive video* and videodiscs It appears that more videodiscs are available than ever before. The 1989-1990 *Videodisc Compendium for Education and Training* contains over 700 videodisc titles from 93 producers, an increase of 61 from the previous edition. Most of the titles are in the science and computer areas. The strongest areas of growth are in art, language arts, and the social studies (Pollak, 1989).

Issues

- Can interactive video be justified as a cost/effective teaching tool?
- How can more than one learner use an interactive video workstation at the same time?
- What is the role of CD-I (compact disc-interactive)?
- Who will prepare the sophisticated interactive video software for schools?

> [illegible] ED[illegible] HAS BE- CO[illegible]SHED [illegible] FOR [illegible] AT [illegible] OF [illegible] AND TRAINING

Distance education is prominent in the educational technology literature. The organization and management of distance education encompasses much more than the delivery systems that are so visible. Yet it is delivery systems that establish the relationship between distance education and educational technology. There is virtually no distance education program that does not involve some aspect of hardware and software as well as the design and development of courseware. The emphasis on design of course materials is critical for learners who are working independent of face-to-face contact with a teacher. Much of the literature falls into the field of educational technology.

There are journals devoted specifically to distance education (*The American Journal of Distance Education, The Canadian Journal of Distance Education*, and several published outside of North America.) None of these journals were part of the content analysis. A cursory review of these specialized journals reveals that many of the articles are devoted to organization, management, retention, evaluation, and other topics that tend not to emphasize communication technology. There appeared to be no one technology that exceeded others in frequency. Broadcasting and telecommunications media were used as frequently as microcomputer discs and multimedia packages. Broadcasting involves open channel stations, point-to-point satellite, cable, and low power transmission (Instructional Television Fixed Service—ITFS). Telephone lines are used for computer networking, two-way audio, and graphic display (electronic chalkboard). Some programs are self-contained on microcomputer discs for individual learning and still others offer a combination of textbook, workbooks, audio cassette, and various video materials (video cassette, slides, illustrations). Some distance education programs have created various media configurations using some of each of the technologies. No one technology or system works for every situation. Trend #9 provides further information about telecommunication delivery systems.

The 1989 publication of *Linking for Learning: A New Course for Education*, by the Office of Technology Assessment (OTA) of the U.S. Congress, signified a current and growing interest in distance education. The OTA report includes the results of a survey describing distance education activities of almost every state at the elementary/secondary and postsecondary levels. The dominant theme is technology delivery systems with dozens of case studies described in detail and comprehensive cost/effectiveness results. This level of interest confirms an earlier estimate that distance education may be a viable response to many problems facing American education, e.g., shortage of teachers especially in rural areas, increased demand for specialized instruction not available in all schools, and opportunities to learn without the timebound and placebound restrictions of formal educational institutions. The OTA *Brief Report* (1989) points out that, "The Star Schools Program, begun in 1988 to develop multistate, multi-institutional K-12 distance education, has helped to focus attention on distance learning." It also credits the National Telecommunications Information Administration and the Rural Electrification Administration with support for distance education through their funding mechanisms. As is usual with OTA reports, a series of recommendations are made. They focus on *telecommunications policy; research, evaluation and dissemination; support for teachers*; and *expansion of the infrastructure*.

Other countries have discovered the potentials of distance education, especially at the postsecondary level. The Open University in Great services will be watched and studied during 1990. Results will be reported in future trends papers.

Another important component of the telecommunications picture is satellite delivery of instruction to schools, colleges, and training settings. By 1989, 10,476 schools had installed satellite dishes (Quality Education Data, 1989). The Star Schools projects, funded by the U.S. Department of Education, uses satellite communication to deliver most of the courses. A number of states and consortia are now operating distance education programs and courses by satellite in Oklahoma, Washington, Missouri, Texas, and Kentucky (Jordahl, 1989). Some satellite-based programs have grown to multi-state operations. The Texas Interactive Instructional Network (TI-IN) serves 20 states and broadcasts over 100 hours of live secondary level courses every week. In Kentucky, 250 secondary schools receive televised instruction via satellite, much of it interactive. The Oklahoma Arts and Sciences Teleconferencing Service offers courses to 102 schools in eight states. Other states have satellite delivery of instruction in various stages of development Coupled with distance education developments, satellite-based communication is clearly one of the growth areas of educational technology.

In higher education, the National Technological University (NTU) continues to offer courses to students in remote locations via satellite. NTU is a consortium of more than twenty engineering schools that broadcasts about 5,500 hours of credit and noncredit courses to about forty corporate sites across the United States. Growth to this level has occurred in the five years since its beginning (Mays & Lumsden, 1989)

Issues

- What types of connections should schools be able to make (e g., cable satellite, low power broadcasting)?
- What are the appropriate uses of networks among schools and colleges?
- Should schools use programs during the school day that contain commercial messages?

- What is the appropriate role of the school in producing instructional programs for transmission to other schools and colleges?
- What are the cost/benefits of connecting schools to other schools and communication sources?

[illegible]

Translating research and theory into practice is a problem that has always been expressed by educators. In part, the problem is perceived differently by researchers and practitioners and its resolution is still waiting. Researchers wonder why practitioners do not use the results of their scholarly efforts, and practitioners wonder why researchers do not provide useful principles that are expressed in understandable terms which can be used directly in day-to-day classroom activities. These positions, which are not new, are nevertheless incorporated into the 1989 trends report because there seems to be a preponderance of reports on *practice* in the current literature and very little on research and theory. Where research and theory are the subjects of articles and papers, they tend to emphasize *models*. Models, in these cases, are usually diagrammatic representations of instructional design and development procedures. Some models are based on research but most seem to use empirical observations as the rationale to support the generalizations represented by each model.

One of the conclusions of the Harvard Educational Technology Center research program (1989) focuses on the need to link teacher knowledge with research findings. "Teachers [should] collaboratively rethink educational goals, strategies, and roles and invent ways to connect their own wisdom with the products of educational research." This position places the responsibility directly on the doorstep of teachers. While teachers wait for "the products of educational research," researchers are calling for more research in order to be able to provide the results that will be directly useful. For example, Anderson and Collins (1989) in their comprehensive study on the influence of television on learners' cognitive development, say

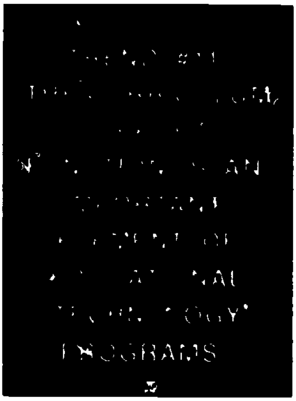
> The research literature provides little support for most of the common beliefs about the influence of television. For a number of reasons, however, it is difficult to conclude that television has no major effects. First, there has been almost no research on a number of major issues, including the influence of entertainment television on children's academically relevant knowledge. Second, considerations of what is known about tele vision viewing suggest possible ne effects (for example, on listening skills) that have not been explored in arch. Third, some of the existing research can be challenged on methodological grounds. (p 5)

Many of the 40 papers submitted to the 1989 annual convention of the Association for Educational Communications and Technology, Division of Research and Theory, were based on doctoral dissertations and make little attempt to derive principles for practice. In contrast, the major conference in the United Kingdom, Educational Technology International Conference 1989, presents mostly case studies of educational technology applications with almost no mention of research or theoretical bases. It appears that the translation process is lacking and that the dichotomous positions are being maintained by both researchers and practitioners. Educational technology is not unique in this matter.

There is another potential for confusion in the matter of research and practice, and that is the interpretation of *evaluation* as research. Misunderstanding of the purpose and procedures of evaluation may lead to erroneous conclusions. Usually, the purpose of evaluation is to gather data to help make decisions, e.g., to continue a program, to market a product, to hire a new staff member. The purpose of research is to explore new areas or test hypotheses in order to discover new facts or to revise existing knowledge. It may or may not have direct practical applications. Evaluation and research often use the same or similar procedures in gathering data. Both report findings and come to conclusions. It is understandable that they are confused. Such confusion is not clarified in the literature so that evaluation often passes for research and vice versa.

Issues

- Where do teachers go to get information about teaching and the design of learning materials?
- In what form would research findings be both responsible and useful?
- How can teachers be built into research and evaluation activities?
- Who facilitates the translation of research into practice?



In the 1950s and 1960s, when the educational media movement was in place, practitioners placed a lot of emphasis on the organization and management of programs in schools and colleges. One important maxim was the "3 R's:" the Right material and equipment, in the Right place, at the Right time!

As the field evolved and there was a gradual shift toward instructional design and development, the emphasis and urgency of **administrative matters** seemed to wane. However, the literature of educational technology in 1989 still displays the residue of this earlier function. The terminology has changed to "curriculum support" and the locus of activity has shifted to the school library *media* center, but the management and logistics concept remains. Authors in 1989 report on ways in which they facilitated the use of educational media and technology activities in their settings. They describe the nature of the services and special procedures that they have introduced to make programs operate more effectively and efficiently. Some of the papers describe ways in which teachers and learners have been taught skills to use the resources that are available in schools and colleges today. Some specify new information services that are intended to help teachers and learners to become more responsible for their own learning. These are the functions that help educators and students to implement and use the hardware and software that are being introduced under the umbrella of educational technology.

Donald P. Ely [illegible]

Glenn LeBlanc [illegible]

Crystal Yancey [illegible] Instructional Design [illegible] University. She [illegible] development [illegible]