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Instructional Designers in Public Schools and Higher Education: Predictions for the Year 2001

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Abstract. This article describes the roles instructional designers are likely to be playing in public schools and higher education in the year 2001. Also put forth is a prediction regarding teacher use of instructional design principles.

In this article, I make some predictions about the roles instructional designers are likely to be playing in public schools and universities in the United States in the year 2001. However, before predicting what designers will be doing in the future, it would be a good idea to describe, in general terms, what instructional designers are doing now, in 1988. Today, as was the case more than 15 years ago, instructional designers are identifying instructional problems and systematically designing, developing, implementing, and evaluating solutions to them. It is quite likely that instructional designers will continue to perform these tasks for at least the next 15 years.

If, in general, instructional designers will be performing the same tasks in 2001, will they be performing them in public schools and universities? If so, what will be the extent of their involvement in these organizations? And what else will they be doing in these settings? To answer these questions, let's look at each setting separately.

Instructional Design in the Public Schools

Before discussing the roles that instructional designers will be playing in the public schools in the year 2001, it is important to ask, "Will there be any instructional designers in the public schools in the year 2001?" This is not a facetious question. How many public school systems in the United States today have instructional designers on their payrolls? I doubt that you can identify a dozen school systems that do. Perhaps most school systems employ some CAI specialists and evaluation specialists, but most of these people perform very few of the functions an instructional designer would be expected to perform.

If there are few designers working in school systems today, what is the likelihood that there will be more of them in 2001? I don't think it is very great. Just look at the recent reports on the status and future of schools in the United States (e.g., National Commission on Excellence in Education, 1983). Although many problems are identified, instructional designers are not mentioned as possible solutions. Instead, the emphasis is on more time in school or more teachers.

Even in the recent report by the National Task Force on Educational Technology (1986), little attention is given to the role instructional designers might play in solving the problems facing the schools. Instead, the emphasis is on increasing the extent to which computers are used for instructional purposes. One should not assume that the in-
creased use of computers in the schools will necessarily result in an increased demand for instructional designers as well. Just as in the past, when other media were the rage, the emphasis is on getting the medium (i.e., computers) into the schools rather than on identifying the instruction that should be presented via that medium and then designing that instruction.

On the positive side, the profession’s lack of impact on public education has become a growing concern among many of us who are training the instructional designers of the future. Evidence of this concern can be found in the fact that a recently formed professional organization, the Professors of Instructional Design and Technology, has given considerable attention to this issue (Carriere, 1986; Reiser, 1986). Also, several leaders in the field of instructional technology have recently called for instructional designers to become more involved in solving the problems of the public schools (Rossett & Garbosky, 1987; Salisbury, 1987; Schiffman & Gansneder, 1987). However, concern on the part of members of our profession does not necessarily translate into action. Hence, by the year 2001 there may be more media in the schools, but it is unlikely that there will be more instructional designers there.

On a brighter note, a greater percentage of teachers in the public schools will be aware of, and perhaps use, some basic instructional design principles. This is likely to come about because of a trend toward placing greater emphasis on teaching basic instructional design concepts in preservice teacher education programs. For example, in recent years several textbooks focusing on how to employ basic instructional design principles in the classroom have been written expressly for preservice teachers (e.g., Dick & Reiser, in press; Gagne & Driscoll, 1988; Sullivan & Higgins, 1983). Furthermore, basic texts in educational psychology (e.g., Good & Brophy, 1986; Woolfolk, 1987) seem to be giving more attention to such instructional design principles as the need to specify objectives and the need to have tests that match those objectives.

In addition, some states, Florida and California in particular, are requiring that textbooks be evaluated and revised before they are considered for state adoption. In Florida, attempts are also being made to teach teachers how to select instructional materials on the basis of criteria such as instructional effectiveness, rather than solely on the basis of aesthetic criteria such as the number of pictures per page (Dick, Berquist, & Vedros, 1987).

In summary, in the year 2001 it is likely that teachers in the public schools will pay more attention to design principles, but it is unlikely that the school systems will employ many instructional designers.

One should not assume that the increased use of computers in the schools will necessarily result in an increased demand for instructional designers as well.

Instructional Design in Higher Education

As was the case with the previous discussion, in considering the roles of instructional designers in colleges and universities in the year 2001, it is appropriate to first ask, will there be any instructional designers in colleges and universities in the year 2001?

On the negative side, the results of a survey conducted a few years ago (Gustafson & Bratton, 1984) revealed that the number of instructional improvement centers in higher education had substantially decreased since the mid 1970s, and today there are no indications that this trend will reverse. On the positive side, at least instructional designers now have a foothold (or perhaps it’s only a toehold) in higher education, and it is likely that a fair number of instructional improvement centers will survive into the twenty-first century.

But what will designers be doing in instructional improvement centers in 2001? How will this role be different from the role designers play today?

One skill that is likely to become more important for designers working in higher education is the ability to manage instructional development projects. There are at least two reasons that instructional designers will have to become better managers. First, as has been the trend since 1975 (Gustafson & Bratton, 1984), budgets for institutions of higher learning are likely to remain tight. Therefore, instructional designers will have to carefully manage and account for the few resources they are given. Second, instructional designers in higher education will place more and more reliance on contracts and grants to support their efforts. According to Gustafson and Bratton (1984), in recent years approximately one-third of the funding for instructional improvement centers in institutions of higher education has been provided by contracts and grants, and the percentage of centers engaged in soliciting contracts and grants has recently increased. If, as I anticipate, this trend continues, instructional designers will have to become more and more adept at preparing budgets and managing and monitoring large- and small-scale projects. Some of these skills are likely to be taught in graduate programs in instruc-
tional technology, but, as is already the case in some programs, students may be required to take one or more management courses in colleges of business.

Not only has there been an increase in the percentage of instructional improvement centers seeking external support, there has also been an increase in the percentage of centers helping other departments at their institutions prepare grant proposals (Gustafson & Bratton, 1984). These trends lead me to believe that instructional designers in higher education will have to become more adept at the art of proposal writing.

In addition to seeking money to help them run their centers, it is also likely that instructional designers in higher education will have to demonstrate that the money allocated to maintain their centers has been well spent. Gustafson and Bratton (1984) report that few centers collect cost-effectiveness data. They also report that when instructional improvement centers cease operation, it is usually for financial reasons. It seems likely that these two facts are related. It is not surprising to find that during financially troubled times, administrators in higher education tend to eliminate service organizations that cannot demonstrate their value.

The lesson here is that instructional designers in higher education must start evaluating the cost-effectiveness of their efforts. If these evaluations are to take place with greater frequency than is currently the case, then students in instructional design programs will need to receive more training in such areas as program evaluation and cost-benefit analysis.

One area in which instructional improvement centers can prove to be very valuable is competency testing. In many states, student competency testing is now a routine part of the K-12 public school education process. In some states, this concept is being adopted by public institutions of higher education. For example, in Florida, students who have completed a two-year junior college program must pass a competency test before they can be admitted to a four-year school. As requirements such as this one become more common, it is quite possible that members of the professional staff in instructional improvement centers will be called upon to help create the tests students will be taking. Thus, in the future it is likely that measurement skills will become a more important part of the instructional designer's repertoire.

In the future, instructional designers will also have to become more adept at designing and producing mediated instruction. Although many designers, myself included, prefer to think of instructional technology as a systematic planning process, educators outside of the design field often think of instructional technology as media. Thus, instructional improvement centers are often called on to plan and produce mediated instruction (Gustafson & Bratton, 1984), with the emphasis usually being on production. In the future, as the number of new instructional hardware technologies increases, it is likely that the demand to produce instruction that makes use of new technology will also increase. Thus, there will be a greater demand for designers who can design and produce (or monitor the production of) instruction that can be delivered with the latest hardware technology.

In the future, although the demand for mediated instruction is likely to increase, the need for good interpersonal communications is bound to remain strong. Recent surveys indicate that instructional design practitioners working in a wide variety of settings emphasize the importance of having good interpersonal skills (Redfield & Dick, 1984). These skills enable the designer to work effectively with subject matter experts, administrators, and other members of design teams. These skills will continue to be among the most important in the future.

In summary, I expect that instructional designers will still play a role in higher education in the twenty-first century. However, their role is likely to be different from the role they are playing today. Designers will have to become more adept at preparing proposals and budgets, managing and monitoring projects and resources, and evaluating the cost-effectiveness of their efforts. In addition, designers will be asked to help design competency tests and will continue to be called upon to produce mediated instruction, so measurement and production skills will be an important part of the designer's repertoire. Finally, good interpersonal skills will continue to be crucial to the instructional designer's success in higher education.

Conclusion

Except for a brief spurt of activity in higher education in the early 1970s, instructional designers have not played a major role in higher education or in the public schools. As much as I would like to see this situation change, I don't foresee this happening by the year 2001. For once, I hope I'm wrong.
References


Roles for Educational Technologists by the Year 2000

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Trying to gaze into the future of the educational technology field is risky business; it is particularly so when the time is twelve years hence and the field has historically been unpredictable. For instance, who foresaw the effect of World War II on education and training, the rise and fall of programmed instruction, the fascination with educational broadcasting, the emergence of instructional systems thinking, and the current preoccupation with computers? Who would have predicted ten years ago that the educational technology academic programs today would be preparing more women than men to enter the field and that the majority of graduates would be taking employment outside formal educational institutions?

With these sobering thoughts in mind, I Venture to speculate on some likely scenarios and trends in our field for the remainder of this century. Because no one can foresee the impact of intellectual and scientific breakthroughs, political-social meanders or catastrophic events, I assume the conservative position that the best predictors of the future are present activities and emerging trends.

In the area of employment settings for educational technologists, I foresee little change ahead. Qualified persons will find jobs in every sector of society where education and training are valued, for example, business, industry, military, government, social services, education, and health care. A specific area for high employment may be in continuing professional education, where certification and recertification requirements will demand countless hours of validated instruction. Higher education, however, will continue to resist the application of educational technology principles of course design and program development; there will be few new employment openings in colleges and universities (Gustafson, 1978).

In terms of the sub-specialities within the educational technology field, I see the following trends:

Film/Video. There will be decreasing numbers of jobs in the film industry; on the other hand, persons with up-to-date video skills coupled with a knowledge about computer-based training will have more job choices.

Computers. There will be good news and bad news in the area of computer-based training. The bad news is that the current level of fascination with computers in education and training will begin to wane, with the net result being a decline in the job market. Individuals who specialize only in programming skills will be at greatest risk, while those with a combination of computer skills, research/evaluation skills, and instructional design expertise will be more likely to secure positions. I base this prediction on the historical fact that each time new technologies emerged (for example, film, video, and programmed instruction), they were initially greeted with great enthusiasm only to fade from prominence and quietly take their rightful place in relation to previous inventions.

Instructional Design. Individuals with training and experience in designing and evaluating instruction will be in the

Qualified persons will find jobs in every sector of society where education and training are valued....
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best position for the next decade. Those with a firm foundation in the sixteen competency areas outlined by the Joint AECT-NSPI Certification Task Force will be sought by employers, regardless of current hardware and software fads (Task Force on Instructional Development Certification, 1981).

Interactive Instruction. The one area where there may be some promise for extended success is interactive instruction. However, two difficult technical problems must be overcome before this area becomes a viable job market: production expense and production methodology. Only persons with a penchant for modest risk-taking will aim their career exclusively toward this area.

Individuals wanting employment at the K-12 level will find the job requirements becoming more rigorous and work expectations more challenging. There is no doubt in my mind that changes will occur in the substance and quality of preservice teacher preparation programs as well as in the inservice programs demanded by practicing teachers. As classroom teachers become increasingly sophisticated about the use of computers and instructional design, they will expect support personnel, such as library/media staff, to be more proactive. A firm grasp of instructional design and consultation skills, coupled with the basics in library/media center management, will be the keys to success for practitioners (Turner, 1985).

There will be a noticeable increase in opportunities for persons to work in foreign countries. The growth of all technologies is exploding worldwide, and many nations are seeking skilled planners and developers to help them be competitive in a global system (Thomas & Kobayashi, 1987).

The concept of professional certification looms on the near horizon. Professional certification is not to be confused with teacher education certification or media specialist certification. For example, the International Board of Standards for Training, Performance and Instruction, recently formed out of collaborative efforts by educational technologists representing the Association for Educational Communications and Technology and the National Society for Performance and Instruction, has published competency standards for instructional designers. The Board will soon release its competencies for trainers, and slated for later development are competencies for evaluators, media developers, and training managers. One of the goals of the Board of Standards is to develop a competency-based certification process (Gilley, Geis & Seyfer, 1987). A recent study of trainers reported that over 75% of them believed professionals should be required to demonstrate mastery of knowledge and skills, and over 80% felt certification would improve their image (Bell, 1986).

The Board of Standards advocates professional certification, and if it is successful in creating a valid, reliable, and acceptable certifying process, all of us—academics, graduate students, practitioners, etc.—will be affected. There will be a need for educational technologists to develop, administer, and coordinate the certifying process. Entrepreneurs with an educational technology background may find new roles in helping their colleagues prepare for the certification examination.

More educational technologists may, in the not too distant future, find themselves in court. It is possible that trainees who complete a "validated" training program but later are unable to meet the job entry requirements will seek recompense from the creator of the training. We may have to enter into contracts with our clients to protect us from litigation by end users of our products. Some of us may earn a living working as legal consultants and expert witnesses in disputes where training is an issue.

As educational technologists make career commitments to their employers, particularly in the for-profit sector, it will be interesting to see how far they are able to climb the corporate ladder. It has been about ten years since they began moving in significant numbers into the corporate sector; many have risen to supervisory roles, and a few have advanced to middle manage-

...a leadership vacuum still exists in the educational technology field.
ment. How far these individuals advance in the next decade will be a signal to those who come behind them.

On the other hand, I doubt that we will see many persons in our field rising to leadership roles in public education, say, as principals and superintendents of school systems or as college deans and presidents. If this prediction is accurate, it will further discourage the more capable and talented people in our field from pursuing careers in public education, where they are needed most (Bratton & Silber, 1984).

The academic community that trains educational technologists will not escape change. I foresee reductions in staff and some closures of programs as institutions reevaluate their costs and priorities. Those programs that survive will become increasingly differentiated on the research-practice dimension. With increased specialization of practice, a few programs will experiment with postdoctoral training, thus creating new roles for faculty and students. Faculty in all programs will face the conundrum of whether to offer a generalist or a specialist orientation to their training. There is some preliminary evidence to suggest that in the near future a merging of educational technology and educational psychology programs may take place at some institutions (House & Bratton, 1986). These changes will affect every member of the academic community, as well as future students.

I predict that before the end of this millennium, professors will have to deal with such issues as academic program accreditation, certification, and licensure. How they choose to respond to these opportunities may well have a more profound effect on the future of our field than any external force.

One important role that has yet to be mentioned is neither job specific nor limited to a single sector, yet it may be the most influential as we move toward the next century. It is called leadership. While there are many people who have made significant contributions in terms of research, scholarly efforts, and professional association service, a leadership vacuum still exists in the educational technology field. Perhaps the role all of us can play today that will most positively affect the future of our field is encouraging bright, insightful, articulate individuals to join us in preparing for the challenges ahead of us in the twenty-first century.

In this article I have described the influences I think will likely affect our practice and field in the near future. In some instances, our roles will be affected whether we attempt to intervene or not. In most cases, we can strongly influence our own destiny.

References
Implications of Instructional Technologies for the Future of Education

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One method of predicting the future involves the extrapolation of past trends to the present and projecting them into the future. In looking at the past of instructional technology, a rich audiovisual heritage is found. When using this extrapolation method to look into the future (to the early 2000s), some very curious trends become evident. After describing these extrapolated projections, a second future forecasting technique, the scenario-construction projection technique, is used to examine current pressures and recent innovations to determine what impact they may have on the future of education.

Straight-Line Projection of Trends

In the 1960s a great deal of excitement was evident in education. The Department of Audio-visual Instruction (DAVI-NEA), the major educational audiovisual organization, became the Association for Educational Communications and Technology (AECT), and grew steadily during the 1960s and 1970s. During the 1980s the organization began to rapidly decrease in size as funding for public school-oriented media equipment and materials production was drastically reduced and fewer media coordinators' positions were funded in schools. The membership pattern in AECT for the above period follows a bell curve and suggests a continued decline. Related professional organizations which are more oriented toward industrial and military training, such as the National Society for Performance and Instruction, the Association for the Development of Computer-based Instructional Systems, the Society for Applied Learning Technology, and the Human Factors Society, are growing.

Graduate instructional technology programs in the 1960s focused on the preparation of public school media personnel and college professors. Today these programs are increasingly oriented toward training industrial and military "trainers" and decreasing their preparation of public school "educators."

In 1960 the population in the United States spent 20% of their lives in schools, but by 1974 this figure had declined to 16% and is still declining somewhat today. One possible reason for the decreased public emphasis and involvement in education today, as measured by the amount of time the average citizen spends in a formal learning environment, is that a greater percentage of our attention and funds for social activities is going to health care and social programs for our aging population.

In the 1960s many films, filmstrips, slide-tape programs and other materials were produced by Coronet, McGraw-Hill, Encyclopaedia Britannica Films, and other media producers. These materials required many new projectors and amplifiers. Programmed instruction materials were developed and language laboratories were installed in secondary and post-secondary schools.

The 1980s show a decline in the production and availability of elementary and secondary school-oriented audiovisual materials and equipment. The federal funding programs (e.g.,

The future appears more promising for business and military-oriented media personnel.
About 50 million adult Americans will need retraining by the year 2000.

The Elementar y and Secondary Education Act and the National Defense Education Act) which helped school districts to buy equipment and which provided training for media personnel have virtually disappeared. The second largest public school district, Los Angeles, put its entire film library into cold military bunkers in the early 1980s and has not significantly added to its collection. Most university film rental libraries are in financial trouble. Except for some computer software and textbooks, little "courseware" is even being produced for educators.

The large educational projects and programs of the 1960s such as the Midwest Project for Airborne Televised Instruction (MPATTI); the Hagerstown, Maryland television project; O. K. Moore's Talking Typewriter Project, which were funded by the Ford Foundation and others, have declined and almost disappeared.

These trends, when extrapolated into the future, are not very promising for public school-oriented media professionals. In the future suggested by these trends, the lecture will be enhanced by few aids and almost no media-based alternatives to learning will be tried. The future appears more promising for business and military-oriented media personnel.

Future Scenarios

Another way of trying to outguess the trends as predictors of the future is to identify new ideas or other pressures which may significantly change education. These new pressures can be placed into projected snapshots or scenarios and studied to determine how they might affect our future. Trend extrapolation is used to examine evolutionary change. Scenario construction is used to consider revolutionary change; enough pressure can dramatically and abruptly change individual or organizational behavior. Following are some possible scenarios which may change the future of education and the media. professional by the end of the century.

SOCIAL SCENARIOS

Pressure: There will be few people coming into the workforce as the baby boomers retire near the end of the century. The year 1992 is projected as the year in which the need for major adjustments will become apparent to employers.

Response: Middle managers and professionals (e.g., teachers) will be given incentives to work until age 65. Women's expected roles will merge with those traditionally expected of men and inequalities will disappear. Military planners are so concerned about the lack of availability of manpower beginning in about 1992 that they are considering urging Congress to institute a draft for men and women and even hiring foreign mercenaries.

Pressure: About 50 million adult Americans will need retraining by the year 2000. Naisbitt (1985) estimates that by that year the expected lifespan of a job will be seven years.

Response: A major focus will be on propriety schools to train new skills, and other organizations will focus on the retraining of managers. Management training will change from a process of an individual manager with the answer telling others what to do (an industrial manager model) to one where a facilitator creates a positive growth environment for workers. Attracting, retraining, and retaining personnel will require a positive work environment.

Pressure: Even with the declining value of the dollar, the United States cannot compete in the production of goods with foreign competition.

Response: Employee retraining will focus on service occupations.

EDUCATION SCENARIOS

Teacher Education

Pressure: The Carnegie Commission Report on Higher Education, the Holmes Committee report on higher education, and other recent studies of colleges recommend elimination of undergraduate education programs.

Response: Following attainment of a Bachelor's degree in the arts and sciences, future teachers will pursue professional teacher preparation in graduate university programs or in training programs funded and directed by unions and school districts.

Pressure: Specialization among educators will occur to a much greater extent than it does today because of the requirement for more graduate education.

Response: Highly trained "master teachers" or "lead teachers" will be common in schools. More teachers will specialize in the design and production of widely disseminated materials, thus reducing the cost of designing these high-quality materials. While a national curriculum will not evolve (in part because of the "local control" requirement), textbook publishers, software developers, and instructional materials producers will become much more essential to the instructional process.
The demand for cost-effective alternatives (including instructional technologies) is about to explode.

Pressure: State-wide teacher competency examination requirements will be implemented in most states.

Response: This focus on specific teaching skills will result in a restructuring of teaching environments in state-mandated continuing education courses similar to the programs for accountants, optometrists, pharmacists, physicians, social workers, and veterinarians. Today it is believed that teacher education skills are intangible (“teaching is an art”) and do not lend themselves to periodic recertification. This will change. Teacher accountability will result, and teaching will become a profession with an identifiable, research-based, foundation. This structure will be based on a research-based technology of teaching. A knowledge base involving categories of learning (learning procedures, skills, knowledges, attitudes) and learners (attitudes toward the content and general learning, processing skills) is currently evolving. This foundation will permit objective evaluation of a teacher’s ability. “Master teachers” will be financially well rewarded, with a differentiated salary program.

Pressure: Inservice teacher growth and development often occurs at conventions.

Response: The “hi-tech, hi-touch” phenomenon, discussed by Naisbitt in Megatrends (1983), will promote an increased need for human interaction and personal contact at conventions, as opposed to electronic communication which reduces travel and personal interaction. Increasing travel costs, however, may result in many of the large national meetings breaking into smaller regional meetings which may seem more personal.

Associations are needed as part of the teacher growth and certification pressures discussed above. Many more professional associations or organizations will evolve for those with specialized interests.

Elementary/Secondary Schools

Pressure: John Naisbitt (1985) has written that the schools have failed. He says we have to completely re-contextualize our educational system in order for it to survive.

Response: One possible solution involves the “voucher system.” In this way the schools would compete for students and quality could evolve.

Pressure: Stating this point more strongly, Lewis Perelman (1986), president of Strategic Performance Services, says: “The age of schooling is over. A new, post-industrial ‘learning enterprise’ is about to replace the outworn infrastructure of industrial-age education” (p. 14). Perelman states that education today compared to that of the twenty-first century is like the horse and buggy compared to today’s transportation system.

Response: Perelman concludes that: “The nation that is first to adopt a high-technology consumer-based learning system will enjoy a permanent competitive advantage in the global economy of the information age” (p. 15).

Pressure: The cost for training and education is more than $300 billion a year (Naisbitt, 1986). As an institution it is rivaled in size and rate of growth only by health care and defense. Per-pupil spending on elementary and secondary students grew by 22.5% during the past decade, when real income per capita increased by only 6.5%. The investment by employers in training is some $800 billion a year, comparable to all formal higher education, and is projected to grow by 25–30% by 1990.

Response: Education is increasingly expensive. Today the federal government provides nearly half of America’s college students with aid from federal programs, but is expected to decrease its support. The states already spend one-third of their budgets on education, so there will be more pressure to decrease spending for public education. The demand for cost-effective alternatives (including instructional technologies) is about to explode.

Pressure: The average cost of classroom instruction in K-12 schools nationwide is about $1,25 per student hour. Equivalent quality computer-based instruction costs $1.10 per student hour. People costs continue to increase, while computer costs are decreasing.

Response: CAI represents an alternative to the labor-intensive lecture. A computer hard disk can hold as much information as 20 encyclopedias, and can be accessed and updated with ease.

Pressure: Better communications systems will result in increasing divergence in student experiences, abilities, and goals.

Response: Each adult student may have a curriculum tailored to his or her own background, interests, and skills. Computers will assist in permitting this. Teachers will increasingly assign students to course work based on their knowledge and skills.

Pressure: Marvin Cetron, president of Forecasting International, suggests that by the turn of the century, adults will be working a 25 to 32 hour week (Cetron, Soriano, & Gayle, 1985). During the time they are not working, many will be preparing for their next job. On the other hand, students will have longer days.

Response: Public schools will be open longer. Year-round programs will evolve, with buildings being open 24 hours per day serving day-care functions. It may be that the school year will
Piracetam capsules every day for two weeks. The other students took placebos. After one week, and again after two weeks, the students took the memory tests. After the second week the students taking Piracetam improved markedly. This drug has also been used with some success on animals, chronic alcoholics, and individuals suffering from senile dementia.

The National Institute of Mental Health has identified a chemical which seems to improve memory and learning. The substance is visopressin, a hormone secreted by the pituitary gland. A synthetic relative of this hormone, called DDAVP, was tested on animals and then on humans. The drug was administered by a nasal spray for several weeks. College students scored 20 percent higher on retention tests related to categories such as fruits, cities, etc., by listing the words according to category. It is suspected that the chemicals may affect motivation and pleasure, important aspects of learning.

Neuroscientists Amy Arnsten and Patricia Goldman-Rakic, of the Yale Medical School, have worked with Clonidine, a drug prescribed in the United States for lowering blood pressure. They find that it enhances the memory of elderly monkeys and people with Korsakoff's syndrome, a memory disorder (Carpenter, 1986). Neurologist William McEntee of Brown University and psychologist Robert Mair of the University of New Hampshire found that Clonidine improves the ability of individuals to learn new information.

Response: Until the moral and ethical ramifications of using mind enhancing or altering drugs is resolved, little school use of drugs can be expected. However, if proven safe, the drugs may prove to be useful in the treatment of forgetfulness common to elderly people (and absent-minded professors). Soon after the year 2010, memory pills may be used to aid students to perceive or retain information for rapid recall.

MEDIA-RELATED SCENARIOS

Pressure: Teleconferencing is not really interactive and does not provide the creative exchanges students desire.

Response: Teleconferencing will not be a significant factor in professional communications.

Pressure: Teletext/electronic telephone directories systems, like the French Teleco system, will mimic the interactivity of two-way videotext at a fraction of its cost.

Response: Advertisers will reassess and reduce their support of newspapers (McManus, 1986; Brand, 1987). The American Newspaper Publishers Association has been so upset by this trend that they successfully lobbied Congress to prohibit the telephone companies from entering the publishing business until 1989. The French now have some 3,000 services available on Teleco at about $9 per hour: home banking, home shopping, weather, airline and hotel reservations, games, TV schedules, real estate listings, maga-

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The use of chemicals to enhance perception and increase retention may be possible in the near future.
Strategies for learning will be taught rather than rote repetition and memorization.

The computer pressures discussed above will result in inexpensive, easily available, high-quality, software-based "teaching machines" with microprocessors. Much of this software will be focused on the home market, but its low cost will permit its increased use in the classroom.

Pressure: Computers will allow the development of new teaching approaches called behavioral engineering (Knauer, 1986). Software can be developed permitting behavioral engineering through neuro-linguistic programming.

Response: Strategies for learning will be taught rather than rote repetition and memorization. These learning strategies will enable individuals to more effectively gain access to internal (mental) and external data bases and therefore to "think better." Math training would involve presentations of "mnemonic association," drawing heavily on visualization.

ECONOMIC SCENARIOS

Pressure: As discussed above, there will be a shortage of qualified personnel by 1992.

Response: Teacher salaries will be raised on an annual basis to within 30% of parity with other professions requiring college degrees.

Pressure: Less than 1% of the national school budget is currently spent on library materials, textbooks, school supplies, or instructional media and

Immediate access to information via teletext will result in the capacity of capable individuals to acquire immense power, insofar as knowledge is power.
...educators will be more concerned with developing a learner's rule generator and much less with environmentally specific data.

Conclusion

We can't accurately predict the future, but we can make some good guesses and approximations to help us plan for it. As individuals and organizations, we want to be on a winning team and use our energies to support good ideas. Good projections of the future will help us to make better decisions. Let us hope that by attempting to get a clearer picture of the future we will be able to participate more fully in it.

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School Media Specialists: Changes and Challenges for the Next Millennium

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Abstract. It has long been recognized that media programs and media centers contribute to the successful schooling of students. Studies over the past ten years have linked the presence of school media centers with students' academic achievements (Bowie, 1984). Persons providing media services, therefore, play key roles in the overall success of instructional programs. Some of these roles have remained fairly stable since the founding of the first public school library. However, with every new round of challenges to the schools and advances in instructional technology, some roles have shifted emphasis. Responses to the many demands and challenges have varied in degree, but programs have been expanded and adapted to provide needed services to learners and teachers. This ability and willingness to adjust and to meet new challenges has enabled media specialists to assume their role as curriculum and instructional leaders.

This article suggests future directions media specialists must take to meet the challenges of today's educational climate. These suggestions are made against a framework of both traditional and contemporary functions assumed by media professionals. It also suggests sources from which these challenges have sprung and how such forces are reshaping media programs in the schools.

Past and Present Roles of School Media Specialists

While media centers and libraries are working to maintain quality in traditional services, there is also a demand to move into new areas that require new technologies that deliver these services. These imperatives are creating important tensions about the fundamental value of traditional roles and functions. (Van Houweling, 1986, p. 82)

Van Houweling, who coordinates computing and telecommunications at the University of Michigan, gives us pause to consider the many past and present roles of school media specialists as distinct but ever changing pictures. The clarity of a given role depends on the time period in which the media specialist is under focus. For example, if one were to observe the work of school media specialists prior to the 1970s, one would generally see school "librarians" who warehoused book collections and worked independently of audiovisual specialists who maintained small equipment and nonprint centers in the same schools. A look in the early 1980s would reveal an entirely different scene in which media professionals provided a wide variety of print and nonprint information services from an integrated collection. An examination of the current roles of school media professionals will prove useful in making sound and rational predictions about their roles in the next century.

Grounded in Tradition

Traditionally, school media specialists spent most of their time facilitating systems that coordinated student and teacher needs with access to resources of all kinds. Probably one of the best terms to describe this role is "information specialist," meaning one who is knowledgeable about formats of in-

Media specialists remain on the front line in the many battles...for free access to a wide range of ideas and materials in the schools.
formation and how to use them. Reader guidance, instruction in library skills, book talks, literature enrichment programs, book fairs, technical and reference services, and a host of other print-oriented activities were the limits of professional activities. Most media specialists felt comfortable with these roles, and many described them as their primary source of professional satisfaction. These roles, however, provided little opportunity to interact with the curriculum and the teaching staff, except in a most superficial manner.

Collection development was also a major part of this tradition. Selecting, acquiring, and managing materials to support the curriculum and satisfy the individual needs of students and teachers have long been, and still remain, central to the goals of the media program. These activities represented, in many professionals' views, the pinnacle of professional responsibility. Direct involvement in the instructional program, except to respond to teacher requests, was not a major responsibility.

Defending the right of students to learn and combating outside and inside infringements on intellectual freedom in the schools have also been traditional roles of school media specialists. Increases in the number of challenges to instructional and library materials have magnified this role and amplified its importance during the last few years. Media specialists remain on the front line in the many battles and skirmishes for free access to a wide range of ideas and materials in the schools. It is a role that is not likely to diminish any time in the near future.

A Contemporary View

Our second "snapshot" shows the media specialist increasingly engaged in curriculum and instructional development activities, working closely with teachers and administrators to implement and evaluate instruction. This role change has required a significant shift from being a passive keeper of a storehouse to becoming an active participant in the instructional program. Helping to design and implement curricula that teach students to think has recently been identified as the most pressing priority for media specialists in their role as instructional developers (Mancall, Aaron & Wallen, 1986; Kuhlthau, 1987). They are planning and budgeting for the curriculum and are helping to integrate vital information access skills with classroom instruction. Many in the profession feel less comfortable with these new responsibilities, but are beginning to accept them now that greater support from state, district, and local school administrators is being realized.

Changing and Re-creating

...for a conscious being, to exist is to change, to change is to mature, to mature is to go on creating oneself endlessly. (Seldes, 1985, p. 40)

The comment above, attributed to French philosopher Henri Bergson, implies that change emanates from intrinsic forces, that it is a self-propelling compulsion that needs little outside assistance to realize its ultimate creation. On the other hand, Golas (1972) describes change as the desire of a body to adjust to outside forces. He says: "Absolute stability exists naturally at the space level, because all relationships are persistent to the degree that the beings involved have the same expansion" (p. 58). It is possible to explain changes in the role of school media specialists by subscribing to either or both of the above viewpoints. While it is true that the profession has grown or matured because of inside forces and demands, it is also true that outside influences on the parent institution precipitated and demanded adaptation for survival.

Whatever the reason, school media programs have changed, and so have the media specialists, even though some strongly questioned their ability to do so. In the early 1970s, for example, it was predicted that school librarians would lack both the interest and the ability to assume a more comprehensive role in the teaching and learning processes in the schools (Gilman, 1970). Many were of the opinion that the concept of an integrated media center under the direction of these "print-oriented" professionals would take fifty years to implement, if in fact it could ever be implemented. This was at a time when many school media specialists were experiencing a so-called "identity crisis," trying to decide allegiance to either librarianship or education (Burrell, 1979; Vandergrift, 1979; Mognier, 1979; Fitzgibbon, 1976; Bowie, 1981). It was also a time when discussions of the role and even the title of school media specialists were a main focus of the research literature and professional gatherings. Franklin (1984) identified 23 different professional titles for school media specialists. Summarizing the dilemma, Daniel (1980) asked, "Butcher? Baker? Candlestick maker? What is our profession? What basic principles and values do we profess?" (p. 107).

In less than twenty years, not fifty, school media specialists have, for the most part, shaken their identity crisis (in purpose, if not in nomenclature) and have implemented the media center concept. They have done this with
Joint school library/media standards... have had an effect on the work and functions of school media specialists.

resilience in the face of reduced budgets and resources, and with an open commitment to meaningful professional reform of their image and work. They have merged some of the best from both education and librarianship and have discarded the useless and irrelevant. They have also adopted many practices from management in an effort to become more productive in their broader role. The results have been innovative programs in many school media centers that merit attention and, sometimes, awards from the public and private sectors.

Internal Forces Mandating Change

There have been both internal and external forces at work to precipitate and facilitate changes in the role of media professionals in the schools over the past fifteen years. One important force was the gradual awareness within the profession of the power, as well as the good sense, of unity among peers. A number of statewide divisions of school librarians/media specialist thus broke away from their parent National Education Association (NEA) and American Library Association (ALA) state affiliates and formed their own separate statewide organizations. As of 1986, 35 of the 50 states were reported as having individual and separate professional organizations devoted to problems and issues relative to school media specialists (Bowker, 1986). In at least one state (Georgia), the professional organization is currently debating the merits of breaking away from its parent, the Georgia Association of Educators. State associations, representing almost 20,000 professionals, have established agendas that reflect growing concern for accountability, management, evaluation, copyright infringement, censorship, and a host of other issues that have made their way to statewide platforms.

At the national level, members of the American Association for School Librarians (AASL) have been seeking more autonomy as a division of the American Library Association. The division wants more control over the distribution of monies and other resources. In a 1984 poll, a majority of AASL's almost 10,000 members felt that the division's current relationship with ALA was counterproductive to the division's goal of becoming more responsive to its own constituents. The division's "Future Structure Report" presented a number of options to the dilemma (Day, 1985). These options are currently under discussion by the boards of both AASL and ALA. The outcome could have far-reaching effects on the image of the division and control of the parent organization. The growing power of school media specialists within ALA is further evidenced by the fact that AASL has held four national conferences of its own during the past decade. These national forums have given the division a larger and louder voice within the parent organization and have called national attention to the progress and problems of school media specialists.

The creation of the Division of School Media Specialists (DSMS) within the Association for Educational Communi-
work and functions of school media specialists. Prior to 1975, library standards were designed by leaders in the field of library science. Since that time, cooperative efforts between leaders in instructional technology, curriculum, and library science have resulted in recommendations that reflect a more comprehensive role for media specialists in the schools.

The recent public school reform movement represents probably the most powerful external force in shaping and changing the role of media specialists. While "A Nation At Risk" (1983) failed to make specific recommendations concerning the impact of school media centers in the scheme of improved education, it did precipitate a number of state and local reforms that have directly affected school media specialists. It also led to a second study and recommendations from the U.S. Office of Education, entitled "What Works" (1986).

School media specialists have naturally assumed much of the responsibility for integrating technology into the school's curriculum. This, in turn, has altered not only the work, but in many cases the image of the media specialist held by parents, teachers, and administrators. Today it is not unusual to find media specialists working with district personnel, curriculum teams, and students in the search for better and more efficient uses of computers and other interactive devices in teaching.

An Emerging Role for the 21st Century

To stand on the summit of perfection is difficult, and in the natural course of things, what cannot go forward slips back.

Gaius Paterculus, 20 B.C. – 30 A.D.

Decisions about the media program will be rooted in reliable data bases, not in hunches or educated guesses.

The development of technology that began with oral language, moved to written symbols, and then to electronic symbols, has placed greater and greater demands on schools to make newer formats of information available to all students. Chisholm (1984) writes,

Even though individual students may not be able to articulate it, there would be a need to the information age and that many aspects of their lives require them to be able to obtain information... The impact is that children's need for information, as well as their awareness of this need, is increasing. (p. 165)

The emerging "snapshot" of the future role of school media personnel is less sharp. However, it does indicate the media specialist will increasingly work with new formats of communication and information and new instructional strategies that will require that more time, thought, and effort be devoted to helping both teachers and other media center personnel carry out the school curricula. Because development of the curriculum will require new skills, staff development must be firmly based in four major assumptions (Buccino, 1986):

1. that a curriculum grounded in a single theory is indefensible,
2. that practical decision making requires eclectic arts,
3. that the more one moves away from the particular, the more difficult it is to make wise decisions, and
4. that values and intentions are only imperfectly known and realized in educational programs.

Buccino's assumptions suggest staff leadership that is broadly focused, while at the same time sensitive to individual strengths and weaknesses. Recent suggestions that school media certificates carry a designation of "leadership" rather than "service" appear to indicate that media specialists are ready to assume such leadership.

This emerging vision of the role of future media specialists is one in which warehousing and circulation duties are relegated to nonprofessional staff and computers. Central to this new role is a broader program of research to determine needs in programming, services, and materials. Decisions about the media program will be rooted in reliable data bases, not in hunches or educated guesses. Teachers and media specialists will assume equal status as curriculum leaders who work together to design curricula that are sensitive to Buccino's four imperative assumptions. These new responsibilities call for greater attention to public relations activities so that taxpayers perceive and realize a greater return on their invested dollars, which will result in greater public support for our schools.

The three "snapshots" of school media specialists presented here depict roles that are by no means stagnant; but dynamic and ever evolving. They represent periods in which internal and external forces demand different forms of response. Programs that prepare school media specialists must continue to shoulder much of the responsibility for selecting appropriate responses to these forces. Otherwise the role of media specialists will cease to progress and will begin to slip back. The schools and the profession cannot afford to let this happen.

References


An Organizational Analysis of the Future of Educational Technology

In this special issue, the reader has the opportunity to examine an interesting and diverse set of futuristic scenarios from authors Bowie, Bratton, Knirk, and Reiser. It is a difficult intellectual challenge to compare and contrast them. However, I believe there is merit in such an analysis. There are provocative similarities and differences across the articles, and it seems they can be sharpened by a systematic, organizational analysis. The tool I have chosen is an organizational analysis method developed by some systems analysts a number of years ago (Kurpus, 1985). I currently use the tool as an intellectual template in analyzing complex development projects or assessing organizations for the suitability of organizational and instructional development interventions. The tool is broad enough to analyze these alternate futures and should provide one powerful, integrated perspective of all our authors’ predictions.

As illustrated in Figure 1, the analysis tool is used to sort organizational dynamics into five primary categories. The environment, that is, forces external to an organization, is often most important. In many ways, the most significant determinants of our professional futures are outside of our control. We are not large enough as a profession to directly manipulate the organizational structures in which we reside. We may ultimately succeed or fail as a field according to our ability to capitalize on patterns and trends well beyond our immediate control.

We are comfortable in analyzing the purposes or goals of our client systems, and in recent years have become quite sensitive to the norms, values, and cultural factors that form the context for expressions of purpose. In some ways, our intellectual pursuit of needs analysis (Mayer & Kaufman, 1985) can be seen as an explicit recognition of the complex manner in which organizations express value, direction, and purpose. Some in our field have argued that our interventions are profound.

![Diagram](image-url)

**Figure 1. A Model for Organizational Analysis**
enough to change the social context in which we perform (Schwen, et al., 1985). If this argument is accepted, we have a professional obligation to anticipate the consequences of our "social" interventions through methods such as needs assessment.

In the descriptions of alternate futures presented in this issue, our authors have engaged in relatively modest speculation about our goals in the future. I believe the authors implicitly argue that the goals of our organizations are more important than our professional goals. In addition, there is reasonable agreement about increased valuing of our profession because of the increased demand for training. There are mixed opinions about how our philosophy of teaching and learning will be valued in schools.

Issues of structure are universal in organizational analysis. Our futurists have raised the issue of our relationships as groups of professionals to the organizations in which we reside. The issue seems to be: Do we have enough status in our relative organizational hierarchies to effect the change we believe is appropriate or adequate?

The methods or technologies we use have been a profound source of introspection for years. We seem to be less articulate and sensitive as a field to alternate methods or processes for solving problems in complex organizational settings. The point of this sort of systems analysis is that we must step back and simultaneously inventory the strengths and weaknesses of all the methods, technologies, and processes that are in use when we choose to intervene in a new organizational setting. There are interesting differences among our authors as to the legitimacy and appropriateness of alternate methods, and this issue would profit from closer examination.

Personal issues are classic points of departure in most organizational analyses. Our authors have expressed considerable concern in their alternate futures about the competence of those who use our tools. There is some speculation about developing the leadership potential of our field, particularly by exporting our tools for other personnel groups to use. There is also a kind of moral exhortation to adapt and to work harder to more effectively influence the organizations we inhabit.

These categories of organizational analysis are quite abstract. The power of using such a tool is in the organizational perspective. This analysis raises the issue of organizational determinism in our future. Can we reasonably predict how these dynamic structures and processes mold and shape our future? I have deliberately taken the position that these dynamics will be more influential than our philosophy or our aspirations. Also, the tool allows for some "modeling" of our organizational future. The weaknesses of such a method include a systematic organizational or sociological bias, and the loss of some of the unique or idiosyncratic predictions through adjusting all predictions to the same level of analysis. Perhaps a few useful questions emerge from the trade-off between the strengths and weaknesses of this method.

Analysis of Environmental Predictions

Knuirk speculates most about the environment. His major premises are the most generic, and they could be paraphrased as follows:

1. Our changing demographic patterns (the graying of America) will put differential stress on our schooling and training organizations. Schools will shrink. Training organizations will expand.

2. Biological and technological research and development will provide tools that will dramatically alter and enhance our professional practice.

3. The economy will respond to the changes in items one and two. Our educational structures will come under attack. Active and successful competition for funds will be necessary to create a promising future for our profession.

4. The general culture may demand more efficient and effective structures or alternative organizations to deliver educational services.

As noted earlier, the model of the environment outlined in this issue by Knuirk and extended by Bowie and the others forecasts population shifts as the population grays, resulting in fewer school-age children. Technological, political, and economic change will follow the demographic change, creating increased pressures on our adult population for retraining. In the judgment of Bratton and Reiser, schools will become less hospitable to the current crop of educational technologists. Reiser, Knuirk, and Bratton all argue that the influence of educational technology will be seen in the schools through the products and processes of educational technologists. In this view, technologists would constitute an external force because they will operate outside the organizational framework of schools. This position is reasonably consistent with Heinich's (1984) longstanding views on the matter. It seems important to come to grips with that point because it bears on a number of issues of national policy, professional organizations, and political alliances to influence funding.

In a manner of speaking, Bowie represents an internal, opposing model of change. She takes the position that librarians and information specialists are...
the new breed of educational technologists in the schools. She argues that the expanded role of librarians, information specialists, and educational technologists will lead in the application of educational technology principles in schools. She argues for a change-from-within perspective.

These opposing views are rarely stated in professional dialogue. It is my view that the issue is critical for the organizational agenda of technologists in the future. It is, obviously, a matter of perceived competence and power. If educational technologists align themselves with librarians, as Bowie suggests, we have much unfinished business to attend to in our professional organizations. In this scenario, technologists would need to be convinced that librarians would be competent at using their approaches in schools. Or, if other alliances are important, we need to identify those leaders and segments of the schools we intend to influence with our methods and tools. At the present time there does not seem to be a clear vision or agenda forming about either view of the future. Perhaps the competition for the Center for Technology in Education offers a new opportunity for developing these and other scenarios for change in the schools.

It seems reasonable and safe to predict rapid developments in biological and technological research and development that will provide our professionals with more tools. However, one could take the position that our tools could become environmental or external forces (as postulated by Reiser and Knirk). Computer application tools, expert systems analysis, and related developments could allow us to put our most sophisticated analytic processes in the hands of far less sophisticated practitioners outside of our profession. There appears to be a revolution of that sort developing in the accounting profession (Shpilberg, 1988). Expert problem solving in tax planning, for example, is distilled and made available to business leaders, thereby markedly improving their performance. Exporting knowledge to education and training settings could dramatically alter our organizational agendas and subsequent relationships.

In closing this section on the environment, it is probably wise to question the most fundamental assumption of our authors: the demographic prediction about the graying of America. As I understand it, if one considers increased immigration pressure and differential birth rates by ethnic and socioeconomic class, we could very well see a dramatic shift in our population ratios in the 1990s. It is quite possible that we will have a reversal of status with black and Hispanic populations becoming the majority due to new births and immigration and the white population becoming the minority group. It's very hard to be as confident about the graying of “America” prediction under these circumstances. The environmental pressures on the organizational framework of the schools could include at least regional increases in the school-age population, with the additional issues of bilingual training and managing the problems correlated with low socioeconomic status of the school population. This scenario could include dramatic changes in demographic patterns and agendas for educational technologists.

Exporting knowledge to education and training settings could dramatically alter our organizational agendas and subsequent relationships.

Analysis of Goals Predictions

The goals systems category is intended to be quite complex, including norms, values, and all forms of expression of intent including vision, purposes, and objectives. Simply stated, the orientation is that organizations express fundamental purposes in a wide variety of ways. The organizational analyst must be quite sensitive to the deeper context of these expressions to truly understand an organization’s sense of purpose and identity. Our futurists have not explicitly devoted much of their predictions to this category. Reiser, Bowie, and Bratton have each made observations about the valuing of our professional perspective in schools. By implication, Krirk has raised issues of value that will change as our environment changes.

Paraphrasing the authors involves quite a bit of personal speculation. The following propositions seem to describe most of the authors’ views, and some of my own:

1. The general societal values of efficiency and effectiveness will begin to break down current educational structures and hold them up to closer scrutiny.
2. The general cultural fascination with improved effectiveness and efficiency will allow us to share in new monies that will be available in our organizational frameworks.
3. The valuing of technology as a process will be linked to our effectiveness. Our effectiveness will be judged by our products and related teaching/learning processes. We will gain power to the degree that we become more effective and efficient.
4. Public education leaders may well value selected, highly visible products like computers and software, but not our professionals, as players in the public education process [Bowie’s observations excepted]. Our professions’ valuing of outcomes rather than methods will be more widely held by
...power is correlated with size, knowledge, and access to finance.

the clients of public educational systems than the leaders and players in these systems.

5. Our value and purpose in training and development settings is more traditional in one important sense. We become the educational system—teachers, designers, and evaluators—although we are not directly linked to the prime purpose of the organizations in which we reside, e.g., the prime purpose of a business is producing its product rather than training.

We have occupied an interesting values/purpose niche in our organizational history. In our first significant organizational niche, public and private education K–16, we were perceived as service providers to faculty, the primary actors. In this reconstructed view of history, we merged with a larger group, librarians, and in the synthesis became less identified with the process of teaching. As noted above, Bratton, Reiser, and Knirk each see the remaining professional hybrid as distinct from our field. Bowie argues that the new librarian has assimilated the old and new roles and values of the merged profession. In any event, all of our authors agree that there are fewer professionals in the schools. Bratton, Reiser, and Knirk see little opportunity for a direct, continuing professional role, while Bowie argues that the professional role is emerging along with changing political alliances. Bratton, Reiser, and Knirk seem to argue that our perspective on process and outcomes will not be valued enough to be institutionalized in professional positions.

In contrast, in training and development we see many professional roles in far more diverse organizational patterns, yet our value is instrumental rather than fundamental. In other words, we are seldom placed in organizations where the primary outcome is training. Our role is to help significant organizational actors learn more so they can produce more in the primary arena of delivering goods or services. In our second niche, we often serve in traditional roles of delivering instruction to clients. I am not convinced that our professions’ valuing of technological processes leading to important outcomes is any better understood in the training and development niche than it has been understood or valued in public education.

Analysis of Structural Predictions

The structures systems category is as complex as the goals category. In typical organizational analyses, we are obviously interested in classic line-and-staff structures, but we are just as interested in formal and informal reference groups, assimilations of power, information networks, financial dispersion networks, and controlling and review structures. It is often the case that organizational structures are more fluid than our representations of them. It is often quite complicated to discern what are the “real” dynamics of structure. Certainly, with our bent toward practical technology, we have learned that the classic representations of organizational structures are often convenient fictions that bear little resemblance to the actual patterns of organizational relationships.

Although our authors did not expend much of their effort on the issue of structures, they have made a small number of interesting predictions. Paraphrasing their efforts with considerable license, the following propositions are offered:

1. The focus of power in our professional organizations will change:
   a) Traditional school-based or affiliated organizations will continue to decline [Bowie’s observations excepted].
   b) Training and development organizations will continue to increase in size and complexity.
   c) The power of influencing schools will move from our school-based organizations to more broadly based constituents and structures [Bowie].
   d) Our professional organizations will become more specialized and less powerful [Bratton and Knirk].

2. Our status as service organizations may increase with the influence and cost of our technologies. Our expensive enterprises must be managed by highly placed or influential organizational units, thereby increasing our status and power.

3. The opposite prediction could be made: As our processes and products become more expensive, more traditional structures may own them as an expression of power and primacy of purpose.

4. Our success in training and development could result in our “restructuring” in higher education. Larger, more dominant units such as educational psychology [House & Bratton, 1986] could assimilate our smaller educational technology structures in higher education [Bratton].

If there is a lesson to be learned from American organizational history, it is that power is correlated with size, knowledge, and access to finance. Further, a minimal amount of power is necessary to affect the course of organizational accomplishments. We are not demographically a significant or powerful component in the organizational niches we occupy. The status of our structures reflect this fact. Further, our knowledge is not considered primary or essential in any of the major organizational settings in which we function.
Consequently, we usually operate in the instrumental middle ranges of organizational status or influence. Our access to financial resources is a function of competition with other priorities at the same or higher levels of status. Our tools, processes, and support systems are increasingly expensive and possibly powerful. We may be on the cusp of owning a larger share of our organizations or of being owned.

Analysis of Methodological Predictions

The methods of organizations are the generic modus operandi, the conceptual or technological solutions to salient problems. Often organizations that routinize and control the match of problems to applications and simultaneously contain the costs of their methods are most successful. The authors were quite provocative in their predictions about the future of our methods. In paraphrasing the predictions, the following are advanced:

1. Our scholarly methods will become more like mainstream academia. We will be judged like other scholars in higher education. Therefore, we will produce less products and more traditional scholarly products [Bratton].

2. Our methods of analysis and synthesis as well as our products will be disseminated to significant client systems. They will be more influential than our labor-intensive organizations that provide direct service [Reiser, Bratton, and Knirk].

3. Our personnel will become more eclectic than our scholarly traditions suggest. Management, developing funding, competency testing, and more product development skills may be required [Reiser].

4. Interactive technology processes will be in high demand [Bratton and Knirk].

5. Our conceptual process traditions will be the most sustaining or enduring approach to solving problems. Our affection for specific skills associated with hardware technologies may well be harmful, as it has been in the past [Bratton].

If we take seriously the current and projected demographics of our field, the only persuasive influence available to us in the future may be in the exporting of our intellectual tools. With the exception of developing significant model sites, no other organizational avenue seems open to us. Our academic traditions could be subsumed by other fields, our professional niches could be restructured by more powerful organizational elements, we could become indistinguishable as we are merged with other professions, e.g., librarians and computer applications specialists. One positive future scenario would be the distillation of our intellectual tools and their careful dissemination across the various educational organizations open to us. Reigeluth's (1988) notion of influencing textbook design is one example. Also, current extrapolations about distilling our intellectual processes in expert systems are plausible positive scenarios.

Analysis of Personnel Predictions

The personnel issues in organizational analysis focus on the appropriate matching of competence to work roles. Changes in our environment, predominant value systems, methods, and structures will all have a profound effect on both competency and situational variables. Our futurists' predictions relative to personnel may be the most speculative of all. In paraphrasing the wide variety of authors' predictions, the following seem most salient:

1. The challenge of leadership may be the most serious test for our field. Given the observations about our structures and our demographics, the litmus test of our future may be in the emergence of leaders who aspire to broader responsibilities and influence in the organizations we inhabit.

2. Our professionals will likely continue to be sought after in training and development posts in business and industry.

3. The schools will not provide satisfying professional roles for our technologists [Bowie's observations excepted].

4. Higher education will continue to decline as a prime setting for our professionals.

5. The traditional media production role of our field may be subsumed by other fields, e.g., telecommunications and commercial art.

6. Process/consultant roles will expand and sustain our field.

There is an interesting professional arget abroad in our field concerning our future (Beckwith, 1988). This process of predicting the future certainly has complex psychological overtones. As a species, we seem to accept more credit for the sweep of human events than we apparently merit. Perhaps this is a natural, psychologically necessary process to maintain our sense of self, but I wonder whether the art of futurism is a quirk of human nature for post hoc rationalization. The apparent contradiction in terms could be explained by the following: We only have...
the past and present to examine. We have a marvelous creative capability of playing infinite patterns and themes on the past and present. The only difference with scholars is that they speculate with formal rules and specialized terminology. We typically play the most favorable, optimistic, or self-serving themes. This process is predominantly one of managing fear rather than self-aggrandizement. We project our future in the least threatening manner and build our "reconstructions" of the past to avoid past failures.

As a profession, we have lost our unique role in schools, we are under continuing stress in higher education, we are finding considerable opportunity in training and development organizations, and we seem to have constructed a moral historic interpretation (Heinich, 1984) in which our successes, but mostly our "failures," can be attributed to our individual and professional actions (Reiser).

We may have inadvertently killed off the artists in our academic organizations because they didn't fit into our social science mold.

We may be taking ourselves altogether too seriously. Much of our history may be a product of unrecognized organizational determinism (Bowie). We may not be departing from a position of truth or right when we speak about our intellectual traditions (Heinich, 1984). We may have inadvertently killed off the artists in our academic organizations because they didn't fit into our social science mold (Bratton). We may be succeeding in training and development because the environment is more chaotic (Knirck). Perhaps our opportunism happens to be matched to the environment. We are probably a very small segment of an extremely large, complex, and anarchical training mechanism in business and industry. We may not be influencing major trends at all. We may be nothing more than flotsam and jetsam in the intellectual history of training. There may be more merit in capitalizing on major trends than in imagining that we will singly or collectively influence those trends as a profession. The act of predicting the future may first and foremost be a process of defining goals that are remotely manageable. Given there is some merit in this hyperbole, the personnel predictions, stated as remotely manageable goals, would be:

1. To attempt to influence powerful personnel who have a chance to influence the schools, e.g., curriculum leaders or textbook publishers.
2. To address the rise and fall of personnel in higher education as an economic and political issue rather than an issue of personnel worth or morality.

Summary and Conclusion

Reanalyzing future scenarios from an organizational perspective introduces a provocative bias into the discussion. At some level, the perspective shifts from philosophic and psychological issues to sociological ones. This isn't entirely true, of course, but there seems to be an interpretable pattern. The future of educational technology becomes delimited by environmental issues that determine the future of the organizations in which we reside. Schools, higher education, training and development units within organizations, and business, industrial, and various other organizations will undergo quite different economic, demographic, political, technical, and social stress in the next twenty years. Our future as a profession may be most dependent on defining trends at that level of analysis rather than at the level of our professional practice.

With considerably fewer degrees of freedom, we can predict and perhaps manage our futures in the organizational settings. Since we are seldom primary in defining the most basic goals or purposes of the organizations in which we reside, I have argued that our values and world view will often be dominated by the basic purposes of the organizations which we inhabit. Despite our rhetoric, we have not added our agenda to the fundamental purposes of many of those organizations. We are a part of the instrumental rather than the primary or substantive goal-setting processes.

The implication of this is that our vision of the future may be quite unrealistic or poorly matched to future trends well beyond our influence. Although it is axiomatic that idealism is a desirable trait in our culture, one wonders if the old joke about the gnat crawling up the leg of an elephant for purposes of sexual gratification has relevance here. Our professional success may be less a function of manipulating the future than of anticipating and opportunistically reacting to it.

The structures we inhabit are uniformly of middle to low status in our organizational settings. We are often well outside of the powerful inner circle.
...our vision of the future may be quite unrealistic or poorly matched to future trends....

of decision makers. This observation is one of utility rather than value or pessimism. As our tools, techniques, and technologies become more expensive and more central to our organizations, our organizational status may improve. However, these will be the times in which other larger and more powerful structures may attempt to subsume us or merge with us as a natural exercise of power and continuity. This is a plausible interpretation of what happened in the schools with media specialists and librarians. We are not a large demographic subset of most structures we inhabit, and there are predictable, normative consequences that flow from this fact.

Our methods, tools, and philosophy may be potent enough to export and thereby influence much larger educational structures. The new tools of expert systems analysis and the natural advantage of our technological approach may offer us a wider influence than our size would first indicate. Issues of uniqueness, competing sources of knowledge, and control of the organizational environment through certification processes would come to bear on this potential influence. We can optimistically project influence in this vein. The test is whether significant talent in our profession will be focused on such an agenda.

For many of our professionals, current personnel issues seem to revolve around who is in or out of the circle of educational technologists. Larry Lipsitz (1988) recently spoke to a national meeting arguing that the "field" defined by those active and publishing may no longer be definable by certification, training programs, or degrees. He was unable to define leaders by these conventional means. I have argued that future personnel issues may require far more flexible and dynamic alliances between and among "technologists," professionals, and educational leaders. We run the risk of losing our identity, but we are in the midst of a fast and curious process and may have no other choice but to build our future on influence rather than direct participation and control.

In closing, I would assert that the process of "predicting" our future is a valuable, provocative form of scholarship that is essential to our growth and development as a field. Bowie, Bratton, Kruck, and Reiser are to be commended for their efforts. We must take the intellectual risk of building future scenarios if we are to grow and develop as a profession. To ignore this form of scholarship is to concede our future to random and systematic variables we neither understand nor have attempted to anticipate or modify. I hope this special issue will elicit further dialogue and scholarship.

References


Educational change does not occur overnight, but the introduction of information technology will initiate a chain reaction of changes in the curriculum, instruction, and organization of education. Research on the process of change both identifies factors involved in the introduction of innovations and suggests guidelines for educators. Two phases in the pursuit of change can be defined: (1) developing readiness in the educational system by teaching about the technology and redefining the educational problems amenable to technological handling; and (2) experimenting and exploring the solutions offered by technology to central problems in education, followed by diffusion and implementation.

Teachers and curriculum decision makers and developers must be prepared to cope with the transition from a rigid format to a flexible one. Changes in instruction would enable increased productivity of learning, mainly through individualizing, i.e., adapting the instructional process to learner variables through automated diagnosis, advanced computer managed instruction, or the development of individualized instruction systems. Organizational changes resulting from the availability of information technology may include the home as an alternative site for learning, special interest study groups, and educational networks. Such changes should be approached with careful planning in order to minimize the social cost of hasty changes based on unrealistic expectations and beliefs.—Microfiche $2.50, paper copy $1.94, plus shipping, as document ED 290 456.


An introductory computer literacy curriculum for teachers and administrators developed by the Science Teaching Centre of the Department of Education at Tel Aviv University covered four major topics: (1) The Information Society; (2) Computer Aided Learning; (3) Computer Languages and Education; and (4) Implementation of Computers in Schools—A Practical View. The final section of the unit provided a summary and discussion of the material covered. The 60-hour course consisted primarily of lectures, although 12 hours were devoted to hands-on interaction with an Apple II+ microcomputer.

The syllabus and learning materials were first tried in an experimental full-credit academic course during the academic year 1981/1982. Based on an evaluation of the course, the curriculum was revised in two versions, one for teachers and the other for educational decision makers. The following year the revised versions were tried out as an academic course with 40 students, and as an intensive extracurricular course for major decision makers in the Israeli education system with 50 participants.

Evaluations showed both an increased interest on the part of the participants in computer technology, and a more realistic appreciation and critical judgment on their part of the process of implementing computers in education. A 14-item bibliography is provided.—Microfiche $2.50, paper copy $1.94, plus shipping, as document ED 290 454.


Based on the premise that the production strategy and the production approach have a strong impact on quality courseware development, a survey was conducted in 1987 to evaluate the development processes used for computer-assisted instruction curriculum materials. Questionnaires were sent to 64 institutions of higher education in England, the Federal Republic of Germany, the Netherlands, Switzerland, and the United States. There was a response rate of 50% for nonprofit in-
Analyses of the data indicated that: (1) most of the respondents include concepts, ideas, and procedures of instructional (system) design in courseware development, but the procedures used have little in common; (2) most of the respondents utilize a team strategy for courseware development; (3) the respondents identified software engineering, the consideration of instructional and/or pedagogic concepts and ideas, and the production strategy as options that may discriminate between good and bad courseware; (4) the cyclic, iterative team strategy is regarded as appropriate by the respondents, most of whom reported no experience with other production systems; (5) respondents considered PASCAL, C, BASIC, machine/assembly language, and Logo to be the most important all-purpose languages for courseware development; (6) review and evaluation forms are the most important methods used by the respondents to determine software quality; and (7) the most important areas of software use after the natural sciences are economics and languages. The data are presented in 31 tables, and five references are provided.—Microfiche 82¢, paper copy $3.88, plus shipping, as document ED 288 511.


This paper describes a Prolog execution model which serves as the uniform basis of textbook material, video-based teaching material, and an advanced graphical user interface for Prolog programmers. The model, based upon an augmented and/or tree representation of Prolog programs, uses an enriched "status box" in place of the traditional and/or tree node to show precise details of clause head/body processing and to deal correctly with the "cut." The purpose of this integrated environment is to address two hitherto unreconciled goals: (1) to provide a clear and consistent model of Prolog program execution for novices that can be used for teaching, exercises, and self-paced study; and (2) to provide an advanced graphical interface for logic programming that is usable by Prolog experts in real-world application domains, and that provides no conceptual change from (1).

The end result comprises a textbook/workbook combination which enables students to work through paper-and-pencil execution snapshots; video animation sequences showing detailed run-throughs of moderately complex Prolog programs; and a working graphical tracer/debugger currently running on Apollo workstations. Seventeen references are listed.—Microfiche 82¢, paper copy $1.94, plus shipping, as document ED 288 505.


Four case studies in varying stages of completion are currently being conducted in the Department of Vocational and Technical Education at the University of Minnesota using live, two-way television to link multiple sites for interactive television classes. Two of the four classes, which are offered via closed-circuit television, are vocational education class and a foreign language class at the secondary level; the other two are a professional education class for parent educators and a food preservation class for extension homemakers. Videotapes of class sessions and interviews with teachers and learners have been used to collect the data, which are being analyzed using ethnographic procedures.

Two findings from the studies illustrate what is being learned about teaching and learning in this context: (1) the interactive television technology did not appear to be a significant intrusion on the flow of lessons; and (2) there was much less interaction between the students and the teachers in several remote sites with small numbers of students. Based on these four studies, planners have more insight into the number of sites that might be linked together effectively; the responsiveness of adults and adolescents to the system; and the support that teachers need to succeed in this context.

Teachers using the system can reflect on patterns of classroom interaction and technology usage in the four courses studied, and adapt the teaching strategies they use in a traditional classroom to this new medium.—Microfiche 82¢, paper copy $1.94, plus shipping, as document ED 288 503.


Following a summary and critique of the research on the use of computers in education to develop higher-order thinking skills, this paper advances eight hypotheses regarding the failure of research to confirm expected positive effects, and makes two major claims. The hypotheses are as follows: (1) a cognitive chain of consequences of programming instruction exists, and students are not progressing to the end of the chain; (2) applications represent a more likely area than programming for the desired cognitive outcomes; (3) research on cognitive outcomes of programming has been poorly conceptualized; (4) such research has been unsophisticated and done at the wrong age level; (5) the anticipation of cognitive benefits constitutes a resurrection of the discredited concept of mental discipline; (6) problem-solving, higher-order thinking, and other goals of programming instruction are discontinuous with the regular curriculum; (7) problem-solving and higher-order thinking may be domain-specific; and (8) failure to find the desired effects of programming has been due to a lack of curricular sophistication, and objectives related to such outcomes have not been inherent in experimental treatments.

The first major claim is that the principal weakness of research on the cognitive consequences of programming instruction very likely has been its inadequate consideration of curriculum issues. The second claim is that a relatively new declarative programming language, Prolog, which is radically different from procedural languages like BASIC and Logo, merits serious consideration for educational use. A brief introduction to Prolog concludes.
the paper. A list of 44 references is included.—Microfiche 82g, paper copy $3.88, plus shipping, as document ED 286 463.


The overview of distance education in the present and future begins by defining the concept of home study and briefly tracing its history from the 19th century to the present. Several distance education institutions around the world are mentioned, including Great Britain’s Open University. In the United States, the work of the Annenberg/Corporation for Public Broadcasting project and the growth of networks and consortia of institutions for delivering distance education are identified as important recent developments. The impact of new technologies and the growing need for lifelong education are noted, and it is suggested that home study programs at the local, state, and national levels will develop in response to changing needs.

Characteristics of the media available for distance education and ways in which they can be used are outlined; however, it is predicted that the printed word—the study guide and correspondence assignment—will remain the most important medium for home study. Elements of good design for course and printed materials are discussed in the contexts of structure, self-sufficiency, “personality” (the ability to give students a sense of excitement), and the provision of space for students to explore more widely outside the course and to use their own experience. The provision of support and counseling services for distance learners is also considered. A review of the current state of research in the field together with educational and research goals for the future concludes the paper.—Microfiche 82g, paper copy $1.94, plus shipping, as document ED 285 567.


Three major themes distilled from a review and analysis of research on learning from interactive video are discussed in this paper: (1) interactive video as an instructional delivery system, including research on instructional effectiveness, cost effectiveness, and instructor/learner attitudes; (2) principles of learning applied to interactive video; and (3) the limitations of current studies. A proposed agenda for further research includes codifying the attributes of interactive video, examining research on other media, and investigating the instructional environment. It is recommended that researchers focus on generalizable results and extend the role of formative evaluation in order to make future research activities more useful and efficient. A 35-item bibliography is included.—Microfiche 82g, paper copy $1.94, plus shipping, as document ED 285 530.


The third of four symposium papers argues that, if instructional methods are to improve learning, they must have two aspects: a direct trace to a specific learning process, and empirical support that demonstrates their significance. Focusing on the tracing process, the paper presents an information processing model of learning that can be used by educators to determine whether specific computer-based media variables and methods may improve learning. Six basic educational components necessary to trace media variables to learning processes are then discussed: (1) learning processes, specifically the long-term memory systems of storage and retrieval; (2) learning objectives; (3) the knowledge base of information to be learned; (4) instructional variables, or the means of instruction by which information is communicated to the student; (5) instructional strategies; and (6) computer-based enhancements.

Instructional strategies for improving the learning of declarative knowledge (knowing what), procedural knowledge (knowing how), conceptual knowledge (knowing when and why), differentiation, integration, and creation are also considered, including such computer-based enhancements as drill and practice, intelligent instructional systems, and problem-oriented simulations. In conclusion, it is noted that additional basic research in instructional technology is needed to
provide support for understanding the role of media in improving learning. A 29-item bibliography is included.—Microfiche 82t, paper copy $1.94, plus shipping, as document ED 285 522.


The series of videodisc-based mathematics products have been developed by the cooperative effort of the University of Oregon, Utah State University, and various school districts. The products were designed to: (1) achieve educationally significant changes in student achievement and attitudes; (2) be consistent with group and individual classroom management practices most commonly used by effective public school teachers; (3) capture and model curriculum-specific practices identified in the research literature on effective teaching; (4) require modest investments in staff development and supervision for effective implementation and maintenance; and (5) be consistent with school budgets.

During formative development, prototype versions of the product were field tested and revised until predetermined standards of student mastery were met. The product was then exposed to challenging instructional settings for stress testing. During the independent regional implementations and evaluation phase, school districts in different geographical areas reviewed, implemented, and evaluated product effectiveness. Comparative field test results and the rationale for the instructional design and use of videodisc technology are included in this report. The appendix describes different types of instructional videodisc programs in relation to needs and resources of public schools.—Microfiche 82t, paper copy $3.88, plus shipping, as document ED 283 503.


Cambre provides a thoughtful response to the charge that instructional television (ITV) is a "failed medium" as she assesses the current status of instructional television (ITV), how it developed, and its potential for the future. Topics addressed include the different roles that have been assigned to ITV; its use as reflected by national surveys; the findings of basic and formative research as well as impact studies; and issues identified by the ITV Futures Planning Group in 1985. Available from ERIC/IR. 030 Huntington Hall, Syracuse University, Syracuse, NY 13244-2340 as document IR-73 ($6.50 each copy, plus $1.50 shipping). Document not available from EDRS.