INSTRUCTION & PROFESSIONAL DEVELOPMENT

NATIONAL EDUCATION ASSOCIATION • 1201 16th St., N.W., Washington, D C 20036 • (202) 822-7350

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TERRY HERNDON, Executive Director

March 8, 1982

The Honorable Donald J. Senese
Assistant Secretary
Educational Research and Improvement
U.S. Department of Education
400 Maryland Avenue, S.W.
Washington, D.C. 20202

Dear Don:

Your technology and education meeting on January 31 was a well-planned, useful, open, and much appreciated exchange of views. Good show.

I was doubly pleased. First, that you invited my employer. And second, that I had the good fortune to represent at your meeting the world's largest, independent, professional union. Also, of course, it was good to meet you and to learn something about your plans in the area of technology and education.

Sorry this has taken me so long, but during our visit last January, I did promise to send you the enclosed documents: an NEA policy paper developed last year by our Special Committee on Instructional Technology, and a reprint of Sharon Robinson's "Teachers and Computers."

Finally, Don, as you and your associates make plans for your national conference here this summer on technology and education, I hope you will include some of the concerns of classroom teachers, many of which were put on the record during your January 21 meeting. As a matter of fact, I would like to suggest that you consider NEA's Sharon Robinson as a speaker or panel member at your conference this summer. She is very good, and I'll be happy to send you some of her more recent statements on technology if you'd like to have them.

With thanks and all good wishes.

Your very truly,

Robert C. Snider
Professional Development Specialist

RCS:lr

enc.

NEA Special Committee

on

Instructional Technology

REPORT

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Special Committee on Instructional Technology

COMMITTEE MEMBERS

Rosetta Johnson-Taylor, *chairperson*
Classroom teacher (elementary)
247 Garden Street, Apt. 2
Cambridge, Massachusetts 02138

Roberta O. Anderson
Classroom teacher (elementary)
953 North 900 East
Provo, Utah 84601

Kathee Dill
Classroom teacher (elementary)
Box 423
Sitka, Alaska 99835

Anita Foster
Classroom teacher (elementary)
306 North Tennessee
Crossett, Arkansas 71635

Mary Lou Grabowske
Classroom teacher (elementary)
621 Belma
Corpus Christi, Texas 78418

Joan King
Classroom teacher (elementary)
1414 Margate Avenue
Orlando, Florida 32803

Louise Kutz
Classroom teacher (secondary)
P.O. Box 241
Stillwater, Minnesota 55082

Don Morrison
Classroom teacher (secondary)
8622 Frazier Drive
San Diego, California 92119

John Tzeng
Classroom teacher (higher education)
416 Boston Avenue
Takoma Park, Maryland 20012

Staff Liaison
Sharon Robinson

SUMMARY

The Special Committee on Instructional Technology was asked to respond to the following charge, which originated in new business item Instructional Technology (1980-61):

To investigate the impact of recent advances in instructional technology and to make recommendations, if appropriate, to assist teachers in the use of such technology.

After study the committee made the following recommendations:

1. That NEA gather quantitative and qualitative information, on a systematic and continuing basis, concerning the uses of new technology for instruction and its various effects. This activity should involve as sources all segments of the teaching profession as well as appropriate sectors of business, industry, government, and the research community. This activity should be concerned with answers to such questions as—
   a. How much and what kinds of new technology are being used in schools?
   b. What are the effects of this use on teachers, students, and everyone else involved with it?
   c. What contract language is now being negotiated between teacher associations and school boards as a result of such new developments?
   d. What federal and state legislative activity is related to instructional technology?
   e. What are the significant research and development activities in this area?
2. That NEA and its affiliates, using its internal and external communications capacity, begin a continuing "technology awareness campaign" to inform its leadership, staff, members, and the public about the complex issues of technology and instruction.
3. That NEA establish advisory mechanisms with industry that will ensure better communication between teachers and vendors, and at the same time develop procedures to ensure a high, uniform quality of the new kinds of hardware and software that are replacing more traditional instructional materials. Such action is essential since industry has a unique and powerful influence on the introduction and use of new technology in education.

INTRODUCTION

NEA has long been concerned with the implications of technological development for education. In resolution B-1, Improvement of Instruction, the Association recommends—

> . . . that professional educators enter into active collaboration with research and development specialists, both in regional educational laboratories and in industry, to promote technology's potential contribution to education by guiding the development of technology in the most educationally sound directions . . . .

The Special Committee on Instructional Technology was appointed and presented with the following charge in response to new business item Instructional Technology (1980-61):

> To investigate the impact of recent advances in instructional technology and to make recommendations, if appropriate, to assist teachers in the use of such technology.

The committee held three meetings at NEA Headquarters in Washington, D.C., in January, February, and March. The committee also made school visits in February in Baltimore and Annapolis, Maryland.

ACTIVITIES AND CONCERNS

The committee gathered a large amount of information, some opinions, and a great deal of speculation from individuals and organizations concerning instructional technology and its future in schools. The committee met with officials from industry, the U.S. Department of Education, and the teaching profession.

Individual committee members gathered data and sampled opinion about various aspects of instructional technology in their school districts, in the communities where they teach, and in their states. In some instances, committee members have begun work with their local and state associations to gather more systematically information about new technology in schools and its effects on teachers. This has already produced some useful data. In Utah, for example, 38 of the 40 public school districts have responded to such a committee survey, and results indicate that about 35 percent of the schools (159 schools from a total of 456 reporting) are now using microcomputers in the classroom. This use is about equally divided between elementary and secondary schools.

The committee has requested and received reports, background papers, and other documentation on many aspects of instructional technology. Such material has included a detailed report on the National Conference on Technology and Education, sponsored by 15 education groups and held in Washington, D.C., in January 1981. Another such report dealt with the U.S. Department of Education's Task Force on Learning and Electronic Technology. NEA's Government Relations unit supplied information on recent congressional activity related to instructional technology and the continuing work in this area of the Congressional Office of Technology Assessment. The committee also received information from regional and state sources.

NEA's Continuing Involvement with Instructional Technology

The work of the Special Committee on Instructional Technology represents the most recent chapter in the Association's long and significant involvement with instructional technology. In 1950, for example, the NEA was a founding member of what is now the Joint Council on Educational Telecommunications. The Association at that time played a very substantial role in persuading the Federal Communications Commission to reserve channels of the broadcast spectrum for the exclusive use of educational and noncommercial television.

The NEA Project on the Educational Implications of Automation was begun in 1960 with an unrestricted grant from IBM. Although the project report, *Automation and the Challenge to Education* (NEA, 1962, 190 pp.), did not deal with the idea of automating instruction, it attempted to define the role of teachers and their responsibilities "in helping to close the gap between scientific progress and social adjustment . . . to help society adjust to these changes." This need remains today, and it has been compounded by more recent technological developments which now make it possible for students to bring their own microcomputers to school.

Perhaps the most perceptive point made 19 years ago in this NEA report anticipates a major Association policy today: the urgent need for unrestricted federal support of one-third the cost of public education. The report describes the 1960 tax base for educational support as "badly outdated," and calls for "more direct federal assistance." The principal effect of such federal support, continues the report, "could well be higher and more uniform academic standards throughout the nation."

Today the increasingly disparate abilities of school districts to support realistically the educational requirements of all youth are in themselves artifacts of a technological society. This uneven and unfortunate state of affairs adds another dimension of support for present NEA policy to equalize the educational opportunity. Technology, for better or worse, has a major role in this effort; it is a part of the problem and a part of the solution.

Over the years, NEA involvement with new technology has been reactive and adaptive. Historically, this has been necessary since almost no technology, as such, has yet been designed specifically and primarily for school use. As a result, Association programs and

policies in this area have been largely concerned with technology transfer. In this process the NEA has anticipated, and called attention to, the positive and the negative results of new technology in the teaching process.

NEA leadership in copyright law revision goes back to the mid-1960s and is an example of a significant Association policy dictated by technological change. Copyright revision has enormous implications for classroom instruction and is a direct result of new communication technology in electronic recording and xerography. Another example of technology transfer for instruction can be seen in NEA's pioneer work with the National Aeronautics and Space Administration to explore educational applications of satellite communication.

The Instructional Technology Committee's brief analysis of NEA's substantial involvement over the past 30 years with a range of technology-related policy issues has given committee members a fuller understanding of the implications of their assignment. This, together with committee deliberations about the present state and future prospects of technological change in education, has convinced the committee of a growing need for the united teaching profession to continue its alert and active stance in relation to such changes and their implications for everyone concerned with education.

The recommendations of the Committee on Instructional Technology, which appear at the end of this report, are based on the considered conclusions of this committee:

1. That the NEA continue its enlightened and progressive approach to emerging relationships between new technology and human behavior
2. That the NEA monitor, evaluate, and publicize significant applications of new technology for instructional purposes
3. That only in this climate can teachers be arbiters of educational excellence within a developing technology of instruction.

What Is Instructional Technology?

Most definitions of technology go something like this: "The science of application of knowledge to a practical purpose: applied science." The college edition of the *Random House Dictionary* uses "education" as an example (i.e., "Technology: The application of knowledge for practical ends, as in a particular field: educational technology").

"It would be unintelligible if technology were defined as no more than hardware," according to Emmanuel G. Mesthene, who directed the Harvard University Program on Technology and Society a decade ago. In his book, *Technological Change* (Harvard, 1970), Mesthene considered the problem of definition:

> We have found it more useful to define technology as tools in a general sense, including machines, but also including such intellectual tools as computer languages and contemporary analytic and mathematical techniques. That is, we define technology as the organization of knowledge for the achievement of practical purposes. It is in this broader meaning that we can best see the extent and variety of the effects of technology on our *institutions* and *values*. (Emphasis added)

Instructional technology, as such, has been studied *ad nauseam* during the past 20 years. One major study—major in that it took a year and cost $500,000—was supported and published by the Committee on Education and Labor of the U.S. House of Representatives. It was called *To Improve Learning: A Report to the President and the Congress of the United States by the Commission on Instructional Technology* (March 1970, 124 pp.). The most useful part of this report today may be its definition of instructional technology:

> It [instructional technology] is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication, and employing a combination of human and nonhuman resources to bring about more effective instruction. . . . In this sense, instructional technology is more than the sum of its parts.

This commission, chaired by Sterling McMurrin, a former U.S. commissioner of education, also cautioned against equating technology with machines, since machines are only one element in technology. For example, the commission report states—

> Many observers believe, for instance, that fascination with the gadgetry of instructional television to the exclusion of the idea behind it has often led to stereotyped and impoverished uses of the medium.

Today, the term *instructional technology* is usually a misnomer in that it is seldom used in the sense of a total system but simply as a newer phrase to replace such older terms as *audiovisual aids*, *educational media*, *instructional communications*, and *learning resources*. Even today, as new hardware is developed and sold to schools, it is usually called "a new technology" despite the fact that is is most often patched onto the old "nonsystem"—like lantern slides and movies as aids and supplements to the classroom teacher.

It is the opinion of the Committee on Instructional Technology that this "supplementary" use of instructional technology today is very much as it was described 10 years ago by the McMurrin Commission:

> Instructional technology is today largely supplementary to the two primary media of instruction: the textbook and the teacher. Eliminate either of these and the educational system would be transformed. Eliminate all of the technology, and education would go on with hardly a missed lesson.

No matter how it may eventually be described, instructional technology now seems to involve three rather separate but interdependent kinds of activity:

1. The adaptation and use of new technology as an integral part of the process of instruction
2. Changing the curriculum to include the role of technology in today's world, i.e., technology as a subject of study
3. Anticipating, planning for, and changing the role of teachers in the instructional process as a result of such technology transfer.

The quality of definition depends on an understanding of what is to be defined. It is a conclusion of the committee that the idea of a technology of instruction has yet to become operational in a full and practical sense.

At the same time, however, the committee is convinced that the current impact of new technology *on* instruction gives increased impetus to the prospect of a full-blown, universal system of instructional technology. *The role and influence of teachers in shaping the future of education in a technological society will depend on the ability of the teaching profession to anticipate, plan for, and give direction to such change.* The recommendations of the Committee on Instructional Technology are based on this assumption.

Teachers and Technology

If the problems of new technology were limited to understanding and learning the operation of machines, there would be no need for this committee and its recommendations. Were this the case, the potential of technology in education would be barren, indeed, and teachers would increasingly leave the profession or abandon hope and resign themselves to becoming subhuman cogs in a mechanistic system of instruction. Nothing, of course, could be further from the humanistic traditions of the teaching profession.

In its coming involvement with a technology of instruction, the profession will be faced once again with the challenge of leadership—by example and by effective communication—the challenge of convincing the public that education is much more than treating students like so many Pavlovian dogs, to be conditioned and programmed into docile acceptance of a do-it-yourself blueprint of the Good Life.

The problems associated with technology, in the final analysis, are problems of freedom and control. Whose freedom? Whose control? As a result of its study, the committee urges the Association to view the problems and promises of instructional technology not as a single issue but rather as a broad continuum of issues affecting all aspects of education and teaching—from purposes to products, from political pragmatism to professional practice. Most problems produced by technology have to do with the human use of human beings. In his book, *The Illusion of Technique: A Search for Meaning in a Technological Civilization* (Doubleday, 1978), William Barrett observes that—

> Human creativity exceeds the mechanisms it invents, and is required even for their intelligent direction. . . . If we try to flee from our human condition into the computer we only meet ourselves there.

The Committee on Instructional Technology has tentatively identified many areas of interest and concern for classroom teachers. Here are some examples from the committee records:

1. Many school administrators still use the old palaver about the classroom being a "labor-intensive, cottage industry" and still talk without end about "cost-effectiveness" in education. Some consultants, however, have sounded a more logical note by pointing out that there is really no rational way of assigning cost-effectiveness to learning gains. What, for example, is a two-month gain in fifth-grade reading worth? Until such questions can be answered, there may be little point in imposing a "factory-production" model on the school via new technology.
2. The image of classroom teachers in relation to technology seems now to be much more positive than in past years, and even superintendents are now talking in public about the need for major continuing education activities for teachers in relation to computers and other aspects of new technology.
   a. All faculty contracts at Oral Roberts University require that teachers be willing to "learn about" and "use educational technology."
   b. One national authority has reported that teachers who know how to use computers in the classroom are in great demand. "Do everything you can to keep them on your staff," he observed. "Treat them very nicely."
3. In terms of equalizing educational opportunity, the gains of the past 15 years may be wiped out in 2 or 3 years by the present uneven use of microcomputers for instruction, largely in selected and privileged schools. The committee has also noted that a growing number of more affluent students (in secondary and elementary schools) have their own microcomputers at home.
4. Another point of view about the use of computers in the classroom has to do with the management of

instruction, handling student records and progress reports. One consultant described this as the most important computer use since it can "instantly format the kinds of current information teachers need about individual students."

5. There seems to be considerable agreement among experts that, as schools make more use of technology, changes will be required in the role of the classroom teacher, including more specialization, perhaps, and certainly more continuing education for teachers. And, finally, there will be more visibility of the professional practice of individual teachers who will increasingly work in teams and consequently be more dependent on everyone involved professionally in a system of shared information and instruction. There are, of course, some negative aspects to this: privacy, for example. This is another reason why such learning systems must be carefully planned and developed with full teacher involvement.

Conditions for Effective Instruction

The National Education Association today continues a long-standing and positive position concerning the use of new communications media for instructional purposes within and beyond the schools. The Association, however, cautions against confusing new media with the much more complex concept of a technology of instruction. The Association, therefore, is committed to the proposition that instructional technology in schools can only become effective, universal, and generally sanctioned when the following conditions are met:

1. The Association encourages properly controlled research and the empirical development of all aspects of a new technology of instruction before its widespread use in schools. School children and their teachers must not serve American industry as guinea pigs.

2. It is essential that classroom teachers in each school district through their local association be involved in the initial planning, introduction, and use of such technology in their schools.

3. All teachers whose professional practice and responsibility will be affected by this new technology must be provided with adequate continuing education.

4. Changes in content and format of instructional materials must be monitored by classroom teachers through their professional educational associations to ensure quality of instruction and curricular coordination.

RECOMMENDATIONS

The Committee on Instructional Technology recommends:

1. That NEA gather quantitative and qualitative information, on a systematic and continuing basis, concerning the uses of new technology for instruction and its various effects. This activity should involve as sources all segments of the teaching profession as well as appropriate sectors of business, industry, government, and the research community. This activity should be concerned with answers to such questions as—
   a. How much and what kind of new technology are being used in schools?
   b. What are the effects of this use on teachers, students, and everyone else involved with it?
   c. What contract language is now being negotiated between teacher associations and school boards as a result of such new developments?
   d. What federal and state legislative activity is related to instructional technology?
   e. What are the significant research and development activities in this area?

2. That NEA and its affiliates, using its internal and external communications capacity, begin a continuing "technology awareness campaign" to inform its leadership, staff, members, and the public about the complex issues of technology and instruction.

3. That NEA establish advisory mechanisms with industry that will ensure better communication between teachers and vendors, and at the same time develop procedures to ensure a high, uniform quality of the new kinds of hardware and software that are replacing more traditional instructional materials. Such action is essential since industry has a unique and powerful influence on the introduction and use of new technology in education.

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TEACHERS AND COMPUTERS[1]

Sharon P. Robinson[2]
National Education Association

It is a genuine pleasure for me to be with you tonight. I hope this occasion will mark the beginning of a closer relationship between our two organizations. The kind of relationship I have in mind might be expressed by some in the bloated language of pedagese, something like this: "A multi-level, mutually meaningful, continuing and viable dialogue based on . . . etc."

But this kind of soft gobbledygook does not express what I have in mind. And I am not prepared to express this idea in the language of "computerese" — but I do understand that computers have given us their own rather specialized "language" problems.

In any event, it seems to me that both of our organizations must share some of the responsibility and guilt for the Tower of Babel now standing between teachers and computers. Misunderstanding is widespread — in some circles — about the role of the teacher and the role of the computer in the process of educating youngsters.

What I do have in mind can be said in plain English: The interests of our two groups converge in the classroom. Both groups want to improve the quality of education. There is a certain amount of misinformation and suspicion within our combined memberships about what each group is up to and why. We should, therefore, take whatever steps are necessary to more fully understand the purposes, policies, and programs of our two associations.

This, of course, will be only a first step in what could become a significant effort to improve the quality of both teaching and learning, while at the same time shaping the future of instructional technology.

The National Education Association now has a committee at work on this problem. Its charge is: "To investigate the impact of recent advances in instructional technology and to make recommendations, if appropriate, to assist teachers in the use of such technology."

If you are troubled by the term "instructional technology," you have a lot of company. The difference between a microcomputer and a technology of instruction may be in the eye of the beholder; *or,* it may be the difference between a Band-Aid and a comprehensive system of health service. But I can assure you that the nine classroom teachers who make up this important NEA group have some of the same concerns you do. Their first report will be issued soon with recommended policy options for the united teaching profession. It is here, it seems to me — in the realm of policy development — that our two organizations can be of considerable help to each other and to the publics we each serve.

My work with this group, which is officially known as the NEA Committee on Instructional Technology, has provided us opportunities to visit classrooms where various computers and other promising bits of instructional technology are in use. It has also made it possible for us to visit with and gather a great deal of information from teachers, industrial leaders, and others in all parts of the country who are involved with and concerned about various aspects of a technology of instruction — including, but not limited to, the computer.

In the middle of all this, I accepted your kind invitation to speak here tonight. As our date drew closer, I began to think about the audience — experts in the development of computer-based instructional systems; and the occasion — a banquet. As I thought about this several weeks ago, I wondered what ADCIS banquets were like. (I can see now that they are no different than NEA banquets.)

One dictionary describes a banquet as "a feast; a sumptuous entertainment of eating and drinking, followed by speeches." And, from my days as an English teacher, I recall something like this about banquet speeches:

> These dinner speeches tire me, they are tedious,
> flat, and stale:
> From a hundred thousand banquet tables comes
> a melancholy wail,
> As a hundred thousand banqueters sit up in fancy dress,
> And salute each mouldy chestnut with a signal of distress.

[1]Remarks made at the Banquet of the Annual Conference of the Association for the Development of Computer-Based Instructional Systems in Atlanta, Georgia, March 4, 1981.

[2]Dr. Robinson is the Director of Instruction and Professional Development, National Education Association. Request for reprints should be addressed to the author at the National Educational Association, Instruction and Professional Development, 1201 16th St., N.W., Washington, D.C. 20036.

Will it be "minimum-competency chestnuts" or will it be "basic skills brandy"? You might prefer something closer to your own field of interest: an "Apple aperitif" or a "digital demitasse."

Perhaps the most ironic (and, at the same time, threatening) phrase in the new vocabulary of the computer classroom is "terminal time." And, for the after-dinner speaker, "terminal time" follows the dessert.

"What," I asked myself, "do after-dinner speakers have in common with the new generation of microprocessors, Apples, Pets, and PLATO's?"

Both can be cost-effective, and both can be readily available for input, output, and interface — on-line and off. Both are often microcosmic symbols of larger and better mainframe constituencies.

Only one, however, can be turned off by pushing a button.

Both are essentially human-dependent . . . although one of us may be more labor-intensive than the other. In each case, excellence of performance is completely dependent on the quality of programming — assuming, of course, that the machine and after-dinner speaker are both operating within the range of normalcy.

Playing with man-machine metaphors has become a literary growth industry. It may also have become an important step toward a better understanding of some of the great social, economic, and political problems now facing all of us. It is here that we find some basic assumptions about the relationship between men and machines; assumptions, incidentally, which, if taken seriously, will force us to probe such fundamentals as the purpose of education, and what it really means to be human in a technological society. Here, for example, are some of these assumptions:

- All machines, from knife to space shuttle, are designed to extend human functions, to enlarge our abilities, and to make it possible for us to do more effectively whatever it is we want to do.
- A second assumption follows naturally. Machines, in this context, have become a substantial answer to the question, "How?" — How can we do this? How can we do that? The answers, of course, are found in our machines. If we can't do something, we build machines that can. In this process, we have been characterized as a "can do" society.

  One difficulty with this assumption is that it neglects the more fundamental question, "Why?" When this question *is* raised, it is often too late. Many people seem intimidated by machines (or, more accurately, by what they may have invested in machines), and the idea of asking "Why?" seems increasingly insubordinate — insubordinate, at least, to what can become a mechanistic authority.

  "Mechanistic authority," unfortunately, has become a management technique in schools and in other essentially human endeavors which today are increasingly organized like machines.
- Another assumption about man-machine relationships goes something like this: It is beneath the dignity of human beings to do whatever can be done better by a machine.

Such assumptions as these, of course, are dangerous generalities. Clearly (or, unclearly), they can quickly lead us into a philosophical thicket of questions about reality, being, and human value. I am reminded of a bit of irreverent, but philosophical, graffiti defacing a university wall in Washington during Inauguration Week. Three lines. Written by three visitors to this essential campus station. The first one wrote:

"To do is to be." Jean-Paul Sartre

A second visitor added:

"To be is to do." John Stuart Mill

And finally, from a music — or political science — major:

"Do-be Do-be Do." Frank Sinatra

Technology puts a premium on what is new, and on better ways of doing just about anything — including some things we've never done before. Although technology has made enormous contributions to our understanding of the past — Carbon 14, for example — technology has a basic affinity for only the future. Usually, it has no time for history.

One example of this may be the current resurrection — after nearly 25 years — of programmed instruction and teaching machines, which today are described — in much less threatening terms — as software, courseware, and hardware. During a recent meeting of the NEA Technology Committee, a top official of a major computer-software company dismissed the work of B. F. Skinner (and the entire operant conditioning movement of the 1950's and '60's) as "nothing more than rote learning." We don't pay any attention to it, he told us.

This know-nothing attitude toward the past — which I'm sure is not typical of your industry's leadership — is illustrated by an apocryphal incident in front of the National Archives Building in Washington. A tourist saw Shakespeare's words carved in marble on the front of the building: "What is past is prologue." The tourist asked his cab driver what it meant. "Well," said the cabbie, "it means you ain't seen anything yet!"

To do is to be.
To be is to do.
Do-be do-be do.

The microprocessor and the after-dinner speaker. Neither of these phenomena would have been possible in an earlier, pre-industrial society of cottage industries. Without a computer-dependent transportation system and a computer-dependent communication system — not to mention computer-dependent credit cards and the hotel industry — our present technology of conferencing could not exist. If this were the case, we would not be gathered here in Atlanta, and we would have no "professional reason" for such a gathering. Technology generates the need for new professions. It seems, also, to increase the need for after-dinner speakers.

As for new professions, the most recent group I know of is the National Association of Videotape Librarians. As far as I know, the floppy disc librarians aren't organized. My favorite acronym is BABEL, a San Francisco group known as the Bay Area Bilingual Education League. The San Francisco subway, as you know, is called BART for Bay Area Rapid Transit, and a friend of mine out there suggests we rename METRO, the Washington subway. He wants us to call it the Washington Area Rapid Transit, WART, since you never know how you catch it, and once you get it, it's hard to get off.

New kinds of human relationships are made possible — sometimes necessary — by technological developments. Technology can also generate completely new industries which in turn develop new markets based on real or artificially stimulated consumer needs. What may be at work here is the Second Law of Technology which is that "when something becomes possible, it then becomes necessary."

When French scientists were asked why in the world *they* had exploded a hydrogen bomb, their reply was simply: "It became possible, and then it became necessary." The triumph of *How?* over *Why?*

All of this may help to explain another tenet of technology which is that technology always becomes irreversible and pervasive once it has been introduced into a society and has shown some promise to serve a real or an imagined human need in that society. In this regard, it may be of some interest to note that the machines (the hardware, if you will) which come to the schools, almost without exception, come from a larger, non-school technology. For purely economic reasons, those who develop, design, and manufacture such things as tape recorders, motion picture projectors, television equipment, and computers must rely on much larger markets than schools alone. Although adaptations are sometimes made for the school market, the original design of such equipment is for other purposes.

Thomas Edison was wrong 70 years ago when he predicted that the primary use of his motion picture equipment would be in schools, and that it would revolutionize education.

Textbooks and other instructional courseware are developed very specifically for the school market. These may be some of the reasons why a systematic technology of instruction has not been developed, and why at the same time, the quality and character and use of instructional materials have remained constant.

I was interested to note a comment in this month's issue of *Creative Computing:* "Good software is expensive; pretty soon they will give you the machine and the equipment but will charge you an 'arm and a leg' for the software."

What will be involved in developing an acceptable technology of instruction, and what can we expect from the classroom teachers of America in this process?

My question assumes — and I think quite correctly — that such a technology will come. Whether it will be a misguided effort to limit the larger humanistic purposes of education, or an enlightened effort to free professional teachers from classroom drudgery, remains to be seen. Right now the more important questions about instructional technology are: Why will it come? What purposes will it serve? How will it change the role of the classroom teacher? How will it come? And, who will control it?

A technology of instruction, in the best sense of what the term suggests, cannot be superimposed onto schools in a helter-skelter, patchwork approach with a computer here and TV sets there; with a wedge of technology further widening the gap between poor schools and affluent schools.

Any technology of instruction worthy of the term will require careful, systematic planning and management. It will force a more careful look at the purposes, priorities, population, and resources of each school. This may put rational limits on public expectations of what can be reasonably accomplished in school. In the process, it may lessen the growing trend of dumping all manner of social problems on the school for solution.

Beyond such curricular additives as metric education, consumer education, drug education, energy education, sex (and sexist) education, bilingual education, human relations education, and education for all handicapped children there is a growing public clamor for schools to get back to the basics. You will note that I have not mentioned the obvious need for teaching computer literacy (to children) at all age levels.

Several years ago, an associate of mine published a paper on all this. It was titled: "Can We Go Back to the Basics in the Mainstream With Career Education for the Handicapped in the Bilingual Classroom?"

Will a technology of instruction solve such problems? The technical answer is very positive; it can be done. The political answer is on hold — probably for the next four years. In the meantime, if tuition tax credits and other proposed approaches to educational vouchers become federal law, then we may have to face up to the demise of our enormously successful experiment with free, universal public education. It would be a dark day for democracy, and for freedom and human dignity.

The educational answer is in our hands; those of us who teach, those of us who work with teachers, those of us who are friends and alumni of public schools. All of us must work together; a united effort to save a democratic educational program that is now the envy of the world. In the process we can make our schools even better. And no doubt, in the years ahead, an emerging technology of instruction will be an important factor in all this.

It is difficult to anticipate the future directions and results of any new technology. Students of the history of technology report that in society after society it has always been impossible to understand technological change while it is taking place. There is also general agreement that every new technology will produce both positive and negative results, which in most cases are not anticipated by those who develop the technology. Edison's plan for revolutionizing education with his movies comes to mind.

The cost-effective instructional uses of micros in schools and at home are well-known to everyone here. Other technical developments just around the corner may soon bring about even greater potentials for changes in schools. For example, custom printing on demand of books — any book or any document — in schools may not be far off, according to a piece last month in *Publisher's Weekly*. One copy, five copies, one hundred copies, the cost will be constant and prices for this so-called nonimpact printing are now reported as substantially below the cost of comparable trade books.

Enough futurism. As the futurists like to say: "The scenery changes — but only for the lead dog."

Within the next few weeks, as I mentioned earlier, the NEA Technology Committee will write its first report. This will be the most recent chapter in the NEA's long and significant involvement with instructional technology. In 1950 we were a founding member of what is now the Joint Council on Educational Telecommunications. At that time we played a very substantial role in working with the Federal Communications Commission to reserve sectors of the broadcast spectrum for exclusive use of educational and non-commercial television.

Later, in the mid-1960's, the NEA called attention to the need in educational circles for major revision of the copyright law as a result of technological changes in recording and copying techniques. Since then — and as recently as last month — NEA officials have been actively working with other groups to protect the interests of teachers in this important legal field.

Time is short here tonight, but it would be easy to write a large book on the history of the NEA in almost every known aspect of instructional technology. I'll have more to report on this in a few minutes.

For now, let me outline for you some of the more obvious concerns of our Technology Committee. As you might expect, teachers want to be involved early when their school district begins planning in any area of instruction which will ultimately affect their work with students. Related to this, of course, is the matter of in-service, on-the-job training to prepare teachers *before* the new hardware hits the classroom.

Several years ago the U. S. Office of Education supported a major study by the RAND Corporation to discover why the hundreds of millions of dollars worth of educational innovations, funded during the golden days of ESEA in the 1960's, did not produce more substantial results. It is a multi-volume report, but let me simply say that early teacher involvement in planning innovations plus subsequent training for teachers were reported as major positive factors in those schools where the instructional innovations were successful and sustained after the federal funds ran out.

Hundreds of thousands of teachers know this very well. A pity they weren't asked. It might have saved a great deal of money.

Our Committee is also very much interested in the use of computers by teachers for classroom management chores: student records, diagnostic data, progress reports, parent conferences, and the like.

Since most school decisions are taken by administrators and school board members who are not a part of the computer generation, the Committee will recommend that qualified teachers and their local associations take the lead in the education of parents and school officials in computer literacy and (why not?) instructional technology literacy. The time may have arrived when such groups as ours will use the news media for this purpose.

Standards — size, shape, interchangeability, etc. — have always been a problem with new technologies. At the outset, every railroad had its own unique track gauge — a critical factor in several battles during the War Between the States. In educational technology, time and again — with movies, tape recorders, disc recorders — the industry has said: "*Wait.* Premature standardization will stifle creative design." And, time and again, teachers have waited. Today we *may* be

going through a standards hassle again — this time with micro software and courseware industry. I expect that our Committee will eventually speak out on this, but as you know, it is a very complex issue.

An area of great interest to the Committee has to do with reporting the effectiveness of CAI software. In 1966 the NEA published a 35-page report: *Recommendations for Reporting the Effectiveness of Programed Instruction Materials.* It was prepared in cooperation with the American Psychological Association and the American Education Research Association. In its day this document was very popular, and parts of it were widely reprinted in scholarly journals.

History may be the science of what never happens twice; but, on the other hand, the time may have come — once again — when teachers will want to ask vendors: "How good are your programs (i.e., your software)?" And, "May we see your developmental data?" In a technology of instruction, the concept of caveat emptor will be obsolete and intolerable.

Here again, we may have an area of mutual interest where the NEA and ADCIS will find it useful to work together.

I would like to close with another poem. This one I think is some better than the one I gave you earlier. This one, at least, is about computers. It was written by a humanist on our Washington staff. It is called:

The Computer Hour

Between the soft- and the hard-ware,
When the tube is beginning to glower,
Comes a pause in the child's occupations
That is known as the Computer Hour.

I hear from responses before me
The clatter of data displayed,
The sounds of a learning program,
And questions so neatly arrayed.

On my monitor I see from the printout,
Descending with electronic flair,
The responses from Jonathan and Gevry,
And Kirsten with golden hair.

Not a whisper, not even a smile,
Yet I know from the bits and the bytes
That my students are being instructed,
Entranced by the bluish-green lights.

A sudden push from the industry,
A sudden grant in the fall,
By three R's left unguarded
They have entered our study hall.

They climb into the curriculum,
O'er plans, objectives, and goals,
If I try to escape, they surround me,
With carrels, consultants, and polls.

They almost devour me with data,
Hard copy is ever replete,
But it beats chalk dust and dittos,
And the students think that it's neat.

Terminal time in the classroom,
A mix of the good and the bad,
A cost effective bypass,
Of some of the things we've had.

Do you think, O digital banditti,
Because you have scaled the wall,
Such experienced teachers as I am
Are not a match for you all?

- Robert C. Snider, © 1981

A technology of instruction. As we explore the promises and the pitfalls, it may become even more obvious to everyone involved that some very essential things, which can only be done in school, cannot be done by machines. It has been said that man has become the most dangerous animal on the planet, and that civilization has become a race between education and disaster.

It may be a race that education cannot win without technology.

It may also be a race that will not be worth winning without universal human freedom and dignity.