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EDUCATION FOR THE FUTURE: IMPLICATIONS FOR EDUCATIONAL
TECHNOLOGY

The University of Oklahoma   PH.D.   1980

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THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

EDUCATION FOR THE FUTURE:

IMPLICATIONS FOR EDUCATIONAL TECHNOLOGY

A DISSERTATION

SUBMITTED TO THE GRADUATE COLLEGE

in partial fulfillment of the requirements for the
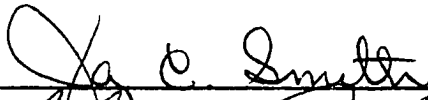
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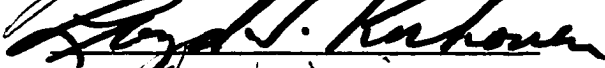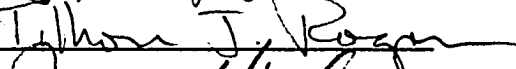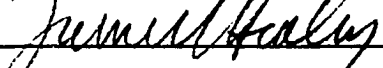
CONNIE GREB DILLON

Norman, Oklahoma

1980

EDUCATION FOR THE FUTURE:

IMPLICATIONS FOR EDUCATIONAL TECHNOLOGY

APPROVED BY

DISSERTATION COMMITTEE

ACKNOWLEDGEMENTS

The writer would like to express her sincere appreciation to Dr. Jay Smith and Dr. John Pulliam for their support and encouragement in the direction of this study.

Appreciation is also expressed to Dr. Tillman Ragan, Dr. James Healey, Dr. Lloyd Korhonen, and Dr. Thomas Wiggins for their valuable suggestions, criticisms, and encouragement throughout the study.

The writer would like to express a personal note of appreciation to her husband, Dave, and her parents Mervin and Wanda Greb for their understanding, patience, support and sacrifice, without which this study could not have been completed.

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CHAPTER I

INTRODUCTION

Preface

The future cannot be forecast but it can be explored.

--E. F. Schumacher, SMALL IS BEAUTIFUL

As the rate of change increases, it becomes important for society's
institutions not only to stay abreast of change, but to keep ahead of
change. Only in this way can individuals exercise any influence in
the direction of their lives.

> It [the future] is at least partly subject to our influence,
> and our interest must therefore focus on "preferable" futures
> as well as those that are "possible" and "probable".
> (Toffler, 1974, p. xxv)

There is, however, doubt concerning the ability of our institutions to
do this. Rather than outpacing change, our institutions seem to lag
behind. This is particularly true of education.

> ...technological and social change is outracing the educa-
> tional system, and that social reality is transforming
> itself more rapidly than our educational images of that
> reality. (Toffler, 1972, p. xxiv)

Education may well hold the key to human survival and human prosperity.

1

Technology is currently blamed for many of the ills which threaten

the human race. It may, however, prove to be an invaluable resource,

if only it is used with caution.

> The primary task of technology, it would seem, is to
> lighten the burden or work that man has to carry in
> order to stay alive and develop his potential.
> (Schumacher, 1973, p. 148)

Educational technology is based on the belief that technology can be

used in the resolution of a variety of instructional problems.

> Educational technology is a field involved in the facili-
> tation of human learning through the systematic identifi-
> cation, development, organization and utilization of a
> full range of resources, and through the management of
> those resources. (Hug, 1978, p. 3)

Background of the Study

Many professionals in our field have written about our place in

the future. Many have given their ideas about what should be done.

However, this author has found no systematic study of the future in

terms of its implications for educational technology. Chapter II

focuses upon three points worthy of consideration. What are the issues

confronting educational technology as it enters adulthood? What are

some of the technological developments which will likely impact educa-

tional technology? And, finally are we willing to consider both the

positive and the negative capabilities of our technological developments?

Mierzwa in his dissertation entitled A Critical Analysis of

Selected Aspects of the Interaction Among Science, Technology and

Society: Implications for Education made this statement:

> Thus given the fact that the schools are increasingly
> being attacked for the supposed failure to provide
> education adequate for coping with certain problems,
> I believe that "radical" critiques of education should
> receive careful attention. For example, the writings

of authors such as Goodman and Illich deserve considera-
tion, since it is possible that to cope with contemporary
and future society, radical departures from existing school
structures and curricular are needed. (1972, p. 129-130)

Though this study does not analyze only the works of the radical cri-

tiques of education, it does analyze those who write about the future.

It does not solely concentrate on those who write specifically about

education, but rather takes a look at what writers from a variety of

areas have to say about education. This study provides a systematic

analysis of what those who study the future believe about the future

and then relates these beliefs to what educational technology is doing

to establish its role in that future.

Statement of the Problem

Are the needs of society as defined by selected futurists being

addressed by the real and ideal values held by educational technology

as defined in the literature?

Significance of the Study

It is important for any field of study to examine what it is doing

and whether it is making a significant contribution to the future of

the society that it serves. Traditional scientific investigation is

an important force in any field of study, but it should not be the

only one, in that it focuses on parts of the whole rather than on the

whole in general. Content analysis is a technique of analysis which

can be used for "describing in systematic form the content of com-

munications." (Selltiz, Wrightsman, and Cook, p. 391).

Content analysis can be used to describe the whole in two ways.

First, it can provide information regarding the direction of a

particular body of research. Only when the direction is known can the appropriateness of that direction be evaluated. Second, content analysis can identify commonalities which may exist among a diverse group of writers. These commonalities, if shared by a variety of people writing from different perspectives might provide a reliable measure of certain trends. This study utilizes both these attributes of content analysis. It gives those in the field of educational technology an overall view of the direction of the research and development activities. It also gives a measure which can be used to evaluate the appropriateness of present research and development, providing a basis on which to suggest alternative lines of research.

This study additionally examines the unique attributes of educational technology which can help achieve the goals described by the futurists. Finally, the study of the works of authors from the fields of economics, science, communications, education and sociology also gives this study an interdisciplinary flavor which is important in a world of increasing complexity and interdependence.

Delimitation of the Study

The needs of society as perceived by selected futurists were defined through a content analysis of a sample of futurist books. Commonalities (or trends) found in the content of these books serve as a reliable measure of what the future may hold, based on the assumption that the authors of these books have undertaken serious study of the future. What the authors have written provides an adequate source for exploring future trends, desirable goals, and the means which can be used to achieve these goals.

The values of educational technology were defined through a content
analysis of the articles published in _Educational Communication and
Technology Journal_ (formerly _AV Communications Review_) and the _Journal
of Instructional Development_ since 1977. These journals are used to
give some insight regarding the values of educational technology since
they are official publications of the Association of Educational
Communications and Technology, the national organization for the
educational technology field. _Educational Communication and Technology
Journal_ provides a sampling of the research while the _Journal of
Instructional Development_ provides a sampling of the development acti-
vities in educational technology. Because the process of choosing
articles to be published in these journals is the result of a deliberate
choice of editorial boards representing educational technology's national
organization, the articles analyzed in this study can be considered repre-
sentatives of the values of educational technology.

The ideal and real values of educational technology were determined
by categorizing the articles published in _Educational Communication
and Technology Journal_ and _Journal of Instructional Development_ into
four categories: those which discuss theory; those which discuss pro-
fessional concerns; those which are empirical studies, and those which
discuss development activities. The theoretical articles and the state
of the art articles are combined to provide a measure of the ideal
values of educational technology. The empirical and development arti-
cles are combined to provide a measure of the real values of educational
technology.

1. Theoretical articles are those which make hypothetical
    or speculative propositions.

2. State of the art are those which discuss professional concerns, the search for identify, professional preparation, history or role in the educational establishment. (Torkelson, 1977, p. 320)

3. Empirical articles are studies which use the scientific method of observation (including reviews of the empirical studies).

4. Development are articles describing applications and include cost/benefit analyses, prescriptions, evaluation techniques and case studies.

CHAPTER II

EDUCATIONAL TECHNOLOGY:

HOW WE GOT HERE AND NOW WHAT?

Introduction

The 1980's hold new horizons for educational technology. Few will
dispute the fact that media and technology have had a tremendous impact
on our society. These same factors have had and will continue to have
an impact on the field of educational technology as well. The purpose
of this chapter is to assess the effects of these technological devel-
opments on this field. First, this review shows evidence of a maturing
educational technology as cited in the recent literature. Second, it
scans some of the new technologies which will be effecting the field.
Finally, it assesses the potential impacts of these new technological
developments.

Educational Technology: A Maturing Profession

Educational technology is a profession approaching maturity. "As
a discipline, educational technology is about to pass from its late
adolescence into early adulthood." (Morgan, 1978, p. 143) A sign of
adulthood is when one begins to seek one's purpose in the world on which
one depends. There are signs that educational technology is at this
point in its development.

The year 1977 marked the 25th anniversary of the publication of
the journal, AV Communications Review. It was decided that a name
change was in order, signaling interest in broadening the scope of the
field. Thus Educational Communication and Technology Journal evolved.
Corresponding this move was the publication of Educational
Communications and Technology: A Definition and Glossary of Terms.
By tracing the development of educational technology, this volume too,
shows signs of a new effort. Emphasis was initially placed on materials
and devises and their attributes. Then came a concern for the entire
communications process and the emphasis shifted from things to processes.

The advent of Skinner's teaching machine and the programmed instruc-
tion movement was accompanied by a concern for the products as well as
the process. Behavioral objectives and criterion-referenced evaluation
sprang from this effort and eventually grew into the systems approach
to learning, with emphasis again placed on the process, but on a larger
scale. Using the systems approach, one must consider the goals of the
supra-system as well as those of the system. As a result educational
technology began to think beyond the goals of the lesson or the course
and in terms of the goals of the school system, the community, and so-
ciety as well. Thus with the introduction of systems thinking, educa-
tional technology began to consider its role in society.

A review of the articles published since the publication of
Educational Communication and Technology Journal also demonstrates a
broadening of our interest to include our place in society. A review
of these articles focused on the following three concerns: first, a
concern about the questions we are asking in our research; second, the

concern about whether we are confusing ends and means; and finally,

the concern about our potential contributions to society.

Sceiford in "Television for Learning: Future Research Opportunities,"

makes this point:

> Decision makers in television and learning often ask the
> wrong questions for the right reasons and vice-versa.
> Research activity as described in previous sections can
> help formulate the right questions for the right reasons.
> (1978, p. 61)

Sceiford lists some of the questions she thinks need to be studied.

These include: right brain development; information coding; the re-

lation of learning, verbal and intellectual skills; motor and cogni-

tive development; attitude and value formation; the effect of television

on imagination and motivation; and the learning capabilities of pre-

school, college and adult students.

Salomon states a similar position with regard to the appropriate-

ness of our questions in "On the Future of Media Research,"

> I see media research in the future focusing more on the
> educational potentialities of the distinguishing qualities
> that cut across media in interaction with personal, social
> and cultural qualities. (1978, p. 45)

He is suggesting that media research encompass the cultural and social

setting as well as the instructional setting.

> It follows that research on media ought to move away from
> the study of media as invariant entities or rigid clusters
> of attributes and closer to the study of how dimensional
> qualities interact with learning. (1978, p. 41)

Some of the areas Salomon believes we need to research are: the cross

cultural component, the effect of the breadth of transmissions, the

amount of interaction, and the qualities that different media and

different cases within a medium may have and in what amount.

Wagner makes this statement regarding film research:

> It is far from certain whether we are even asking the right
> questions, and doubtful if we have yet found the appropriate
> tools and methods with which to get the right answers.
> (1978, p. 66)

Wagner quotes Seldes, who suggested as long ago as 1950 that a vital
concern regarding the nature of research should be its relation to the
public interest.

> The moment we see that our mass media are creative in the
> sense that they influence our thought and feelings, en-
> tirely new questions come up. Have these arts any choice
> as to the kinds of audiences they shall create? Is what
> they are doing now the best they can do? Do they operate
> in the public interest or are they dangerous to the well
> being of our country? Are they in the general framework
> of domestic capitalism? Are they contributing all they
> can to prepare us to make moral and intellectual judge-
> ments which will have to be made in the next generation?
> If they are not, can they change without government inter-
> ference? Or are they condemned by their economic structure
> to keep on creating a larger and larger audience whose
> existence endangers our democratic system? (1978, p. 73)

Wagner suggests that film research should make a comprehensive study of
"the image with its underlying image-making and image-consuming drive"
and its effect on "shaping the mental and physical development of
people all over the world. A crucial issue is the increasing amount
of life space and life time becoming occupied by media." (p. 75)

Of course, adequate research needs adequately trained professionals.
Clark in "Doctoral Research Training in Educational Technology" believes
that we are failing to properly train our professionals for research
and development. He presents evidence that contradicts statements
regarding the value educational technology places on research. He
cites a lack of faculty preparation in teaching and conducting re-
search, failure to keep up with the latest techniques, and failure to

rank the competencies associated with research as high as other competencies.

A related issue in educational technology can be found in the debate over ends and means. Silber makes this statement:

> It seems that educational technology as a profession, as well as many educational technologists, are concerned only with the means of improving education, not with the ends of education. Given the power of educational technology and its impact on education, this is an extremely dangerous position. (1978, p. 179)

Morgan suggests that the fact that we are becoming more concerned with the outcome than the process of education is evidence of maturation. He relates this change to the development of programmed instruction, and a shift in attitudes regarding the learning potential of students. "More educators began to believe that learning conditions could be arranged so that virtually all students could learn." (1978, p. 146)

Grayson fears what may happen in the hands of technology if we overlook the ends of education. In "Education, Technology, and Individual Privacy," he states that extensive personal student data is open to public scrutiny, and he has found that there is no uniformity regarding the use of this data. He fears that teachers and administrators, with the best of intentions may invade the students' right to privacy neglecting "all too often the goals and concerns of the community." (1978, p. 203) He points out that privacy is a constitutional right, but education is not. "Individual privacy must take precedence over effective teaching." (1978, p. 203)

In speaking of technology in general, Teich says of means and ends:

> What, I ask, is the point of making the tools of society
> more and more efficient and increase the material in-
> fluence of society if the ultimate result is not satis-
> faction but alienation of a large segment of the population?
> Is material progress an end in itself, or is it, more
> properly, a means to some higher end? Is the development
> of technology leading toward a more desirable state of
> human affairs, or is it actually producing a decline in
> the quality of life? Is technology a tool that human
> beings are capable of using as they choose, or is it, in
> a basic sense a system gone out of control? (1977, p. x)

The concern with sorting out means and ends and asking more relevant

questions is indeed a sign that educational technology is broadening

its scope. Like an adolescent becoming an adult, educational tech-

nology is seeking its identity in terms of society and is becoming

concerned with its potential contributions to the world in which it

exists.

> The trend of professional concern and activity seems to
> be from a narrow focus on improving the way we teach to
> a wider concern with interventionism in general. We
> are not turning our backs on media, but we are increas-
> ingly moving toward developing better media and methods
> in a context of wanting to improve society. We are
> slowly becoming holistic as well as competent special-
> ist. (Kaufman, 1978, p. 118)

Kaufman suggests that educational technology has indeed matured in

its "search for educational utility." One question we should be

asking ourselves is "to determine what an educational or training

unit 'should' be accomplishing as compared with what 'is' being accom-

plished." (p. 110)

> Is there a direct relation between the goals of an organi-
> zation (or an effort) and the requirements for survival
> and contributions in the world external to the organization.
> (Kaufman 1977, in press)

He goes on to make this important point regarding our role in the

future:

If people believe themselves to be helpless victims
tossed on the stormy seas of fate, they will likely
remain victims. If they believe that positive change
is important and useful, they will become active par-
ticipants in the change process--masters of change,
not victims of it. (1978, p. 117)

Technology in the Making

The second section of this review examines some of the technological
advances which will likely change the face of education and educational
technology in the future.

Referring to the rapid strides being made in technology in our
society, Bransom said this about change and education:

What is not understood is that no amount of creative
sensitive management can save the steam locomotive
industry or the traditional school model--both are
obsolete. (1978, p. 128)

This section, then, will look at some of the technologies discussed in
the literature which may very well make our "traditional school model"
obsolete. Of the many technologies being developed, there are three
major areas which seem to be particularly relevant to educational tech-
nology. These are telecommunications, computer technology, and
genetic research.

Telecommunications

In the past three decades, television has become a pervasive
influence on our lives. The role of television in the future will
likely have just as much (if not more) impact on us, but in different
ways. This discussion will center around these three attributes of the
telecommunications system: distribution and programming, interaction
and retrieval and storage.

Distribution and programming. Even today, the distributive capabilities of television are unprecedented. It is estimated that 115 million Americans are watching television on any given evening. (Smith, 1979, p. 18) This number is expected to increase, especially as programming variety increases. Today cable television subscribers can choose from 24 to 36 different channels. Communications satellites have the potential of offering such diversity that individuals will be able to create their own network scheduling. (Smith, 1979, p. 17) Superstations which combine satellite distribution with cable delivery are already on the market. WTBS, a superstation in Atlanta can reach some five million households in 46 states. Individuals can own a dish antenna for $10,000 to $37,000 and permission of the FCC. This dish antenna enables them to choose from the hundreds of television programs which are being broadcast via satellite throughout the North American Continent. Besides having wide access to programming, they will also have access to a 24 hour news service. Thus more and more of what we learn will come from the television.

Another breakthrough in terms of the distributive capabilities of television is in the development of optical fibers and lasers. These hairlike fibers are very strong, and with improvements in laser technology, will have an adequate light source, thus making it possible to not only increase the carrying capacity, but also making them multipurpose in that they can be used for phone lines, computers, microprocessing and digital switching. (Gunn, 1989, p. 13)

Interaction. Advances have also been made in the interactive capabilities of telecommunications. QUBE, a much publicized system

in Columbus, Ohio includes multiple channel per-program pay services, non-program services such as fire alarms and medical assistance, and it is two-way. That is, viewers can respond to something as they watch it on television. Potentially, this capability will enable viewers to vote, do the family marketing, book airline tickets and even pick up the mail. (Smith, 1979, p. 18)

Storage and Retrieval

Television technology has also advanced in terms of its storage and retrieval capabilities. CEEFAX, a teletext system transmitted continuously by the British Broadcasting Company, provides viewers with information and graphics on their home receivers. Viewdata is similar to CEEFAX but has a larger computer data base. Facsimile is a system which will give the viewer a hard copy of the information printed on the screen.

> Almost any type of alpha-numeric data can be displayed:
> news, sports, weather and traffic reports, school closings,
> menus, consumer information, theater and performance time-
> tables, curriculum outlines, a considerable array of educa-
> tional materials...as well as basic community, state,
> regional, national and international information.
> (Gunn, 1978, p. 17)

Video tape and video cassette recorders enable time shift viewing. That is, viewers can watch what they want when they want. They can record any program, even omitting the commercials at the push of a button. Video-disc is a "machine that can translate information on a twelve inch plastic record into a television picture that is better than anything obtainable from normal over-the-air transmission, plus perfect stereo sound." (Smith, 1979, p. 68) Video-discs will allow a viewer to select from current Broadway shows, new and classic motion pictures, night club performances, rock, jazz and classical concerts. (Smith, 1979, p. 67)

Of course, television production equipment is becoming smaller, better and cheaper. Television audio and picture reception are continually improving. We may not be far from the day when portable on the spot communications between individuals throughout the world is possible. The potentials of holography and telecommunications have barely been considered.

Some of the potentials of television in education have been explored by Brudner. Television will enable instruction to be carried outside the school to the home and community as well as business and industrial centers. Cable television can "put the most disadvantaged students into contact with the most advantaged resources." (1977, p. 24) Electronic and audio visual developments will allow multi-campus institutions to "extend the available faculty talent of unique qualifications to remote institutions." (1977, p. 15) Video tapes will provide an audio visual library of resources, enabling the playback of one-time events. Television is already used as an effective means of evaluation in the form of micro-teaching. Its close-up and special effect capabilities enable the production of completely developed instructional modules, which can be replayed whenever and as often as one desires. Entire encyclopedias, journals and books may soon be available on video-discs, enabling a student to read, see and hear something...all in one setting.

Computers

Another technology which has had a major impact on society and educational technology is the computer. Computers enable one to record, store and retrieve an infinite amount of information (including pictures, sounds and print) instantaneously. Gordon and Ament suggest that some day a central (or regional) storage facility

center with wide public access will be established providing citizens

with all kinds of general and specialized information, such as library,

medical and legal assistance. Individuals will have access to an un-

limited amount of information at the push of a button, and without

stepping outside their homes.

In "The Technological Society," Ellul predicts the following

development:

> Knowledge will be accumulated in "electronic banks" and
> transmitted to the human nervous system by electronic
> coded messages. There will no longer be any need of
> reading or learning mountains of useless information;
> everything will be received and registered according to
> the needs of the moment. There will be no need of atten-
> tion or effort. What is needed will pass directly from
> the machine to the brain without going through the con-
> sciousness. (1964, p. 432)

In other words, Ellul is predicting a symbiotic relationship between

man and the computer.

Computers are having their effects on education in the areas of

individualized instruction, counseling, gaming and simulations. They

also have the capabilities of incorporating multi-media modules. New

developments are increasing the potential uses of the computer in

education.

> Cathode-ray tube display terminals are beginning to
> replace the typewriter for many purposes. More ad-
> vanced terminals, such as plasma displays with a
> variety of audiovisual features, are also coming into
> use, and even more advanced laboratory prototypes offer
> great promise for future low-cost, high function ter-
> minals. (Brudner, 1977, p. 22)

Computers will enable flexible modular scheduling, expand learning

options for working students, and even generate time-payment and credit

spread schedules." (p. 15)

Molecular Biology

The rate in which advances are being made in molecular biology is unprecedented. "When scientists speak of something being 'new' in most areas of research they are likely to mean the last five years. In molecular biology they often mean within the past three months--or even last week." (Schmeck, 1979, p. 9) Some of the new technologies being developed in this area include; the programming of bacteria to make biological chemicals like human insulin; the ability to take genes apart and grow them in large quantities; and gene splicing.

> Gene splicing, an art which began only about seven years ago, has in turn accelerated the pace of research in molecular biology by permitting scientists to rearrange genetic materials almost at will and to grow many copies of the genes of humans and animals in bacteria. (Schmeck, 1979, p. 9)

The question for educational technologists, as well as all of society, is where will all this stop. What more will we learn about human behavior and genetic development and where will our knowledge lead us?

Society will have to consider the possibilities of genetically programming human intelligence, or creativity or even personality. Genetic programming might even replace education. . . and with unknown consequences. This leads us to the final section of this chapter, which will examine some of the potential effects of continued technological advancement.

Technology: For Better or For Worse

Home terminals will enable home education and individual citizens will have the opportunity to become proficient in law, medicine and money management. The new telecommunications system will provide the means by which citizens can vote directly on issues, paving the way

for direct democracy through referendum. Reference services will be improved and increased access will provide individuals with information about a broad range of subjects. This information will be available, not only in print, but in the form of pictures, words or sounds, depending on the seekers unique needs. The telecommunications center will provide a center for information, and educational and cultural activities which will surpass anything available today. Increased demand for locally produced programming will correspond with increased opportunities for creativity and productivity at the local level. Teaching machines adaptable to the unique cognitive and emotional needs of individuals will shift the responsibility for learning from the teachers to the students. Teachers, freed from the routine tasks, will be able to concentrate on the more rewarding aspects of instruction and provide a higher level of individual guidance. The teacher's role will be expanded to a manager role.

A most important aspect of these developments is the general access to information. Stanton made these remarks in a National Seminar held at the Library of Congress called "Television, the Book, and the Classroom."

> Citizens must understand what is going on so they can
> understand what their leaders are saying. They must
> have knowledge in order to choose those leaders wisely.
> They must be prepared to move in new directions when
> events or trends in the nation or the world dictate it.
> (1978, p. 18)

This is an important issue, because individuals can only keep abreast of change when they can respond to it adequately. Our future ability to take in a great deal of information quickly, sorting out the

relevant from the irrelevant, will be crucial...technology will be

an invaluable asset in achieving this goal.

But technology can also bring problems. Mesther has analyzed the

events associated with any technological development. He warns us to

be aware of the negative possibilities as well as the positive poten-

tialities. The sequence follows:

1) The technological advance creates a new opportunity
   to achieve a desired goal.

2) There is an alteration in the social organization to
   accept the new technology.

3) This alteration interferes with the existing social
   structure.

4) Then, other goals which were met by previous structures
   are inadequately achieved.

Meadows presents three questions which society must answer before any

technology is adopted.

1) What are the physical and social side effects?

2) What social changes will be necessary before the
   development is implemented and how long will it
   take to achieve this?

3) If the development is successful and removes some
   material limit to growth, what limits will the
   growing system meet next? Will society prefer
   its pressures to the ones this development is
   designed to remove?

Teich in Technology and Man's Future states this:

> ...few contemporary observers, including those who would
> cheerfully accept the label of technological optimist
> dispute the need for society to develop better ways of
> controlling the impacts of technology. (1977, p. 223)

He goes on to describe a move called technological assessment. This

is "a process through which the total impact of technology on society--

particularly the secondary and indirect effects that are not apparent

are ascertained." "...the aim of technological assessment is to bring such impacts to the public view and thus provide the underpinning for improved long range planning and problem solving. (Teich, 1977, p. 223)

Some of the potential negative effects of technology related to the field of educational technology are discussed below. Increased computer access, may be accompanied by an increase in computerized crime. Both computer and two-way interactive television threaten the right to privacy since computers can store and analyze large amounts of information, well beyond the human capacity. And this information can be distributed to a much wider audience. The information may contain errors which will take on an unwarranted degree of accuracy. The possibility exists of centralizing all records of all individuals in the United States giving the few who have access to this information a new kind of power. The capability of interactive telecommunications may threaten our privacy as well. An individual's opinion or vote on an issue may easily be recorded. Some unknown public may have access to an individual's financial records, purchases, subscriptions, attitudes, and household inventory. Grayson (1978) points out another less apparent problem. He fears that increasing exposure to the media may numb our sensitivity toward the invasion of privacy. Other ways technology may effect our private lives include electronic eavesdropping, hidden television, truth measurement with polygraph devices, behavior modification, and psychological testing.

McDermott cites the following negative impacts of contemporary technology on our organizational structures:

1) An increase in the scale and complexity of operations.

2) Wide diffusion into new areas.

3) An increase in the number of activities controlled by central management.

4) An increase in the ambition of managements' goals.

5) An increasing resistance to the influences of negative externalities. (1977, p. 189)

McDermott goes on to make this point:

The technical means which makes that system rational and efficient in its aggregate terms, that is, as viewed from the top, themselves tend by design to filter out the 'non-rational' or 'non-efficient' components and subjects, that is, those rising from the bottom. (p. 189)

Though technology potentially can provide us with the ability to decentralize, McDermott believes that natural tendency of technological systems is toward centralization. He fears that the centralizing powers of management along with the use of technological jargon will filter into our social organization with these consequences:

...I am persuaded that...we now observe evidence of a growing separation between ruling and lower class culture in America, a separation which is particularly enhanced by the rapid growth of technology and the spreading of its "lassiez innover" ideologies. (1977, p. 189)

Laissez innover is to technological development what laissez-faire is to economic development. McDermott describes laissez innover in this way. It is the view that technology is a self-correcting system. Temporary oversight or "negative externalities" will and should be corrected by technological means. Attempts to restrict the free play of technological innovation are, in the nature of the case, self-defeating. Technological innovation exhibits a distinct tendency to work for the general welfare in the long run.

Marcuse is concerned about the manipulative effects of technology.

The [technological] products indoctrinate and manipulate;
they promote a false consciousness which is immune against
falsehood. And as these beneficial products become avail-
able to more individuals in more social classes, the in-
doctrination they carry ceases to be publicity, it becomes
a way of life. It is a good way of life--much better than
before--and as a good way of life, it militates against
qualitative change. (1977, p. 14)

So, technological progress brings with it as many problems as
potentials. Technological development has as many implications for
educational technology as educational technology has for technological
development. As educational technology shows an increasing concern
with its place in society and its role in the future, it must come
to grips with the realities of technological development.

CHAPTER III

DESIGN AND METHODOLOGY:

AN ETHNOGRAPHIC APPROACH TO CONTENT ANALYSIS

This study applies ethnographic techniques to content analysis.
An ethnographic study may be defined as an extensive description and
interpretive effort at explaining a complexity through some variety of
participant observation; whereas content analysis is a technique for
describing the content of some form of communication. This study
employs a particular ethnographic technique called documentation. The
assumption underlying the use of this technique for a content analysis
is based on the notion that a book or a research study is the end prod-
uct of a deliberate from of human action and can be the object of
intense participant observation.

Content Analysis Described

Content analysis is defined as "any technique for making inferences
by systematically and objectively identifying the specific character of
messages." (Holsti, 1968, p. 601) The intent of content analysis is
particularly appropriate to the nature of this study because of its
ability to "get at the characteristics of content itself...by focusing
attention on the substantive nature of the content and comparing data
at different points in time coming from different sources." (Gopal, 1970,
p. 205) In terms of design, however, content analysis as described in
the literature does not meet all the requirements for this study. Berelson

defines content analysis as "a research technique for the objective, systematic and quantitative description of the manifest content of communication." (Berelson, 1971, p. 18) The terms objective and quantitative are particularly disturbing, and imply inherent problems with using content analysis as described in the literature with this particular study.

The literature describes an effort to make content analysis more scientific through objectivity and quantification. Traditional scientific research will be referred to as the logical-positivist approach. The logical-positivist design presumes prior specification of data, precise definitions of the concepts involved, reproducible or objective data categorization, and the precise coding of data. (Gopal, 1970, p. 205)

A summary of this design as described by Gopal follows. The researcher should first begin with a statement of an underlying theory from which hypotheses may be generated, then state the hypothesis to be tested. Second, the characteristics of the content should be specified by focusing on specified categories which are reproducible and objective. Third, each category should be operationally defined and a categorization scheme should be developed which can be adapted to empirical content. Next, the researcher should code the data in one of these three ways: dichotomy, which is the recording of the presence or absence of an attribute; serializing, the ranking of material in terms of degree of intensity; or variable, which consists of introducing equal intervals into the scheme of categories. Finally, reliability should be established by testing and retesting, using a multiple form, or utilizing a split-half test; and validity can be achieved through the logical approach, jury opinion, or independent criteria.

The Logical-Positivist Approach: A Critique

Traditional quantitative techniques described in the preceding

paragraph are inappropriate for use with the data of this study for

these reasons:

1. A purpose of this study is to generate hypotheses rather
    than to test them.

2. Qualitative research can address study of a variety of
    viewpoints in varying intensities about a complex and
    interrelated set of subjects.

3. Traditional research is suited to quantitative data, where
    as the data of this study is qualitative.

4. Whereas traditional research uses data which can be
    operationally defined where as the data of this study cannot
    be operationalized.

Though the intent of content analysis is appropriate, the tradi-

tional research design is not. Similar concerns regarding the direction

of content analysis methodology are stated by Selltiz, Wrightsman, and

Cook in their book, Research Methods in Social Relations. They make

the point that the quantification procedure described in content analy-

sis methodology tends to override the concern for the actual content.

They further suggest that, as with interviews and observation, quanti-

fication should not be the primary requirement for content analysis.

> Definitions of content analysis tend to emphasize the
> procedure of analysis rather than the character of the
> data...they imply a somewhat arbitrary limitation of
> the field by excluding from it all accounts of communi-
> cations that are not in the form of the number of times
> various themes or other elements appear in the material
> being analyzed. (1976, p. 392)

Others have written of similar problems with the logical-positivist

model. Mishler (1979) describes positivism as "the view that the method-

ology developed in the natural sciences (that is, the rules of experi-

mental design and technical procedures of measurement and statistical

analysis) is applicable to the study of social events and processes." (1979, p.3)

The logical-positivist approach is based on the following assumptions: that there is unity in the scientific method despite diversity of the subject matter; that the ideal explanation consists in the subscription of individual cases under general laws; and that the formal structure of mathematical physics is a methodological ideal. Mishler and others claim that the logical-positivist model need not be the only guide to serious systematic study. The problems associated with the use of traditional scientific inquiry in certain studies include:

1. Emphasis on prediction rather than explanation.
"...the end product of scientific inquiry into human behavior need not be prediction of that behavior but simply explanation without prediction. (Magoon, 1977, p. 661)

2. Logical-positivist research is deductive rather than inductive. "Traditional methods tempt researchers to restrict the focus of their interest to short-run events and a limited range of meanings and, thus, their methods tend to determine problems rather than the other way around." (Mishler, 1979, p. 7)

3. The logical-positivist approach neglects the context in which behavior occurs. "...ordinary commonsense understanding of meaning as context dependent has been excluded from the main tradition of theory and research." (Mishler, 1979, p. 2)

4. The need to objectify and quantify has turned means into ends. "The framework for interpreting and coding behavior is arbitrary in that any number of meaning systems could be selected. The objective social scientist, in standardizing the interpretation, may have destroyed some of the most valuable data (s)he had." (Wilson, 1977, p. 250)

5. The positivist approach may in certain situations lead to "ungrounded and meaningless hypotheses" and "sterility in theory" in that it "tries to understand a complex

subject by breaking it into a temporal chain of
events all connected by determinate causal rela-
tionships." (Lutz and Ramsey, 1974, p. 5)

Ethnographic Techniques Described

The alternative methodology proposed falls under a variety of

labels including anthropological, ethnographic, constructivist and

phenomological. The basic presumptions of this methodology include:

1. An extensive description and interpretive effort at
   explaining a complexity. (Magoon, 1977, p. 652)

2. Some variety of participant observation. (Wilson,
   p. 254)

3. Careful study of a complete socio-cultural system.
   (Lutz and Ramsey, 1974, p. 5)

4. Immersion in a direct observation of a small number
   of cases over extended periods of time within their
   natural setting. (Carini, 1975, p. 29)

5. Cultural analysis, defined as "guessing at meanings,
   assessing the guesses and drawing explanatory con-
   clusions from the better guesses. The primary concern
   is how well the ethnographer fits his description of
   what might be called social discourse into a theoret-
   ical explanation." (Magoon, 1977, p. 669)

"These methods [ethnographic] have been found to be useful for gathering

certain important kinds of data; in fact some researchers claim that

these techniques may gather information about human behavior which is

impossible to obtain quantitatively." (Wilson, 1977, p. 247)

The attributes of the ethnographic methodology include:

1. "...assurance that research investigations take into
   account the social context of the phenomenon.
   (Magoon, 1977, p. 657)

2. "The researcher is in a position...to pull together
   hints, consistencies and patterns...." (Magoon, 1977,
   p. 661)

3. Social scientists can understand the framework within
    which the subjects interpret their thoughts, feelings
    and actions. (Wilson, 1977, p. 249)

4. The formulation of pattern explanations. (Magoon, 1977,
    p. 661)

5. "Illuminative evaluation," which is defined as "a
    primary concern not with prediction and measurement,
    but with description and interpretation." (Magoon, 1977,
    p. 684)

6. Returning to the "long tradition in Western thought
    which holds that before it is possible, let alone
    discernable, to abstract and isolate elements of a
    phenomenon according to the principles of logic, we
    must first conduct an inquiry that brings us closer
    to the phenomenon in all its complexity. (Carini,
    1975, p. 12)

7. The search for increased meaning that can lead to
    imaginative insights and create new totalities for
    inquiry.

A Description of Documentation: An Ethnographic Technique

The design of this study employs a specific ethnographic technique

called documentation. Documenting is a method of observing, recording,

describing, and analyzing human action which was developed by Carini.

(Mishler, 1979, p. 10) Documentation requires two participants, the

observer and the phenomenon. The researcher is the observer and the

phenomenon is that which is observed. The observer is "central to the

datum and it is in the articulation of his(her) point of view that the

datum of inquiry is assumed to emerge." (Carini, 1975, p. 15) The

observer should be able to abide with the object of inquiry, immerse

him(her)self in it, compel his(her) thought and accept its ambiguous

and complex nature. The phenomenon is assumed to be "thinkable but

inexhaustible" whose multiple meanings will emerge from its continuing

transformation through the changing point of view of the observer.

(Carini, 1975, p. 10)

The procedure for documentation as described by Carini is outlined below. The function of observing should be to constitute the multiple meanings of the phenomenon. The observer should organize the observations in such a way that they are juxtaposed to each other in documentary form revealing patterns of reciprocities. These observations should occur in a setting through time.

Data may be collected from a variety of sources including archival records, artifacts and documents. (Wilson, 1977, p. 255) The observer must choose from what sources the data will be collected, and must methodologically plan the forms of data collected, the setting and the participants. The function of recording is to reflect upon the meanings deduced from observations for contemplation enabling the observer to build a repertoire of ways in which to represent and select the event. The analysis of data should consist of the incorporation of single events into a model by singling out the elements and putting them together again in a way so as to explain the total system. (Lutz and Ramsey, 1974, p. 8)

Documentation, then is the "accrual of observations and other records of phenomenal meaning over time, enabling patterns of meanings to emerge through an increasingly revealed complexity and interpretation of the phenomenon observed through the increasingly articulated thought of the observer" in order to reveal the "integrity of a phenomena." (Carini, 1975, p. 29) From this information, matrices can then be formed. "In a process of juxtaposing the data...the commonalities, differences, nuances, shadings of process as it was expressed through data can be articulated through graphic representation." (Carini, 1975, p. 37)

Preliminary matrices can then be formulated into a provisional matrix so it can be used by other documentors to plot additional data.

Documentation then consists of observing, collecting data, recording and analyzing the data, and finally formulating matrices which reveal patterns, commonalities, and differences within the phenomenon. The sampling procedure recommended is a snowball sample, where informant information leads the researcher to other persons. (Lutz and Ramsey, 1974, p. 8) Reliability will be achieved in several ways, including the understanding approach which is described by Petri.

> Here the researcher is in a position much like a member
> of the audience in a play, attempting to pull together
> hints, consistencies and patterns. The audience might
> then provide a set of inferences, that is, the meaning
> of acts for further scientific analysis or as final
> results in a particular inquiry. (Magoon, 1977, p. 661)

Disciplined subjectivity is also a type of reliability used in this type of research and is described by Wilson as being in touch with a large number of participants; making sure sampling is representative in terms of the situation; synthesizing the various experiences of the participants to comprehend the subtleties of their actions, thoughts and feelings; and systematically seeking to understand actions from the different perspectives of various groups of participants. (1977, p. 258) Construct validity is the strength of ethnographic research in that its purpose is to uncover the meaning of events or situations to participants rather than trying to predict the outcome of a situation.

Documentation is a type of ethnography in which the aim is "analysis and not simply a list of procedures for recording field notes." (Mishler, 1979, p. 11) "Ethnography is not just a new fad; rather it is part of a long-respected research tradition that for

various historical reasons has remained outside the mainstream of
educational research. Similarly it is not a static tradition;
researchers are constantly working to refine the methods." (Wilson,
1977, p. 263) "These approaches vary and each has its own problems,
but they provide a range of possibilities for us to rethink our ways
of doing research." (Mishler, 1979, p. 17)

An Ethnographic Approach to Content Analysis: An Alternative

This study combines the attributes of content analysis research
with the attributes of ethnographic design formulating a design which
will be appropriate to the nature of the material being analyzed. The
design of this study is an ethnographic approach to content analysis.

Sampling Procedure

Since the study consists of the comparison of the content of two
unrelated bodies of literature, two sampling procedures were used.

Sampling procedure: futurists. The writings of the futurists
are written from a variety of perspectives and tend to be broad in
scope. The sampling procedure used in choosing the books to be ana-
lyzed is a type of snowball sample, which is described in ethnographic
research. A snowball sample, as previously defined, is informant infor-
mation which leads the researcher to other persons. (Lutz and Ramsey,
1974, p. 8) Two sources of informant information were used in the
selection of the sample.

First, a type of citation analysis was used. Five bibliographies
of futurists works served as the source for the first informant. Any
book listed in at least two bibliographies was added to a preliminary
list, based on the assumption that any book listed in at least two of

the five bibliographies would serve as a reliable indication that this is a source appropriate for a preliminary list of significant futurists works. Based on consultations with acknowledged experts in educational futures, these bibliographies were selected as being most representative of the current literature in educational futurism. The bibliographies used were from the following:

1. "Resources for Teaching About the Future," _Futures Unlimited: Teaching About Worlds To Come_, 1979.

2. "Fifty Books About the Future," _The Futurists_, 1972.

3. "Notes," _The Far Side of the Future_, 1978.

4. "Section Four of the Appendix: Readings," _Learning for Tomorrow_, 1972.

5. "Bibliography: General Futurology," _Futures Conditional_, 1972.

Any highly technical entries and all entries dated prior to 1960 were deleted. The preliminary list then consisted of a sample of fifty futurists books.

The second source of informants were presentors at the 1979 World Future Society Conference in Minneapolis, Minnesota. From the preliminary list of fifty books, a questionnaire was developed which asked the participants to "select the ten most important books in terms of what they had to say about desirable futures and ways of achieving these futures." (See Appendix A) The presentors were selected using a purposive sampling technique which assumes that "with good judgement and appropriate strategy one can hand pick the cases to be included in the sample and develop samples that are satisfactory to one's needs." (Selltiz, Wrightsman and Cook, 1976, p. 521) Seventy-five copies of the questionnaire were distributed to these respondents and

forty-four were returned. Analysis of the results showed that fourteen books on the original list had been selected by twenty-five percent of the respondents. Twenty-five percent or more was considered significant and again a reliable indication that these fourteen books are significant in the area of futures and could serve as the content to be analyzed in this study. (See Appendix B)

Sampling procedure: educational technology. The research in the field of educational technology tends to be specific rather than general and written from the more specialized viewpoint of the educational technologist, with clearly stated intentions and results. The sample journals analyzed were Educational Communication and Technology Journal (formerly AV Communications Review), volumes 25, 26 and 27 and the Journal of Instructional Development, volumes 1, 2 and 3 (no. 1). All the articles in these volumes were analyzed.

Reliability

For the purposes of this study, reliability is defined as consistency in results. (Selltiz, Wrightsman and Cook, 1976, p. 580) Reliability is achieved in keeping with the requirements of ethnographic research: first, the sample chosen is representative in terms of the situation and is selected from a large number of participants; second, the study seeks the synthesis of the various experiences of the participants; finally, the study utilizes the "understanding approach" of reliability in that it attempts to pull together hints, consistencies and patterns.

Validity

Construct validity is the strength of ethnographic research in that its purpose is to uncover the meaning of the events [or statements] of the participants [or authors]. (Magoon, 1977, p. 669) Construct is defined by Selltiz, Wrightsman and Cook as a "concept, defined in terms of events, used to account for regularities or relationships in data." (1976, p. 576) Construct validity is achieved by systematically seeking to understand the meanings from the different perspectives of the various participants.

Method of Analysis

The intent of content analysis is to "get at the characteristics of the content." In order to do this, categories should be devised which will allow the comparison of messages of two or more different sources. (Holstoi, 1968) Since this study analyzes the role of educational technology in education and in society, the categories chosen need to define education and describe trends in society. Since this study attempts to identify the desirable ends and means for achieving these ends, the categories chosen need to analyze the goals of education. The three major categories chosen for this study then are:

1. How does the author define education?

2. What trends relative to education does the author describe?

3. What are the goals of education?

The next step is to define and develop a categorization scheme. These definitions should be specific to the extent that they allow consistency, but broad enough to be applicable to a variety of perspectives and viewpoints. The categories are not intended to be

comprehensive, but rather their selection is based on the assumption

that there are many truths revealed in any body of literature. The

categories selected for this study represent some of those truths.

The categories were chosen by a process described below.

> In the absence of standard schemes of classification,
> the analyst is usually faced with the task of con-
> structing appropriate categories by trial and error
> methods. This process consists of moving back and
> forth from theory to data, testing the usefulness of
> tentative categories and then modifying them in light
> of the data. (Holsti, 1968, p. 646)

The categories are defined below:

1. Definition of education--how does the author define
    education?

2. Trends--things that are happening today that indi-
    cate the direction for the kinds of education
    needed in the future.

    a. Individual trends--those things that are happening
        to an individual which he/she can control.

    b. Trends in the family--those things that are hap-
        pening to persons within a household that can
        be controlled by the members of that household.

    c. Societal trends--those things that are happening
        to a person which are out of his/her direct con-
        trol.

    d. Educational trends--those things that are affec-
        ting the formal school system.

3. Goals of Education.

    a. Ends--the ultimate aim of education.

    b. Means--ways of achieving these aims.

The building of these categories was determined by a pilot study

conducted on three books; two from the selected sample and one from

outside the sample. This pilot study gave an indication regarding the

applicability of these categories to books both in the sample and outside the sample.

The observation process follows. Observations were made as each book in the sample was read. Any important statement was noted and recorded. A statement was considered important if it summarized the context of a particular section of the book. Such a statement is referred to as a topic sentence.

> There are occasions when one may justifiably rely on
> verbal or very general statements of facts...one is
> likely to gather verbal facts when he is recording
> fairly complex aspects of a situation, when he is
> interested mainly in indicating the general nature
> of conditions and is content to point out the differ-
> ence between one case and another in qualitative terms.
> (Mierzwa, 1972, p. 10 from Good and Scates)

These statements serve as the data of the study, the accumulation of which provides a repertoire of thematic (or important) statements. The analysis of data consisted of the incorporation of these single statements into a model. The elements were singled out and put to-gether again in terms of the stated categories, enabling comparisons to be made and main ideas to formulate. Each element, or statement was transferred to a card. These cards were organized by author and indexed by similar ideas. Once this process had been completed for each author, a list was formulated containing the major ideas of each author. Any idea discussed only by one author was eliminated. This list of ideas served as the basis for the formulation of subcategories.

From this information, preliminary matrices were formed based on these commonalities (or subcategories) found in the data. These pre-liminary matrices summarize which author discussed which subcategory. The accompanying narrative, then, details each author's particular ideas.

These subcategories were recorded in such a way as to allow the formation of another set of preliminary matrices, providing a basis upon which to compare the futurists ideas with the literature in educational technology. This second set of preliminary matrices resulted from an analysis of the futurists means and the attributes of educational technology. The category called 'futurists means' refers to the means to a desired end, it is not a statistical mean. Each futurists mean was analyzed in terms of what educational technology could contribute. These matrices in effect, transcribe the futurists means into educational technology terminology. Definitions were formed from both educational technology and futurists literature. The final matrices then analyzed the articles published in Educational Communications and Technology Journal and the Journal of Instructional Development in terms of these transcribed definitions.

CHAPTER IV

A CONTENT ANALYSIS OF

FOURTEEN SELECTED FUTURISTS BOOKS

This chapter contains the results of a content analysis of fourteen selected futurists' books. The purpose of this portion of the study is to identify commonalities which exist among the futurists in terms of: 1) How they define education, 2) Current trends they describe in relation to society, the family, the individual and education, 3) Desirable ends, 4) And means by which those ends can be achieved. These commonalities are referred to as subcategories and will provide the basis for the content analysis of educational technology research in the next chapter. This procedure then will provide a comparison of futurists' values with actual research in educational technology.

This chapter consists of four sections. The first section contains the preliminary matrices, set 1, and accompanying narrative, providing an overview of what the futurists have to say about current trends and potential means. The second section provides a closer examination of the content of the futurists' books, detailing each futurist's particular point of view, illustrating nuances and opposing opinions. Section three lists the definitions of education and discusses these in terms of the ends of education from the futurists' point of view. The chapter then concludes with an inventory of the positive uses of technology discussed by the futurists.

Preliminary Matrices (Set 1) and Development of Subcategories

The categories were delineated into subcategories through a process described by Holsti.

> In the absence of standard schemes of classification the analyst is usually faced with the task of constructing appropriate categories by trial and error methods. This process consists of moving back and forth from theory to data, testing the usefulness of tentative categories and then modifying them in light of the data. (1968, p. 646)

The matrices on the succeding pages are constructed in such a way as to provide consistency between the subcategories of trends and means. (Table 1 illustrates.) For example, a trend in society discussed by ten of the futurists is "change/transition." A related trend in education discussed by eight futurists is that what is taught in the schools is not keeping pace with the events happening in the world. Thus, education is said to be reality poor. The means of overcoming this problem is to make sure the population is aware of the world condition, to help people develop a sense of self in relation to the changing world condition, and to give the people the tools which will enable them to make ethical decisions. Table 1 also shows the number of futurists discussing each category.

Tables 2 through 5 show which futurists discussed which category. The subcategories are listed horizontally and the authors are listed vertically. An 'X' is placed in the appropriate box if an author discussed a particular subcategory. A (-) means that the author states an opposing point of view. The 'Total' row shows the number of futurists discussing each subcategory.

TABLE 1

Relationship of Futurist Trends and Means

TRENDS								MEANS	
Society	No. Authors	Individual	No. Authors	Family	No. Authors	Education	No. Authors		No. Authors
Change/Transition	10					Reality Poor	8	Awareness of World Condition Self Awareness Moral Education	14
Short Term/Long Term	11					Past Oriented	6	Future Oriented	12
Environmental/Resources	14							Put more resources into growth industries	
Population	8			Change in Family Patterns	8				
Social Chaos	13	Anomie/ Alienation	8	↓		Social- izes	9	Equality	8
Dependence	12							Freedom	14
Dependence on Technology	.14							Technological Assessment Social Accounting	10
Dependence on Information	7							Access to Credible Information Judgement	11

TRENDS								MEANS	
Society	No. Authors	Individual	No. Authors	Family	No. Authors	Education	No. Authors		No. Authors
Interdependence	13	Distrust Self and Others	4					Cooperation Responsible Ethos Participation	14
Dependence on Bureaucracies	11					Ineffective Structures	9	New Organizational Structures	12
Materialism	9	Materialistic Values	6			Encourages Materialistic Values	5	Enoughness Value Quality over Quantity	5
Conformity	7							Diversity Interdisciplinary	11
Work/Education/Leisure	5	Job Dislocation Leisure Time	5			Not Lifelong	4	Lifelong Learning	7
Creativity	4	Failing to Realize Creative Potential	3					Develop Creative Capacity	11
Human Learning	4					Not Understand Human Learning	7	Develop Intellectual Capacity	12

TABLE 2

(-) = Author states an opposing point of view

Futurist Subcategories: Trends in Society and the Family

	Author														
	Bell 1973	Boulding 1964	Bowman 1978	Fuller 1969	Heilbroner 1974	Illich 1970	Leonard 1968	McHale 1976	McLuhan 1965	Platt 1966	Schumacher 1973	Skinner 1972	Theobald 1976	Toffler 1974	TOTAL
Society:															
Change & Transition	X	X	X		X		X	X	X	-			X	X	10
Short Term/ Long Term	X		X	X	X			X	X	X	X	X	X	X	11
Environment Resources	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14
Population			X		X		X	X		X		X	X	X	8
Social Chaos	X		X	X	X	X	X	-	X	X	X	X	X	X	13
Dependence	X	X	X		X	X	X	X	-		X	X	X	X	12
Dependence on Technology	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14
Dependence on Information	X		. X	X				X	X	X			X		7
Interdependence	X	X	X	-	-		X	X	X	X	X	X	X	X	13
Dependence on Bureaucracy	X		X	X		'X	X	X	X	X		X	X	X	11

	Bell 1973	Boulding 1964	Bowman 1978	Fuller 1969	Heilbroner 1974	Illich 1970	Leonard 1968	McHale 1976	McLuhan 1965	Platt 1966	Schumacher 1973	Skinner 1972	Theobald 1976	Toffler 1974	TOTAL
Author															
Materialism	X		X	X	X	X	X		X		X		X		9
Conformity	X	X	X						-	-		X	X		7
Work/Education/ Leisure		X					X	X	X			X			5
Creativity		X					X				X		X		4
Human Learning		X				X						.X	X		4
Family: Changing Family Patterns	X	X	X				X		X	X			X	X	8

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TABLE 3

Futurist Subcategories: Individual Trends

	Author														
	Bell 1973	Boulding 1964	Bowman 1978	Fuller 1969	Heilbroner 1974	Illich 1970	Leonard 1968	McHale 1976	McLuhan 1965	Platt 1966	Schumacher 1973	Skinner 1972	Theobald 1976	Toffler 1974	TOTAL
Anomie/Alienation	X	X	X		X			X		X		X		X	8
Distrust Self and Others		X		X						X			X		4
Materialistic			X		X	X			X		X		X		6
Work/Education/ Leisure						X		X	X	X		X			5
Not Realizing Potential				X			X			X					3

TABLE 4

Futurist Subcategories: Trends in Education

	Author														
	Bell 1973	Boulding 1964	Bowman 1978	Fuller 1969	Heilbroner 1974	Illich 1970	Leonard 1968	McHale 1976	McLuhan 1965	Platt 1966	Schumacher 1973	Skinner 1972	Theobald 1976	Toffler 1974	TOTAL
Reality Poor			X			X		X	X	X	X		X	X	8
Past Oriented	X		X				X	X					X	X	6
Not Responsive to Population Change		X													1
Increase in School Violence													X		1
Socialization		X	X			X	X			X	X	X	X	X	9
Not Teach Decision Making														X	1
Ineffective Structure	X		X	X		X	X		X	X			X	X	9
Teach Materialistic Values		X	X			X	ʼ						X	X	5
Conformity													X		1
Not Lifelong Learning	-		X										X	X	4
Not Understand Human Learning	X	X	X			X	X	X						X	7

TABLE 5

Futurist Subcategories: Means

| | Author | | | | | | | | | | | | | | |
	Bell 1973	Boulding 1964	Bowman 1978	Fuller 1969	Heilbroner 1974	Illich 1970	Leonard 1968	McHale 1976	McLuhan 1965	Platt 1966	Schumacher 1973	Skinner 1972	Theobald 1976	Toffler 1974	TOTAL
Awareness Moral Development	X	X	X	X	X	X	X	X	X	X	X	X	X	x	14
Future Oriented	X	X	X	X	X		X	X	X	Design		Design	X	x	12
Resources into Growth		X		X	X	X	X			X	X				8
Decrease Population Growth					X								X		2
Equality	X				X	X		X		X		X	X	x	8
Freedom	x	x	x	x	X	X	X	X	x	x	x	X	X	x	14
Technological Assessment/ Social Accounting	X		X	x		X	X	X	X	X	X			x	10
Access to Credible Information/ Judgement	x	x	x			X		X		x	x		X	x	12
Cooperation Responsible Ethos Participation	X	X	X	X	X	X	X	X	X	X	x	X	X	X	14

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	Author														
	Bell 1973	Boulding 1964	Bowman 1978	Fuller 1969	Heilbroner 1974	Illich 1970	Leonard 1968	McHale 1976	McLuhan 1965	Platt 1966	Schumacher 1973	Skinner 1972	Theobald 1976	Toffler 1974	TOTAL
New Organization Structures	X	X	X		X	X	X	X	X	X	X		X	X	12
Enoughness/ Quality vs. Quantity				X	X						X		X		5
Diversity Interdisci- plinary	X	X	X			X	X	X	X	X		X	X	X	11
Lifelong Learning			X		X	X	X	X		X				X	7
Develop Creative Capacity	X	X	X	X		X	X	X	X		X		X	X	11
Develop Intellectual Capacity	X	X	X	X		X	X	X	X	X	X	X		X	12

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The Matrices: An Overview

The futurists contend that society is in a state of transition from one period to another. Most agree that a condition of change is here to stay, and that change will continue at an ever increasing rate. The effect of this state upon education has resulted in an ever-widening gap between what is happening in the world and what is being taught in the school. Education is critized for being reality poor.

Increasing change brings with it the need for foresight and planning. Though the futurists differ on the extent to which they believe society should plan, they agree that foresight is critical. Education, however, continues to emphasize the past.

Two frequently cited examples of the effects of shortsightedness include degradation of the environment and overpopulation. The population problems have been confounded by radically altered family patterns.

Times of rapid change are often accompanied by an increase in social chaos. The social order today is threatened by overdependence. This dependence has taken several forms including: dependence on technology; dependence on information; dependence on each other; and dependence on bureaucracies. The futurists criticize bureaucracies in that they thrive on consumption and demand conformity for survival. Education is criticized for being the major socializing mechanism which feeds this bureaucratic tradition. As a result, individuality gives way to the common good and the individual must cope with alienation and anomie.

> With the further development of technology to the post-industrial phase, almost absolute social conformity will be required to preserve the technological basis for survival....Lifelong socialization must ensure that not one in ten million citizens will be disruptive....Small wonder that such a world could be termed 'friendly facism'. (Bowman, 1978, p. 16)

Change brings dangers, but it also brings potentials. Most futurists agree that our resources can be used for good or ill, and it is up to society to make that choice. A striking potential exists in the area of education and human learning. Changes in the nature of work and leisure may cause certain difficulties, such as job displacement. However, such changes could provide opportunities for increased learning and participation. The nature of work, education and leisure may play a major role in improving the quality of life, if only the resources are made available. These resources include the human ability to learn and to create throughout a person's lifetime. Most futurists agree that it is critical that society use its technology for humane and social ends. To do this will require a greater emphasis on monitoring and/or assessing the potential positive and negative effects of technology.

The Futurists: A Closer Look

Change/Transition

Trends: society. Ten of the futurists claim society is undergoing a state of transition. The various labels used include: industrial to post-industrial, civilized to post-civilized, mechanical to electrical, and industrial to communications. These futurists talk of the continuing rate of change. McLuhan says that this change has the character of implosion rather than explosion.

> In our present electric age the imploding or contracting
> energies of our world now clash with the old expansionist
> and traditional patterns of organization....In fact, it is
> not the increase of numbers in the world that creates our
> concern with population. Rather, it is the fact that every-
> one in the world has to live in the utmost proximity created
> by our electric involvement in one another's lives. (1965, p. 47)

Change is pervasive throughout society and results in a decreasing

time cushion, that is, there is less time to comprehend and adapt.

Individuals lack a transcendent ethos which would provide guidance,

because the 'times' call for continually changing attitudes, thought

patterns and organizational structures.

> ...the society is left with no transcendent ethos to
> provide some appropriate sense of purpose, no anchorages
> that can provide stable meanings for people. (Bell, 1973,
> p. xxi)

Platt (1966) provides the exception. Though he believes society is

in a transition state, he compares it to a "shock front" which, when

passed, will enable the rate of change to decline.

Trends: education. The effect of rapid change on education has

resulted in an ever-widening gap between what is taught and what is

happening. Education is criticized for being "reality poor." For

example, in a media world little attention is given to media education.

Students continue to be excluded from real world activities and, thus

are ill prepared for the existing world. Bowman (1978) makes the point

that the books, subjects and curriculum determine the knowledge acquired,

not the issues themselves.

Means. In order to deal with an increasing rate of change, indi-

viduals need to acquire a greater social awareness, understanding and

sensitivity to the world condition. They also need an improved sense

of self awareness, by developing a sense of significance, keeping in

touch with their emotions and senses, and understanding the motives

behind their own behavior. In times of change, the process of teaching

people what values to have must give way to teaching people how to

clarify their own values. Individuals must learn to reexamine their

values in terms of a new situation. They need to establish a guiding ethos, a clarification of their central convictions. In a world of images, individuals should have the skills which enable them to accurately test those images, and make judgements about those images.

Short Term Needs Versus Long Term Planning

Trends: society. Heilbroner (1972) calls it devaluation of the future when the long term consequences are neglected for the short term gain. The choices society make today may limit and effect future possibilities. The futurists criticize society for making these choices by trial and error rather than design. Planning that is done is often single in purpose, though the results are often interrelated. Society lacks any mechanism for social navigation or early warning systems. People are wary of change by nature, and are becoming more fearful of what the future holds. McLuhan (1965) says that our media is put out before it is thought out. He goes on to suggest that the electronic media, because of its high involvement and participation tends to preclude future thinking.

Trends: education. The futurists criticize education for being past oriented rather than future oriented. The schools educate society for a culture which no longer exists. A primary function of education is to pass on established values and skills, when it should be teaching individuals the process of acquiring new values and skills as they are needed. Students are taught what is known rather than how to find out what they need to know. Teachers cling to old teaching patterns despite the new resources available to them. Students are failing to develop future-focused images of themselves.

Means. Society needs to become sensitive to the long term

consequences of present actions. Individuals need to develop planning

skills and anticipatory thinking. To survive, individuals and social

structures will need to tolerate risk and ambiguity. Several futurists

call for a designed society. Skinner (1972) puts forth a plan for a

planned society with total control of human behavior. Platt (1966)

suggests a system design which contains adequate response and feedback

mechanisms to enable individual choice. Careful thought should be

given to the relationship between the need for increased planning ver-

sus individual freedom.

The Environment

Trends: society. The environment poses a fine example of the

effects of short-sightedness. The depletion of our natural resources

is finally taking its toll on both the standard of living and inter-

national security. A related concern is the continuing degradation

of the environment in the form of air and water pollution, the effect

of industrial heat on climatic conditions, and technological spillovers.

Illich discusses the fact that many of the technologies which have been

developed to cure one problem, often cause worse problems. (1970)

Other related concerns cited by the futurists include the increas-

ing technological power over nature without accompanying moral or social

control. Boulding (1964) fears that as society learns to make the envi-

ronment adapt, society will, in turn, loose its own adaptability, an

essential element of survival. The futurists are concerned about the

inability of the environment to continue to support industrial growth.

Means. To counter this trend, society needs to develop renewable energies as well as focus on those areas of growth which are consistent with environmental standards. These include science, the service sector, and education. Bell (1973) suggests, however, that a service oriented society loses its ability to increase productivity.

It is also important that the values regarding production and the standard of living change with the constraints of the time. Society's relation to the environment must change from that of master to partner.

Population

Trends: society. A lurking issue is the population problem. The decline in death rate resulting from several factors including increased food production, the slowing of the aging process and disease control, has not been accompanied by a decline in birth rate. The futurists fear the effects of an overcrowded world may result in a kind of Malthusian check, either through world-wide famine, disease, or increased social chaos and war.

Trends: family. A related trend effecting mostly the industrial countries is a change in traditional family patterns. As more people live longer, there will be a more equal distribution of children, adults, and elderly. Single parent families and working wives and mothers have changed the face of the family in the Western countries, particularly the United States. Education as well as the other institutions need to be able to adapt to these shifts in the population and work force.

Means. Of the futurists, only Theobald (1976) and Heilbroner (1974) discussed population control, and their solution was to control the growth of the population. No specific measures for doing so were discussed.

Social Chaos

Trends: society. Accompanying increasing change is an increase
in social chaos. This trend can be demonstrated on both the inter-
national and national levels.

From an international perspective, society is experiencing con-
tinued conflicts between the 'haves' and the 'have nots'. Advances
in the electronic media and in transportation have had a significant
impact on the rising expectation of the poorer (and formerly isolated)
populations. Rising expectations accompanied by declining opportunities
result in an increase in the level of frustration. Unfortunately
wealth and poverty are relative. Even as individuals gain more wealth,
they are continually confronted by those who in their view have more,
often causing resentment to grow. Half the world's population still
exists in dire poverty. The media provides the weak with powerful
voices and the proliferation of nuclear weapons provides them with
powerful tools. As a result, the world faces an increasing danger of
wars of redistribution.

On a national level, the problems of inflation, unemployment and
crime have reached epidemic proportions. Mass migration to the cities
has caused mass unemployment and the formation of ghettos. As cities
grow and suburbs form, the city becomes a megalopolis, which is plagued
with its own problems of coordination, jurisdiction and the provision
of services. And the individual becomes lost in the crowd.

Bell states that as information and knowledge become a source of
power and wealth, conflicts may rise between the meritocracy and the
masses. Bell defines meritocracy in this way: "...what is central to

the assessment of a person is the assumed relation of achievement to intelligence...." (1973, p. 410) Bell believes that a major issue to be resolved in the post-industrial society is how to define equality.

McHale offers the exception to the discussion of the increase in social chaos. He states that from an evolutionary point of view, the human race is evolving toward order.

> On the largest scale, the evolutionary direction of life itself seems to be directed toward increase order in the environment as information increases and accumulates. (1976, p. 20)

Trends: individual. Today, individuals are submitted to an increasing number of competing values while churches are losing their hold over individual value choices. The result is that people lack the guiding values which once provided a source of stability. Skinner (1972) says that individuals lack sound reinforcers from society. As a result, the individual is faced with alienation and anomie. In times of rapid change, it is difficult to determine individual goals, especially as the choices increase. Individuals have been subjected to a number of confidence shaking events. Individuality is threatened by the bigness represented by growth of bureaucracies and the replacement of the small town by the megalopolis.

Trends: education. Illich claims that the schools are doing their share in the polarization of society. There are those who go to school and succeed, and there are those who do not go and/or fail.

> Obligatory schooling inevitably polarizes society; it also grades the nations of the world according to an international caste system. Countries are rated like castes whose educational dignity is determined by the average years of schooling of its citizens.... (Illich, 1970, p. 13)

Means. The means for confronting the problems of social chaos

center around a more equitable distribution of resources. Bell (1973)

suggests doing this through taxes. Other suggestions include the use

of communication technologies to provide vital services to the poor

and underdeveloped countries, and by stressing education in these coun-

tries rather than industrial growth.

Post-industrial society must also come to terms with a new concept

of equality. As discussed earlier, Bell (1973) talks of the problem

between equality and meritocracy. Illich (1970) believes that society

must have equal opportunity without obligatory schooling. Skinner (1972)

says society must be fair in the use of reinforcers. It is generally

agreed that all the people throughout the world must have an equal

ability to contribute by having equal access to and fair use of the

resources they need to fully develop their potential.

Dependence on Technology

Trends: society. The futurists discuss some of the effects of

society's increasing dependence on technology. Many noted a growing

tension between technology and culture. For instance, technology demands

specialized and detailed knowledge while the general culture lacks access

to this knowledge. The effect of technology is pervasive throughout the

culture in that any technological innovation creates its own needs and

stresses on the culture.

The futurists fear technology in that its growth has tended to be

uncontrolled and single purpose. Technology is increasingly at fault

for society's ills, in the way of harmful by-products. Technology has

increased humanity's power over nature. And human needs are often

subordinated by technological needs. Through technology, society has realized comprehensive destructive potential without accompanying comprehensive social control.

Bell (1973) holds the exception to this notion by commending technology for raising the standard of living, increasing the level of production and, as a result, reducing inequality.

Means. Many of the futurists discuss a mechanism providing for technological assessment, enabling society to learn to anticipate the possible consequences of the diffusion of new technologies, and channel those technology toward social ends. McHale (1976) suggests increasing legislative and judicial vigilance over technological development.

A related means is the development of a system of social accounting that would consider the social costs and benefits as well as the monetary costs and benefits. Bell (1973) suggests imposing tax penalties on those impinging on the social good. Most futurists maintain that scientific and technological development be guided by a responsible social ethos.

Dependence on Information

Information society: trends. As information becomes increasingly pivital and a primary source of power and wealth, there will be an increased demand for educational attainment. What an individual knows may very well determine the degree of freedom that individual can exercise. As society organizes around information, physical products will decrease in value. Business will be synonymous with learning. Society may witness a time when individuals have neither jobs nor property. McLuhan (1965) suggests that man is in a process of retribalizing, this

time in the form of an information gatherer rather than a food gatherer.
The information dissemination function of the press will become syn-
onymous with the political process.

The information society may have some positive attributes. Unlike
material goods, information accummulates as it is used, it is not dimin-
ished. McHale (1976) discusses some potentially positive effects includ-
ing the spector of cooperation rather than competition, and an increased
flexibility in social uses.

Information society: trends: education. The broadcast media has
not only blurred the distinction between education, entertainment and
work; but has increased the amount of informal learning. More and more
information is obtained outside the schools. As a result, schools are
becoming more specialized and vocational, and more restrictive in the
choices they provide learners. Educational institutions are being
weakened by the increase in communications and access to information.

Information overload: trends: society. Increased information com-
pounds the problem of retrieval of relevant information, increasing
stress and complicating decision making. Information overload is also
a result of rapid diffusion of cultural information through the elec-
tronic media.

Access to credible information: trends: society. Not only do
individuals face the problem of information overload, but they face
problems in deciding what to believe. As the media becomes increas-
ingly concerned with image making, it becomes more difficult to distin-
guish the image from the reality. It is also difficult to delineate
between information and entertainment and advertising.

McLuhan (1965) claims that the electronic media numbs the senses in that it alters perceptions without the realization it has done so. His claim that "the medium is the message" results from the notion that the medium shapes and controls the scale and form of human association. (1965, p. 24) He states that we do not yet fully understand the effects of media on the culture.

Fuller (1969) refers to media bias as information pollution. McHale (1976) suggests that the oversimplification of information by the broadcast media is a form of bias. Theobald (1976) notes that the public is beginning to distrust the messages it receives. So the difficulty of an information society lies not only in the ability to sort out relevant information, but also to determine the credibility of that information.

Means. In order to cope in an information society, the methods for disseminating information need to be improved. The home computers offer a promising potential, as both a source of information retrieval and as the basis for the development of a world-wide communications network. Individuals need to be given some kind of media education which will improve skills in judgement and evaluation. They should have equal access to information through reference services, objects of education, teachers, and peers with similar interests. Illich (1970) believes that the resources of education should be controlled by the learner.

Not only do individuals need access to information but they need access to relevant information. The flexibility offered by computers may be a powerful force in the indexing of information so that it may be retrieved at will. In order to deal with the problem of increasing specialization which serves to isolate people, technical knowledge may be 'freed up' through canned specialization.

Interdependence

Trends: society. As the speed and incidence of travel and communications increases, national boundaries are becoming obsolete. McLuhan (1965) uses the term "global village" to describe the growing internationalism. The day of the rugged individualist is over, for in this society everyone is dependent on each other.

Increased interaction and instant awareness has its dangers as well as its potentials, in that as the diffusion of information and events increases, so does the speed and effects of chain reactions. The people of the world share a common culture because they share common information translated through the electronic media. This information, however, tends to be general rather than specialized knowledge and individuals may suffer from the lack of in-depth understanding.

As the society becomes interdependent so does its economy, as witnessed by the growth and dominance of multinational organizations. Politically, this interdependence has both centralizing and decentralizing effects. In a world community, more and more decisions are made in the political arena. Because people depend on each other, social decisions are taking precedence over individual decisions and as a result may soon witness a spector of world-wide regulation and world-wide provision of services.

Some decentralizing effects include increased social awareness and increased opportunity for involvement in world events through the electronic media. As institutions become more open to public inspection, problems of national security increase.

Fuller (1968) and Heilbroner (1974) offer the exception to the notion of increasing internationalism by stating that as fear and the threat of war increase, the world will tend to become more nationalized.

Trends: education. The futurists suggest that because today's children are less provential due to their exposure to the electronic media, the schools need to be less provential in the education they provide. Also, the futurists criticize education for failing to give students experience in making decisions which affect others. Students need this experience because they are growing up in a world in which more and more decisions will be made in the political arena.

Means. Because the decisions of the future will tend to be social rather than individual, society will need to improve the mechanism for resolving issues. Some fruitful areas of development include conflict management, peace research and systems thinking.

In order to provide for individual freedom in a communal society, it is vital that the social structures provide for citizen participation. This can be done by maintaining decentralized structures, by keeping them open to individual inspection, by making adequate provisions for two-way communications and feedback, by having many centers of power, by creating global communications networks to promote dialogue, and by providing individual citizens with a mechanism for action. Illich (1970) talks of the need for convivial institutions, that is, institutions which value action over consumption. Skinner (1972) in his planned society, would provide for citizen participation by making the designer part of the group.

Before the individual can be an effective participant, that individual must receive an adequate education for citizenship. People need to develop skills in negotiation, decision making, organizing and in group interaction. They must understand the nature of change and chain reactions. Subjects should be studied in depth and in terms of their interrelationships and interdependence—requiring an interdisciplinary approach rather than a specialized approach.

Individuals need to develop a sense of cooperation rather than competition and need to develop trust in the public's ability to choose. Individuals need to be socially responsible, learning to tolerate differences in others, learning to be empathetic to the needs of others and embrace the concept of social justice. Leonard (1968) says that individuals need to value sharing rather than acquisition.

Dependence on Organizations

Trends: society. A dominant complaint in today's society centers around the increase in size and scale of society's organizations. The effectiveness of these bureaucracies in meeting the future needs of the society they serve is questioned by the futurists for a variety of reasons.

First, bureaucracies tend to be fragmented and specialized. For a bureaucracy to work, the 'cogs' need to fit the 'wheel'. This is accomplished by standardization, uniformity and repetitiveness at the expense of individuality, responsiveness and flexibility.

Second, the nature of this fragmentation and specialization precludes comprehensive thinking in a world which requires comprehensive understanding. This means that in a complex world, bureaucracies will

not be able to deal with complexity. In a world requiring inventiveness,

bureaucracies negate the individual's ability to invent, because the

inventive cog tends to upset the wheel. And, as Fuller points out, in

terms of evolutionary history, specialization leads to extinction. Bell

(1973) makes this statement:

> ...as institutions grow in size and in the functions they
> have to perform, specialized and distinct subsystems are
> created to deal with these functions. With the growth of
> specialized subsystems one finds as well new, distinct
> problems of coordination, hierarchy and social control.
> (p. 173)

McLuhan (1965) suggests that increasing centralization increases

the threat of tyranny, by increasing the power of elites, by increasing

the power of those who have access to information, and by increasing the

centralization of regulatory capabilities.

The futurists also criticize bureaucracies for relying on punitive

sanctions rather than reward. Skinner calls this "aversive control,"

that is, control over people by negatively reinforcing a certain behav-

ior after that behavior is emitted.

> Thus, a slave driver induces a slave to work by whipping
> him when he stops; by resuming work the slave escapes
> from the whipping (and incidentally reinforces the slave
> driver's behavior in using the whip). (1972, p. 26)

Several of the futurists discuss the effects of technology on

bureaucracies. Bowman (1978) claims that technology has had a negative

impact by encouraging a linear approach to problem solving rather than

diverse lateral thinking. McHale (1976) claims that technology has

increased the amount of formal specialized knowledge required.

McLuhan (1965) takes a more positive position, however, by differ-

entiating between mechanical technology, which is fragmented, specialized

and linear; and electric technology which is decentralized, mosaic
and lateral. He claims the feedback capabilities of electronic tech-
nology have created an end to lineality. Because electronic energy
can be applied to many different tasks, specialization may become irrel-
evant. So the new electronic technologies may have inherently decen-
tralizing effects. These include, the ability to can specialized
knowledge, enabling increased access to information, and providing for
two-way communications. McLuhan claims that the pyramid organizational
chart is an anachronism in the electric age. (1965)

Trends: education. Educational bureaucracies face similar problems.
Bell (1973) cites the centralizing influence of the government on the
organization of education. First, education is becoming increasingly
dependent on the federal government. Also, a large amount of government
resources still go to a small number of elite universities.

The futurists are critical of the structure of education for many
of the same reasons they criticize the structure of bureaucracies. The
schools are not designed to receive feedback, there is a deference for
rank rather than knowledge, certification standards provide teachers
with the monopoly on education, and because education is so labor inten-
sive it is vulnerable to inflation.

The learning environment provided by the schools is neither general
nor lifelong. The subjects taught are specialized and lack depth.
Fuller (1969) claims that the natural spontaneity and comprehensiveness
in children is repressed by an educational system which remains special-
ized and regimented. This specialization in the learning environment
fails to increase awareness of the wider human condition, especially

since the world environment is interrelated and interdisciplinary and the electronic media which provides the majority of our information, presents this information symbolically and in depth.

Though it is vital that individuals learn to participate in choosing the direction of their lives, the schools do not provide the student the chance to participate in what she/he learns. Learning is mass produced and impersonal, the choices are prescribed and limited. Passive learning dominates in a system where teachers always teach and students always learn. The lecture precludes any chance for dialogue. The result is to stifle individuality at a young age in a time when the very nature of that individuality is threatened.

Means. Bell (1973) calls for reorganization of the work place. Schumacher (1973) suggests doing this by learn ing the art of simplicity. Society needs to be sensitive to the appropriate size and scale, allowing for humane and workable organizations. Learning to function with a multiplicity of small scale units rather than a few large scale units will require improved coordination capacity, but will also provide for democratic rather than authoritarian work places, and enable incentives to be given through reward rather than coersion.

Flexible organizations which are able to adapt and modify to changing circumstances will have the greatest chance of survival in a future of uncertainty and change. Bowman (1978) calls for organizations that are situationally interdependent in that they have the ability to adapt to their unique location or situation. As information overload hampers decision making, new structures which provide for efficient participation and accurate feedback will be required.

Schumacher (1973) talks of decentralizing production. McLuhan (1965) believes that the electronic media may make this possible by increasing adaptability, or canned specialization. Production can be made accessible by increasing internal accounting.

The futurists suggest new educational structures which accommodate participation, which are adaptable and are suited to the needs of the individual learning. Education can be democratized if the responsibility for learning is shared by students, teachers, administrators, school boards and parents. Democracy in education may also be achieved by providing for interaction and feedback between learner and educators.

Illich (1970) wants to "deschool society," replacing the school with learning centers. These learning centers would provide for student directed learning, matching peers with similar interests, using facilitators in place of teachers, and providing for a center for skill exchanges.

Materialism

Trends: society. Many futurists feel that materialism dominates our society. The nature of the market place, whether capitalism or socialism is based on the assumption of scarcity, that there is not enough to go around. This leads to competiveness and aggression. Optimism is stated in terms of production and material goods. A primary motivator is acquisition and success is measured by profits and efficiency.

The drive for economic success encourages common values which find satisfaction in mass produced goods. In order for the market to work, needs must be created faster than satisfaction, and individuals are encouraged to strive for immediate reward.

Private goods predominate over public goods. The environment is tamed and controlled for the sake of production. Humanity is lost to the market place, in that man is viewed as a component. People are accommodated to machines and they are valued only in their ability to toil. Because an individual is forced to work in order to survive, she/he does not choose to work and as a result is a slave to the system. Schumacher criticizes the economic system for it institutionalizes non-responsibility. In other words, the market is responsible, rather than the people involved.

Two futurists offer exceptions to these ideas. Fuller (1969) believes that as information and transportation become increasingly pivital, possessions will become more burdensome. Bell (1973) makes a similar observation. He suggests that the new scarcities are not material, but are information, coordination and time.

Trends: individual. Several futurists note that the individual reflects the materialistic attitudes of competitiveness, aggression and efficiency. The objective is to get more at the expense of someone else. The futurists criticize the individual for being egocentric and for failing to take responsibility. Schumacher and Theobald see growing signs of a consumer revolt against the predominance of materialistic values.

Trends: education. The futurists criticize education for reinforcing materialism. They claim that society deems the educational system successful if it produces workers who can fit into a preexisting static order, and if its students can perform a job. The primary function of higher education has been to channel human resources into the industrial system.

They claim the schools teach consumption and the value of escalation. Boulding (1964) states that formal education is centered around the acquisition of status symbols rather than the acquisition of ideas. The grading system is based on competition and thus encourages the aggressiveness needed to survive in the market place.

Materialism encourages consumption in a world which is suffering from overconsumption. It subordinates individuality in a world where individuality is already threatened. And it requires competition and aggressiveness in a world which needs cooperation and responsibility.

Conformity

Trends: society. A related concern of the futurists is an increase in conformity at the expense of diversity. Mass production and large scale organizations breed, not only materialism, but conformity. Bowman suggests that an increasingly specialized and interdependent society becomes more dependent on conformity and uniformity. The rugged individual must give way to the organizational man.

> With the further development of technology to the post-industrial phase, almost absolute social conformity will be required to preserve the technological basis for survival....Lifelong socialization must ensure that not one in ten million citizens will be disruptive. (Bowman, 1978, p. 17)

McHale and McLuhan disagree. Again by making the distinction between electronic technology and mechanical technology, McLuhan suggests that the individual will have more choices and therefore, society will be increasingly diversified.

> ...the range of choice in design, stress and goal within that total field of electronmagnetic interprocess is very much greater than it ever could have been under mechanization....

> Panic about automation as a threat to uniformity on a
> world scale is the projection into the future of mech-
> anical standardization and specialism, which are now
> past. (1965, p. 311)

McHale agrees and suggests that the culture may face problems resulting

from fragmentation of attitudes rather than homogenation of attitudes.

> ...the present cultural environment offers a great variety
> of co-existent cultural forms and lifestyles....The in-
> crease of options and choices also entails an increase in
> the range of responses and value preference. (1965, p. 54-55)

Means. To combat increasing conformity, several of the futurists

suggest ways of incorporating variety into the social process. Skinner

(1972) calls for planned diversification. Others suggest fostering values

which support variety in points of view and celebrate varieties in

people. The electronic media may be used to foster uniqueness and diver-

sity by offering a means of interaction and a source of choice. Educa-

tion can play a stabilizing role whether the fear is overconformity or

over-diversity. Education could stress individuality in several ways.

First, by valuing uniqueness rather than competition, by determining

growth based on individual standards rather than group standards, and

by stressing individual experience rather than an unquestioning accep-

tance of tradition.

Today's students need to be prepared for life in a plurality and

need to learn to interact productively with people from diverse back-

grounds.

Dependence and the Threat To Individual Freedom

Trends: society. The dependencies on technology, information,

other people and organizations, and the related effects of materialism

and conformity all pose a unique threat to individual freedom.
Individuals are increasingly vulnerable to situations which are out-
side their control. Illich points out that even the institutions
which were designed to help people have instead increased the psycho-
logical impotence of those who have come to depend upon them. (1970)

Trends: individual. As a result individuals are suffering from
anxiety and alienation, along with a decreased sense of personal power.

Trends: education. The futurists are critical of the role educa-
tion has played in the decline of individual freedom. Education has
served as a mechanism of social control rather than individual liberty.
Bowman (1978) says "the educational institution often proclaims its
effort to promote self reliance while it creates dependencies." (p. 31)
He continues to suggest that education is merely a reflection of society
when it could be a force for the improvement of society. Several of
the futurists, most notably Illich (1970) discuss the concept of the
hidden curriculum. This is the curriculum which teaches the value of
materialism, consumption and bureaucracies. It is this curriculum which
institutionalizes dependence at an early age. The educational system
decides who learns what and when they learn it. It is dominated by the
search for the right answer, rather than concentrating on the study of
ideas and the testing of those ideas. The degree means more than the
knowledge acquired. In doing this education fails to develop leadership
abilities.

Means. The futurists discuss several means for maintaining and
enhancing individual freedom. These have been classified in terms of
the economic, political, and educational system, as well as needed skills.

The essence of economic freedom centers around the ability to use one's time at one's own descretion. In order to accomplish this, individuals need to be free of mass producers and independent of bosses. Schumacher suggests that everyone have access to the means of production by keeping enterprises small and by developing "new forms of partnership between management and men, even forms of common ownership." (1973, p. 21) McLuhan advocates self employment, that is, where the choice of work is based on personal desire rather than monetary reward. He feels that electric technology may make this feasible.

> Since electric energy is independent of the place or kind
> of work-operation, it creates patterns of decentralism
> and diversity in the work to be done....the social and
> educational patterns latent in automation are those of
> self employment and artistic autonomy. (1965, p. 311)

The political system should strive to enable individuals to have a say in the forces that affect their lives. Bureaucracies need to be more representative, providing opportunities for input and feedback, they should be smaller in scope and size, and they should be more flexible.

Illich (1970) suggests that in education, learning should be voluntary. The individual should be able to set his/her own goals, have access to peers with similar interests and have access to facilitators. He claims an important first step is to make people aware of the hidden curriculum.

In order to adequately cope with freedom in the future, individuals need to develop certain skills or abilities. Individuals need to develop vision regarding the effect of present actions on the future. They need to learn to handle both the rewards and constraints of freedom. They need to learn to exercise direction over their own lives, while developing

skills which enable them to work with others in determining the
direction of democracy. Also, they need to learn to live with change
and uncertainty.

Both Skinner and Heilbroner believe that individual freedom must
not take precedence over human survival. Heilbroner fears that in
the future, freedom may not be possible.

> As the histories of ancient and modern democracies illus-
> trate, the pressure of political movement in times of war,
> civil commotion or general anxiety pushes in the direction
> of authority, not away from it. (1974, p. 108)

He suggests that society will have to "redefine the legitimate boundaries
of power and the permissible sanctuaries of freedom." (p. 137)

Skinner makes the point that we can never be free because the envi-
ronment is a source of constant control. He suggests that individuals
should be free, not from control but from certain kinds of control.
These include aversive control, which he describes as "simulated approval
and affect" used to change behavior; and inconspicuous control, that is,
controls which are not recognized as controls.

> If there is any purpose or direction in the evolution of
> a culture, it has to do with bringing people under the
> control of more and more of the consequences of their
> behavior. (1972, p. 137)

The Nature of Work, Education and Leisure

Trends: society. The futurists discuss the problems and possibil-
ities associated with changes in the patterns of work. As the organiza-
tion of work becomes increasingly automated and self regulated, fewer
workers are needed. This creates the problem of what to do with human
time, which in turn may threaten social cohesion. From a positive per-
spective this change could enable individuals the chance to find jobs

which provide commitment and fulfillment. It may also enable greater

opportunities for more education and productive leisure activities.

Trends: education. Already the pattern of education is changing.

As people find it necessary to retrain for new jobs, all ages are becoming

involved in learning. The futurists feel that despite this, the oppor-

tunities for lifelong learning are limited. The worker-learner role

is still separated, and economic institutions are ill prepared to re-

spond to the need for lifelong learning.

Means. Lifelong learning is a concept that must be embraced and

reflected in society's institutions. Learning opportunities need to be

made available from birth to death. Skinner (1972) suggests that educa-

tional opportunities be designed into society. But most important indiv-

iduals need to learn to learn and be motivated to learn.

Society must find new ways to integrate work, education and leisure.

Education can be made location free through the use of the electronic

media and its ability to provide flexibility, individualization, and

increased access. Learning should be action learning, with more breaks

between work and education, and a greater emphasis on experience and

'doing' in the classroom.

The Potential for Human Learning

Creative skills. The futurists suggest that society is failing to

make adequate use of the human creative potential. Educators need to

discover the conditions which improve creativity. Education should be

programmed for discovery rather than instruction. Exploratory behavior

and innovation need to be reinforced. The schools need to provide for

the mixing of ideas, the challenging of conformity, and neighborhoods should once again become centers of creativity. Institutions in general need to provide environments enhancing creative thought.

Intellectual skills. Though biological and genetic technologies are enabling greater control over the factors of human excellence, there is still much to learn about the learning process. Electric technology alone may have significantly altered the learning process. McLuhan (1965) suggests that the electronic media encourages high involvement and decreases the importance of visual separation and analysis. Education focuses on a narrow set of mental abilities which may prove irrelevant in the electric age. For instance, education concentrates on the linear rather than the intuitive, the verbal rather than the spatial, the deductive rather than the inductive, and tends to disregard the eye and ear man. Also, in the iconic world of the image makers, educators do not understand what conditions enable the growth of a true image.

The curriculum is structured in a way that learning is chained to a series of irrelevant tasks. The grading system assumes that knowledge can be measured.

Means. The futurists offer a number of suggestions. Education needs to understand the process by which an individual acquires knowledge. Some questions that need to be considered include: how information is associated with prior structures of understanding; how can the curriculum be tied with the structure of knowledge; how can we use what we know about genetics to increase educability; how can we structure the environment more effectively.

The futurists call for new theoretical approaches, including the development of a new cognitive paradigm, the development of an operationally effective theory of education, a technology of behavior, and a way to combine the humanistic, cognitive and behavioral approaches to learning theory.

The futurists discuss a number of intellectual skills which need to be developed. These include: analysis and logic, concept formation, interpretation, rule making, generalizing, problem solving, inference, and methodological inquiry. Several futurists also discuss the importance of media education, that is, skills to improve the individual's perceptions of technology and communication.

The What and Why of Education

Below are a list of statements made by the authors which express each author's definition of education.

1) Bell—education is the affirmation of the principle of intelligence and artistic order through the search for relatedness of discordent knowledge. (1973, p. 423)

2) Boulding—it (education) includes all those human activities in the family and in informal groups by which communications increase the total knowledge in the minds of men. (1964)

3) Bowman—education is the discovery of responsibility and the knowledge that one is even "responsible for his very desire to flee responsibility." (1978, p. 45)

4) Fuller—the educational task must be to convert man's spin-drive toward oblivion into an intellectually mastered power pull-out safe and level flight of physical and metaphysical success, whereafter he may turn his spaceship Earth's occupancy into a universe exploring advantage. (1969, p. 125)

5) Illich—education is to learn the means to acquire a new skill or insight. (1970, p. 16)

6) Leonard--education is a process that changes the learner. (1968, p. 7)

7) McHale--education is one of the cultural agents which is part of a larger movement of sensitizing and alerting their contemporaries to enlarged possibilities and wider experiences of the human condition. (1976, p. 57)

8) McLuhan--ideally education is civil defense against media fallout. (1965, 175)

9) Platt--education is deciding what kind of human nature and what kind of personal and social relations we want our children to have, so they will be able to make a better society in turn for themselves. (1966, p. 163)

10) Schumacher--education is the transmission of ideas which enable choices to be made. (1973, p. 86)

11) Skinner--education is the design of contingencies under which students acquire behavior that is useful to them and their culture. Contingencies without the troublesome by-products and that generate the behavior said to show respect for learning. (1972, p. 149)

12) Theobald--education is the process of understanding a subject from the inside so that we can participate in its further development. (p. 37)

13) Toffler--education is learning to know one's mind, to understand one's own values clearly enough to be able to make consistent effective choices. (1974, p. xxv)

Only one author, Heilbroner (1974), did not specifically discuss education. The definitions demonstrate from the futurists' perspective not only what education is, but what it is not as well.

Education is not a place. It is not limited to an age group nor a particular group of people nor nationality. Education is not a degree nor a diploma. Education is ongoing throughout life. Education is not a grade or an intelligence quotient. It cannot be measured.

Education is an ongoing process. Education is communication, it is learning to learn, it is the search for order. Education is the discovery of responsibility and the means for making effective choices. Education is for all the people all the time. Education is the means to a better society.

And just what is this better society? The ends of education category was divided into four subcategories. These categories, and the relevant statements of the authors are shown in Table 6.

The most frequently cited end of education was human survival In all, thirteen of the fourteen authors discussed education for survival. Fuller (1969) called it regineration, Heilbroner (1974) called it the will to live, and Schumacher (1973) called it permanence. The general feeling expressed was that in an uncertain future which may bring a great many difficulties, the survival ethic must predominate.

Another frequently cited end was humanity and dignity. Bell (1973) called for equality of respect; Boulding (1964), for the elimination of human misery. Skinner (1972) said that society should decrease punishment and increase compassion.

Ten of the authors discussed some form of self actualization as an end of education. Most talked of coming closer to realizing the full human potential. Fuller (1969) called for happiness and prosperity, Illich (1970) called it maturity, and McLuhan (1965) called it artistic autonomy.

Finally, seven authors talked of a learning, intellegent or knowledge society. Leonard (1968) wants a society where there is a joy in learning.

TABLE 6

Futurist Subcategories: Ends of Education

| | Author | | | | | | | | | | | | | | |
	Bell 1973	Boulding 1964	Bowman 1978	Fuller 1969	Heilbroner 1974	Illich 1970	Leonard 1968	McHale 1976	McLuhan 1965	Platt 1966	Schumacher 1973	Skinner 1972	Theobald 1976	Toffler 1974	TOTAL
Survival	Survive	Survival Change	Survival	Regin-eration	Preserve the Will to Live	Survive & Hope	Survive		Survive	Keep Alive & E-vol-ving	Perma-nence	Survival	Survival	Survive	13
Human Dignity	E-qual-ity of Re-spect	Elim-inate War & Misery	Dig-nity	Elim-inate War		Value People More than Pro-ducts	Improve the Quali-ty of Life	Learn to be Human		Non-lethal	Decrease Human Misery	Decrease Punish-ment Increase Compas-sion	Human-ity & Digni-ty	Respect and Dignity	12
Self Actualization		Live Closer to Capa-city	Ful-fill Human Poten-tial	Happi-ness & Pros-perity		Ma-turi-ty	Rea-lize Human Poten-tial Happi-ness		Artis-tic Auton-omy	Happi-ness & De-light	Utilize Human Poten-tial Self Reliant and In-dependence		Realize Poten-tial	Expand Human Poten-tial	10
Learning Society		In-crease Learn-ing Capa-city				Edu-cate World Joy in Learn-ing	Life-long Learn-ing Joy in Learn-ing			In-tel-li-gent So-ciety	Knowledge	Techno-logy of Behavior		Learn How to Learn Learn-ing Society	7

> ...the highly interactive, regenerative technological
> society now emerging will work best, indeed will require
> somethin akin to mass genius, mass creativity and life-
> long learning. (Leonard, 1968, p. 115)

Skinner calls for a technology of behavior which would enable the re-

duction of "aversive consequences of behavior and maximize the achieve-

ments of which the human organism is capable." (1972, p. 119)

Positive Uses of Technology

Though the futurists make a point of discussing many of the

dangers of technology, they also discuss the potentials of technology.

This section provides an inventory of some of these positive uses.

The next chapter will then apply this list to the potential uses

of technology in education.

Technology provides a distributive capability of unprecedented

dimensions. This capability could be used to provide many services

to even the most remote areas of the world, including medical services

and education. Technology can also provide informational services.

It has the capability of providing individuals with access to a vast

range of resources and databanks, computers serve a great retrieval

function, the micro revolution has increased preservation capacity,

and the potential exists for the development of world-wide information

networks. Communications technologies may provide transportation

functions, by serving as a means for getting products to consumers,

and through the development of automatic transportation systems.

Technologies have numerous coordination capabilities. The marriage

of the satellite and computers provide the vehicles for putting

individuals with similar intersts together regardless of location

or nationality. This technology can provide for increased interaction

for international congresses of scholars and scientists, as well

as laymen. The prospect of international cooperation in the provision

of medical and educational services may become a reality.

The electronic technologies provide flexibility. Multichannel

two-way television can provide a diverse choice of entertainment

and leisure activities, as well as educational opportunities. Com-

puters can accomodate individual needs. These technologies provide

flexibility, not only by increasing choices, but also because they

are location free. A computer terminal or television can be placed

almost anywhere.

These technologies can also provide a variety of feedback capa-

bilities. They can be interactive. Satellites can free up communications,

two-way television can increase dialogue between people and provide

a mechanism for increased participation. Feedback and two-way

capabilities may be used in the decentralization of structures,

providing for more individualization and an increased ability to meet

the demands of diverse groups of people. This feedback capability

may be of great use in futures planning. Computers, using feedback

from the environment can help improve the ability to predict. Simu-

lations avoid the cost of experience. Warning systems can be developed

to alert us to potential problem areas, whether in the environment

or social or political system. Satellites can be used to detect

areas with environmental problems.

The automatic capability of technology has potentials as well.

As computers are used to specialize and memorize, humans will be

freed to generalize, think comprehensively and exercise their creative abilities. For the first time, humanity may be released from the drugery of the routine and given the chance to fully utilize its unique metaphysical capability.

Technology can be used to make the educational process less dependent on humans, and therefore, more resistent to inflationary pressures. Technology can teach the routine and increase the rate of learning. This could free teachers to concentrate on the more rewarding aspects of education.

Development of a symbiotic relation between the human, the computer and communications technologies may provide profound opportunities. Humanity may develop new sensory ranges, enlarging the range of aural and visual images and symbol manipulation. Computers may aid in the exploration of language, memory and other mental and symbolic processes. Computers have a vast capacity to deal with complexity and can function as quasi intellegent machines. These new relationships may reshape the very concept and perception of society.

The electronic media may function as instruments to improve learning and motivation. Programming can be developed which is both motivating and instructive. Media can be used to enrich an otherwise sterile environment.

CHAPTER V

A CONTENT ANALYSIS OF

RESEARCH IN EDUCATIONAL TECHNOLOGY:

PERSPECTIVE FROM THE FUTURE

This chapter contains the results of a content analysis of the articles published in the Educational Communication and Technology Journal (formerly AV Communication Review) and the Journal of Instructional Development for the past three years. The contents of this chapter include: the attributes of educational technology and their relevance for the future, the process used to relate the educational technology literature with the futurist literature, and the definition of the educational technology categories used in the content analysis.

This study has thus far examined the trends in society and education, the ends of education, and the means by which education can help society move from where it is to where it might be, through a systhesis of the works of fourteen futurists. This chapter compares the futurists ideals to the reality practiced by educational technology, making it possible to identify what educational technology is doing and what educational technology might be doing for the future of society. Such a comparison might be done through an analysis of

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any field of endeavor. Educational technology has certain attributes which are particularly relevant to the direction of our future society.

Attributes of Educational Technology

Chapter IV identified these desirable ends of education: education should contribute to the survival of the human race; education should promote respect for humanity; education should provide individuals with the means for self actualization; and education should contribute to the creation of a learning society. Chapter IV also identified the means by which these ends may be achieved. These means are relevant to educational technology in that most involve improving the human capacity to learn.

Educational technology is a field committed to the development of the human learning potential. The Association of Educational Communications and Technology defined educational technology as

> ...a complex, integrated process involving people, procedures, ideas, devices and organization for analyzing problems and devising, implementing, evaluating and managing solutions to these problems, involved in all aspects of human learning. (AECT, 1977, p. 164)

Educational technology has demonstrated its committment to the improvement of the human learning capacity in three major areas.

The first of these centers around the study of the internal processes involved in learning. The literature in educational technology calls these processes strategies, and they include the cognitive or thinking processes and the perceptual or sensory processes.

A second area of study in educational technology concerns the

domains or spheres of learning, the contention being that learning

can be categorized in terms of learning outcomes. The literature

in educational technology discusses these three classes of learning

outcomes.

First, the psychomotor domain of learning pertains to the

manipulative or motor skill area." (Gerlach and Ely, 1971, p.46)

Some examples of skills in the psychomotor domain might include

learning to type, to tie a shoe lace, or to operate an automobile.

A second domain of learning is cognitive learning. This type

of learning pertains to "the recall or recognition of knowledge and

the development of intellectual abilities and skills." (p. 46)

Gagne and Briggs have developed a hierarchy of intellectual skills

which they categorize by complexity. The hierarchy begins with

the simplest intellectual skill, identified as stimulus response

connections. The next step on the hierarchy is a slightly more

complex skill identified as response chains, which involve the ability

to sequence a series of stimulus response connections into one

identifiable unit. The more complex intellectual skills include

discriminations, concrete and defined concepts, rule making and

problem sloving. (Gagne and Briggs, 1974, p. 23)

The third domain of learning is the affective domain. Affective

pertains to "interests, attitudes, and values, and the development

of appreciations and adequate adjustment." (Gerlach and Ely, 1971, p. 46)

The final area of study in educational technology centers around

the capabilities of the technologies available to education.

Technology is used here in the broad sense of the word to include

"any extension of man which will lighten the burden of work."

(Hoban, 1977, p. 2)

Educational Technology Attributes and Their Relation to the Future

In order to compare the futurist literature with the research

in educational technology, it was necessary to relate the means

derived from the futurist literature to the attributes of educa-

tional technology. This was done through an analysis of each

section in Chapter IV which discussed the means to desired ends,

from the perspective of the futurists. It is these means which

provide the direction for filling the gap between the present

reality and the ideal future.

Each means sections was analyzed according to the potential

attributes of educational technology which are relevant to the

concerns cited by the futurists. These attributes were formulated

by the process described by Holsti which involves moving back and

forth between the literature in educational technology and the data

provided by the content analysis of the futurists in Chapter IV.

(Holsti, 1968, p. 646)

Table 7 (The Relationship of Educational Technology Attributes

and Futurist Means) illustrates this process. Column 1 of Table 7

(Futurist Subcategories) lists the futurists categories of societal

trends which are listed in Table 1 (Relationship of Futurist Trends

and Means). Column 2 of Table 7 (Futurist Means) lists the futurist

means derived from the means sections in Chapter IV and summarized

in Table 5 (Futurist Subcategories: Means). Column 3 of Table 7

(Attributes of Educational Technology) lists the attributes of

TABLE 7

The Relationship of Educational Technology Attributes and Futrists Means

Column 1 Futurist Subcategories	Column 2 Futurist Means	Column 3 Attributes of Educational Technology
Change/Transition	Awareness of the world condition	Delivery: Improve formal instruction, information dissemination, lifelong learning Strategies: Cognitive, perceptual
	Self awareness	Spiritual Domain
	Moral education	Social Domain: Moral development
		Intellectual Domain
Short term/Long term	Ability to plan and anticipate	Intellectual Domain
	Creativity and risk taking	Aesthetic Domain
	Future focused role image	Spiritual Domain: Self awareness
Environment	Awareness of the world condition	Spiritual Domain: Awareness Delivery: Information dissemination, improve formal instruction, lifelong learning
	Moral education	Social Domain: Moral development
Population	Adaptable institutions	Decentralize: Flexible, individualize Delivery: Lifelong learning, equal access
Social Chaos	Equal distribution	Delivery: Equal access
	Redistribution of resources	Decentralize: Individualize, flexible

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Column 1 Futurist Subcategories	Column 2 Futurist Means	Column 3 Attributes of Educational Technology
Dependence on Technology	Anticipate	Intellectual Domain
	Social responsibility in technological development Vigilance Social accounting	Technological Assessment
Dependence on Information	Worldwide communications networks	Delivery: Information dissemination Dialogue: Participation, feedback
	Access to unbiased information	Delivery: Information dissemination, equal access Intellectual Domain Strategies: Cognitive, perceptual
	Equal access to educational resources	Delivery: Equal access
	Learner controlled education	Decentralized: Flexible, individualized, participation
Interdependence	Social decision making	Social Domain: Social organization
	Ability to take action	Dialogue: Participation, interaction, feedback
	Understand change and chain reaction	Delivery: Information dissemination, improving formal instruction Design: Interdisciplinary
	Social responsibility	Social Domain: Moral development
	Empathy, tolerance	Emotional Domain: Attitude

Column 1 Futurist Subcategories	Column 2 Futurist Means	Column 3 Attributes of Educational Technology
Dependence on Organizations	New organizational structure	Decentralize: Individualize, flexible, coordinate
	Systems to aid in decision making	Dialogue: Feedback, participation, interaction
Conformity	Differentiated Educational System	Design: Interdisciplinary, diversity of experience
	Prepare for life in a plurality	Dialogue: Interaction Design: Diversity in viewpoints, diversity with people
Individual Freedom	Voluntary learning Individualized learning goals	Decentralize: Flexible, individualized
	Learn to cope with freedom	Social Domain: Moral development
	Vision	
	Learn to guide own life	Aesthetic Domain: Planning, imagination Spiritual Domain: Self Awareness
Work/Education/ Leisure	Learning for all ages	Delivery: Lifelong
	Learn how to learn	Intellectual Domain
	Motivation to learn	Emotional: Motivation
	Integrate work, education, and leisure	Decentralize: Flexible, individualize Delivery: Equal access, information dissemination, improve formal instruction
	Action learning	Decentralize: Participation

Column 1 Futurist Subcategories	Column 2 Futrist Means	Column 3 Attributes of Educational Technology
Potential for Human Learning	Creative skills	Aesthetic Domain
	Community centers of creativity	Decentralize
	Improve intellectual skills	Intellectual Domain
	Understand how people learn	Strategies: Cognitive
	What condition enable accurate images	Strategies: Perceptual

educational technology which are defined in the succeeding section on pages 93-95.

The following example illustrates how to interpret table 7. The first futurist means were cited in the subcategory called Change/Transition. The futurist means cited in this subcategory included awareness of the world condition, self awareness and moral education. Educational technology could contribute to an improved awareness of the world condition through its delivery capability, which would include improving formal instruction, information dissemination and providing the mechanism for lifelong learning. Educational technology could also contribute by improving the cognitive and perceptual learning strategies.

Educational technology might improve an individual's capacity for self awareness through study of the spiritual domain of learning, which might include the effects of media on self concept and an understanding of human behavior. Educational technology could contribute to improved moral education through the study of the social domain and the higher order intellectual domain in terms of how people learn to work together, to make judgements and ethical choices.

The attributes of educational technology which are considered important from the futurist perspective include the study of the cognitive and perceptual strategies, the higher order intellectual domain and the affective domain, and the capabilities of technology. The futurists place more importance on the higher order intellectual skills such as the ability to discriminate, to define and classify concepts, to make rules and to solve problems, rather than on the

lower intellectual skills, such as stimulus response chains, and the psychomotor skills. The futurists also emphasize the affective domain. Since this domain is concerned with feelings and attitudes, it is difficult to describe and even more difficult to study. Foshay (1977) suggests that this domain is made up of four distinct domains, including the emotional domain, the social domain, the aesthetic domain, and the spiritual domain. (p. 23) This categorization scheme developed by Foshay proved consistent with the analysis of the futurist literature.

The section in Chapter IV which described the positive uses of technology provided the basis for the identification of the capabilities of technology. These capabilities included the ability to deliver information; to provide a mechanism for dialogue; to enable decentralization; and to provide unique approaches in the design of instruction.

The final category is technological assessment which is "the evaluation of technology in terms of human and social ends." (Kaufman, 1977, p. 6) This concept received emphasis from the futurists cited in Chapter IV and the literature in educational technology cited in Chapter II.

The Educational Technology Categories Defined

This section lists and defines the categories which were derived in table 7 for use in the content analysis of the educational technology literature. These categories serve as the basis for the formation of the final matrices which will be discussed in Chapter VI.

I. <u>Strategies</u>--internal processes in attending, in storing and
    retrieving information, and in organizing problem solution.
    (Gagne and Briggs, 1974, p. 9)

    A. <u>Cognitive Strategies</u>--capabilities that govern the individual's
        own learning, remembering and thinking. (Gagne and Briggs,
        1974, p. 24)

    B. <u>Perceptual Strategies</u>--the process of becoming aware of
        objects, qualities or relations by way of the sense organs.
        (AECT, 1977, p. 218)

II. <u>Domains of Learning.</u>

    A. <u>Higher Order Intellectual Skills</u>--skills which enable the
        individual to respond to the conceptualizations of the
        environment. (Gagne and Briggs, 1974, p. 23)

        1. Descriminate--the capability of making different responses
            to stimuli that differ from each other along one or more
            physical attributes. (Gagne and Briggs, 1974, p. 39)

        2. Concrete Concepts--the ability to identify a stimulus
            as a member of a class having some characteristics in
            common. (Gagne and Briggs, 1974, p. 40)

        3. Defined Concept--the ability to demonstrate the meaning
            of some particular class of objects, events or relations.
            (Gagne and Briggs, 1974, p. 42)

        4. Rules--the ability to respond with a class of relation-
            ships among classes of objects or events. (Gagne and
            Briggs, 1974, p. 43)

        5. Problem Solving--the ability to learn something which
            can be generalized to other problems having similar
            formal characteristics. (Gagne and Briggs, p. 45)

    B. <u>Emotional Domain</u>--feelings, emotions and emotional develop-
        ment (Foshay, 1977, p. 23)

        1. <u>Attitudes</u>

        2. <u>Motivation</u>

    C. <u>Social Domain</u>--the development of social organization; moral
        development (Foshay, 1977, p. 23)

        1. <u>Social Organization</u>

        2. <u>Moral Development</u>

D. Aesthetic Domain—formal, technical, sensuous and expressive response to an object of contemplation. (Foshay, 1977, p. 23)

   1. The Ability to <u>Plan</u>.

   2. The Ability to <u>Imagine</u>.

   3. The Willingness to Take <u>Risks</u>.

E. Spiritual Domain—relating to the ultimate search for meaning. (Foshay, 1977, p. 23)

   1. <u>Awareness</u>

   2. <u>Self Awareness</u>—development of a sense of significance

III. <u>Capabilities</u>.

A. <u>Delivery</u>.

   1. <u>Equal access</u> to the resources of education, information and knowledge to individuals throughout the world.

   2. <u>Information dissemination</u>.

   3. <u>Improving formal instruction</u>.

   4. <u>Lifelong Learning</u>—learning opportunities from birth to death.

B. <u>Dialogue</u>.

   1. <u>Interaction</u>—two-way communications and feedback.

   2. <u>Participation</u>—the ability to take action and to share in the responsibility for outcomes.

   3. <u>Global Communications</u>—the ability to communicate with people throughout the world.

C. <u>Decentralize</u>.

   1. <u>Individualize</u>—education suited to a learner's unique needs and abilities.

   2. <u>Coordinate</u>—the ability to create order between a multiplicity of small scale units.

   3. <u>Flexibility</u>—the ability to adapt to the uniqueness of the situation.

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D. <u>Design</u>.

    1. <u>Interdisciplinary</u>--subjects studied in depth and in terms of their interrelationships and interdependence.

    2. <u>Diversity</u>--access to variety.

        a. Variety of experience.

        b. Variety of points of view.

        c. Variety in people.

IV. Technological Assessment--(External assessment)--the evaluation of technology in terms of human and social ends. (Kaufman, 1977, p. 6)

CHAPTER VI

RESULTS AND DISCUSSION

This chapter presents the results of the content analysis of

the comparison of the needs of society as defined by selected futurists

and the real and ideal values held by educational technology. A

summary of each article analyzed and the categories designated

to that article are presented in Appendix C. Appendix D contains

Tables 8 through 19. These tables contain the results of the content

analysis, illustrating which articles in the educational technology

literature relate to the futurists categories.

Finally, the discussion comments on the areas of research in

educational technology which are adequate, more than adequate and

insufficient from the futurists perspective.

Results of the Analysis

The futurists suggest that an important need of society is

to learn more about the human ability to think and perceive.

Educational technology has contributed to this area through research

in the cognitive and perceptual strategies. Almost one-third of the

articles in this analysis studied these strategies. Of these,

17.9% concentrated on the cognitive strategies and 13.7% on the

perceptual strategies.

The futurists stress the importance of developing not only the intellectual being, but the emotional, social, aesthetic, and spiritual being as well. Of the educational technology articles analyzed, 61.5% studied these domains of learning.

The futurists stress the importance of developing the intellectual capability, by concentrating on the higher order intellectual skills, such as problem solving, analysis, rule making, logic, concept formation, interpretation, evaluation and judgement. Twenty percent of the articles analyzed fell into this category.

Of particular importance in an information society is the ability to use judgement in the interpretation of messages...that is, media education. Virtually none of the articles published in the educational technology journals dealt with media education in any form.

The futurists discuss the importance of the emotional domain as it relates to both attitude formation and motivation. Almost 20% of the articles analyzed studied this domain, with 8.5% in the attitude category and 11.1% in the motivation category.

Another important area for improved learning capacities is in the social domain. The futurists make the point that as the number of interactions increase, the effect of individual actions become more critical. Thus, it will be important to develop appropriate social skills. Included in this category are skills of social organization and moral development. Only 6.8% of the articles analyzed were classified in the social domain.

The futurists place a great deal of importance on the full development of the aesthetic (or creative) abilities. Only 6.8% of the

articles analyzed studied the aesthetic domain. The aesthetic domain

was categorized into three subcategories of abilities: the ability

to plan, to imagine, and the willingness to take risks. Only

0.8% of the articles studied planning abilities, and only 1.7%

studied risk taking. Most of the articles, 4.2%, studied imagination.

The futurists suggest that another important area of study

relates to the ultimate search for meaning, which is classified

as the spiritual domain. This domain has two subcategories: aware-

ness, or the extent to which one is aware of what is happening in

the world; and self awareness, which is defined as the development

of a sense of significance. Of the total articles published,

7.7% are classified in the spiritual domain with 1.7% studying aware-

ness and 6.0%, self awareness.

The section on capabilities examined some of the predominate

attributes of the technologies available to education in terms of

the potential contributions to the future. Almost every article

published, 98.2% studied one of these capabilities.

An important category is the delivery capability. Most of

the articles published, 61.5% fell into this category. The delivery

category was subcategorized into four subcategories: equal access,

information dissemination, formal instruction, and lifelong learning.

The greatest percentage of articles published fell into the subcategory

of formal instruction. Any articles which studied ways to improve

the nature of formal instruction fell into this category.

The next most frequently cited area was information dissemination.

This category included any articles which studied the mechanism

for disseminating information, whether through hardware or software. A total of 19.7% of the articles fell into this category.

The subcategory of lifelong learning mostly contained studies which compared the learning of students of different ages. Unfortunatly, most of these articles studied populations of traditional school age. Of the total articles published, 6.0% fell into the lifelong learning category.

In order to further examine what educational technology is doing in the area of lifelong learning, the articles were classified by the age of the subjects in the study, if this information was provided. Table 19 shows the results. As expected, almost 50% of the studies examined subjects in college, 23.6% of the studies examined subjects in the elementary grades, 9.1% examined subjects in grades seven through nine and 5.4% examined subjects in grades ten through twelve. Only 3.6% of the subjects were preschoolers, only 9.1% were adults, and no studies examined subjects 65 years or older. Over 87% of the studies analyzed subjects of traditional school age.

The futurists discuss the potential of technologies with the ability to provide previously remote and/or isolated populations with equal access to educational opportunities. This category then consisted of articles which sought ways of improving educational opportunities to underdeveloped countries and disadvantage populations within developed countries. Only 5.1% of the articles fell into this category.

Another important capability of these technologies is the ability to provide opportunities for dialogue between people. This capability

can enable individuals to interact with an unlimited number of people, and to participate in a variety of events. Another aspect of the dialogue category is global communications. Communities of scholars, congresses and citizens can now communicate and therefore increase the total sum of the knowledge worldwide. Boulding (1964) calls this the "noosphere," that is, the total content of the minds of men. Despite the dialogue capability, only 5.1% of the articles discussed its use in education, with 1.7% of the articles studying the interactive capabilities and 3.4%, the participation capabilities. Most of the later referred to ways in which students may participate more in their own learning. None of the articles discussed any form of global communications.

The futurists argue that increasing centralization poses a threat to individuality and individual freedom. Technology, if appropriately applied, may enable society to enjoy both the advantages of centralization and decentralization. In education, this can be done through individualized instruction and more flexible design and structures. Accompanying this capability is the need for adequate coordination. Over 25% of the articles fell into this category. Most of the articles in the decentralized category analyzed some form of individualized instruction. Of the articles analyzed, 19.7% fell into the individualized subcategory. Most of the work classified in this subcategory included studies of cognitive styles and aptitude treatment interaction. Only 2.6% of the articles studied the coordination potential and 3.4% studied the flexible potential of technology in education. The Personalized System

of Instruction was the subject of the majority of articles in the latter two subcategories.

The futurists also stress that in an interrelated and inter-dependent world, it is important not only to understand subjects in depth, but to understand subjects in terms of their interrelation-ships and the chain reactions of events. Individuals need, then, exposure to diversity and variety. This category is labeled the design category, and includes the subcategories: interdisciplinary and diversity. Through the new technologies, contacts with a wide variety of people and experiences are no longer limited by space or time. The design of instruction can enable instructional segments to be arranged in such a way as to give both in depth study of one subject and its relationships to others as well. This capa-bility has been used effectively in such programming as the Ascent of Man, Civilization and Connections, to name a few. This would seem to have potential for use in the instructional environment as well as the broadcast environment. However, only a very small per-centage of the articles analyzed (1.7%) studied the design capability.

Finally, the futurists stress the importance of technological assessment, that is, some form of systematic analysis of the human and social consequences related to the intervention of technology. Of the articles analyzed, 15.4% were classified in this area.

The articles were classified into four separate groups in order to provide a comparison of the ideal and real values of educational technology. These four groups were: 1) Theoretical articles,

2) State of the Art articles, 3) Empirical articles, and 4) Development Activities. The ideal and real values of educational technology could be compared by an analysis of the combination of the theoretical articles and the state of the art articles, to provide a measure of the ideal; and the empirical and development articles to provide a measure of the real.

The articles were classified into these four categories and then classified again in terms of the futurists subcategories. (See tables 14 through 17). They were then combined into theoretical/ state of the art; and empirical/development. (See table 18).

This analysis shows strikingly little difference between the ideal and real values of educational technology. Four areas are of importance, however.

First, 24.3% of the articles say educational technology should study cognitive styles, while only 15% of the articles actually study cognitive styles. Also, only 8.1% of the articles call for more studies on motivation, while 12.5% of the articles actually study motivation.

Another area, showing some discrepancy is in the delivery category. Only 10.8% of the articles call for improving the dissemination of information, whereas 23.7% of the articles actually study the dissemination of information. Over 12% of the articles call for study in the subcategory of lifelong learning compared to 7.5% of the articles which actually study lifelong learning.

A significant discrepancy exists in the category of technological assessment. Almost one-third (32.4%) of the articles call for

technological assessment, compared to only 7.5% which actually perform this kind of assessment.

Discussion

This comparision of the needs of society as defined by selected futurists and the values held by educational technology shows that only 12% of the research in educational technology was not related to a futurist value. The primary thrust of research in educational technology has been in four areas: the learning strategies (31.6%); the higher order intellecutual domain (20.5%); improving the nature of formal instruction (30.8%); and individualized instruction (19.7%). This is as expected, and indeed, many educational technologists might contend that this is as it should be. The point of this study, however, is to examine not only what educational technology values, but what it might value in order to make a more effective contribution to the society it serves.

A point consistently discussed by the futurists is that people are not realizing their full potential. This amounts to a loss to both society and the individual. Several of the futurists, most notably Fuller (1969), Illich (1970) and Leonard (1968) suggest that education actually inhibits the development of an individual's potential. Leonard goes so far as to claim that individuals use less than ten percent of their potential. Table 5 shows that eleven of the futurists urge development of the creative capacity, twelve urge development of the intellectual capacity, and all

fourteen call for greater individual awareness, self awareness and moral development.

Educational technology offers society the means for improving the individual's capacity for realizing his full potential. Much of the literature in educational technology studies the internal processes involved in learning, that is, the cognitive and perceptual strategies. The fact that almost one-third of the articles analyzed fell into these categories demonstrates that educational technology is making a significant contribution in its study of how people learn and how they acquire accurate images. However, the human being is not only a thinking being, but a social, feeling, spiritual and creative being as well. Educational technology could contribute by a greater emphasis on these other aspects of learning, and their relationship to the thinking and perceiving being.

The futurists discuss skills which will be essential to the survival of society. Though educational technology is making a significant contribution in the domain of the higher intellectual skills, there is much that needs to be done in the development of the affective skills. The literature in educational technology discusses three domains of learning: the psychomotor, the cognitive and the affective. The data of this study points to deficiencies in the research concerned with the affective domain. Educational technology needs to develop a more precise description of the affective domain. Foshay's categorization of this domain into subcategories called emotional, aesthetic, social and spiritual provides a place to begin.

The futurists maintain that the future environment will be
a more political one. This implies that the development of social
skills such as decision making, conflict management, group inter-
action and organizational behavior will be essential. Yet only
2.5% of the articles analyzed in this study were classified in the
social organization category. One particularly fruitful area
of research lies in the study of simulation and gaming techniques.
Only one article touched upon this potentially valuable area, however.

The futurists are concerned about the increasing interdependence
of society. As individual actions come to have a greater impact
upon others, the futurists suggest that more work must be done in
the development of social responsibility and moral growth. Educational
technology could play a role by providing learning situations in
which ethics and social responsibility can be explored and examined
by learners. Only 3.7% of the articles analyzed studied this aspect.

Considering the profound effect of media on the shaping of
attitudes, educational technology could provide teachers with
strategies for helping students understand the impact of media
on attitude formation. Media can be used as a tool of propaganda
or as an instrument of individual freedom. Seven of the futurists
noted society's growing dependence on information. Bell (1973)
suggests that credible information will be the most valuable com-
modity in the post-industrial society. Democracy cannot survive
unless all individuals have access to information which they can trust.
The educational system has a responsibility to protect society from
propaganda. Educational technology has the responsibility to provide

teachers with the techniques for teaching students to judge the information they receive and its effects upon their attitudes. However, not one article in the educational technology literature reviewed for this study discussed this kind of media education.

The futurists are concerned about the individual's ability to make full use of creative skills. This study has outlined some of the many difficulties which face society, including the need to cope with rapid change, environmental and population problems, social chaos and increasing dependence. In an uncertain future, creative solutions will be essential not only for society at large, but for the individual as well. Several of the futurists have suggested that education inhibits development of the creative potential at the expense of socialization. Educational technology offers society a rich opportunity to make better use of the individual creative potential through study of the aesthetic domain, and in the development of learning environments and strategies which stimulate and develop creative skills. However, only 7.5% of the articles analyzed studied the aesthetic domain of learning.

All fourteen futurists discuss the impact of change on society, and the need for the individual to stay abreast of change, while maintaining a sense of significance in the midst of increasing dependence and uncertainty. Educational technology might explore some techniques for providing individuals with ways to have access to greater amounts of information, and the ability to process this information.

Normally, educational technologists approach solutions to instructional problems by analyzing the problem in light of the techniques available. One purpose of this study is to encourage an alternative approach. That is, to search for solutions by first examining the capabilities of technology, and then think about the possible instructional problems these capabilities might solve. The analysis of the futurist literature in this study contained an inventory of some of the positive uses of technology. These were categorized into capabilities including: delivery; dialogue; the ability to decentralize; and alternative designs. It is the contention of this author that educational technology should explore these capabilities of technology in light of the potential learning problems they might solve.

Delivery

More and more of the information individuals receive comes from outside the school, and much of this information comes from the broadcast media. The marriage of satellite distribution and cable television programming assures the continuation of this trend. These new applications of media may provide many of the the functions that the school presently provides. Educational technology needs to question whether this function should be left solely to the image makers. Educational technology needs to become involved in the administration and politics of developments in cable and broadcast television. In thinking of the distribution of educational services, educational technologists should begin thinking beyond the limits

of the traditional school walls. There are no longer time, distance

or spatial limits on the distribution of educational services.

In an information society, learning becomes a full time, life-

long occupation. However, most of the research in educational

technology is still directed toward the traditional school student

in the traditional school setting. Because of the delivery capabilities

of the electronic technologies, educational technolgy could become

a demonstrable force in the development of lifelong learning ac-

tivities. Educational technologists could cooperate with adult or

lifelong educators in the provision of educational opportunities

virtually uneffected by time or distance constraints. The futurists

discussed the potentials of a new relationship between work, education

and leisure activities. Educational technology could provide the

mechanism which would enable workers to keep pace in rapidly changing

fields, to retrain in times of unemployment and to have access to

a variety of educationally enriched opportunities. The technologies

available to education provide society with the capability of

developing a society committed to learning.

The preschool years are rich years for educational growth.

Educational technology, in cooperation with early childhood educators,

could explore opportunities for providing learning experiences to

preschool children. This might serve a dual function. As the number

of working mothers increases, such an endeavor could provide an

enriched environment for preschool children while their parents

are at work. At the other end of the life cycle, educational

technology might provide new opportunities for the elderly in at least two ways. First, by providing special educational instruction suited to the needs of the elderly; and second, by giving society a chance to benefit from the vast experience of its older citizens by providing them with a means to contribute unhindered by time or distance limitations. Educational technology can cooperate with adult educators and psychologists to consider ways of meeting the unique learning needs of the adult learner.

A major problem cited by the futurists confronting society is an increase in social chaos. Many futurists blame this on the differences which arise between the haves and the have nots. Heilbroner (1974) fears that society will face an increase in wars of redistribution. Ideally all people should have equal access to the resources of education. Education is an important means of upward mobility. Since the electronic technologies virtually eliminate distance problems, educational technology could play an important role in the delivery of education to underdeveloped nations, and to the impoverished people living in the developed nations. Only 7.5% of the articles analyzed in this study explored this potential.

Dialogue

The futurists contend that individuals need to participate in the events which effect their lives. Illich (1970) has criticized education for failing to allow learners to participate in the direction of their own learning experiences. These futurists

question whether people will develop the ability to participate

if the educational system in which they grew up bars participation.

Educational technology can provide unique opportunities for increased

participation in two ways: by using the unique feedback capabilities

of the electronic technologies; and by developing ways to build

participation into learning experiences. Only 3.7% of the educational

technology articles analyzed explored this possibility, and the

Personalized System of Instruction was the dominant theme of these

articles.

Educational technology might explore its potential role in the

development of a global communications network, making possible the

meetings of international congresses of scholars, economists, students,

and interested citizens. Technology could be used to improve

communications among the many disciplines through the delivery

and feedback capabilities of two-way television and the storage

and retrieval capabilities of computers.

Decentralize

Of the articles analyzed in educational technology, 22% explored

the possibilities of individualized instruction. This is indeed

an area of vast potential for educational technology. It has been

stated in this discussion several times that the futurists urge

the development of the full human potential, regardless of individual

differences. It is possible that one day education will be adapted

to a learner's unique learning style and needs. The cooperation

of educational technology and special education could stimulate

useful practices in meeting the learning needs of special learners.

The technologies offer flexibilty in the learning process not only by eliminating time and distance constraints, but by adapting to individual learners' needs. As learning becomes increasing individualized, coordination capabilites may become more important. Computers provide powerful record keeping and summarizing capabilities, and may prove essential in the administration and organization of educational services for the future.

Design

The futurists have emphasized the need for individuals to have access to variety: variety in experience; variety of points of view; and access to a variety of people. The editing capability of the electronic technologies provide the ability to organize variety. Subjects can be presented in terms of their interrelationships. Individuals can interact with people from diverse backgrounds and nationalities, with different points of view, all in a single setting. Educational technology might explore how this capability can be more fully utilized in the learning environment.

A final important concern of the futurists involves the concept of technological assessment, the study of the potential human and social effects of technological intervention. The effects of the diffusion of technology on society have been no less than profound. The effects of technologies yet to be developed may be unprecedented. Capabilities resulting from developments in such areas as computer science, genetic engineering and behaviorism have both potentials and risks. Over thirteen percent of the articles published in

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educational technology discussed technological assessment. Perhaps
100% of the articles should consider the human and social implica-
tions. In "Educational Technology and Human Values," Hoban warns
that human values must be considered in the planning and use of
technology. Educational technology, if it becomes machine rather
than human oriented, will fail to make significant improvements, and
the profession will lack any common committment to a broad educational
philosophy. He goes on to ask these pertinent questions:

> Does our responsibility terminate at the end of the media
> supply line, as if we had intrinsic values independent
> of human design and human consumption? Are we encouraging,
> supporting and producing needed instructional materials
> in our graphics labs, or recording studios, when conscien-
> tious teachers set out to develop technologies of instruction
> after it has become evident that old technologies have
> failed miserably? Do we join them, give our talents with
> insight and enthusiasm? (1977, p. 240)

The capabilities of technology in education go beyond the
simple use of the machine technologies, but rather include the
entire structure of the learning environment. Hoban says that there
are two classes of technology. Physical or machine technology
is that which is "energized through the mechanical, chemical or
electric process." (p. 223) And social technology, which is the
"patterning of the organization of people, the power of authority,
rules and regulations of the flow of operation and the structure
of careers by other people." (p. 223)

> The central point of all this is that technology is not
> simply an array of gadgets or an assortment of techniques.
> It is a system with strong and diverse psychic effects.
> This holds for all technology, including communications
> technology of which education and instructional technology
> are only one element. (p. 224)

Our machine technologies provide many capabilities including delivery, dialogue, decentralization, and diversity. Our social technologies can provide these capabilities as well through the structuring of the learning environment in terms of who has access, what they have access to, the formation of groups, the ability to interact and participate, the opportunity to experience variety, and the right to realize their full and unique potential.

Summary

Many of the future developments in society will require non-traditional approaches to education. People of all ages, nationalities and abilities need access to the resources of education. Individuals need to take part in educational activities not only at school, but at home and at work. Meeting the complex educational needs of the future will be a challange. So many of the technologies available could help educators meet this challange. Educational technology should be at the forefront...leading the way in meeting the educational needs of the future. But it is not. Most of the research analyzed in this study was concerned with the traditional school student in the traditional school setting. More and more of the education individuals receive comes from outside the school. Educational technology should be active in the policy and administration of these alternative forms of education made possible through such innovations as cable and broadcast television. But it is not. Most of the research analyzed in this study was concerned with only the education that takes place in the school system.

It was not the intent of this study to offer conclusions, but rather to provide the reader with a framework for envisioning educational technology as an important and vital force in the creation of a desirable future for both society and the individual.

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GLOSSARY

Content Analysis--any technique for describing in systematic form the content of communications.

Construct--a concept, defined in terms of events, used to account for regularities or relationships in data.

Construct Validity--the ability to uncover the meanings of events.

Disciplined Subjectivity--a type of reliability which is achieved by being in touch with a large number of participants; making sure sampling is representative in terms of the situation; synthesizing the various experiences of the participants to comprehend the subtleties of their actions, thoughts and feelings; and systematically seeking to understand actions from the different perspectives of the various groups of participants.

Documentation--a method of observing, recording, describing and analyzing human action.

Ethnographic techniques (also referred to as anthropological, constructivist and phenomenological--an extensive description and interpretive effort at explaining a complexity through some variety of participant observation.

Logical-Positivist Approach--the view that the methodology developed in the natural science (rules of experimental design and technical procedures of measurement and statistical analysis) is applicable to the study of social events and processes.

Purposive sampling--a form of nonprobability sampling which assumes that with the use of good judgement and appropriate strategy, one can handpick the cases to be included in the sample and develop samples that are satisfactory to one's needs.

Reliability--consistency in results.

Snowball sampling--informant information which leads the researcher to other persons.

Understanding approach to reliability--the attempt to pull together hints, consistencies and patterns, providing a set of inferences.

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APPENDIX A

Survey Questionnaire

October 11, 1979

Dear Sir/Madam:

I am working on the proposal for my doctoral dissertation in the field of Educational Technology and I need your help.

I am interested in finding ways in which my field can help in the achievement of a desirable future by asking the question "Do we in the field of Educational Technology value the kinds of things we should value, as defined by those who study the future?" I will answer this question by comparing the content of pertinent works in futures and educational technology. This is where you can help.

On the next two pages, you will find a list of fifty "futures" books. PLEASE CHECK THE TEN YOU FEEL ARE MOST PERTINENT IN TERMS OF WHAT THEY HAVE TO SAY ABOUT DESIRABLE FUTURES AND WAYS OF ACHIEVING THESE. Please add any books you think are missing. From lists such as the one you will provide me, I will select the ten most cited books as the source for my content analysis.

If you would like a copy of the results of my study, please include your name and address. Thank you very much for your help.

Sincerely,

Connie Greb Dillon

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____ Thomas, John. LEARNING CENTERS.

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APPENDIX B.

Survey Results

Results of

Citation Analysis

Rank Order	Number Selected	%	Author	Title	Date of Publication
1	31	70	Bowman	THE FAR SIDE OF THE FUTURE	1978
2	22	50	Toffler	LEARNING FOR TOMORROW	1974
3	20	45	Heilbroner	AN INQUIRY INTO THE HUMAN PROSPECT	1974
5	18	41	Illich	DESCHOOLING SOCIETY	1970
5	18	41	Leonard	EDUCATION AND ECSTASY	1968
7	15	34	McHale	THE CHANGING INFORMATION ENVIRONMENT	1976
7	15	34	Platt	STEP TO MAN	1966
7	15	34	Schumacher	SMALL IS BEAUTIFUL	1973
10	14	32	Bell	THE COMING OF THE POST INDUSTRIAL SOCIETY	1973
10	14	32	McLuhan	UNDERSTANDING MEDIA	1965
10	14	32	Theobald	AN ALTERNATIVE TO AMERICA'S THIRD CENTURY	1976

Rank Order	Number Selected	%	Author	Title	Date of Publication
12	13	29	Skinner	BEYOND FREEDOM AND DIGNITY	1972
14	12	27	Boulding	THE MEANING OF THE TWENTIETH CENTURY	1964
14	12	27	Fuller	OPERATING MANUAL FOR SPACESHIP EARTH	1969

APPENDIX C

Summary of Articles and Rationale for Category Selection

State of the Articles

1) *ACVR Vol. 25, No. 1
   Schwen, Thomas
   Professional scholarship in educational technology-criteria
   for judging inquiry, pp. 5-22.

   Description: "This article is directed to the publication
   criteria by which scholarly activity in educational technology
   is judged. (p. 5) The central arguement of this article is
   that underlying all three professional roles research, devel-
   opment and practice is one function inquiry. (p. 7) This
   article has been directed primarily toward judging inquiry
   that is subsumed by the scientific goal of prediction." (p. 22)

   Categories: None

2) AVCR Vol. 25, No. 2
   Becker, Ann DeVaney
   Alternate methodologies for instructional media research, pp.
   181-194.

   Description: "In this paper, I will attempt to describe vari-
   ables overlooked by the s-r model, to offer alternative methods
   that include these variables and to explicate one alternate
   method." (p. 182) Neglected variables: intention--the learner
   has an inner life, gives meaning to outward acts and expresses
   purpose in movement. . . use of language rather than numbers;
   action-movement that is inner directed not as reaction. . .
   observe and record human actions; situation-action described in
   relation to the field in which it exists.

   Categories: Spiritual Domain: Self Awareness

3) AVCR Vol. 25, No. 3
   Kerr, Stephen T.
   Are there instructional developers in the schools? A socio-
   logical look at the development of a profession, pp. 243-267.

   Description: "If practitioners in the field of educational
   communications and technology sincerely believe that their
   contributions to teaching via instructional development can
   make a difference, then it is up to them to see that teachers
   become aware of instructional development and that they use
   LRS more fully as an instructional developer." (p. 265)

*AVCR - AV Communication Review

Categories: Delivery: Improving Formal Instruction

4) AVCR Vol. 25, No. 4
    Torkelson, Gerald M.
    AVCR - One quarter century: evolution of theory and research,
    pp. 317-358.

    Description: A report on the observation of trends, contro-
    versies, and areas for further consideration. Three questions:
    Who are we as a profession as exemplified by our choice of
    terminology, our stated purpose and our theoretical foundations?
    What have we done? Has AVCR made a difference in education?

    Categories: Technological Assessment

5) *ECTJ Vol. 26, No. 1
    Salomon, Gavriel
    On the future of media research: no more full acceleration in
    neutral gear, pp. 37-46.

    Description: "I see media research in the future focusing more
    on the educational potentialities of the distinguishing
    qualities that cut across media in interaction with personal,
    social and cultural qualities and aiming at the generation of
    limited theories": (p. 45) interactive theories, cultivating
    the mastery of mental skills, media attributes that cultivate
    a different set of abilities, situational differences, cultural
    differences and technological differences in relation to
    individual differences.

    Categories: Higher Order Intellectual Skills
                Individualized
                Technological Assessment

6) ECTJ Vol. 26, No. 1
    Sceiford, Mary
    Television for learning: future research opportunities,
    pp. 55-63.

    Description: Research in instructional TV must be related
    to theories, processes and conditions of learning. Include
    pre-school, college and adults. Research and Theory: needs
    organization of communication networks among researchers,
    left brain/right brian/dimensions of television in relation
    to verbal knowledge, intellectual skills, attitudes and
    values, imagination and play; types of instruction, color,
    cues and motivation in relation to design.

*ECTJ - Educational Communication and Technology Journal

Categories: Individualized
                Emotional: Attitudes
                          Motivation
                Aesthetic: Imagination
                Social Domain: Moral Development

7) ECTJ Vol. 26, No. 1
Wagner, Robert W.
Film research: the need for a new breed, pp. 65-78.

Description: Need a comprehensive theory of film. "Consider image with its underlying image-making and image consuming drive in urgent need of comprehensive study as a possibly evolutional phenomenon reflecting and shaping the mental and physical development of people throughout the world. An increasingly amount of life time and life space is occupied by the media experience." (p. 75)

Categories: Cognitive Strategies
                Perceptual Strategies
                Technological Assessment

8) ECTJ Vol. 26, No. 1
Hall, Keith A.
Computer based education: research, theory and development, pp. 79-93.

Description: Computer Based Education provides: a no nonsense learning environment, predetermined scope and sequence of individual adaptive programs, student selected schedule and pace, student control of own progress, impartial judgment of student responses, record keeping and summarizing power, interaction, and simulations.

Categories: Dialogue: Interaction
                          Participation
                Decentralized: Individualize
                          Coordinate
                Delivery: Dissemination of Information

9) ECTJ Vol. 26, No. 2
Kaufman, Roger
From how to what to why: the search for educational utility, pp. 107-121.

Description: "The requirements for survival and contribution in our society, now and in the future, should be the referent for determining needs, analyzing needs, determining requirements identifying and selecting means, designing and implementing needs, evaluating effectiveness and efficiency and revitalizing and renewing the system." (p. 116)

Categories: Technological Assessment

10) <u>ECTJ</u> Vol. 26, No. 2
   Branson, Robert K.
   Instructional development, pp. 123-132.

   Description: "The technology of instructional development
   is advancing at a slow but steady rate; it is, however,
   underutilized in the educational systems." (p. 131) Needs:
   an approach to achieve the definition and acceptance of out-
   come goals by politically affected parties, research-based
   principles on how to teach faithfully executed by the instruc-
   tor, discretionary development funds in learning materials,
   delivery systems opportunities that will increase directly
   as a function of requirements that specifically state desired
   results, quality-control.

   Categories: Cognitive Strategies
               Delivery: Improving Formal Instruction

11) <u>ECTJ</u> Vol. 26, No. 2
   Morgan, Robert M.
   Educational technology--adolescence to adulthood, pp. 142-152.

   Description: "We need the means of making immense improve-
   ments in educational accomplishments. This end must be
   attained with human and material resources presently available
   and affordable. The processes and products of educational
   technology must be included in this inventory of resources so
   it can contribute to the quickening the pace of educational
   improvement. As long as the approches of educational tech-
   nology are responsive to the changing problems in education,
   this new discipline will have its raison d'etre. . . other-
   wise it will be replaced by more relevant ideas." (p. 151-
   152)

   Categories: Technological Assessment

12) <u>ECTJ</u> Vol. 26, No. 2
   Kerr, Stephen T.
   Change in education and the future role of the educational
   communications consultant, pp. 153-164.

   <u>Description:</u> "I will argue here that people working to
   achieve change through educational communications, while
   recognizing the importance of student-teacher interaction
   have not recognized the centrality of social interaction

among educators. Further, two key trends in education offer
the educational communications consultant unusual oppor-
tunities to take a broader and more effective role in pro-
moting change, if there is increased awareness of the social
interactions inherent in that role": (p. 153) increase
ecological research and increased specialization.

Categories: Decentralize: Coordinate

13) ECTJ Vol. 26, No. 2
Clark, Richard E.
Doctoral research training in educational technology, pp. 165-
173.

Description: "The number of skills required to conduct intelli-
gent research has increased enormously during the past decade.
It appears, however, that such skills have not been applied to
the design and conduct of much research in the field of educa-
tional technology." (p. 165)

Categories: None

14) ECTJ Vol. 26, No. 2
Silber, Kenneth H.
Problems and needed directions in the profession of educational
technology, pp. 174-185.

Description: This article focuses on the present status of
the field to determine the degree of professionalization
that has been developed, to review the historical development
of the status and to suggest problems that must be met and
some possible solutions that might be developed in order to
move the field further in the direction of a true profession.

Categories: None

15) ECTJ Vol. 26, No. 2
Goldberg, Albert L. and Grimes, George H.
Research and the practitioner at the regional Education Service
Agency, pp. 186-192.

Description: "At the regional level we have separate concerns
with trends, organization change, theory, communication and
other issues that have necessary input for improving the leader-
ship and conduct of instruction at the local level. (p. 190)
In behalf of these concerns, we need and want theory, research
and development addressing these. We believe future research

and publication efforts would do well to reflect the range of concerns and problems faced by practitioners and more importantly, by policy ends." (p. 191)

Categories: Delivery: Formal Instruction
            Decentralize: Coordinate
                          Flexible

16) ECTJ Vol. 26, No. 3
    Grayson, Lawrence P.
    Education, technology and individual privacy, pp. 195-206.

    Description: "In developing and applying technology to education, potential effects must be analyzed, so that negative possibilities can be identified and overcome before major resources are committed to projects that could produce undesirable long term social consequences." (p. 204)

    Categories: Technological Assessment

17) *JID Vol. 1, No. 2
    Diamond, Robert M.
    Research, theory and instructional development: a view from the trenches, pp. 2-5.

    Description: "It is the understanding of existing research combined with experience that allows a developer, playing his [her] hunches, to make the right decisions. Faced with the pressures of rapid implementation and limited time and resources I propose the following working relationship: utilize the indepth approaches when attempting to find out why certain elements are not working or why certain students are not learning." (p. 3)

    Categories: Delivery: Improving Formal Instruction

18) JID Vol. 1, No. 2
    Davies, Ivor K.
    Instructional development: fruit fly or lemming?, pp. 5-9.

    Description: "What is necessary is that instructional developers re-assess the basic paradigms and models of ID, returning the whole process as necessary. The serious question is whether ID can be content upon an approach in which people

*JID - Journal of Instructional Development

appear to be but a variable to be manipulated, rather than
as a given with a rich potential to be realized." (p. 8)

Categories: Technological Assessment

19) JID Vol. 1, No. 2
Reigeluth, Charles M., Bunderson, C. Victor, Merrill, M. David
What is the design science of instruction, pp. 11-16.

Description: "This paper is an attempt to identify what
instructional science is and what instructional scientists
do. The fundamental purpose of instructional science is to
contribute to improve the quality of instruction." (p. 11)

Categories: Delivery: Improving Informal Instruction

20) JID Vol. 2, No. 1
Gustafson, Kent
The future of instructional development--through the looking
glass darkly, pp. 2-5.

Description: "I think the ID movement must seriously re-examine
its basis of existence and modus operandi. I believe ID can
have a future and it can make a significant contribution to
education through the development of effective instruction."
(p. 5)

Categories: Delivery: Improving Formal Instruction
                       Technological Assessment

21) JID Vol. 2, No. 1
Silber, Kenneth H.
Instructional development: deliverance, pp. 2-5.

Description: "The goal of ID is to provide effective, efficient,
relevant instruction at a reasonable cost using a systematic
process of designing, implementing and evaluating the instruc-
tion, a process based on sound learning and instructional
theory." (p. 2)

Categories: Delivery: Improving Formal Instruction

22) JID Vol. 2, No. 1
Boutwell, Richard C.
Scientific notation in instructional design

Description: The adaptation of a notation system that is
generalizable to all instructional designers will allow and
encourage a common communication base. Strategy rules can
be developed and then explained to varying target populations
for strategy adaptations.

Categories: Delivery: Improving Formal Instruction

23) <u>JID</u> Vol. 2, No. 2
Patridge, Mark I. and Tennyson, Robert D.
Graduate education in instructional systems: a review of
selected programs

Description: "As a result of both academic and societal
needs for ID, there has been an increase in university
graduate programs. The purpose of this report is to
describe and contrast selected graduate programs so that
patterns and directions of this emerging field can be
examined by the community of educational researchers."
(p. 18)

Categories: Technological Assessment

24) <u>JID</u> Vol. 2, No. 3
Boutwell, Richard C.
Instructional systems development in the next decade, pp. 31-35.

Description: "We in academic settings must examine our pro-
cedures, our techniques, and our limitations. Then we can
discover our professional direction and determine if it is
in fact congruent with our abilities and goals. This paper
examines one of the cornerstones of instructional systems
design; models of design and development as they translate
and dictate the instructional processes." (p. 31)

Categories: Technological Assessment

25) <u>JID</u> Vol. 2, No. 4
Durzo, Joseph J., Diamond, Robert M., and Doughty, Philip L.
An analysis of research needs in instructional development,
pp. 4-10.

Description: "This article represents a step toward the
establishment of a research agenda focused on the practice
of instructional development. (p. 4) Some of the key
questions that are, as yet, unanswered by research and
scholarly inquiry, will be posed as a tentative basis for
a research agenda for the field of instructional develop-
ment. We know a great deal about how to facilitate and
evaluate learning, but we need to know more about how to
initiate support and assist with the instructional change
process in higher education, if our knowledge is to bear
on the task of improving instruction in higher education."
(p. 10)

Categories: Improving Formal Instruction

26)   AVCR   Vol. 25, No. 3
      Hoban, Charles F.
      Educational technology and human values, pp. 221-241.

      Description: "Explicity, the major theme that a symbiotic
      relationship exists between educational technology and
      human values and that in this symbiosis human values are
      or should be invariantly transcendent. (p. 239) Lasswell's
      set of eight basic values: affection, enlightenment,
      rectitude, respect, skill power and wealth, well being,
      malignant self centeredness.

      Categories: Higher Order Intellectual Domain (enlightenment)
                    Emotional Domain: Attitudes (power & wealth)
                    Social Domain: Moral Development (rectitude,
                        affection, respect)
                    Spiritual Domain: Self Awareness (well being)
                    Technological Assessment (malignant self
                        centeredness)

Theoretical Articles

1) AVCR   Vol. 25, No. 1
   Hsia, H. J.
   Redundancy: is it the lost key to better communications

   Description: "This article suggests that the key to better
   human communications lies in the determination of the optimal
   redundancy rate and extensive use of between-channel-redun-
   dancy, which is defined as the redundancy rate between
   auditory and visual information (also auditory-olfactory,
   visual-tactile)." The conclusion offered is that the man-
   ipulation of redundancy is the key to the understanding of
   information processing, intelligence and communication.

   Categories: Cognitive Strategies
                 Delivery: Information Dissemenation

2) ECTJ   Vol. 26, No. 1
   Norberg, Kenneth
   Perception theory: does it make any difference?, pp. 5-13.

   Description: This article proposes that perception theory
   can make a difference for learning psychologies and instruc-
   tional systems designer, if there is recognition of some
   common ground between perceptual theory and learning behavior.

   Categories: Cognitive Strategies
                 Perceptual Strategies

3) ECTJ   Vol. 26, No. 1
   Levie, W. Howard
   A prospectus for instructional research on visual literacy,
   pp. 25-36.

   Description: This article suggests that the key question for
   researchers is "What mental operations can be represented
   pictorally?" Discussion centers around media literacy which
   is defined as the ability to interpret the information avail-
   able in the stimulus and to develop new mental skills; and the
   iconoic mode which consists of external, perceptual represen-
   tation (pictures) and internal mental representation (imagery)
   and the connections between them.

   Categories: Cognitive Strategies
                 Perceptual Strategies
                 Higher Order Intellectual Domain

4) ECTJ   Vol. 26, No. 1
    Hill, Harold E.
    Communications research and instructional technology, pp. 47-54.

    Description: Suggests that instructional technologies need
    to apply sound communications principles and theory to the
    use of their media. The schools need to teach more about
    communications than reading and writing (example: visual
    literacy). Schools need to adapt to the need of learners
    of all ages.

    Categories: Cognitive Strategies
                 Lifelong

5) ECTJ   Vol. 26, No. 2
    Thiagarajan, Sivasailam
    Instructional product verification and revision: twenty
    questions and 200 speculations, pp. 133-141.

    Description: This article offers some speculations regarding
    the systematic assessment of the worth on an instructional
    product in order to provide a base for decision making related
    to the improvement of the instructional product.

    Categories: Delivery: Information Dissemination
                            Technological Assessment

6) ECTJ   Vol. 26, No. 1
    Wicker, Frank W.
    Our picture of mental imagery: prospects on research and
    development, pp. 15-24.

    Description: This article suggests that imagery mediation
    may act as a powerful facilitator of learning and memory.
    Imagery seems to aid in learning and memory specifically in
    terms of rule making, concept formation, problem solving,
    self concept, emotions, attitude and creativity.

    Categories: Cognitive Strategies
                 Perceptual Strategies
                 Higher Order Intellectual Domain
                 Aesthetic Domain: Creativity
                 Emotional Domain: Attitudes
                 Spiritual Domain: Self Concept

7) ECTJ Vol. 26, No. 4
Ausburn, Lynna J. and Ausburn, Floyd B.
Cognitive styles: some information and implications for
instructional design, pp. 337-354.

Description: The purpose of this article is to discuss
some implications of individual differences variables known
as cognitive styles as an important factor in designing
instruction.

Categories: Cognitive Strategies
            Individualize
            Delivery: Improving Formal Instruction

8) ECTJ Vol. 27, No. 3
King, Daniel W. and King, Lynda A.
Stimulus as a random factor in analysis of variance: increasing
the generalization of findings, pp. 179-184.

Description: This article suggests that in the design of
studies having educational variables, more attention needs
to be given to recognizing the universe of generalizations
and to include into the design a variable that represents
the universe.

Categories: None

9) ECTJ Vol. 27, No. 4
Marsh, Patrick O.
The instructional message: a theoretical perspective, pp.
303-318.

Description: This article suggests: 1) adapt information
relevant to learners needs and capacities, 2) compromise
between boredom and overload, 3) provide for the anticipatory
schemata that prepare the perceiver to accept certain kings
of information, 4) and take into account the complex, syste-
matic, and uniquely human processes of cognition.

Categories: Cognitive Strategies
            Perceptual Strategies
            Motivation
            Individualize
            Information Dissimenation

10) <u>JID</u> Vol. 2, No. 3
Reigeluth, Charles M.
In search of a better way to organize instruction: the
elaboration theory, pp. 8-14.

<u>Description</u>: The purpose of the article is to present
the elaboration theory of instruction as an alternative
to the standard way of organizing instruction based on
hierarchical task analysis. Elaboration theory suggests
that instruction should start with a general presentation
or overview and then proceed to add detail or complexity.
The result should be higher levels of learning, synthesis,
retention and affect.

Categories: Higher Order Domain
            Delivery: Improving Formal Instruction

11) <u>JID</u> Vol. 2, No. 4
Keller, John M.
Motivation and instructional design: a theoretical perspective,
pp. 26-34.

<u>Description</u>: "The purpose of this paper is to present a
theoretical approach to understanding motivation in relation
to other factors that influence learning and the design of
instruction." (p. 26) Four factors in motivational strategy
are: interest, relevance to personal values, expectation,
and outcomes.

Categories: Emotional: Motivation
            Delivery: Improving Formal Instruction

Development Articles

1) ECTJ Vol. 27, No. 1
   Kiesling, Herbert
   Economic cost analysis in higher education: the University
   of Mid-America and traditional institutions compared, pp. 9-24.

   Description: Discusses a methodology for and the problems
   inherent in analyzing the economic costs of educational in-
   stitutions.

   Categories: None

2) JID Vol. 1, No. 1
   Kaufman, Roger
   Needs assessment: internal and external, pp. 5-8.

   Description: "The external needs assessment is suggested
   as a rationale and logical starting place for organized
   effort [including learning design] in that it studies and
   identifies skills, knowledges and attitudes which are
   important outside the school and uses that information
   as a basis for educational design and effort. Internal
   needs assessment goes from that point forward to identify
   objective methods and means to meet those required and
   desired outcomes. This article strongly urges that internal
   needs assessment be augmented with external needs assess-
   ment data and information." (p. 8)

   Categories: Technological Assessment
                Delivery: Improving Formal Instruction

3) JID Vol. 1, No. 1
   Gagne, Robert
   Types of capabilities and learning hierarchies in instructional
   design

   Description: "There are some general decisions to be made in
   the design of a program of training for instructional develop-
   ment specialists:" (p. 8) the task required of people in the
   field; what kinds of learnable human capabilities are involved;
   classification of these competencies; and determination of
   the technique designed (i.e., intellectual skills and enabling
   skills).

   Categories: Delivery: Improving Formal Instruction

4) <u>JID</u> Vol. 1, No. 1
   Merrill, M. David
   Content analysis via concept elaboration theory, pp. 10-13.

   <u>Description</u>: "The purpose of this presentation is to pro-
   pose a distinctive alternative to learning hierarchies and
   the frequently used procedures for sequencing and organizing
   subject matter content based on this approach (p. 10): con-
   cept elaboration theory. This is an approach which provides:
   a procedure for representing the content structure of com-
   plex subject matter, for determining an optimal presentation
   strategy for subject matter. (p. 11) Subject matter--re-
   quires students to use a set of interrelated procedures or
   principles to produce some kind of product or solve some
   class of problems.

   Categories: Higher Order Intellectual Skills
                Delivery: Improving Formal Instruction

5) <u>JID</u> Vol. 1, No. 1
   Markle, Susan M.
   Teaching Conceptual Networks, pp. 13-17.

   <u>Description</u>: "The problem for instructional designers is to
   find procedures for bringing such structures [the structure
   of memory to enable mastery of a conceptual structure of
   subject matter] into being as efficiently as possible. (p.
   14) Most of us have been given insufficient practice in
   manipulating the knowledge we have on file." (p. 16) De-
   signers should put more emphasis on deliberate training in
   flexible thinking. Make knowledge that is filed in such
   hierarchical structures available to students when needed.
   The general principle is full mastery of a single concept
   and rational planning to cover a rich variety of cases.

   Categories: Higher Order Intellectual Skills
                Delivery: Information Dissemenation

6) <u>JID</u> Vol. 1, No. 1
   Faust, Gerald W.
   Selecting instructional strategies or once you've got an
   objective what do you do with it?, pp. 18-22.

   <u>Description</u>: "This paper outlines some relatively simple,
   practical guidelines that can be used to go from objectives
   to the selection and specification of instructional strate-
   gies. (p. 18) Making the road between instructional objec-
   tives and instructional materials an easy one to follow is
   the main goal of the system described in this paper." (p. 21)

Categories: Delivery: Information Dissemenation

7) <u>JID</u> Vol. 1, No. 1
   Snow, Richard E.
   Individual differences and instructional design, p. 23.

   <u>Description</u>: "Individual differences [and ATI interaction
   between individual differences and instructional conditions]
   can be used by the instructional developer to understand
   and improve instruction for everyone. It is their [people]
   right to learn in spite of individual differences. (p. 23)

   Categories: Delivery: Improve Formal Instruction
                           Individualized
                           Equal Access

8) <u>JID</u> Vol. 1, No. 1
   Baker, Eva L.
   The dance of evaluation: hustle or minuet, pp. 26-28.

   <u>Description</u>: "A review of the role of evaluation in instruc-
   tional planning and development is suggested with a focus
   on an examination of the purpose and utility of evaluation
   for educational technology." (p. 27) Who will evaluate:
   summative or formative?

   Categories: None

9) <u>JID</u> Vol. 1, No. 1
   Gustafson, Kent L.
   Can you really do instructional development on 24¢ per day?,
   p. 28.

   <u>Description</u>: "If ID is to have the impact on education we
   say it can, it must be practical at a variety of levels of
   cost and sophistication." . (p. 29)

   Categories: Delivery: Improving Formal Instruction

10) <u>JID</u> Vol. 1, No. 1
    Schwen, Thomas M. and Keller, John M.
    A case study: developing convergent formative evaluation
    methodology, pp. 31-35.

    <u>Description</u>: "This is a case study of the evaluation of a
    course development project. Our goal was to develop an
    evaluation design which would provide convergent data in

making decisions about revisions in the course material and exercises. It was the general goal of the evaluation to develop convergent feedback that would lead to appropriate revisions in the development of material and exercises." (p. 31)

Categories: Delivery: Improving Formal Instruction

11) JID Vol. 1, No. 1
Gale, Larrie E.
Rural education in Bolivia and the potential of educational technology

Description: "This paper reports part of an investigation to describe the rural Bolivian educational system in terms of major constraints impending improvement. The data collected provided a base from which alternative strategies could be suggested for minimizing those constraints (p. 35): curriculum content and methods; design, development and production of instructional material; inservice training; dissemination of information; individualized self instructional packages.

Categories: Delivery: Equal Access
                    Dissemination of Information
            Individualized

12) JID Vol. 1, No. 2
Wilson, Buford E.
Prerequisites for understanding: implications for the design of instructional strategies and materials, p. 17.

Description: "In this paper we will examine some of the factors involved in comprehension and see how these factors are related to the design of instructional material. (p. 17) Comprehension as it relates to understanding. Understanding is a problem solving type of activity which entails constructing semantic interpretations." (p. 20)

Categories: Higher Order Intellectual Domain
            Delivery: Information Dissemination

13) JID Vol. 1, No. 2
Foshay, Wellesley R.
An alternative for task analysis in the affective domain, pp. 22-24.

Description: Application of commonly used task analysis procedures to the affective domain leads to difficulties with

instructional design, specification of intermediate
objectives and completeness of analysis. (p. 22) The
present analysis includes analysis of six domains as
an alternative: intellectual, emotional, social, physical,
aesthetic, and spiritual.

Categories: Higher Order Intellectual Domain
             Emotional: Attitudes and Motivation
             Social: Social Organization and Moral
                 Development
             Aesthetic: Planning, Risk and Imagination
             Spiritual: Awareness and Self Awareness

14) **JID** Vol. 1, No. 2
     Weiss, Elaine A.
     Prototype development of a self-instructional program in
     media selection, pp. 25-29.

     Description: "The purpose of this study was to develop and
     test a self instructional program in media selection, for
     use by teachers, librarians and media specialists. The pro-
     gram was developed by applying design criteria from systems
     approaches to instructional development." (p. 25)

     Categories: Delivery: Dissemination of Information

15) **JID** Vol. 1, No. 2
     Durzo, Joseph J.
     Basic considerations for implementing instructional development
     programs in higher education: some suggestions from the
     literature, pp. 30-34.

     Description: "The intent of this article is to provide a
     framework for considering issues related to instructional
     development programs in higher education. The focus is on
     organization and implementation rather than in instructional
     design procedures or models. Will instructional improvement
     efforts become an integral part of effectively functioning
     institutions of advanced learning?" (p. 30)

     Categories: Delivery: Improving Formal Instruction

16) **JID** Vol. 1, No. 2
     Merrill, Paul F.
     Hierarchical and information processing task analysis: a
     comparison, p. 35.

Description: "The purpose of this paper was to compare
the hierarchical and information processing approaches
to task analysis. It was argued that for many tasks both
types of analysis should be used in order to ascertain the
various types of relations between the subskills or sub-
operations of the task." (p. 40)

Categories: Delivery: Improving Formal Instruction

17) JID Vol. 2, No. 1
Wager, Walter
Using Gagne's events of instruction as a guide for producing
stimulus material, pp. 6-8.

Description: "The relationships that seems to exist be-
tween the internal processes of learning and the external
events that elicit the internal process have implications
for instructional designers because they provide a con-
ceptual base on which to select and sequence stimuli that
constitute instruction. The purpose of this paper is to
operationalize this theoretical foundation as a component
in the instructional design process." (p. 6)

Categories: Cognitive Strategies
             Delivery: Improving Formal Instruction

18) JID Vol. 2, No. 1
Misanchuk, Earl R.
Descriptors of evaluations in instructional development: beyond
the formative/summative distinction, pp. 15-18.

Description: "This paper focuses on communication problems
caused by the vocabulary associated with evaluation in ID
projects (i.e., formative and summative). In this paper,
I will suggest a third dimension, conformative evaluation -
that kind of evaluation that is done on a product of an in-
structional development effort that has been put into practice
for a period of time and now is up for review." (pp. 5-6)

Categories: None

19) JID Vol. 2, No. 1
Tennyson, Robert D.
Evaluation technology in instructional development, pp. 19-26.

Description: "I am presenting another model of instructional
development, which identifies the principles and theories

associated with the process of instructional development. The assumption made here is that with each application of these principles and theories, a unique sequencing of development activities will be produced." (p. 19) Also evaluation is included in every phase of development.

Categories: Delivery: Improving Formal Instruction

20) _JID_ Vol. 2, No. 1
Reiser, Robert A.
Promoting adherence to a new paradigm of instructional management, pp. 27-28.

Description: "Adherence to the new paradigm of instructional management [i.e., where decision regarding instructional tactic are made at the curriculum planning level] might result in improved instructional effectiveness and efficiency. The remainder of this paper will describe techniques that instructional designers can employ to promote adherence to a new paradigm." (p. 27)

Categories: Delivery: Improving Formal Instruction

21) _JID_ Vol. 2, No. 1
Green, Edward E. and Mills, Gordon E.
Putting together an instructional development team, pp. 29-33.

Description: "This paper will discuss five factors usually associated with the concept of project management which when considered and properly prepared for will facilitate the creation and operation of an effective production team. With increased demands for the services of instructional development there exists more often than not a need to organize a team of specialists together to help solve instructional problems." (p. 29)

Categories: Delivery: Improving Formal Instruction

22) _JID_ Vol. 2, No. 2
Coscarelli, William C. and Rhode, Shari
Caveat designare: a case study in the realities of copyright issues, pp. 2-7.

Description: This is a case study regarding the copyright problem of who holds the copyright on materials developed jointly by a subject matter expert and an instructional developer.

Categories: None

23) <u>JID</u> Vol. 2, No. 2
Gooler, Dennis D.
Instructional developments in developing nations, pp. 8-17.

Description: This paper outlines issues that bear further examination in the use of instructional development and evaluation in developing countries with a tradition of instability and fusion with political demands. Needs: trained personnel, data gathering and analysis, skills in organization and group process, needs assessment--both the learning needs of individuals and broader social needs.

Categories: Technological Assessment
             Social Domain: Social Organization
             Delivery: Equal Access

24) <u>JID</u> Vol. 2, No. 2
Liebler, Harry
Survey results of ID activities in higher education, p. 26.

Description: This is a "description of the extensiveness and characteristics of instructional development activities in higher educational institutions to develop models for describing and defining instructional materials production within an instructional development framework. (p. 26) Little comprehensive instructional development is conducted in higher education in Illinois in light of limited use of a complete instructional development process, limited involvement of faculty in process, lack of evaluation procedures, service emphasis on activities, lack of production activities, limited use of production activities within an ID framework." (p. 31)

Categories: Technological Assessment

25) <u>JID</u> Vol. 2, No. 2
Lawrason, Robin E. and Hedberg, John G.
Instructional development projects in higher education: predicting success, pp. 32-38.

Description: This is an "investigation of the variables involved in the successful implementation of instructional development projects in higher education. (p. 33) Developers who want to facilitate successful ID projects on their campuses should be aware of the campus political structure; give priority to key instructional development projects by key change agents; and accept the secondary

role as 'support staff' providing input on the ID process
as required by faculty team members." (p. 38)

Categories: Delivery: Improving Formal Instruction

26) JID Vol. 2, No. 3
Freedman, Martin and Gruebel, Jerold
Cost-effective video: a taxonomic decision-model for
media selection, pp. 2-7.

Description: The purpose of this article is to present a
decision model for the potential user of video and which
can be used to ascertain whether or not the user is using
video cost effectively.

Categories: None   .

27) JID Vol. 2, No. 3
Guzy, Lawrence T., Gardiner, Joseph S., and Humphrey, David A.
Instructional development project: five-semester report on
an innovative introduction to psychology course, pp. 20-30.

Description: This article traces the development of an
innovative approach to the teaching of introductory psycho-
logy. Design of the course: accomodate individual student
abilities, interests and needs, flexible enrollments, on
going evaluation, cost effective, and feedback.

Categories: Delivery: Improving Formal Instruction
            Individualized
            Flexible
            Participation

28) JID Vol. 2, No. 4
Osterman, Dean N.
Transmitting instructional development to university faculty:
two approaches, pp. 12-16.

Description: "With the increase in demand and often the cut-
back in assistance to the instructional developer, the instruc-
tional development consultant must be prepared to consider
alternative methods of training faculty in instructional de-
velopment procedures in addition to maintaining the individual
consultant-client approach of working with faculty." (p. 12)

Categories: Delivery: Improving Formal Instruction

29) <u>JID</u>   Vol. 2, No. 4
Doughty, Philip L.
Cost-effectiveness analysis tradeoffs and pitfalls for planning
and evaluating instructional programs, p. 17.

Description: "Professionals making decisions about instruction
must consider issues related to costs and effectiveness. How
and when these issues are considered are becoming major concerns
in these times of retrenchment and resource allocation. Where
does the developer or evaluator begin in developing a cost-
effectiveness analysis perspective?" (p. 17)

Categories: None

30) <u>JID</u>   Vol. 3, No. 1
Nalbone, Patrick J.
Improving readiness for change and innovation: a case study,
pp. 2-8.

Description: "This is a case study of an effort to improve
the effectivenss of an instructional development program in a
health professions schools by modifying the level of organiza-
tional readiness and individual faculty readiness for instruc-
tional innovation and change." (p. 2)

Categories: Delivery: Improving Formal Instruction

31) <u>JID</u>   Vol. 3, No. 1
Fisher, Kathleen M.
Lecturing is a personalized system of instruction--for the
lecturer, pp. 9-15.

Description: This article points out the primary motivational
factors which explain why the lecture is the foremost method
of instruction for most faculty.   Proposed development of a
new approach: 1) frequent substantial oral presentations;
2) frequent individual testing; 3) includes interpretation,
application, synthesis, analysis, and evaluation; 4) unit per-
fection requirement or mastery; 5) normative grading for others;
6) carefully structured learning materials independent and in-
dividually paced.

Categories: Higher Order Intellectual Skills
              Individualized
              Emotional Domain: Motivation
              Participation
              Delivery: Improving Formal Instruction

32) <u>JID</u> Vol. 3, No. 1
    Lent, Richard
    A model for applying cost-effectiveness analysis to decisions
    involving the use of instructional technology, pp. 26-32.

    <u>Description</u>: Describes a general model for applying cost-
    effectiveness analysis to decision situations involving in-
    structional technology.

    Categories: None

33) <u>JID</u> Vol. 3, No. 1
    Parkhurst, Perrin E. and McCombs, Barbara L.
    Applying the ATI concept in an operational environment, pp.
    33-39.

    <u>Description</u>: "An attempt is made in this article to synthe-
    size the authors' experiences and the relevant literature in
    the area of ATI research into a working model for applying
    the ATI concept in an operational instructional environment."
    (p. 33) Sets forth a framework for designing, evaluating
    and implementing alternative instructional modules that can
    benefit individual learners, instruction and the instructional
    environment as a whole.

    Categories: Individualized
                 Delivery: Improving Formal Instruction

Empirical Articles

1) AVCR Vol. 25, No. 2
   Pascarella, Ernest T.
   Interaction of motivation, mathematics preparation and in-
   structional method in a PSI and conventionally taught cal-
   culus course, pp. 27-41.

   Description: "The purpose of the present investigation was
   to examine the interactive effects of prior mathematics,
   level of personal motivation and instructional method on
   achievement in an introductory calculus course taught by
   PSI and conventional methods." (p. 27) Basic features of
   PSI: individual student pacing, mastery of material prior
   to proceeding to the next unit, utilization of student
   tutors, use of study guides to impart critical information,
   use of lecture to motivate and stimulate rather than depart
   information.

   Categories: Motivation
                Individualized
                Flexible
                Intellectual Domain

2) AVCR Vol. 25, No. 1
   Flemming, Malcolm
   The picture in your mind,

   Description: A review of the research and theory on mental
   imagery from the perspective of instructional design.
   Imagery theory provides some relatively basic ways to con-
   ceive and investigate the effects of instructional media, both
   verbal and pictoral, particularly with reference to the cog-
   nitive fate of these stimuli as they are processed, stored,
   recalled and used by the learner. Imagery processes are
   currently being investigated, but as yet are only partially
   understood. Evidence to date implicates them most focally
   in memory tasks, but suggests they may also function in con-
   cept learning, problem solving, and thinking.

   Categories: Perception
                Cognitive Strategies
                Intellectual Domain

3) AVCR   Vol. 25, No. 2
   Dayton, Deane K.
   Inserted post-questions and learning from slide-tape presen-
   tation-implications of the mathemagenic hypothesis, pp. 125-
   143.

   Description: "The purpose of this study is to investigate
   the literature concerning the use of questions in fixed
   sequence, fixed pace instructional programs such as slide-
   tape presentations." (p. 125) Variables were: question
   type - higher order (comprehension, analysis, application)
   versus lower order (recall), study time, age (elementary,
   high school, college), motivation - (used money as moti-
   vator), and ability - high ability versus low ability.

   Categories: Cognitive Strategies
                Intellectual Domain
                Motivation
                Individualized
                Lifelong

4) AVCR   Vol. 25, No. 2
   Judd, Larry R. and Smith, Carolyn B.
   Changes in self concept and ideal self concept after viewing
   a videotaped speech, pp. 147-157.

   Description: "This study was conducted to determine whether
   the video tape experience, the time in the semester of the
   video tape experience, sex of student affected self or ideal
   concept during a beginning speech course. (p. 147) Self
   concept--a student's perception of who they are and their own
   self worth as a speaker." (p. 148)

   Categories: Spiritual: Self Awareness
                Technological Assessment

5) AVCR   Vol. 25, No. 2 .
   Anderson, Daniel R., Levin, Stephen R., and Lorch, Elizabeth
   Puzzles
   The effects of TV program pacing on the behavior of preschool
   children, pp. 159-166.

   Description: "Recently a number of critics have been con-
   cerned with a structual aspect of the medium--program pacing
   [on social or cognitive behavior] . (p. 159) The present
   study examined the short term effects of TV program pacing

on the subsequent behavior of young children." (p. 159)
Measures of behavior: attention to cognitive task, play-
active (bodily movement), directive (symbolic), undirective
(sensorimotor or staring), agressive.

Categories: Cognitive Strategies
            Social Domain: Social Organizations
            Technological Assessment

6) AVCR Vol. 25, No. 2
   Main, Ray E. and Griffiths, Bruce
   Evaluation of audio and pictoral instructional supplements

   Description: "Since audio and/or pictoral supplements to
   printed texts have typically produced changes in the organ-
   ization or content of information, it is relevant to question
   whether equally effective learning benefits can be produced
   without a change in media format. Three questions con-
   sidered: can the advantage of an audio/pictoral supplement
   to a printed text be duplicated with a print/pictoral supple-
   ment; can the advantages of a pictoral or audio/pictoral
   supplement to a printed text be duplicated with a printed
   supplement that provides the same information content; do
   the facilitative effects of different media combinations and
   methods of presenting information vary with the verbal
   ability of the student." (p. 167) Content: range of con-
   ceptual difficulty appropriate to abilities in order to pro-
   vide for adequate task learning.

   Categories: Delivery: Formal Instruction
               Individualized (ability)

7) AVCR Vol. 25, No. 3
   Ruch, Michael D. and Levin, Joel R.
   Pictoral organization versus verbal repetition of children's
   prose: evidence for processing differences, pp. 269-280.

   Description: "If pictures provide more than a simple
   repetition of information, what do they provide? Presumption:
   pictures probably afford a more useful organizational context
   within which the passage can be conveniently structured. Given
   the repeated observation that benefits of contextual organi-
   zation are primarily storage and not retrieval related, one
   would expect picture effects to be more apparent when pictures
   are presented during the study period than when they are pre-
   sented during the testing period." (p. 270)

Categories: Cognitive Strategies
             Delivery: Improving Formal Instruction

8) AVCR Vol. 25, No. 3
    Baran, Stanley J.
    Television programs as socializing agents for mentally retarded
    children, pp. 281-289.

    Description: The President's Commission on Mental Retarda-
    tion (1973) suggested that "the main factors blocking indi-
    vidual progress ⌈mental retardation⌋ may be uncontrolled
    emotions, or negative self image, or entrenched negative habits
    that are reinforced with repetition or physical handicaps."
    (p. 281) Two general assertions of this study: "A specially
    prepared series of television dramas can effect positive
    socialization changes in mentally handicapped children and a
    program's prosocial potential can be maximized through the
    use of an adult interpreter. This project allowed for com-
    parison of children who received different levels of parental
    intervention." (p. 284)

    Categories: Spiritual Domain: Self Awareness
                 Individualized
                 Technological Assessment

9) AVCR Vol. 25, No. 4
    MacDonald-Ross, Michael
    How numbers are shown: a review of the research on the presen-
    tation of qualitative data in texts, pp. 359-405.

    Description: "We are here examining the way such data
    (qualitative) are presented in texts to the world at large.
    This review concentrates on the presentation of data."
    (p. 360)

    Categories: Delivery: Information Dissemination

10) AVCR Vol. 25, No. 4
    Chapman, David W., Holloway, Robert, and Kelly, Edward
    Using ratings by students to predict high and low achievers
    in a PSI course: a discriminant analysis,

    Description: The purpose is to "investigate the relationship
    of student achievement to student perceptions of specific
    teacher behavior and classroom activities in PSI courses. The

present study investigated whether students who differed
in their achievement in a PSI Psychology course also
differed in their ratings of specific teacher behavior
and course activities." (p. 412) Variables: high versus
low achievers, previous academic performance.

Categories: Perceptual Strategies
            Delivery: Improving Formal Instruction

11) ECTJ Vol. 26, No. 2
Coombs, Don H.
Is there a future for simulation and gaming research?, pp.
99-106.

Description: "It is the thesis of this paper that simulation
gaming will again pick up momentum and will earn deserved
recognition as an instructional technique. (p. 100) What
is proposed here is continued investigation of promising
important characters with restraint in choosing which games
to include in the design." (p. 105) These important
characteristics include: motivation, improved inquiry,
integrated views, skills (decision making, influence resis-
tance, communications, resources allocation, persuasion),
attitudes, student run, person growth, information retrieval
devices.

Categories: Intellectual Domain
            Emotional Domain: Attitudes
                              Motivation
            Social Domain: Social Organization
            Spiritual Domain: Awareness
                              Self Awareness
            Delivery: Information Dissemination
            Dialogue: Interaction
                            Participation
            Decentralize: Flexible
            Design: Interdisciplinary
                        Diversity

12) ECTJ Vol. 26, No. 3
Wright, Emmett L.
Effect of film-mediated intensive instruction on basic prob-
lem solving skills of ninth graders, p. 207.

Description: "This study examined the utilization of intensive
instruction in observation (cue attendance) or hypothesis

generation as a model for improving both the short and
long term, the basic problem-solving skills of ninth
grade students." (p. 207) Lends support "to Salomon's
conclusion that intensive instruction with an event that
creates a discrepancy between the observers' expectations
and the information received evokes conflict and response
uncertainty" (p. 213) in turn leading to exploratory
behavior, curiosity and information search.

Categories: Higher Order Intellectual Domain
             Aesthetic Domain: Risk
             Emotional Domain: Motivation

13) _ECTJ_ Vol. 26, No. 3
     Higgins, Leslie C.
     A factor analysis of children's picture interpretation
     behavior, pp. 215-232.

     Description: To determine what psychological processes
     are involved in drawing inferences from pictures? Picture
     interpretation consists of: 1) observation-identification
     or categorization based on visually accessible data; 2) in-
     ference drawing – understanding beyond an awareness of what
     is seen to the identification of states, events, and cir-
     cumstances which are not defined completely and explicitly:
     the ability to generalize concepts and principles, retrieving
     concepts from memory and selecting and combining new meanings,
     and making predictions.

     Categories: Cognitive Strategies
                  Perceptual Strategies
                  Intellectual Domain

14) _ECTJ_ Vol. 26, No. 3
     Levin, Joel R. and Lesgold, Alan M.
     On pictures in prose, pp. 233-243.

     Description: Review of studies of prose learning which
     conclude that there is solid evidence that pictures facilitate
     prose learning. The focus is on comprehension which is defined
     as factual recall, and the prose was presented orally.

     Categories: Delivery: Information Dissemination

15) ECTJ Vol. 26, No. 3
    Mangan, James
    Cultural conventions of pictoral representation: iconic
    literacy and education, p. 245.

    Description: "Visual perception, which also includes the
    interpretation of pictures, is learned and specific mode
    of interpreting visual images depends upon culture." (p.
    246) Implications for education: people can learn new
    styles of depiction: perception and action go hand in
    hand: the visual image can become a powerful reference
    material; people within a different culture can always
    learn to read pictures.

    Categories: Perceptual Strategies
                 Individualized
                 Dissemination: Equal Access

16) ECTJ Vol. 26, No. 4
    Tennyson, Robert D.
    Pictoral support and specific instructions as design variables
    for children's concept and rule learning, pp. 291-299.

    Description: "Students learn concepts and rules by noticing
    and labeling the relevant features and then matching or
    applying those labels to newly encountered instances or
    problems. To facilitate the process of noticing and labeling,
    especially in children, this article proposes the use of
    visuals, in the form of pictoral supports, as an additional
    design strategy, by which to focus student attention on the
    learning of relevant features." (p. 291)

    Categories: Higher Order Intellectual Domain
                 Delivery: Improving Formal Instruction

17) ECTJ Vol. 26, No. 4
    Henderson, Ronald W. and Swanson, Rosemary A.
    Age and directed-participation variables influencing the
    effectiveness of televised instruction in concrete operational
    behaviors, pp. 301-312.

    Description: To examine the relative effectiveness of
    television modeling alone and television modeling in com-
    bination with directed participation on the acquisition of
    two related early mathematical behaviors when instruction
    involves the facilitation of counting and the acquisition
    of relation concepts. Mathematical Behaviors: enumeration--
    the ability to discriminate numerical equivalence and non-
    equivalence of quantitative sets; and Conservation of number--

the ability to recognize the quantitative invariance of numerosity in spite of perceptual transformation of these sets.

Categories: Intellectual Domain
Lifelong (three years and five years)
Delivery: Formal Instruction

18) ECTJ   Vol. 26, No. 4
Evans, G. S. and Seddon, G. M.
Responsiveness of Nigerian Students to Pictoral Depth Cues, pp. 313-320.

Description: To examine the cues create difficulties for students of different educational levels in Nigeria. Because pictoral and diagrams are important in science and technology education, many people in developing countries have difficulty understanding Western style pictures. (Depth portrayal)

Categories: Perceptual Strategies
Individualized
Delivery: Equal Access

19) ECTJ   Vol. 26, No. 4
Braverman, Marc T. and Farley, Frank H.
Arousal and cognition: the stimulation-seeking motive and structural effects in comprehension of film, pp. 321-327.

Description: "In a learning situation, certain features of the educational materials would combine with individual differences in sensation seeking to influence actual learning in an aptitude treatment interaction." (p. 322) Studied the degree of arousal relative to the degree of complexity, ambiguity, inconsistency, structure, low versus high sensation seekers. (Tested for comprehension)

Categories: Motivation: Emotional Domain
Individual Differences

20) ECTJ   Vol. 26, No. 4
Carrier, Carol A. and Clark, Richard E.
Effects of presentation modes, explicitness and student aptitudes on learning, pp. 329-336.

Description: To study the "preferential/compensatory treatment function hypothesis [that certain mental functions can be provided externally] and to clarify further the relation

between aptitudes and modes of presentation, specifically: verbal and spatial reasoning abilities and verbal and spatially oriented instructional modes," (p. 330) and degree of explicitness. (Computation of surface areas)

Categories: Individualized

21) ECTJ Vol. 26, No. 4
Clark, Robert L.
Media, mental imagery, and learning, pp. 355-363.

Description: "The purpose of this study is to formulate a model of memory that examines the effects of visualization. Such a model could be used to predict the effect of media presentation on mental imagery and learning." (p. 355) Mental imagery - the chief nemonic device used by those who perform memory feats.

Categories: Cognitive Strategies
             Perceptual Strategies
             Delivery: Information Dissemination

22) ECTJ Vol. 27, No. 1
Dunathan, Arni T. and Powers, William G.
Media use among communications apprehensive education majors, pp. 3-8.

Description: Studies the "potential of personality type to affect beginning education majors' projected use of education media." (p. 3)

Categories: None

23) ECTJ Vol. 27, No. 1
Orwig, Gary W.
Effects of verbal shadowing on the recognition of visually presented verbal and nonverbal information, p. 18-29.

Description: This research attempted to provide additional information that might improve understanding of the human memory-processing system. "An area of primary interest is the effect of verbal interference on memory of verbal and nonverbal material." Used a form of "verbal interference called shadowing which involves repeating aloud words and sentences provided through earphones." (p. 26)

Categories: Delivery: Information Dissemination
             Cognitive Strategies

24) ECTJ Vol. 27, No. 1
Borg, Walter R. and Schuller, Charles F.
Detail and background in audiovisual lessons and their effect
on learners, pp. 31-38.

Description: "To determine whether the use of complex visual
art is more effective than simple visual art in terms of
content mastery and attitudes of individuals taught with these
visuals." (p. 31) Content mastery--fairly complex tasks.

Categories: Delivery: Dissemination of Information
             Emotional Domain: Attitudes

25) ECTJ Vol. 27, No. 1
Pend, Chao-Ying and Levin, Joel R.
Pictures and children's story recall: some questions of
durability, pp. 39-44.

Description: Do story-relevant pictures substantially im-
prove childrens' recall of story information? Are gains
attributable to pictures over the long term? Would differences
persist more in verbatim or paraphrase questions (more com-
prehensive demanding)?

Categories: Delivery: Information Dissemination
             Intellectual Domain

26) ECTJ Vol. 27, No. 1
Myatt, Barbara and Carter, Juliet Mason
Picture preferences of children and young adults, pp. 45-53.

Description: What is the relationship of the use of pictures
as a primary aid to children's picture preferences. Types of
pictures: photographic, simple line, full line, painterly,
cartoon and collage..

Categories: Emotional: Attitudes
             Lifelong (Elementary, 9th grade, high school)

27) ECTJ Vol. 27, No. 1
Lauricella, Stephen L. and Edington, Everett D.
Communicating educational information to Anglo and Hispanic
populations, pp. 54-57.

Description: "To determine the effectiveness of the mass
media in getting information to the Hispanic and Anglo pop-
ulations in the extreme western portion of Texas." (p. 54)

Variables: Awareness of Anglos versus Hispanics, and communication techniques most effective (TV spots versus social relations).

Categories: Delivery: Equal Access
            Dissemination of Information

28) ECTJ Vol. 27, No. 1
    Coscarelli, William C. and Schwen, Thomas M.
    Effects of three algorithmic representations on critical thinking, laboratory efficiency and final grade, pp. 58-64.

Description: To determine "the effect of different representations of algorithims on critical thinking, laboratory effectiveness and efficiency." (p. 56) Algorithmic representations: Standard prose, list and flow charts. Algorithim - a precise, generally comprehensible prescription for carrying out a defined sequence of elementary operators in order to solve any problem belonging to a certain class." (p. 56) Critical thinking - definition of problem, selection of pertinent information, recognize stated and unstated assumptions, formulate the relevant and promising hypothesis, draw valid conclusions and judge validity of inferences.

Categories: Higher Order Intellectual Skills

29) ECTJ Vol. 27, No. 2
    Herbener, Gerald F., Van Tubergen, G. Norman, and Whitlow, S. Scott
    Dynamics of the frame in visual composition, pp. 83-88.

Description: To study the relation of proper framing of visual images on: balance of the image, level of attention given the object within the field, vitality of the object, interpretation of the object itself. To study the relation between the meaning of the object and the meaning of its position within a frame, i.e., the semantic value. In short, placement in the field influences the meaning a viewer takes away from the image.

Categories: Perceptual Strategies

30) ECTJ Vol. 27, No. 2
    Levin, Joel R., Bender, Bruce G., and Pressley, Michael
    Pictures, imagery, and children's recall of central versus peripheral sentence information, pp. 89-95.

Description: "The purpose of the present study was to determine the kind of story information likely to be enhanced by both real and imagined pictures (visual illustration) and visual imagery." (p. 89) Three test groups: control--remember sentence while listening; imagery--construct in minds pictures of content; picture-- shown line drawings.

Categories: Delivery: Information Dissemination
             Lifelong: Compared 2nd and 5th Grades

31) ECTJ Vol. 27, No. 2
     Greco, Anthony A. and McClung, Chris
     Interaction between attention directing and cognitive style, pp. 97-102.

Description: "To investigate the effects of the analytic/ global dimensions of cognitive style on learning from a slide/tape presentation." (p. 99) Based on research dealing with the interaction between specific individual characteristics and instructional design elements. Cognitive style-- "a pervasive trait that manifests itself in an individual's perceptual and intellectual abilities and in personality." (p. 97)

Categories: Cognitive Strategies
             Perceptual Strategies
             Individualized

32) ECTJ Vol. 27, No. 2
     Dayton, Deane K. and Schwier, Richard A.
     Effects of postquestions on learning and learning efficiency from fixed pace, fixed sequence media, pp. 103-113.

Description: To determine: 1) whether inserted post questions increase intentional and incidental learning from fixed-pace, fixed-sequence media i.e., slide tape; 2) the advantage of inserted post questions over questions grouped at the end; 3) how the use of questions affect learning efficiency; 4) to identify interactions between inserted post questions treatments and learning aptitude (defined as scholastic aptitude, verbal ability, and field dependence/independence). Learning of factual knowledge.

Categories: Individualized
             Delivery: Information Dissemination

33) ECTJ Vol. 27, No. 2
Rankowski, Charles A. and Minaruth, Galey
Effectiveness of multimedia in teaching descriptive geometry,
pp. 114-120.

Description: "To determine the effectiveness of multimedia
materials in teaching the basic principles of descriptive
geometry": (p. 114) 1) Attitude toward descriptive geometry;
2) visualizing 3-D geometric figures; 3) solving problems in
3-D; 4) informational achievement in descriptive geometry.

Categories: Emotional Domain: Motivation
             Intellectual Skills
             Aesthetic Domain: Imagine

34) ECTJ Vol. 27, No. 2
McVey, G. F.
User assessment of media presentation rooms, pp. 121-147.

Description: To determine and compare ratings of user
satisfaction with various environmental and display system
factors incorporated into the design of selected media
classrooms.

Categories: None

35) ECTJ Vol. 27, No. 2
Winn, William and Everett, Richard J.
Affective rating of color and black-and-white pictuers,
pp. 148-156.

Description: "To explore the effect of grade level and sex
on affective ratings of color and black-and-white pictures."
(p. 150) Affective rating - students' feelings about pic-
tures.

Categories: Emotional Domain: Attitudes
             Lifelong: Compared 4th, 7th and 12th grades

36) ECTJ Vol. 27, No. 3
Haring, Marilyn J. and Fry, Maurine A.
Effect of pictures on children's comprehension of written text.

Description: Do pictures facilitate comprehension of written
text? Pictures enhanced recall of only main-ideas, pictures
need not be detailed, artistic or colorful; picture benefits
endured over time, no differences between young and old.

Categories: Delivery: Information Dissemination
            Lifelong: (Compared 4th and 6th Grade)

37) <u>ECTJ</u> Vol. 27, No. 3
     Burton, John K. and Aversa, Frances N.
     Formative evaluation information from scripts, scratch
     tracks, and rought cuts: a comparison, pp. 191-194.

     <u>Description</u>: "How early in the development process should
     review by people outside the team begin?" (p. 191)

     Categories: None

38) <u>ECTJ</u> Vol. 27, No. 3
     Smith, Horace G.
     Investigation of several techniques for reviewing audio
     tutorial instruction, pp. 194-204.

     <u>Description</u>: To provide techniques for enhancing retention
     of mastered material. Review (both summary guides and
     audio tutorial) were more effective than non review on a
     retention test. Compressed speech-failed as beneficial
     review techniques.

     Categories: Delivery: Information Dissemination

39) <u>ECTJ</u> Vol. 27, No. 4
     Chute, Alan G.
     Analysis of the instructional functions of color and monochrome
     cuing in media presentations, pp. 251-263.

     <u>Description</u>: Unique capabilities of color cues for improving
     instruction: perception, human information processing, learning
     in general, valuing, imagination, and for reducing individual
     differences in learning.

     Categories: Cognitive Strategies
                 Perceptual Strategies
                 Social Domain: Moral Development
                 Aesthetic Domain: Imagine
                 Individualized

40) <u>ECTJ</u> Vol. 27, No. 4
     Higgins, Leslie C.
     Effects of strategy-oriented training on children's inference
     drawing from pictures, pp. 265-280.

     <u>Description</u>: How do children draw inferences from pictures?
     Inferences involve: deriving concepts, principles, explanations

and predictions. Productive aspects: discover and formulate
a problem; organize and make use of information; general
ideas. Evaluative aspect: evaluate and improve ideas.

Categories: Cognitive Strategies
           Higher Order Intellectual Domain

41) ECTJ Vol. 27, No. 4
    Whitley, Brown Joanne and Moore, David M.
    Effects of perceptual type and presentation mode in a visual
    location task, pp. 281-290.

    Description: People differ in their psychological orienta-
    tions toward sensory perception. Individuals differ in the
    perceptual processes, i.e., the gathering and handling of
    information from the environment (haptics/visual).

    Categories: Perceptual Strategies
               Individualize

42) ECTJ Vol. 27, No. 4
    Jonassen, David H.
    Implications of multi-image for concept acquisition, pp. 291-
    302.

    Description: To study the relation of multi-image presenta-
    tion on concept acquisition. Concept acquisition - "the net-
    work of inference that are or may be set into play by an act
    of categorization." (p. 292) Will multi-image improve classi-
    fication behavior and do cognitive styles (conceptual style, ·
    field articulation or focal attention) interact with treatment ;
    modes?

    Categories: Cognitive Strategies
               Individualized

43) ECTJ Vol. 27, No. 3
    Metallinos, Nikos
    Composition of the TV picture: some hypothesis to test the
    forces operating within the TV screen, pp. 205-214.

    Description: To investigate "the processes involved in per-
    ception of visual messages." (p. 205) Asymmetry of the
    screen as it relates to perception, visual and verbal reten-
    tion. Horizontal and vertical orientation as it relates to
    perception and appraisal.

Categories: Perceptual Strategies
          Delivery: Information Dissemination

44) ECTJ Vol. 27, No. 3
    Simonson, Michael, Thies, Pamela, and Burch, Georgeann
    Media and attitudes: a bibliography, part I, pp. 217-236.

    Description: "A review of the literature on the relation
    between media attitudes and achievement. Attitude - a mental
    and neural state of readiness, organized through experience,
    exerting a directive or dynamic influence upon the individ-
    ual's response to all objects and situations with which it
    is related." (p. 220) (Liking, change in liking, attitude
    comparison, relation to the learning process.)

    Categories: Emotional Domain: Attitudes
                                   Motivation

45) JID Vol. 2, No. 3
    Simonson, Michael R.
    Designing instruction for attitudinal outcomes, pp. 15-19.

    Description: "This paper attempts to document procedures that
    were successful in experimental situations in producing de-
    sired attitudinal positions." (p. 15) Definition of attitude:
    affective--evaluation of, liking or emotional response; cogni-
    tive--beliefs or factual knowledge; behavioral--overt behavior
    directed toward an object. Techniques likely to produce a
    favorable reaction in students should be identified, refined
    and evaluated routinely as part of the design and delivery of
    instruction.

    Categories: Intellectual Domain
                Emotional Domain: Attitudes
                                   Motivation

46) JID Vol. 3, No. 1
    Choi, Soo-Young, Merrill, M. David, Callahan, Ed, Hawkins,
    Richard T., and Norton, Robert F.
    The relationship of test performance to ISDP rating in organic
    chemistry texts, pp. 16-25.

    Description: "The study was designed to find out which text-
    book is 'better' from an instructional science perspective
    and to provide data bearing on the Chemistry Department textbook
    selection decision." (p. 16) ISDP--evaluate instructional
    materials' consistency between instruction and test items:

adequacy, in that the presentation communicates the 'to be learned'. ISDP is a tool which facilitates the evaluation and revision of existing instruction and the design of new instruction.

Categories: Delivery: Dissemination of Information

47) AVCR Vol. 25, No. 1
Maddox, H. and Loughran, R.J.
Illustrating the lecture: prepared diagrams versus built-up diagrams, pp. 3-6.

Description: "This study compares the presentation of a complete diagram versus one that is shown in successive stages." (p. 3) The built up diagram led to better understanding.

Categories: Intellectual Domain
            Delivery: Formal Instruction

APPENDIX D

FINAL MATRICES

TABLE 8

The Relationship of Futurist Means* and the

Articles Published in Volume 25, AV Communication Review

Volume 25 — No.	1					2					3					4			Sub-total
Futurists Means:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	
I. Strategies																			
A. Cognitive			x	x		x		x					x						5
B. Perceptual			x															x	2
II. Domains																			
A. Intellectual		x	x			x	x					x							5
B. Emotional																			
1. Attitudes												x							1
2. Motivation		x				x													2
C. Social																			
1. Social Org.								x											1
2. Moral Dev.												x							1
D. Aesthetic																			
1. Plan																			
2. Imagine																			
3. Risk																			
E. Spiritual																			
1. Awareness																			
2. Self Awareness								x			x	x		x					4
III. Capabilities																			
A. Delivery																			
1. Equal Access																			
2. Info. Dissem.			x														x		2
3. Formal Instr.				x							x		x	x				x	5
4. Lifelong Lrng.					x														1
B. Dialogue																			
1. Interaction																			
2. Participation																			
3. Global Commun.																			
C. Decentralize																			
1. Individualize	x					x					x			x					4
2. Coordinate																			
3. Flexible	x																		1
Design																			
1. Interdisc.																			
2. Diversity																			
IV. Technological Assess.							x	x				x				x	x		5
V. Others	x																		1

*Futurist means as described on page 38.

TABLE 9

The Relationship of Futurist Means* and the Articles Published in

Volume 26, Educational Communications and Technology Journal

Volume 26 — No. 1								2								
Futurists Means:	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9
I. Strategies																	
A. Cognitive	x	x	x		x		x				x						
B. Perceptual	x	x	x			x											
II. Domains																	
A. Intellectual		x	x	x					x								
B. Emotional																	
1. Attitudes		x				x			x								
2. Motivation						x			x								
C. Social																	
1. Social Org.									x								
2. Moral Dev.						x											
D. Aesthetic																	
1. Plan																	
2. Imagine		x				x											
3. Risk																	
E. Spiritual																	
1. Awareness									x								
2. Self Awareness	x								x								
III. Capabilities																	
A. Delivery																	
1. Equal Acess																	
2. Info. Dissem.							x	x			x						
3. Formal Instr.										x						x	
4. Lifelong Lrng.					x												
B. Dialogue																	
1. Interaction							x	x									
2. Participation							x	x									
3. Global Commun.																	
C. Decentralize																	
1. Individualize				x		x	x										
2. Coordinate							x							x		x	
3. Flexible										x						x	
D. Design																	
1. Interdisc.										x							
2. Diversity										x							
IV. Technological Assess.				x			x			x		x	x				
V. Others															x	x	

*Futurist means as described on page 38.

Volume 26 No. 3 4													
Futurists Means:	1	2	3	4	5	1	2	3	4	5	6	7	Subtotal
I. Strategies													
A. Cognitive			x								x	x	9
B. Perceptual			x		x			x				x	8
II. Domains													
A. Intellectual		x	x			x	x						8
B. Emotional													
1. Attitudes													3
2. Motivation		x							x				4
C. Social													
1. Social Org.													1
2. Moral Dev.													1
D. Aesthetic													
1. Plan													
2. Imagine													2
3. Risk		x											1
E. Spiritual													
1. Awareness													1
2. Self Awareness													2
III. Capabilities													
A. Delivery													
1. Equal Acess					x			x					2
2. Info. Dissem.			x								x		5
3. Formal Instr.						x	x				x		5
4. Lifelong Lrng.						x							2
B. Dialogue													
1. Interaction													2
2. Participation													2
3. Global Commun.													
C. Decentralize													
1. Individualize					x		x	x	x	x			8
2. Coordinate													3
3. Flexible													2
D. Design													
1. Interdisc.													1
2. Diversity													1
IV. Technological Assess.	x												6
V. Others													2

TABLE 10

The Relationship of Futurist Means* and the Articles Published in

Volume 27, Educational Communications and Technology Journal

Volume 27 — No.	1								2							3					
Futurists Means:	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	6
I. Strategies																					
A. Cognitive			x								x										
B. Perceptual							x				x									x	
II. Domains																					
A. Intellectual				x			x				x										
B. Emotional																					
1. Attitudes				x		x								x							x
2. Motivation												x									x
C. Social																					
1. Social Org.																					
2. Moral Dev.																					
D. Aesthetic																					
1. Plan																					
2. Imagine												x									
3. Risk																					
E. Spiritual																					
1. Awareness																					
2. Self Awareness																					
III. Capabilities																					
A. Delivery																					
1. Equal Acess						x															
2. Info. Dissem.			x	x	x		x				x		x				x		x	x	
3. Formal Instr.																					
4. Lifelong Lrng.						x					x				x	x					
B. Dialogue																					
1. Interaction																					
2. Participation																					
3. Global Commun.																					
C. Decentralize																					
1. Individualize												x	x								
2. Coordinate																					
3. Flexible																					
D. Design																					
1. Interdisc.																					
2. Diversity																					
IV. Technological Assess.																					
V. Others	x	x													x	x		x			

*Futurist means as described on page 38.

Volume 27 No. 4

Futurists Means:	1	2	3	4	5	Subtotal	Total
I. Strategies			.				35
A. Cognitive	x	x		x	x	6	20
B. Perceptual	x		x		x	6	16
II. Domains							51
A. Intellectual		x				4	17
B. Emotional							17
1. Attitudes						4	8
2. Motivation				x		3	9
C. Social							5
1. Social Org.							2
2. Moral Dev.	x					1	3
D. Aesthetic							5
1. Plan							
2. Imagine	x					2	4
3. Risk							1
E. Spiritual							7
1. Awareness							1
2. Self Awareness							6
III. Capabilities							67
A. Delivery							37
1. Equal Acess						1	3
2. Info. Dissem.					x	10	17
3. Formal Instr.							10
4. Lifelong Lrng.						4	7
B. Dialogue							4
1. Interaction							2
2. Participation							2
3. Global Commun.							
C. Decentralize							24
1. Individualize	x		x	x	x	6	18
2. Coordinate							3
3. Flexible							3
D. Design							2
1. Interdisc.							1
2. Diversity							1
IV. Technological Assess.							11
V. Others						5	8

TABLE 11

The Relationship of Futurist Means* and the Articles Published in

Volume 1, Journal of Instructional Development

Volume 1	No.	1										2								Sub total
Futurists Means:		1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	
I. Strategies																				
A. Cognitive																				
B. Perceptual																				
II. Domains																				
A. Intellectual				x	x										x	x				4
B. Emotional																				
1. Attitudes															x					1
2. Motivation															x					1
C. Social																				
1. Social Org.															x					1
2. Moral Dev.															x					1
D. Aesthetic																				
1. Plan																x				1
2. Imagine																x				1
3. Risk																x				1
E. Spiritual																				
1. Awareness																x				1
2. Self Awareness																x				1
III. Capabilities																				
A. Delivery																				
1. Equal Acess							x			x										2
2. Info. Dissem.				x	x					x				x		x				5
3. Formal Instr.		x	x	x			x		x	x		x		x				x	x	10
4. Lifelong Lrng.																				
B. Dialogue																				
1. Interaction																				
2. Participation																				
3. Global Commun.																				
C. Decentralize																				
1. Individualize							x			x										2
2. Coordinate																				
3. Flexible																				
D. Design																				
1. Interdisc.																				
2. Diversity																				
IV. Technological Assess.		x											x							2
V. Others							x													1

*Futurist means as described on page 38.

TABLE 12

The Relationship of Futurist Means* and the Articles Published in

Volume 2, Journal of Instructional Development

Volume 2	No. 1								2					3				
Futurists Means:	1	2	3	4	5	6	7	8	1	2	3	4	5	1	2	3	4	5
I. Strategies																		
A. Cognitive			x															
B. Perceptual																		
II. Domains																		
A. Intellectual															x	x		
B. Emotional																		
1. Attitudes																x		
2. Motivation																x		
C. Social																		
1. Social Org.									x									
2. Moral Dev.																		
D. Aesthetic																		
1. Plan																		
2. Imagine																		
3. Risk																		
E. Spiritual																		
1. Awareness																		
2. Self Awareness																		
III. Capabilities																		
A. Delivery																		
1. Equal Acess										x								
2. Info. Dissem.																		
3. Formal Instr.	x	x	x	x	x	x	x				x			x	x	x		
4. Lifelong Lrng.																		
B. Dialogue																		
1. Interaction																		
2. Participation																x		
3. Global Commun.																		
C. Decentralize																		
1. Individualize																x		
2. Coordinate																		
3. Flexible																x		
D. Design																		
1. Interdisc.																		
2. Diversity																		
IV. Technological Assess.	x								x	x	x						x	
V. Others				x				x	x					x				

*Futurist means as described on page 38.

Volume 2   No. 4

Futurists Means:	1	2	3	4	Subtotal
I. Strategies					
A. Cognitive					1
B. Perceptual					
II. Domains					
A. Intellectual					2
B. Emotional					
1. Attitudes					1
2. Motivation				x	2
C. Social					
1. Social Org.					1
2. Moral Dev.					
D. Aesthetic					
1. Plan					
2. Imagine					
3. Risk					
E. Spiritual					
1. Awareness					
2. Self Awareness					
III. Capabilities					
A. Delivery					
1. Equal Acess					1
2. Info. Dissem.					
3. Formal Instr.	x	x		x	13
4. Lifelong Lrng.					
B. Dialogue					
1. Interaction					
2. Participation					1
3. Global Commun.					
C. Decentralize					
1. Individualize					1
2. Coordinate					
3. Flexible					1
D. Design					
1. Interdisc.					
2. Diversity					
IV. Technological Assess.					5
V. Others		x			4

TABLE 13

The Relationship of Futurist Means* and the Articles Published in

Volume 3, Journal of Instructional Development

Volume 3						No. 1			
Futurists Means	1	2	3	4	5	Sub total	JID Total	Grand Total	%
I. Strategies								37	31.6
A. Cognitive							1	21	17.9
B. Perceptual								16	13.7
II. Domains							21	72	61.5
A. Intellectual		x				.1	7	24	20.5
B. Emotional							6	23	19.7
1. Attitudes							2	10	8.5
2. Motivation		x				1	4	13	11.1
C. Social							3	8	6.8
1. Social Org.							2	4	3.4
2. Moral Dev.							1	4	3.4
D. Aesthetic							3	8	6.8
1. Plan							1	1	0.8
2. Imagine							1	5	4.2
3. Risk							1	2	1.7
E. Spiritual							2	9	7.7
1. Awareness							1	2	1.7
2. Self Awareness							1	7	6.0
III. Capabilities							43	110	98.2
A. Delivery							35	72	61.5
1. Equal Acess							3	6	5.1
2. Info. Dissem.			x		1		6	23	19.7
3. Formal Instr.	x	x		x	3		26	36	30.8
4. Lifelong Lrng.								7	6.0
B. Dialogue							2	6	5.1
1. Interaction								2	1.7
2. Participation		x			1		2	4	3.4
3. Global Commun.									
C. Decentralize							6	30	25.6
1. Individualize		x		x	2		5	23	19.7
2. Coordinate								3	2.6
3. Flexible							1	4	3.4
D. Design								2	1.7
1. Interdisc.								1	0.8
2. Diversity								1	0.8
IV. Technological Assess.							7	18	15.4
V. Others			x		1		6	14	12.0

*Futurist means as described on page 38.

TABLE 14

Content Analysis

The Relationship of Futurist Means* and the Theoretical Articles
Published in the Educational Technology Journals

Futurists Means:	1	2	3	4	5	6	7	8	9	10	11	Theory Total
I. Strategies												11
A. Cognitive	x	x	x	x		x	x		x			7
B. Perceptual			x	x		x			x			4
II. Domains												
A. Intellectual			x			x				x		3
B. Emotional												3
1. Attitudes						x						1
2. Motivation									x		x	2
C. Social												
1. Social Org.												
2. Moral Dev.												
D. Aesthetic												1
1. Plan												
2. Imagine						x						1
3. Risk												
E. Spiritual												1
1. Awareness												
2. Self Awareness						x						1
III. Capabilities												9
A. Delivery												7
1. Equal Acess												
2. Info. Dissem.	x				x				x			3
3. Formal Instr.							x			x	x	3
4. Lifelong Lrng.			x									1
B. Dialogue												
1. Interaction												
2. Participation												
3. Global Commun.												
C. Decentralize												2
1. Individualize							x		x			2
2. Coordinate												
3. Flexible												
D. Design												
1. Interdisc.												
2. Diversity												
IV. Technological Assess.					x							1
V. Others								x				1

*Futurist means as described on page 38.

TABLE 15

Content Analysis

The Relationship of Futurist Means* and the State of the Art Articles

Published in the Educational Technology Journals

Futurists Means:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
I. Strategies																	
A. Cognitive						x		x									
B. Perceptual						x											
II. Domains																	
A. Intellectual				x													
B. Emotional																	
1. Attitudes						x											
2. Motivation						x											
C. Social																	
1. Social Org.																	
2. Moral Dev.						x											
D. Aesthetic																	
1. Plan																	
2. Imagine					x												
3. Risk																	
E. Spiritual																	
1. Awareness																	
2. Self Awareness		x															
III. Capabilities																	
A. Delivery																	
1. Equal Acess																	
2. Info. Dissem.							x										
3. Formal Instr.		x							x						x		x
4. Lifelong Lrng.																	
B. Dialogue																	
1. Interaction							x										
2. Participation							x										
3. Global Commun.																	
C. Decentralize																	
1. Individualize				x	x		x										
2. Coordinate							x				x				x		
3. Flexible															x		
D. Design																	
1. Interdisc.																	
2. Diversity																	
IV. Technological Assess.			x	x		x			x		x					x	
V. Others	x												x	x			

*Futurist means as described on page 38.

Futurists Means:	18	19	20	21	22	23	24	25	26	Art Total	Theory Art Total
I. Strategies		·								3	14
A. Cognitive										2	9
B. Perceptual										1	5
II. Domains											18
A. Intellectual									x	2	5
B. Emotional										3	6
1. Attitudes									x	2	3
2. Motivation										1	3
C. Social										2	2
1. Social Org.											
2. Moral Dev.									x	2	2
D. Aesthetic										1	2
1. Plan											
2. Imagine										1	2
3. Risk											
E. Spiritual										2	2
1. Awareness											
2. Self Awareness									x	2	2
III. Capabilities										28	37
A. Delivery										10	17
1. Equal Acess											
2. Info. Dissem.										1	4
3. Formal Instr.		x	x	x	x			x		9	12
4. Lifelong Lrng.											1
B. Dialogue										2	2
1. Interaction										1	1
2. Participation										1	1
3. Global Commun.											
C. Decentralize										7	9
1. Individualize										3	5
2. Coordinate										3	3
3. Flexible										1	1
D. Design											
1. Interdisc.											
2. Diversity											
IV. Technological Assess.	x		x			x	x		x	11	12
V. Others										3	4

TABLE 16

Content Analysis

The Relationship of Futurist Means* and the Empirical Studies Published
in the Educational Technology Journals

Futurists Means:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
I. Strategies																	
A. Cognitive		x	x		x		x						x				
B. Perceptual		x								x			x		x		
II. Domains																	
A. Intellectual		x	x	x							x	x	x			x	x
B. Emotional																	
1. Attitudes											x						
2. Motivation	x		x								x	x					
C. Social																	
1. Social Org.					x						x						
2. Moral Dev.																	
D. Aesthetic																	
1. Plan																	
2. Imagine																	
3. Risk												x					
E. Spiritual																	
1. Awareness											x						
2. Self Awareness				x				x			x						
III. Capabilities																	
A. Delivery																	
1. Equal Acess															x		
2. Info. Dissem.									x		x			x			
3. Formal Instr.					x	x		x								x	x
4. Lifelong Lrng.			x														x
B. Dialogue																	
1. Interaction											x						
2. Participation											x						
3. Global Commun.																	
C. Decentralize																	
1. Individualize	x		x			x		x							x		
2. Coordinate											x						
3. Flexible	x										x						
D. Design																	
1. Interdisc.											x						
2. Diversity											x						
IV. Technological Assess.				x	x			x									
V. Others																	

*Futurist means as described on page 38.

Futurists Means:	18	19	20	21	22	23	24	25	26	27	28	29	30
I. Strategies													
A. Cognitive				x		x							
B. Perceptual	x			x								x	
II. Domains													
A. Intellectual							x			x			
B. Emotional													
1. Attitudes							x		x				
2. Motivation		x											
C. Social													
1. Social Org.													
2. Moral Dev.													
D. Aesthetic													
1. Plan													
2. Imagine													
3. Risk													
E. Spiritual													
1. Awareness													
2. Self Awareness													
III. Capabilities													
A. Delivery													
1. Equal Acess	x									x			
2. Info. Dissem.				x		x	x	x		x			x
3. Formal Instr.													
4. Lifelong Lrng.									x				x
B. Dialogue													
1. Interaction													
2. Participation													
3. Global Commun.													
C. Decentralize													
1. Individualize	x	x	x										
2. Coordinate													
3. Flexible													
D. Design													
1. Interdisc.													
2. Diversity													
IV. Technological Assess.													
V. Others					x								

Futurists Means:	31	32	33	34	35	36	37	38	39	40	41	42	43	44
I. Strategies														
A. Cognitive	x								x	x		x		
B. Perceptual	x								x		x		x	
II. Domains														
A. Intellectual			x							x				
B. Emotional														
1. Attitudes					x									x
2. Motivation			x											x
C. Social														
1. Social Org.														
2. Moral Dev.									x					
D. Aesthetic														
1. Plan														
2. Imagine			x						x					
3. Risk														
E. Spiritual														
1. Awareness														
2. Self Awareness														
III. Capabilities														
A. Delivery														
1. Equal Acess														
2. Info. Dissem.		x				x	x						x	
3. Formal Instr.														
4. Lifelong Lrng.					x	x								
B. Dialogue														
1. Interaction														
2. Participation														
3. Global Commun.														
C. Decentralize														
1. Individualize	x	x								x		x	x	
2. Coordinate														
3. Flexible														
D. Design														
1. Interdisc.														
2. Diversity														
IV. Technological Assess.														
V. Others				x			x							

Futurists Means:	45	46	47	Empirical Total
I. Strategies				22
A. Cognitive				11
B. Perceptual				11
II. Domains				
A. Intellectual	x		x	14
B. Emotional				14
1. Attitudes	x			6
2. Motivation	x			8
C. Social				3
1. Social Org.				2
2. Moral Dev.				1
D. Aesthetic				3
1. Plan				
2. Imagine				2
3. Risk				1
E. Spiritual				4
1. Awareness				1
2. Self Awareness				3
III. Capabilities				
A. Delivery				29
1. Equal Acess				3
2. Info. Dissem.		x		14
3. Formal Instr.			x	6
4. Lifelong Lrng.				6
B. Dialogue				2
1. Interaction				1
2. Participation				1
3. Global Commun.				
C. Decentralize				15
1. Individualize				13
2. Coordinate				
3. Flexible				2
D. Design				2
1. Interdisc.				1
2. Diversity				1
IV. Technological Assess.				3
V. Others				3

TABLE 17

Content Analysis

The Relationship of Futurist Means* and the Development Activities
Published in the Educational Technology Journals

Futurists Means:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
I. Strategies																	
A. Cognitive																	x
B. Perceptual																	
II. Domains																	
A. Intellectual				x	x							x	x				
B. Emotional																	
1. Attitudes													x				
2. Motivation													x				
C. Social																	
1. Social Org.													x				
2. Moral Dev.													x				
D. Aesthetic																	
1. Plan													x				
2. Imagine													x				
3. Risk													x				
E. Spiritual																	
1. Awareness													x				
2. Self Awareness													x				
III. Capabilities																	
A. Delivery																	
1. Equal Acess							x				x						
2. Info. Dissem.				x	x						x	x		x			
3. Formal Instr.		x	x	x			x		x	x					x	x	x
4. Lifelong Lrng.																	
B. Dialogue																	
1. Interaction																	
2. Participation																	
3. Global Commun.																	
C. Decentralize																	
1. Individualize							x				x						
2. Coordinate																	
3. Flexible																	
D. Design																	
1. Interdisc.																	
2. Diversity																	
IV. Technological Assess.		x															
V. Others	x							x									

*Futurist means as described on page 38.

Futurists Means:	18	19	20	21	22	23	24	25	26	27	28	29	30	31
I. Strategies														
A. Cognitive														
B. Perceptual														
II. Domains														
A. Intellectual														x
B. Emotional														
1. Attitudes														
2. Motivation														x
C. Social														
1. Social Org.						x								
2. Moral Dev.														
D. Aesthetic														
1. Plan														
2. Imagine														
3. Risk														
E. Spiritual														
1. Awareness														
2. Self Awareness														
III. Capabilities														
A. Delivery														
1. Equal Acess						x								
2. Info. Dissem.														
3. Formal Instr.		x	x	x				x		x	x		x	x
4. Lifelong Lrng.														
B. Dialogue														
1. Interaction														
2. Participation										x				x
3. Global Commun.														
C. Decentralize														
1. Individualize										x				x
2. Coordinate														
3. Flexible										x				
D. Design														
1. Interdisc.														
2. Diversity														
IV. Technological Assess.						x	x							
V. Others	x				x				x			x		

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Futurists Means:	32	33	Development Total	Dev. & Emp. Total	Grand Total
I. Strategies			1	23	37
A. Cognitive			1	12	21
B. Perceptual				11	16
II. Domains				54	72
A. Intellectual			5	20	24
B. Emotional			3	17	23
1. Attitudes			1	7	10
2. Motivation			2	10	13
C. Social			3		8
1. Social Org.			2	2	4
2. Moral Dev.			1	3	4
D. Aesthetic			3	6	9
1. Plan			1	1	1
2. Imagine			1	3	5
3. Risk			1	2	2
E. Spiritual			2	6	9
1. Awareness			1	2	2
2. Self Awareness			1	4	7
III. Capabilities				80	
A. Delivery			24	53	72
1. Equal Acess			3	6	6
2. Info. Dissem.			5	19	23
3. Formal Instr.		x	18	24	36
4. Lifelong Lrng.				6	7
B. Dialogue			2	4	6
1. Interaction				1	2
2. Participation			2	3	4
3. Global Commun.					
C. Decentralize			6	21	30
1. Individualize		x	5	18	23
2. Coordinate					3
3. Flexible			1	3	4
D. Design				2	2
1. Interdisc.				1	1
2. Diversity				1	1
IV. Technological Assess.			3	6	18
V. Others	x		7	10	13

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TABLE 18

The Relationship of Futurist Means* and Articles Published in the

Educational Technology Journals, Summary

Futurists Means:	Total%	ECTJ%	JID%	Theory/Art%	Empirical/Dev.%
I. Strategies	31.6	50.0	2.2	37.8	28.8
A. Cognitive	17.9	27.8	2.2	24.3	15.0
B. Perceptual	13.7	22.2	--	13.5	13.8
II. Domains	61.5	70.8	46.7	48.6	67.5
A. Intellectual	20.5	23.6	15.5	13.5	25.0
B. Emotional	19.7	23.6	13.3	16.2	21.2
1. Attitudes	8.5	11.1	4.4	8.1	8.7
2. Motivation	11.1	12.5	8.9	8.1	12.5
C. Social	6.8	6.9	6.7	5.4	6.2
1. Social Org.	3.4	2.8	4.4	--	2.5
2. Moral Dev.	3.4	4.7	2.2	5.4	3.7
D. Aesthetic	6.8	6.9	6.7	5.4	7.5
1. Plan	0.8	--	2.2	--	1.2
2. Imagine	4.2	5.5	2.2	5.4	3.7
3. Risk	1.7	1.4	2.2	--	2.5
E. Spiritual	7.7	9.7	4.4	8.1	7.5
1. Awareness	1.7	1.4	2.2	--	2.5
2. Self Awareness	6.0	8.3	2.2	8.1	5.0
III. Capabilities	98.2	93.0	95.5	75.7	100.0
A. Delivery	61.5	51.4	77.8	45.9	66.2
1. Equal Acess	5.1	4.7	1.7	--	7.5
2. Info. Dissem.	19.7	23.6	13.3	10.8	23.7
3. Formal Instr.	30.8	13.9	57.8	32.4	30.0
4. Lifelong Lrng.	6.0	9.7	--	12.7	7.5
B. Dialogue	5.1	5.5	4.4	5.4	5.0
1. Interaction	1.7	2.8	--	2.7	1.2
2. Participation	3.4	2.8	4.4	2.7	3.7
3. Global Commun.	--	--	--	--	--
C. Decentralize	25.6	33.3	13.3	24.3	26.2
1. Individualize	19.7	25.0	11.1	13.5	22.0
2. Coordinate	2.6	4.7	--	8.1	--
3. Flexible	3.4	4.7	2.2	2.7	3.7
D. Design	1.7	2.8	--	--	2.5
1. Interdisc.	0.8	1.4	--	--	1.2
2. Diversity	0.8	1.4	--	11	1.2
IV. Technological Assess.	15.4	15.3	15.5	32.4	7.5
V. Others	12.0	11.1	13.3	10.8	11.2

*Futurist means as described on page 38.

TABLE 19

Age of Subjects in Studies

Age of Subjects in Studies	Educational Communication and Technology Journal			Journal of Instructional Development				
	Vol. 25	26	27	1	2	3	Total	%
Preschool (0-5 years)	1	1	-	-	-	-	2	3.6
Elementary (1st-6th grades)	2	4	7	-	-	-	13	23.6
Jr. High (7th-9th grades)	-	1	4	-	-	-	5	9.1
High School (10th-12th grades)	1	1	1	-	-	-	3	5.4
College	5	3	9	3	4	3	27	49.1
Adults	1	-	3	1	-	-	5	9.1
Over 65 yrs.	-	-	-	-	-	-	-	0.0
TOTAL	10	10	24	4	4	3	55	100.0