DOCUMENT RESUME

ED 047 143 VT 012 538

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TITLE	A New Role for Industrial Arts In the Senior High School.
INSTITUTION	American Vocational Association, Washington, D.C.
PUB DATE	69
NOTE	48p.; Presented at the National Convention of the American Vocational Association (Boston, Mass., Dec. 1969)
EDRS PRICE	EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS	Citizen Participation, Citizen Role, *Citizenship, Curriculum Development, Decision Making, *Educational Needs, *Industrial Arts, Industrial Technology, Models, Problem Solving, Program Development, *Resource Allocations, Secondary Education, Social Problems, Speeches, *Technology, Vocational Education

ABSTRACT

The time has come to reexamine the role of industrial arts in the high schools. Our society is no longer in the industrial era but rather in the post-industrial era which is characterized by pressing social problems. Solutions must be found for the problems of pollution, power generation, housing, transportation, communication, conservation, more effective resource utilization and industrial productivity. The role industrial arts can play in these areas of concern is not one of finding solutions but rather one of educating the citizenry to be aware of the implications of these problems. There is no doubt about the extent of our technological know-how; the question is how to reduce the ever-widening gap between the technologist and the great masses of people who use or must make decisions about the application, acceptance, or rejection of the technology. This proposal outlines a system of study for the senior high school that will educate citizens to make intelligent decisions concerning the future application of our great wealth of technological know-how. (Author/JS)

A NEW ROLE FOR INDUSTRIAL ARTS

IN THE SENIOR HIGH SCHOOL

ED047143

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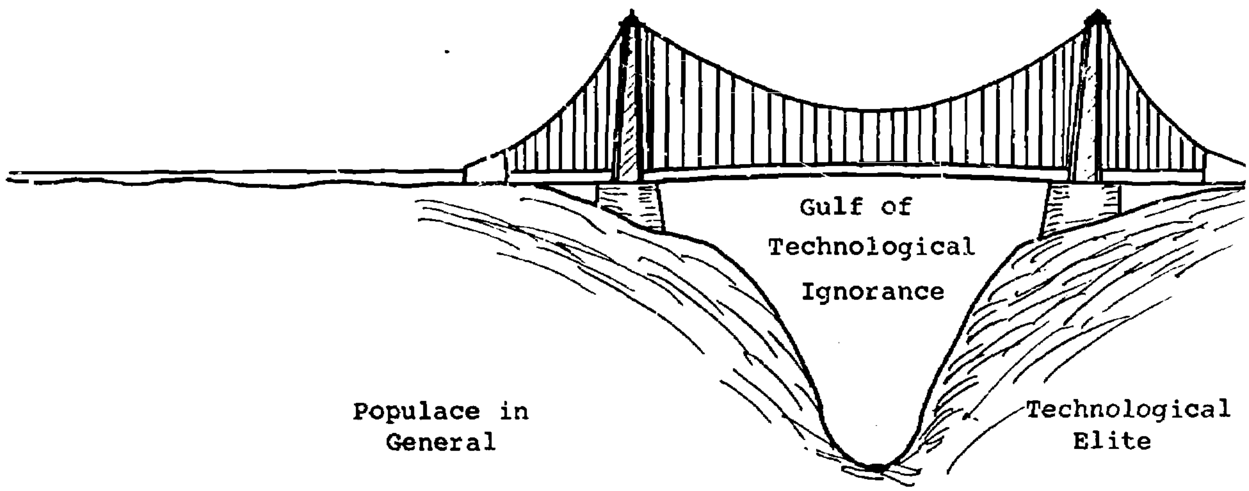
The brighter tomorrow will be there only if a bridge can be designed that would span the gulf of technological ignorance which exists between the vast majority of the populace and the technical elite. DM



"The contention that persons ignorant of technology can function in a democracy to any affect when the society is a technological one is dubious. Understanding is not a prerequisite of control, it is control."

Don Fabun
The Dynamics of Change

A NEW ROLE FOR INDUSTRIAL ARTS
IN THE SENIOR HIGH SCHOOL

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This presentation is a proposal to the Industrial Arts profession to take on a new and dynamic role in education. And I might caution you that such a new role might even give rise to the need for new terminology. Nevertheless, I am convinced that the area of the school that is best suited for this new role is Industrial Arts. Its past interests, activities, and concerns as compared to the remainder of the school leads me to this conclusion.

But first let me remind you of some of the factors that seem to indicate a need for close examination of the role of Industrial Arts at the senior high school level.

1. The senior high school Industrial Arts program with its domination by unit shops and a hierarchy of courses based upon a sequential prerequisite scheme was in actuality a form of "quasi

vocational" education. It enabled many young people, not going to college, to develop skills and understandings that would be salable for entry into the world of work. This brand of Industrial Arts was indeed the only form of vocational education available to a large segment of the male high school population.

The Vocational Act of 1963 and its subsequent amendments have changed this "vocational" role for Industrial Arts in many communities. This has come about through the development of hundreds of area and special vocational schools throughout the country to the point where strong and effective vocational education at the secondary school level is a possibility. These schools are better equipped and their reason for being is effective vocational education.

This leaves the Industrial Arts program at the senior high school in many areas free of its "quasi vocational" responsibility, and free to identify itself with a new and more effective role in the area of general education.

2. As a nation we are no longer in the industrial period. We are now in a post-industrial period with a smaller and smaller percentage of our people engaged in manufacture and production.

It has been speculated by 1980 or '85 that "two or three per cent of the population could do all of the work that has to be done to satisfy the material needs of society." (3, p.90)

3. The Commission on the Year 2000 describes a world with --

Intercontinental travel by rocket

Decision making by computers

Abundant thermonuclear energy

Farming in the oceans

Mining on the moon

Permanent research laboratories orbiting in space

A world population of 6 or 7 billion people

Fewer production workers and more clerks, researchers and technicians

Routine use of drugs to alter behavior

Bigger cities and vast conglomerations of cities (7, p.F-1)

The world of vast involvements with computers, cybernetics, automation, lasers, masers, space enterprise, super-sonic travel, communication wonders, and the miracles of medicine lie just ahead. Yes, but with all the growth in man's sophistication and the marvels of his technology there is an ever-increasing need for the school and society in general to face the problems of a society that doubles its population in a short space of years; that gathers major segments of its people in sprawling urban megalopolises; that year by year increasingly disturbs the

ecology of life; that demands mobility, communication wonders, increasing amounts of power, and physical comfort; and a society that sees its environment in nearly every dimension shrink and consumed year by year.

I ask you to read the reports of the Commission on the Year 2000, Robert Jung and Johan Galtung's text Mankind 2000, Dr. Burnam P. Beckwith's book The Next 500 Years, Stuart Chase's The Most Probable World, Harrison Brown's The Challenge of Man's Future, Theodore Gordon's work The Future, Robert Prehoda's book Designing The Future, or Brown, Bonner, and Weir's work titled The Next Hundred Years. Or perhaps better still, I ask you to read your daily newspaper, the popular magazines on the newsstand, or to listen attentively to the broadcasted news by way of radio or television. Each of these keeps reminding us of pressing, major social and environmental problems that bear practically no relation to what I see going on in most Industrial Arts programs at the senior high school level.

Likewise, as I observe the concerns, interests, and motivations of the youth of today, there is little evidence to support much of what is done in the program.

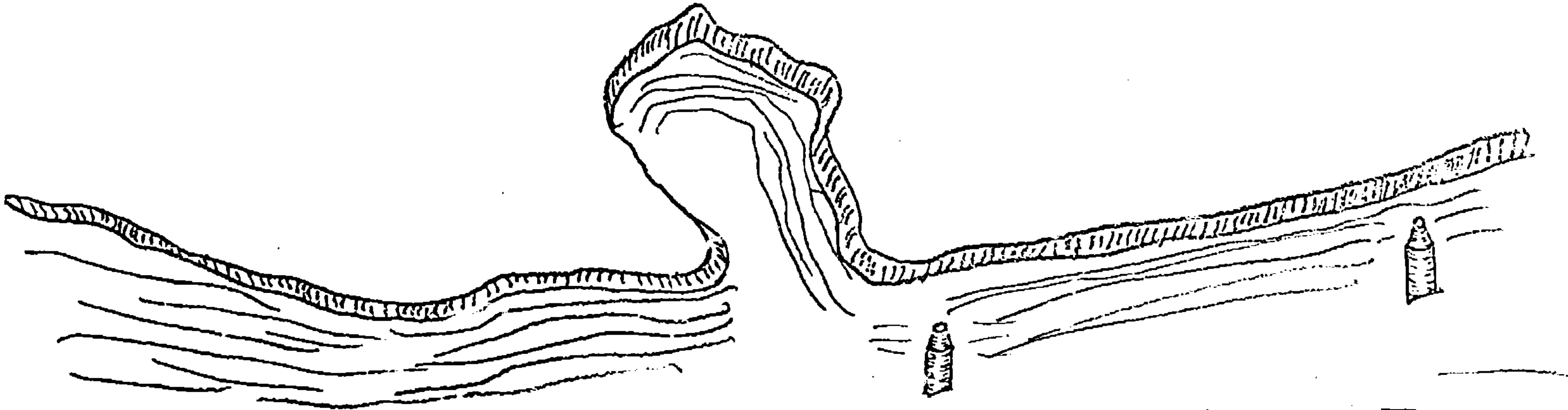
Pointedly and specifically, I am asking that Industrial Arts or some other more appropriate title assume a new posture that will take it out into the mainstream of American education.

Yes, out into the mainstream of life itself.

The forces of historical determinism, a lack of commitment to the total educational process, a superficial play at isolationism, and an over abundance of tradition have caused the profession to maintain its anchor in the safe harbor of limited school and minor curriculum participation.

The shallowness of these operating waters perpetuated by a "thing" and "process" centered philosophy have precluded any broad or penetrating involvement in the total school or society. The geography of the shop wing in our physical structures resemble the off-the-beat inlet that offers shelter from the storm. The storm in this case is the turbulent, dynamic, ever-changing process of education where the trade winds of academic disciplines mix and foment in the face of societal challenge and debate.

The alternative to this safe, flimsy security is to move out into the mainstream of education; to move out into the deep and wide channels of involvement with the total school and society, out into the waters that will permit the maneuverability to cope with the range of human interests, abilities, and capacities. Yes, out into that main channel where interdisciplinary participation is a reality and the shaping of course and direction of the school and society becomes an assumed responsibility.



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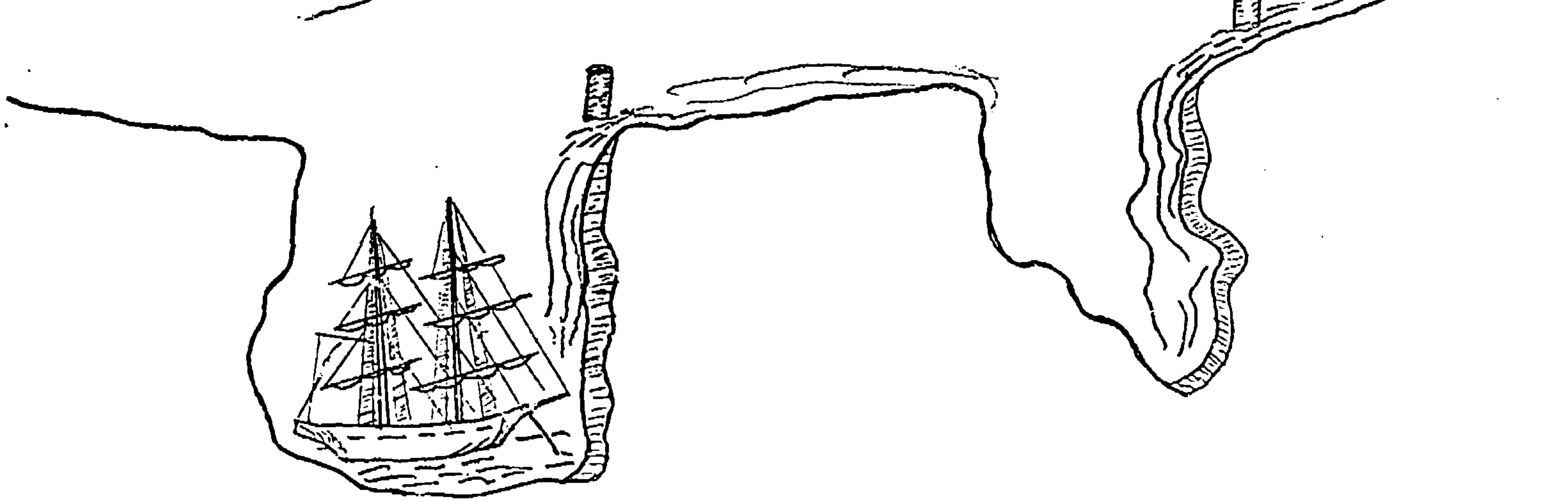

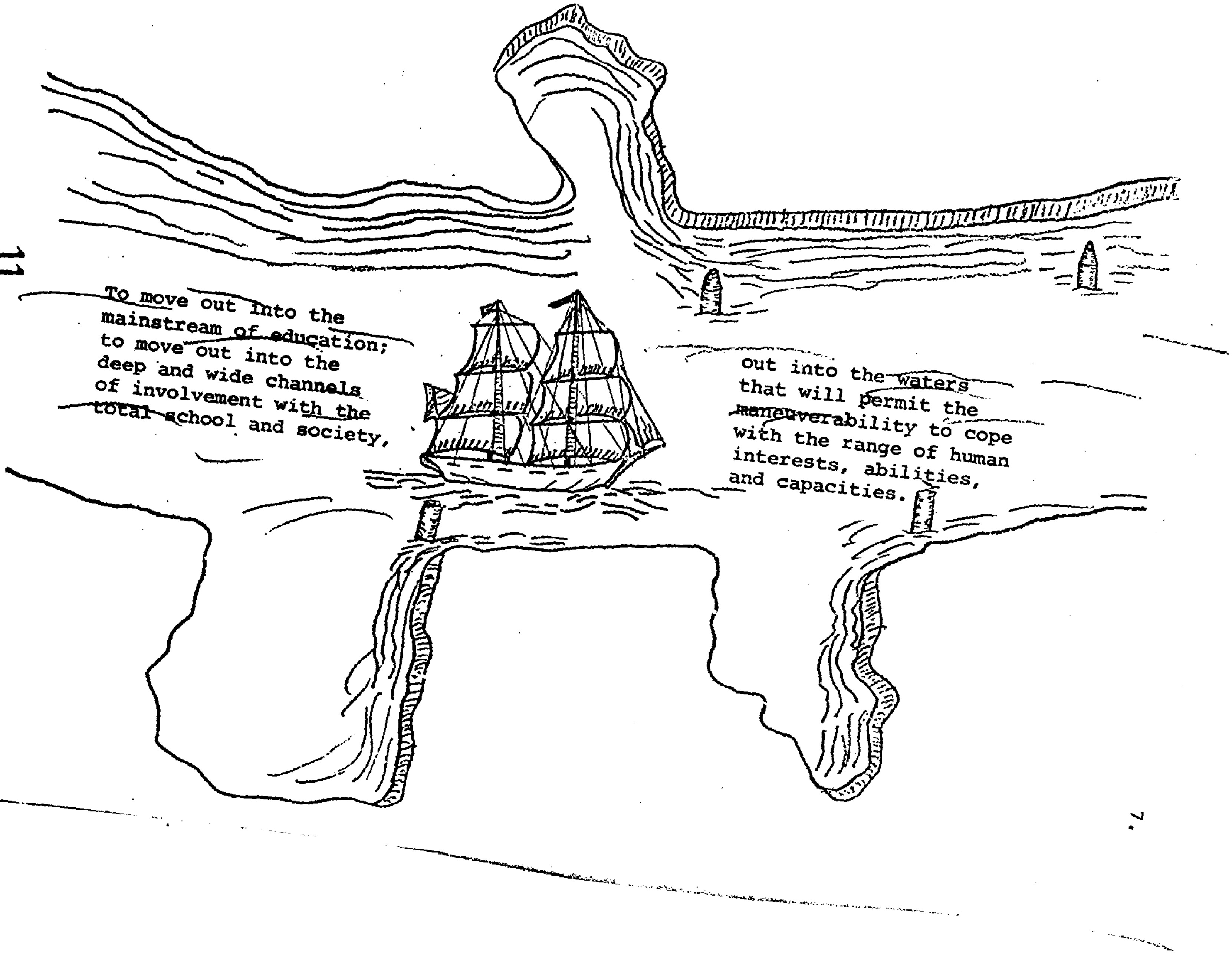
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and capacities.

And now that I have said that, -- I am aware of my responsibility to constructively examine potential courses of action or directions that could put meaning and reality into education and a great deal of vitality in Industrial Arts.

If you were to ask -- "Where is the action for Industrial Arts?", I would submit -- it is in the areas of major societal problems facing mankind.

> BUT MORE POINTEDLY, AND MORE SPECIFICALLY, I AM SUGGESTING A FORM OF INDUSTRIAL ARTS THAT -- EXPLORES THE APPLICATION OF TECHNOLOGY IN THE SOLUTION OF MAJOR SOCIAL, *ENVIRONMENTAL, AND OPERATIONAL PROBLEMS* THAT FACE MANKIND.

Please note my interest in technology is what it can do and not in a minute taxonomy of each and every twig or branch of the tree of technology. My interest and aspiration for Industrial Arts is general education, and if the signs of the times are correct, I would submit it as imperative education.

What are some of these problems that need urgent attention? As man enters into the last part of the Twentieth Century, he is confronted with the absolute necessity of finding workable solutions to the problems of --

pollution

power generation

housing

transportation

communication

conservation

more effective resource utilization, and

industrial productivity.

The charge to Industrial Arts is not to develop the solutions although it does prevent some interesting possibilities. The major function would be one of education. That is, the education of the citizenry regarding technological developments that are directed towards solving the problems of pollution, housing, transportation, etc.

The great need is for education, so that intelligent decisions can be made at all levels in society. Major debates are presently being conducted in numerous localities regarding the development of nuclear power generating stations, pollution control measures, conservation projects, and many more.

Decision making in a democracy demands levels of understanding that frequently have not been available or sufficiently developed. Classic examples in our own history include the

burning and destruction of the early looms, a technological development that would make possible the clothing of hundreds of millions of people. The destruction of the early cotton gins is another example of technological ignorance. Perhaps the most classic example was the prolonged and bitter strikes that accompanied the installation of automatic dialing facilities in the telephone system. The volume of calls on any ordinary day is so great that it would be utterly impossible to find enough operators available to handle a fraction of the load. The history of mankind is filled with instances of technological ignorance that delayed progress and of instances when progress was won after bitter conflict, strife, strikes, and human loss.

Permit me to give you a few examples of the present potential open to mankind through the fruits of technology.

"Dr. Lee A. DuBridge, President of the California Institute of Technology, has said that from a purely technical standpoint we now know enough to:

1. Produce enough food to feed every mouth on earth -- and to do this even though the population may double or triple.
2. Make fresh water out of sea water and then irrigate all of the world's arid regions.
3. Produce enough energy from uranium to

light and heat our homes and offices, electrify our railroads, and run all of our factories and mills.

4. Build houses, buildings, and indeed whole cities, which are essentially waterproof, heatproof, cold proof and storm proof." (1,p.13)

Dr. Alvin W. Weinberg, Director of the Oak Ridge National Laboratories has made some interesting observations in an article titled: "Can Technology Replace 'Social Engineering'?". (9, p.56,57)

Dr. Weinberg identified two past technological fixes on social problems that have plagued man for centuries. These were war and widespread poverty. It is Dr. Weinberg's idea that --

> "Edward Teller may have supplied the nearest thing to a quick technological fix to the problem of war. The hydrogen bomb greatly increases the provocation necessary to lead to large scale war ---"

Secondly, a technological fix was made on widespread poverty through the use of technology in the greatly expanded production system involving mass production and automation.

A third social problem that Dr. Weinberg speculates on with respect to a technological fix is the great water

shortages experienced in such areas as Southern California and the Eastern Seaboard. This would involve the use of nuclear desalination plants. It is estimated that water costs would be less than ten cents per thousand gallons. This would depend upon the development of inexpensive electrical power from huge nuclear reactors.

John McHale in his text, The Future of the Future, put it this way:

> "Our chances of survival are clearly based on our capacity to meet the largest challenge ever offered to man. Technologies and 'know-how' are more than adequate to solve many of our largest problems. What we lack is that combination of vision, understanding, and innovative action that will enable us to use our knowledge more immediately and more effectively." (5, p.170)

The thrust of this new form of Industrial Arts would be aimed at another important problem that faces mankind in the present and certainly will more so in the future.

The problem is one of an ever-widening gap between the technologist (the technical elite) and the great masses of people who use or must make decisions about the application, acceptance, or rejection of the technology.

Walter W. Finke (Vice President of Honeywell, Inc.'s Computer Group) has indicated that --

> "A language barrier as real as any that exists in the world today separates the technocratic society from the remainder of society. And the tragedy is that little attempt is made to break down the barrier ..." (4, p.49)

The gap between the technologist and the populace in general was a concern of Sir Charles Snow when he said --

> "... that he feared that technological progress would eventually lead to a situation in which life-or-death decisions would one day be made by a small scientific elite 'who do not quite understand what the depth of the argument is.'
>
> That is, he said, 'one of the consequences of the lapse or gulf in communication between scientists and nonscientists'." (4, p.50)

A similar concern was expressed by Barbara Ward in her text Spaceship Earth in which there is a concern for the impact of technology and the control of political and economic policy.

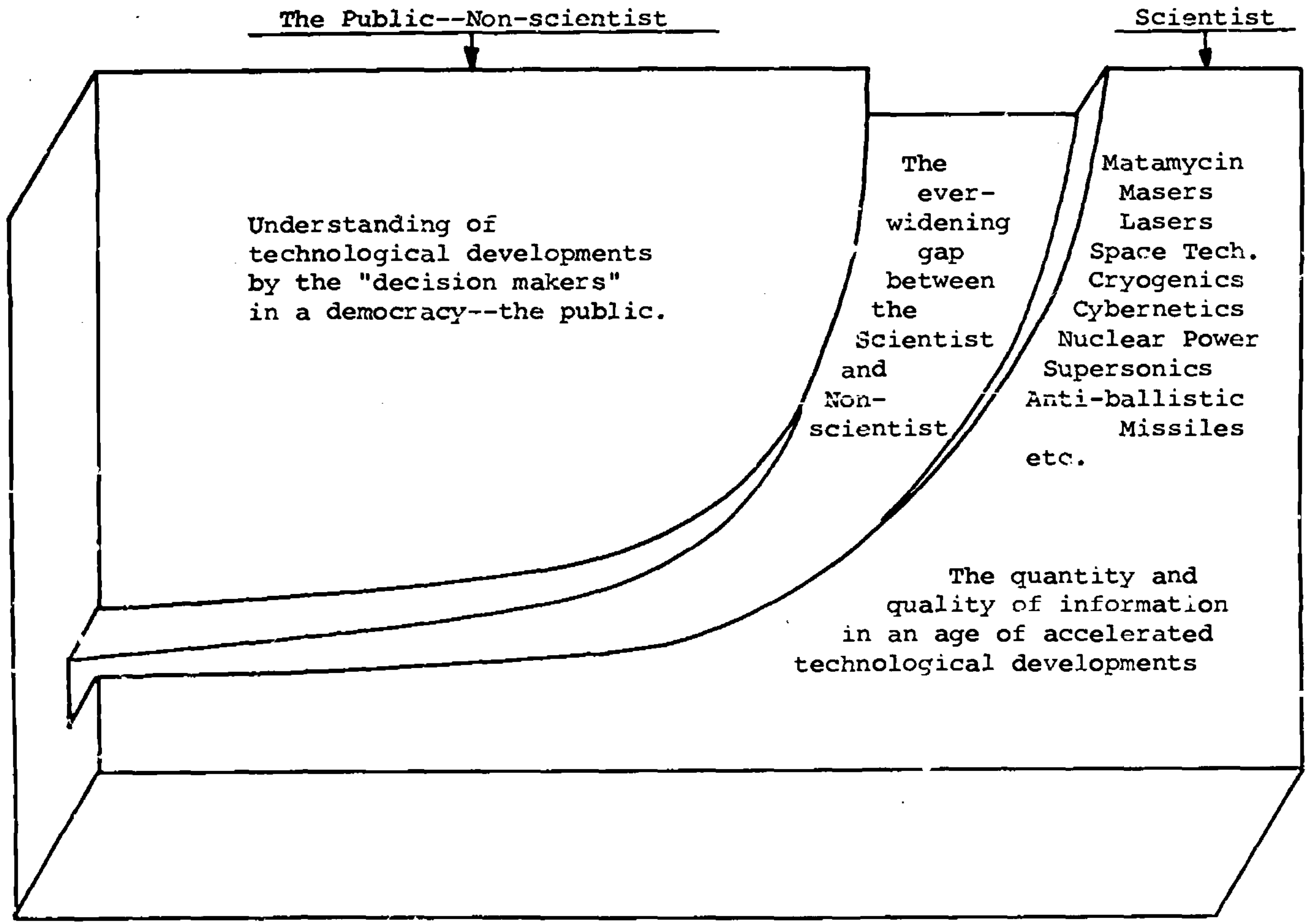
> "In a world that is being driven onward at apocalyptic speed by science and technology, we cannot, we must not, give up the idea that human beings can control their political and economic policies..." (8, p.1)

Perhaps an even more pointed element was contained in the report from the Commission on the Year 2000. The report projected:

> "The end of democratic government as people lose interest and leave the decisions to an intellectual, technological elite." (7, p.F-1)

THE PROBLEM OF A DANGEROUS COMMUNICATIONS

GAP BETWEEN THE SCIENTIST AND THE NON-SCIENTIST



The solution for each of these concerns lies in the nature of education that is a part of each individual's program. I am suggesting that to not have a significant emphasis on the role of technology in society as a part of general education would indeed be walking directly into the pitfalls so identified by the Commission on the Year 2000, Sir Charles Snow, Walter Finke, and Barbara Ward. I also am suggesting that the present Industrial Arts at the senior high school would do well to evolve into such a role.

The need for greater emphasis on the role of technology and its part in the evolving social scene is highlighted by the factor of <u>time</u>. In many instances it may more appropriately be called <u>lead time</u>.

The acceleration of technological innovation and the ensuing accelerated changes in society have contributed to major social, economic, and psychological problems.

The time to adjust and the span of time for adjustment are crucial matters. The slow moving dynamics of technology as experienced by those living in the previous centuries allowed considerable time for adjustment and assimilation. However, the present and the future are marked by a protraction of time with the predictions for the future of even greater acceleration.

Let us examine a few examples. From the moment of scientific

invention until the manufacture of the product, the time lag was as follows for the items below. (Servan 6, p.)

112 years for photography (1727-1839)

56 years for the telephone (1820-1876)

35 years for the radio (1867-1902)

15 years for radar (1925-1940)

12 years for television (1922-1934)

6 years for the atomic bomb (1939-1945)

5 years for the transistor (1948-1953)

3 years for the integrated circuit (1958-1961)

In another area let us examine the time interval between the seven generations in the evolution of typography. (10, p.4-6)

Generation	Innovation and Date	Time Interval
First Generation	movable type, 1450	
		--- 436
Second Generation	linotype, 1886	
		--- 44
Third Generation	teletype, 1930	
		--- 17
Fourth Generation	phototypesetting, 1947	
		--- 7
Fifth Generation	electronics in type-setting, 1954	
		--- 9
Sixth Generation	computer, 1963	
		--- 3
Seventh Generation	character generation, 1966	

The same kind of an analysis can be made with equal or even

more accelerated projections in the fields of medicine, speed of travel, production, construction, metallurgy, and many more. A graphic plot of such technological acceleration is presented in figure 1.

The resultant takes on many dimensions such as the increasing reduction of the half-life of the engineer; the need for new plants and equipment; the altering of accepted social values; the concept of planned obsolescence; the protracting of time and distance; the widening impact of individual or group activities; the knowledge explosion; and many more.

The significance of the study of the role of technology in this accelerated pace is that it would equip the individual with the capability to anticipate certain changes and to have in some instances evaluated alternatives. It also is anticipated that such a study of technology on man's future problems would provide a higher tolerance for change as one sees the contributing elements grow, emerge, or come to pass.

It does present an interesting hypothesis that those who study the future problems and the associated accelerating technological developments would be in less conflict with the changes that come about, than would the individual who did not engage in such study and concentrated on the past.

I have very briefly mentioned to you the problem areas that

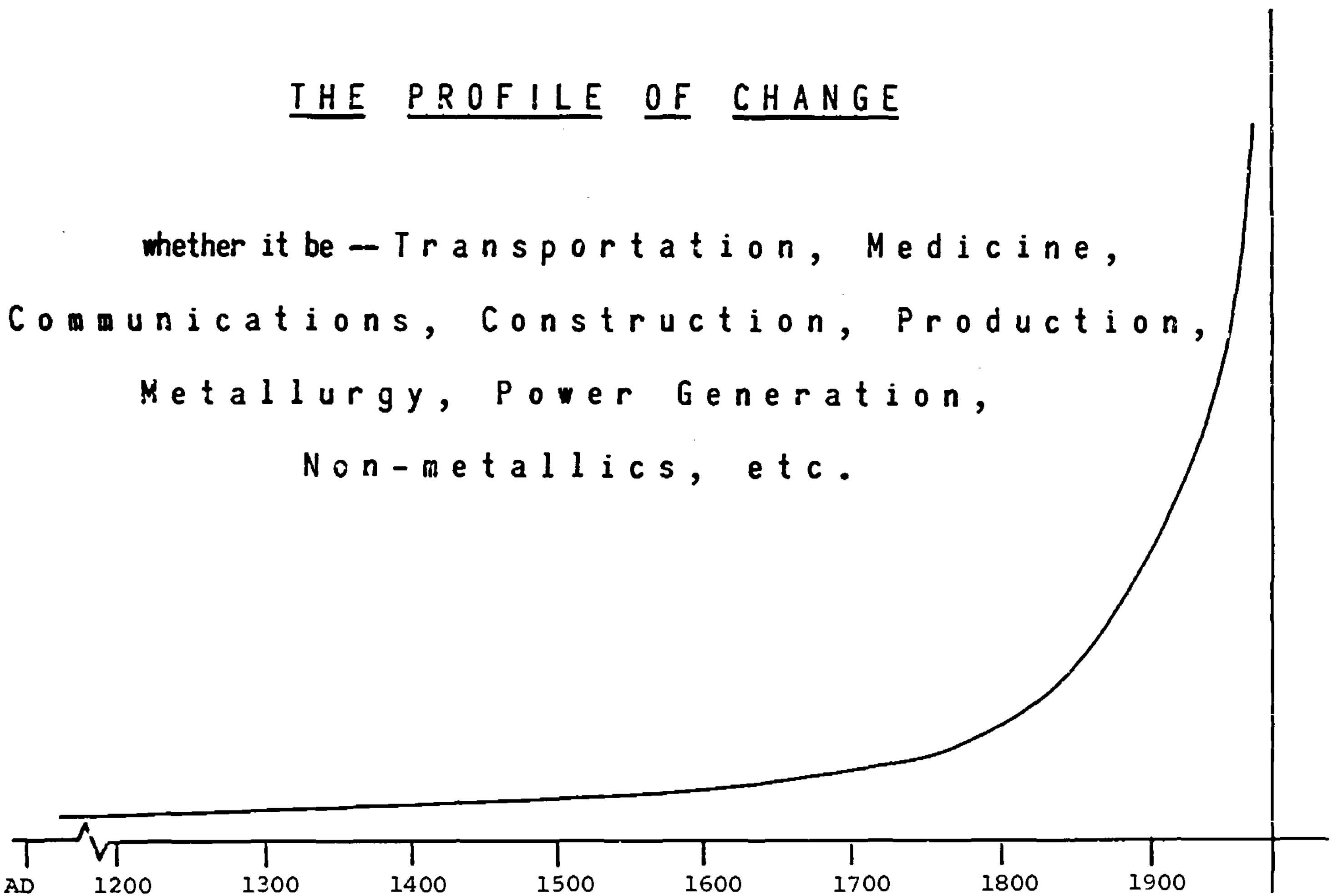

THE PROFILE OF CHANGE
whether it be — Transportation, Medicine,
Communications, Construction, Production,
Metallurgy, Power Generation,
Non-metallics, etc.
AD
1200
1300
1400
1500
1600
1700
1800
1900

Figure 1

I believe Industrial Arts (or some other title) can effectively and productively contribute to in the contemporary societal and educational arena. A rationale extending out into a number of different areas has been presented. The following section deals with a proposal for a senior high school program that relates directly to the preceding discussion. This section will deal briefly with the background, development and design of the program, as well as the systems of study.

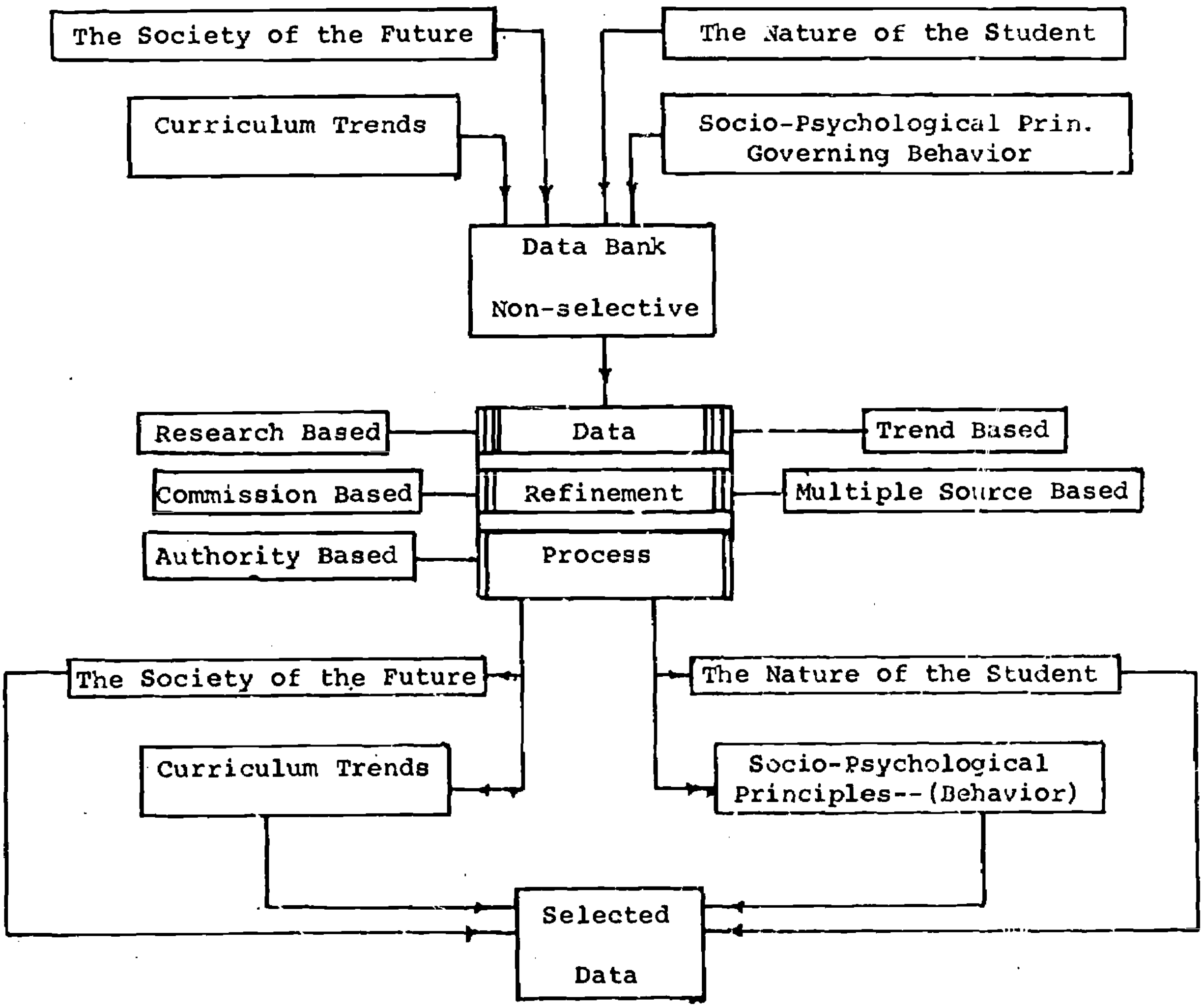
Background Development on the Program

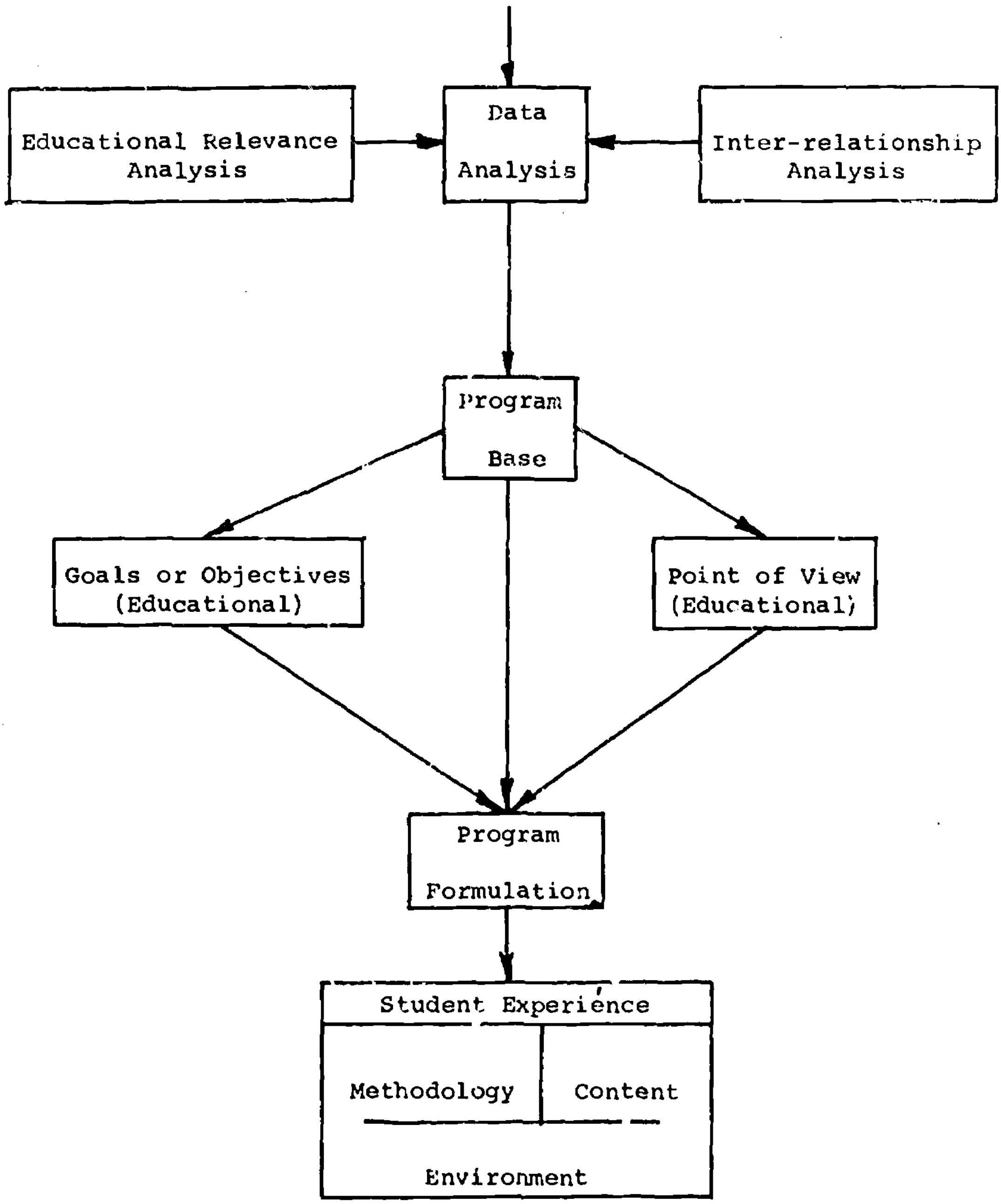
The projected program of this proposal grew out of an in-depth investigation of four broad areas of study by a group of competent advanced graduate students under the leadership of this writer. The four broad areas included --

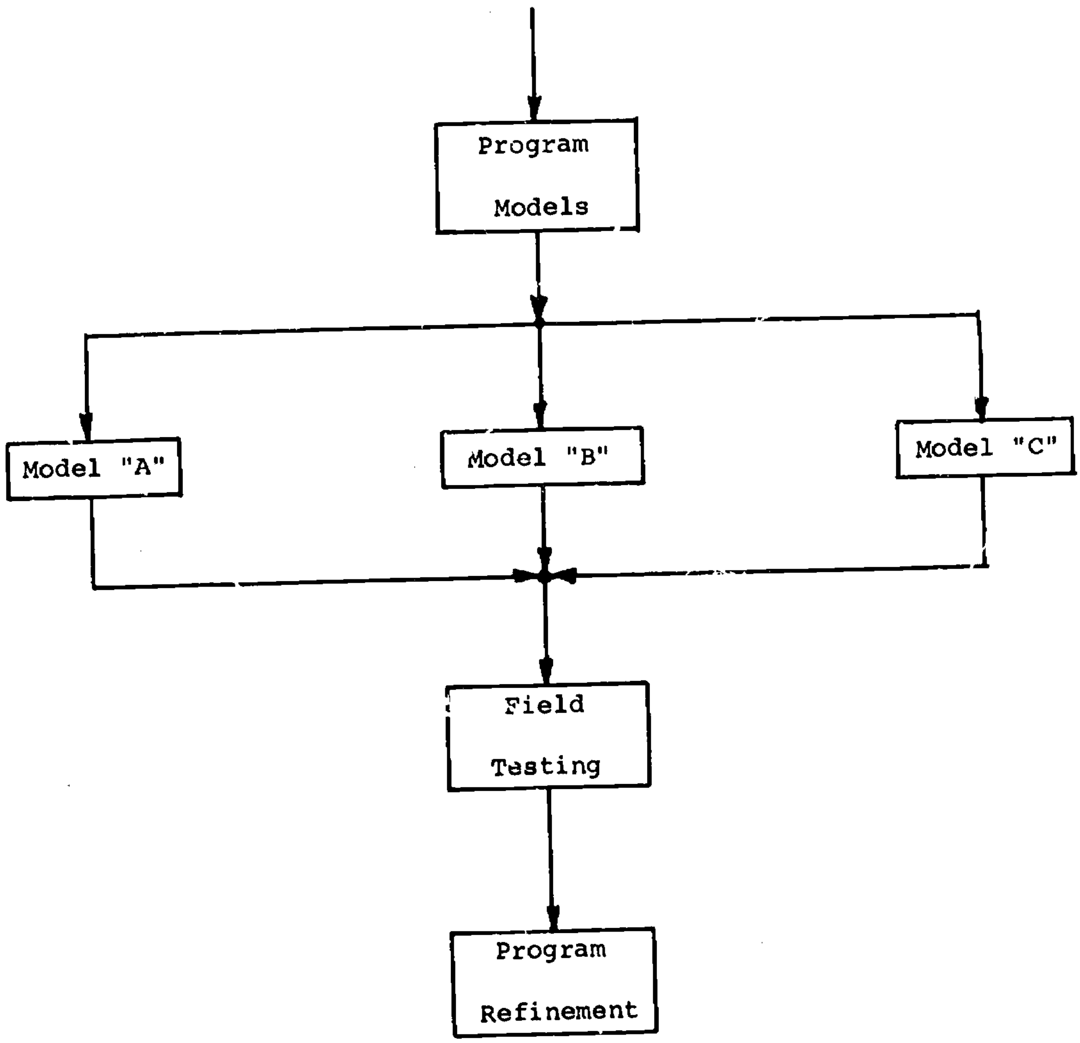
1. The Nature of the Society in the Next Thirty Years.
2. The Nature of the Senior High School Student.
3. The Socio-Psychological Theories Governing Man's Behavior.
4. Curriculum Trends at the Secondary School Level.

The complete procedure for this study is shown in the schematics on pages 18, 19, and 20. This initial investigation

Program Development Model
for the
Senior High School
Industrial Arts




Data
Analysis
Educational Relevance
Analysis
Inter-relationship
Analysis
Program
Base
Goals or Objectives
(Educational)
Point of View
(Educational)
Program
Formulation
Student Experience
Methodology
Content
Environment


Program Models
Model "A"
Model "B"
Model "C"
Field Testing
Program Refinement

revealed the importance of a broad base, multi-faceted approach to the problem of designing a program for the future.

The students who participated in this early phase of the work found whole new sources of information and a broader perspective of relevant literature upon which they could depend. Visitors and guest lecturers who appeared before the class of investigators were amazed with the breadth of study and resourcefulness of the group.

This intensive study produced a quantity of significant data in each of these broad areas as well as an exceptionally fine bibliography. A number of valuable community and institutional resources were identified in this process.

Design of the Program

The specific direction of the program is aimed at the following ideas.

1. The students in the schools of today will live their lives in the future, thus the emphasis is on a program aimed at education for the future.
2. Technology will play a leading role in the solution of major problems facing mankind in the future.
3. Major societal problems that face the citizen of the future include --

a. Pollution -- air, water, noise, etc.

b. Conservation -- natural resources, human energies, material, products, etc.

c. Transportation -- air, land, sea, space, etc.

d. Housing and Urban Development

e. Power Generation

f. Water Supply

g. Production Processes

h. Communications

i. Resource Utilization

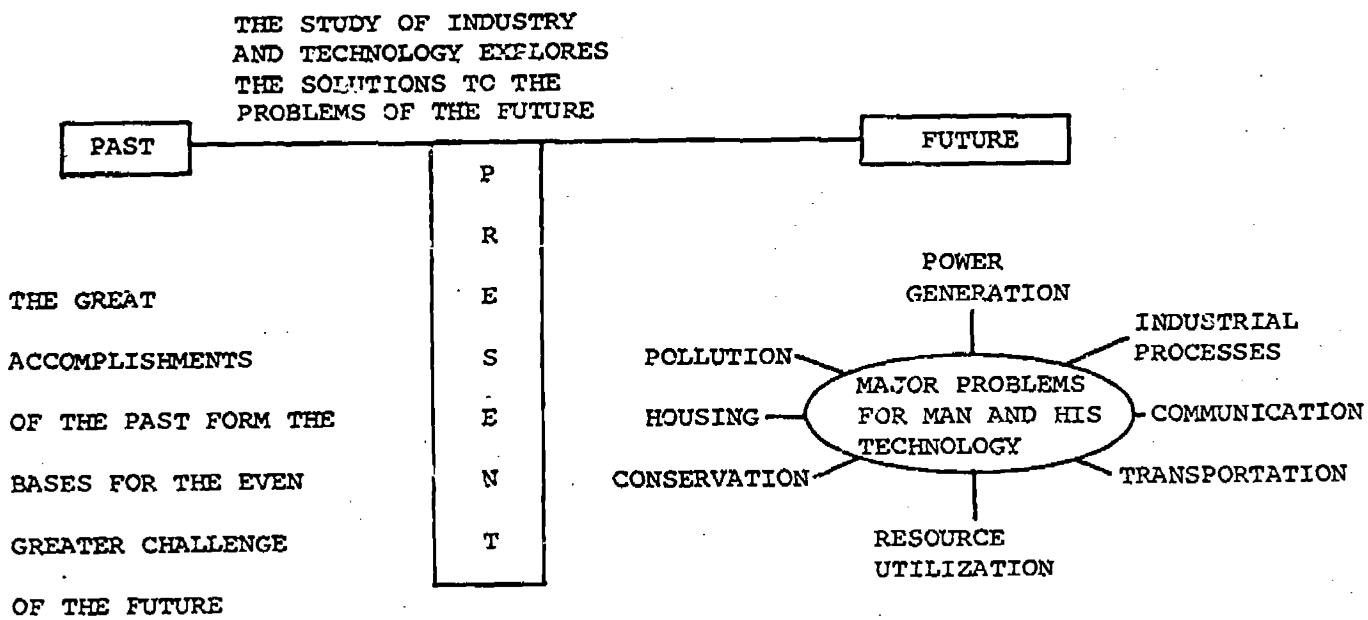
Pilot and experimental instructional models have been tested during the previous year with several of the major problems listed above. These attempts have been observed and commended by experts in curriculum, human growth and development, as well as persons specializing in projecting and studying the future.

Systems of Study

Since the program was directed towards the senior high school, it appeared advisable that some direction should be given to the teacher regarding the kinds of experiences or

THE PRODUCTS OF TODAY'S EDUCATION

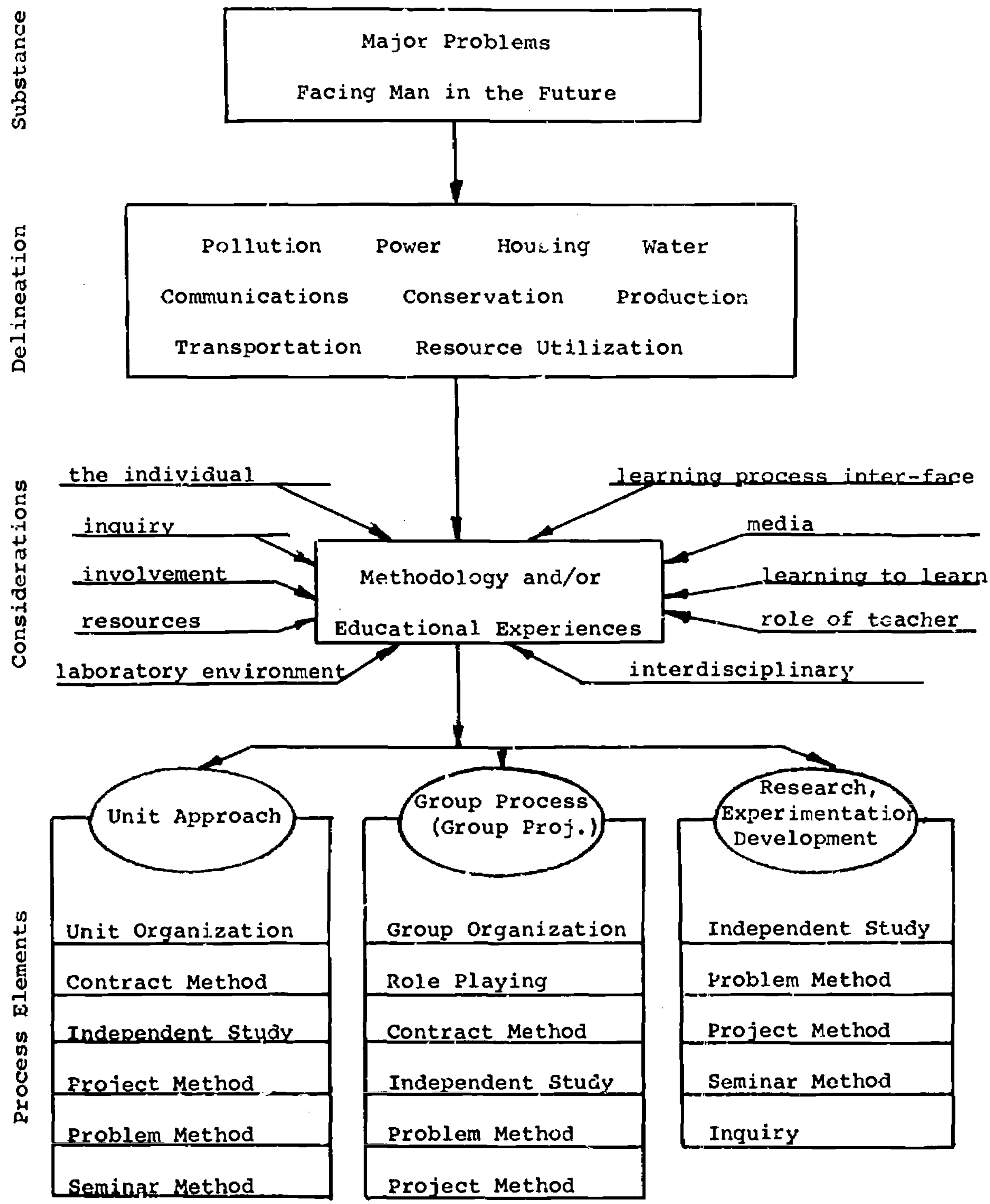
LIVE THEIR LIVES IN THE FUTURE



organized activities for the class. The bases for the selection of the several approaches or systems grew out of the study of the four broad areas -- i.e., the nature of the student, curriculum trends, socio-psychological principles affecting behavior, and the nature of the society of the future.

Emphasis was placed on the following ideas or concepts --

1. The development of each individual was paramount.
2. Inquiry was emphasized above the memory of isolated facts.
3. A high level of student involvement was stressed in the structuring of potential student activities.
4. The bounds of the laboratory were extended to reach out into every section of the school, the community, and the nation as sources of information.
5. The traditional textbooks gave way to broader library study, contemporary newspapers and magazines, scientific journals, industrial house organs, government bureaus, public utilities, scientific organizations, commission reports, and a variety of organizations including The World Future Society.


Substance
Major Problems
Facing Man in the Future
Delineation
Pollution
Power
Housing
Water
Communications
Conservation
Production
Transportation
Resource Utilization
Considerations
the individual
inquiry
involvement
resources
laboratory environment
learning process inter-face
media
learning to learn
role of teacher
interdisciplinary
Methodology and/or
Educational Experiences
Process Elements
Unit Approach
Unit Organization
Contract Method
Independent Study
Project Method
Problem Method
Seminar Method
Group Process
(Group Proj.)
Group Organization
Role Playing
Contract Method
Independent Study
Problem Method
Project Method
Research,
Experimentation
Development
Independent Study
Problem Method
Project Method
Seminar Method
Inquiry

6. A broad range of instructional media such as audio and video tapes, movies, models, graphics, collections, etc., should be used.
7. Considerable stress was given to the process by which the individual got his information and arrived at his conclusions.
8. The role of the teacher was to be that of a "manager of education" -- one who facilitates, encourages, stimulates, advises, and develops a climate for growth.
9. Although the individual attainment or growth was paramount, stress was given to the structuring of group process experiences to provide the setting for interaction, responsibility, role-playing, self-direction, peer-culture involvement, cooperation, challenge, and democratic participation.

One system of study tested included the unit approach to several of the major problems. A sample unit topic might be stated as follows:

"Transportation Needs and the Future with Implications for Technology and Human Ingenuity"

In the process of carrying out the unit approach to such a topic, the methodology would include problem solving, the

contract method, individual or independent study, the project method, inquiry, and the seminar procedure.

The total list of unit topics and their complete wording are as follows:

1. Transportation needs and the future with implications for technology and human ingenuity.
2. Pollution control and the future with implications for technology and human ingenuity.
3. Conservation needs and the future with implications for technology and human ingenuity.
4. Housing, structures and architecture and the future with implications for technology and human ingenuity.
5. Communications and the future with implications for technology and human ingenuity.
6. Power generation and the future with implications for technology and human ingenuity.
7. Production processes and the future with implications for technology and human ingenuity.

8. Natural resources, and the future with implications for technology and human ingenuity.

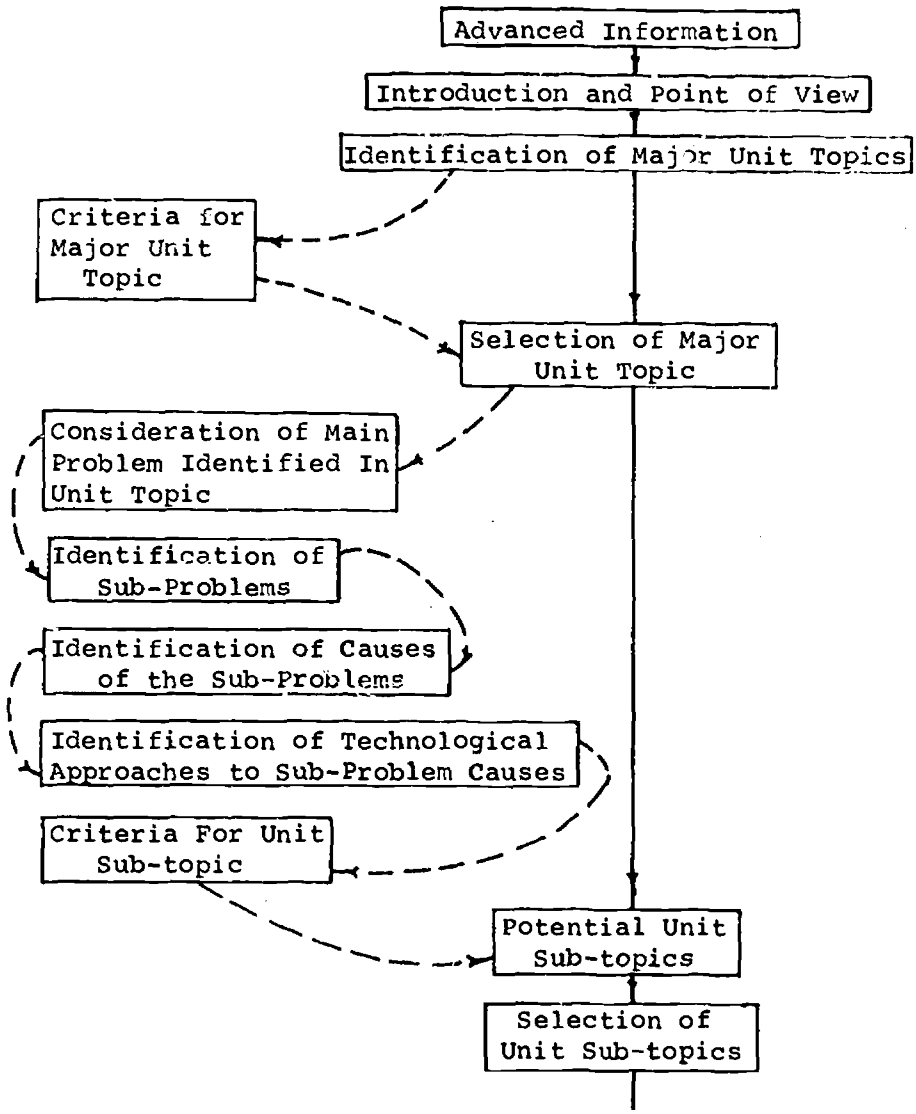
It was proposed that a total class would undertake the study of only one unit at a time. Each student would contract for a particular phase of the topic and would pursue an in-depth study of his part of the total unit. All other students would do the same with their individual parts of the whole. The bringing of all components together in a cohesive study would be accomplished by means of student (class) seminars.

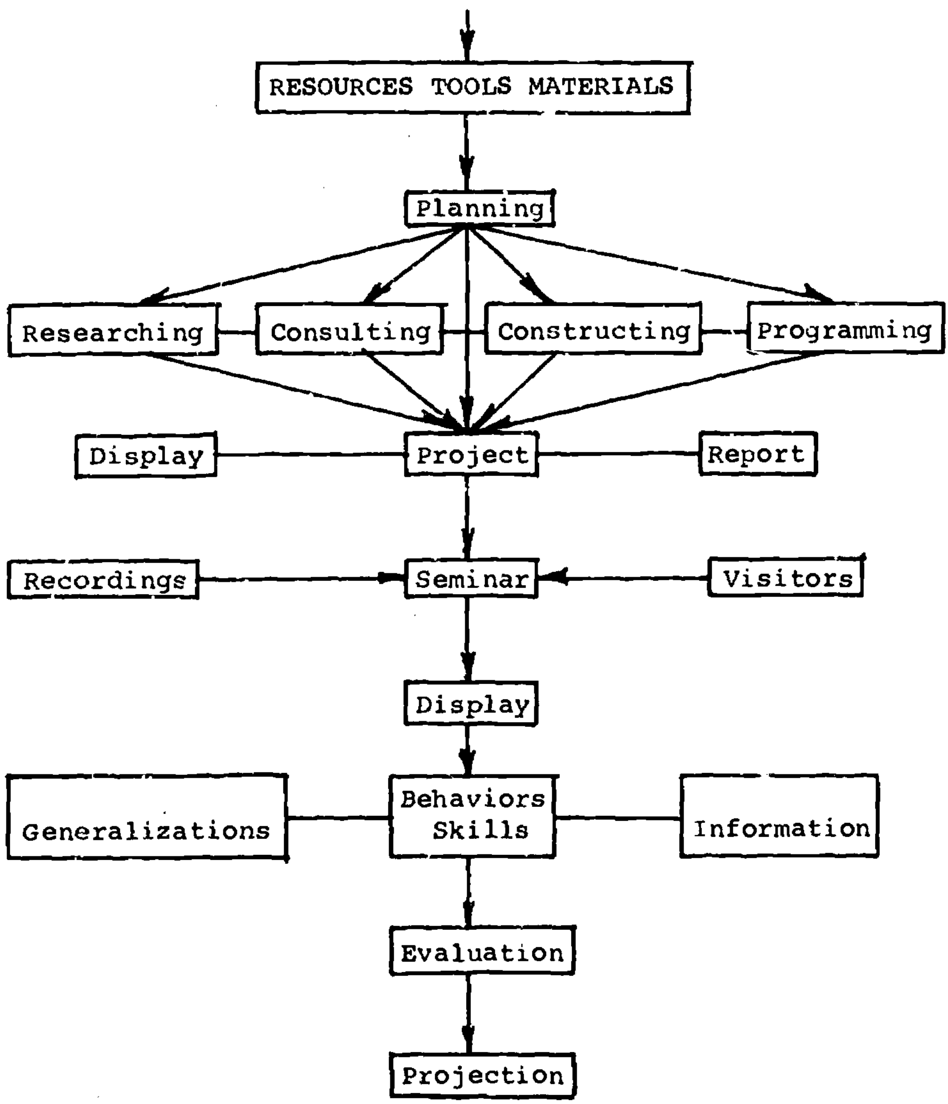
A schematic of the various phases through which the instructional program might procede is presented on pages 28 and 29.

Tangible products produced by the students would include a constructional model depicting the sub-topic each has selected, a written presentation dealing with the individual's specific sub-topic, and in some instances a display of literature, pictures, graphics, specimen, or other illustrative material.

The outline of the written unit presentation was proposed to have the components as shown on page 30. This outline is designed to get at a broad understanding of the topic and to move more effectively in an educational experience that goes beyond a new form of "project making".

SCHEMATIC FOR A CONTEMPORARY UNIT STUDY
THAT RELATES TO A PROBLEM




RESOURCES TOOLS MATERIALS
Planning
Researching
Consulting
Constructing
Programming
Display
Project
Report
Recordings
Seminar
Visitors
Display
Generalizations
Behaviors Skills
Information
Evaluation
Projection

OUTLINE OF UNIT PRESENTATION

I. UNIT TOPIC
The unit topic that the class is studying.

II. SUB-TOPIC
The specific subdivision of the main topic reported on. The sub-topic project should reflect some aspect of the sub-topic you have selected to develop and report on.

III. PURPOSE
Explains the reason behind the sub-topic and answers the question "Why" you selected it.

IV. PROCEDURE
Explains in outline form the way in which the purpose has been achieved and answers the question "How" you accomplished your total effort.

V. IMPLICATIONS FOR SOCIETY AND TECHNOLOGY
Describes the relevance of the sub-topic for society and technology.

VI. BACKGROUND INFORMATION
Discusses the current developments related to the sub-topic.

VII. TECHNICAL, SCIENTIFIC AND ECONOMIC FACTORS
Describes the technical information, scientific principles and economic implications which relate to the sub-topic.

VIII. EQUIPMENT AND MATERIALS
A list of equipment and materials used.

IX. REFERENCES
A listing of all books, pamphlets and other printed materials.

X. RESOURCES
A listing of interviews, visits, phone calls, letters, etc.

XI. APPENDIX
The extra information collected as a result of the investigation. This includes the actual items received from the resources listed above.

A second system that has been tested with such major topics involves a total class (group project) study. This is a system of instruction pioneered by the Industrial Education Department at the University of Maryland for the study of major industries. Its application to the major problem of the future has been tested out and found to be most appropriate.

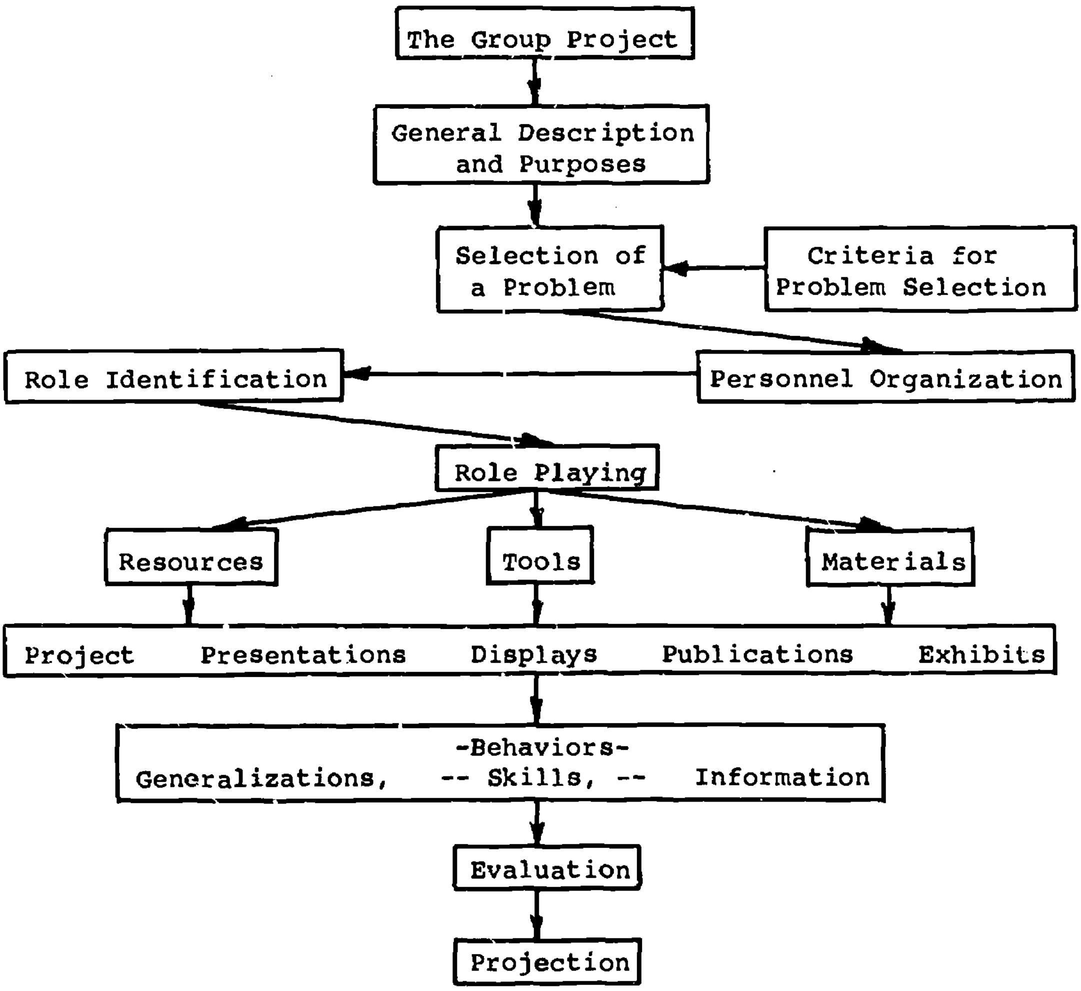
The schematic on page 32 illustrates the various phases through which the group process (group project) approach is developed.

The broad problem areas are maintained as follows: pollution, conservation, transportation, housing and urban development, power generation, water supply, production processes, communications, and resource utilization.

However, the group project problem will in all probability be a single facet of one of the broad problem areas perviously listed. As an example, a group project under the broad topic of pollution might deal with rivers and streams, or industrial pollution of the water, or industrial pollution of the air, or noise pollution in the cities, or airport noise abatement problems, etc.

A second schematic is presented on page 34. This is an analysis of just one phase of the previous schematic on page , and deals only with that part of the process whereby a problem

CLASS ROUTINE & PROCEDURES



is selected by the class. This particular sequence of events is to get at the processes of decision making by students, stimulating participation, developing criteria, and applying democratic principles.

This group process approach involves a great deal of student leadership, decision-making, and independent study. Role-playing is a principal feature and provides a living-learning involvement with the content of the problem. The process uses an excellent blend of the mental and manipulative activities enhanced by an abundance of opportunity for leading, researching, following, innovating, analyzing, and projecting.

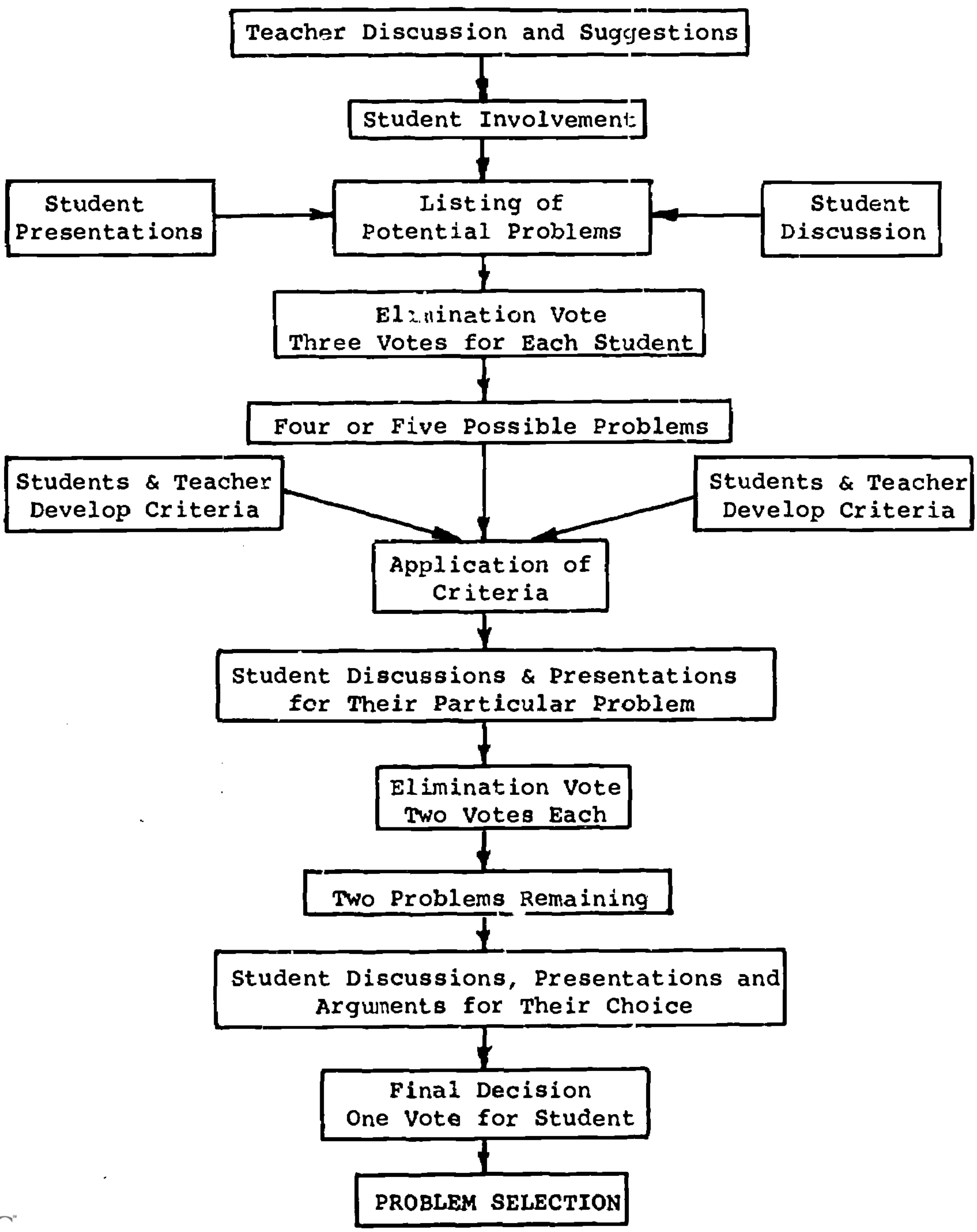
A third instructional system is the research and experimentation phase that is aimed at developing the investigative, inquiring, and problem-solving abilities of the student. The application of this methodology to the major social problems identified earlier opens the possibility for countless problems for research, or experimentation.

Each student would take up a particular aspect of one of the broad topic areas previously listed. His research should move towards the actual testing, applying, evaluating, or developing some experimental apparatus in search of more information on a problem of the future or present.

This is not just a paper-writing experience. It should

SELECTING A PROBLEM

FOR A GROUP PROJECT STUDY



be a "hands-on", apparatus or equipment involvement, experience making full use of the rich environment for testing and application as found in the Industrial Arts laboratory.

The schematic on page 36 identifies a series of phases through which this educational experience may be guided. The Industrial Education Department at the University of Maryland pioneered the research and experimentation activities as a part of the overall Industrial Arts program at the secondary school level.

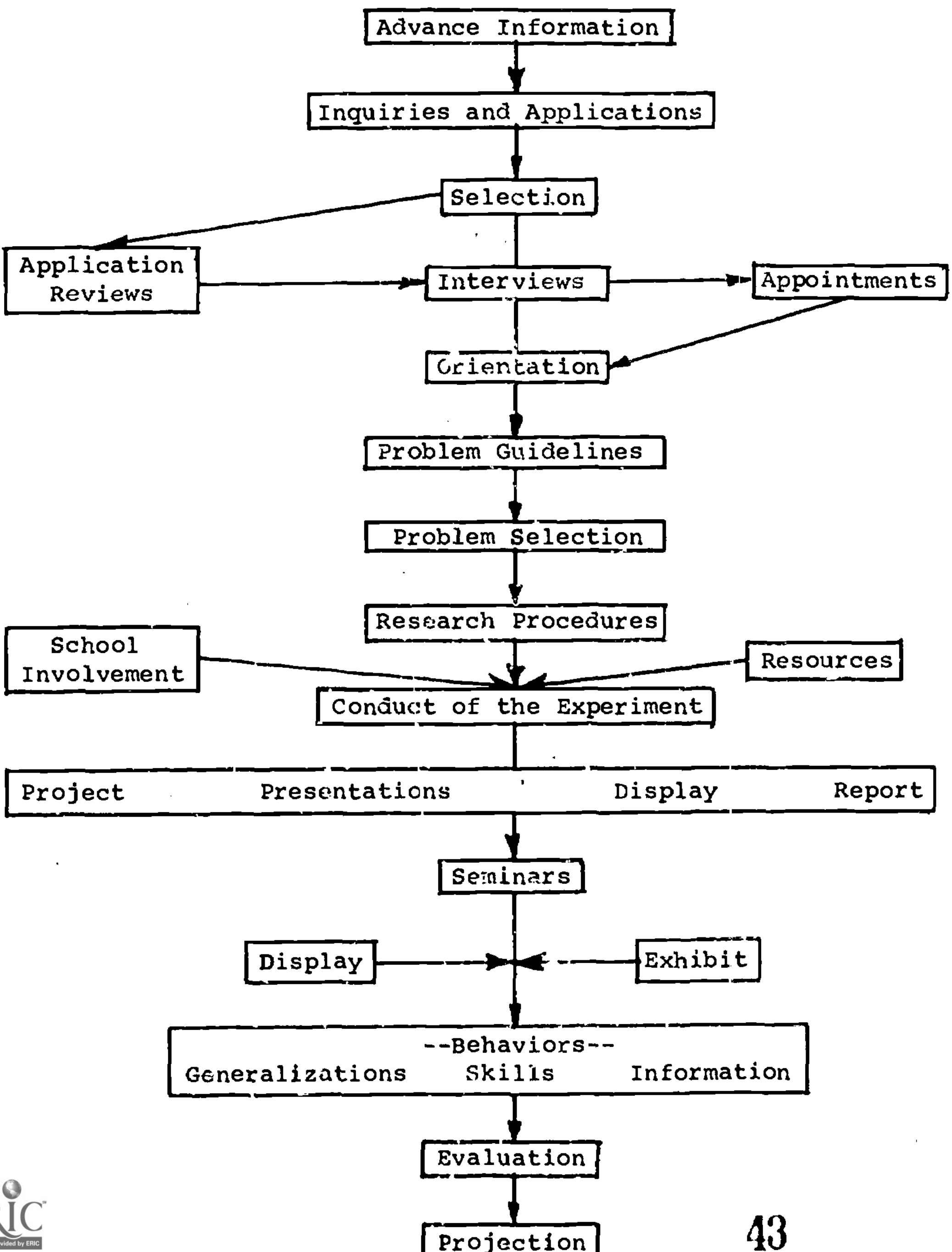
The application of this kind of a program to man's pressing problems of the future has special relevance, and has special appeal to certain kinds of students.

The students engage in the development of their research through the drawing up of the usual components of a research report such as: statement of the problem, purpose, need, assumptions, limitations, hypotheses, procedure, terminology, investigation, findings, summary, conclusions, and recommendations.

In anticipating the question as to whether high school students can handle such tools or components of research, it is important to relate that junior high school youngsters have done this same thing with great accomplishment.

The broad communication of each student's research to the other members of the class, the school, and the community is

RESEARCH AND EXPERIMENTATION SCHEMATIC



done by means of structured seminars. These seminars are presided over and administered by students. The following is a sample agenda for such a seminar.

COMPREHENSIVE SEMINAR AGENDA

I. Introduction by student chairman

II. Individual progress reports

III. Comprehensive report by one or two students on their research -- challenge and discussion

IV. Presentation of individual problems students are experiencing in the conduct of their research

V. News items of interest

VI. Closing comments.

As a further bit of evidence to establish the validity for this new direction in education, I would like to call your attention to an article that appeared in a Washington newspaper dated September 6, 1969. It was a United Press International story titled "Technology Unit Is Sought".

> "Both Congress and the White House were urged yesterday to create new organizations to deal with the dangers inherent in technological progress.

> The recommendation was made in a report by the National Academy of Sciences and released by Chairman George P. Miller (D-Calif.) of the House Science and Astronautics Committee.
>
> The report, prepared under a contract with the committee, said technological advances held 'great promise for mankind' if properly directed.
>
> 'If society persists in its present course, the future holds great peril, whether from the uncontrolled effects of technology itself or from an unreasoned political reaction against all technological innovation,' the report concluded."

It is interesting to note that our work preceded this announcement by over a year.

The impact of such a program and the need for it takes on many forms. The basic question is not whether Industrial Arts is willing to make this move. It is much more a matter of whether society can afford not to develop a greater and more effective understanding of the impact and potentialities of technology in the solution of man's problems.

This point is superbly made in a quotation by Harrison Brown in his text The Challenge of Man's Future:

> "If man is to find his way successfully through the labyrinth of difficulties that confront him in the years ahead, he must, above all, use his intelligence. He can no longer rely upon the unforeseeable fortunate circumstances; future mistakes will have consequences far more dangerous than past ones have been. He must divorce himself from unreasoned slogans and dogma, from the soothsayer, from the person whose selfish interests compel him to draw false conclusions, from the man who fears truth and knowledge, from

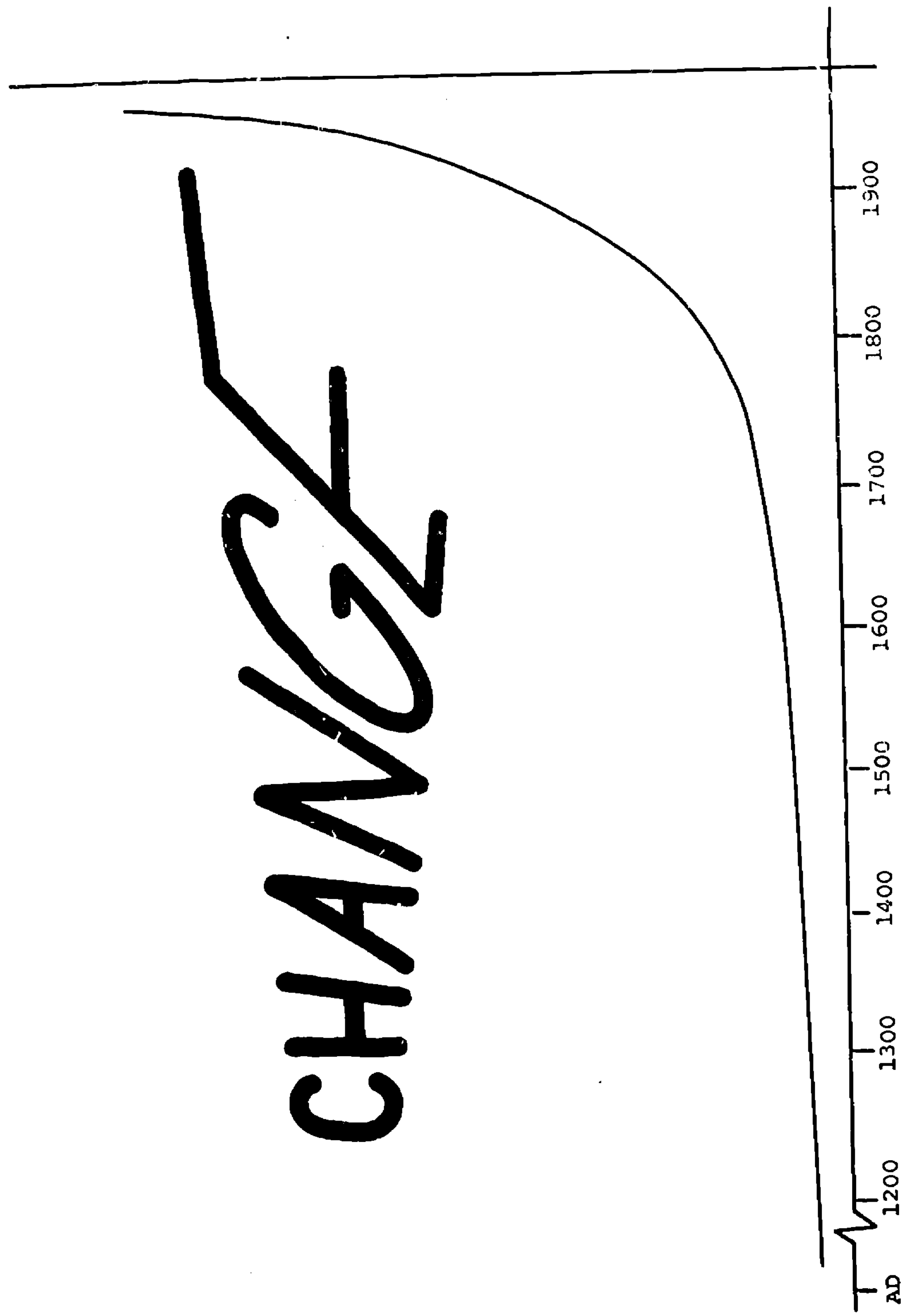


Figure 3.

the man who prefers indoctrination to education. Man must rapidly accumulate knowledge concerning his environment and himself, and he must learn how to use that knowledge wisely. He must encourage the emergence of new ideas in all areas. He must learn not to fear change, for of one thing he can be certain -- no matter what happens in the world of the next few decades, change will be the major characteristic. But it is within the range of his ability to choose what the changes will be, and how the resources at his disposal will be used -- or abused -- in the common victory -- or ignominious surrender -- of mankind.

(2, p.265-266)

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