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INDUSTRIAL ARTS--A STUDY OF INDUSTRY AND TECHNOLOGY FOR CONTEMPORARY MAN.

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AS AN IMPORTANT ELEMENT OF GENERAL EDUCATION, INDUSTRIAL ARTS MUST ENGAGE IN THOSE HUMAN ACTIVITIES WHICH CONTRIBUTE TO THE DEVELOPMENT OF SKILLS AND HABITS OF MIND WHICH WILL BE THE INSTRUMENTS OF CONTINUOUS CHANGE AND GROWTH ON THE PART OF THE INDIVIDUAL. THE UNIVERSITY OF MARYLAND CONCEPT OF INDUSTRIAL ARTS PROGRAMS RELATES TO THIS POSITION BY EMPHASIZING THE PROCESS OF HOW THE INDIVIDUAL ARRIVES AT HIS ANSWERS. INDUSTRIAL ARTS AS A CURRICULUM IS DEFINED AS THOSE PHASES OF GENERAL EDUCATION WHICH DEAL WITH THE ORGANIZATION, MATERIALS, OCCUPATIONS, PROCESSES, PRODUCTS, AND PROBLEMS OF INDUSTRY. THE BROAD AREAS IDENTIFIED ARE THOSE WHICH MUST BE TAUGHT IN A REALISTIC AND MEANINGFUL WAY. DURING THE PAST 10 YEARS, THE GROUP PROJECT AND THE LINE PRODUCTION TECHNIQUES OF TEACHING HAVE BEEN TESTED IN IN-DEPTH STUDIES OF THESE AREAS. A SECOND EMPHASIS OF THE UNIVERSITY OF MARYLAND CONCEPT IS ON DEVELOPING PEOPLE INSTEAD OF THINGS. METHODOLOGY MUST BE FOCUSED ON WHAT THE INDIVIDUAL DOES AND, MORE SPECIFICALLY, ON HOW HE ACCOMPLISHES WHAT HE DOES. INDUSTRIAL ARTS HAS GREAT POTENTIAL FOR INTEGRATING SUBJECT MATTER IN LIFE-LIKE SITUATIONS AND FOR SHOWING THE CONTRIBUTIONS OF TECHNOLOGY TO EVOLVING CIVILIZATIONS. TEACHERS MUST BE EDUCATED TO DESIGN LEARNING EXPERIENCES AND TO USE EXPERIMENTAL PROCESSES TO IMPLEMENT THIS BROAD AND FUNCTIONAL APPROACH TO INDUSTRIAL ARTS. A JUNIOR HIGH SCHOOL PROGRAM UTILIZING THESE CONCEPTS IS IN USE IN MONTGOMERY COUNTY, MARYLAND, SCHOOLS AND IS BEING DEVELOPED IN FAIRFAX COUNTY, VIRGINIA. A DIAGRAM OF THE PROGRAM IS INCLUDED. A RELATED DOCUMENT IS VT 002 956. (EM)

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INDUSTRIAL ARTS - - A STUDY OF INDUSTRY AND TECHNOLOGY FOR CONTEMPORARY MAN

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"If we indoctrinate young people in an elaborate set of fixed beliefs, we are ensuring their early obsolescence. The alternative is to develop skills and habits of mind which will be the instruments of continuous change and growth on the part of the individual." (3, p.2)

John W. Gardner.

The above quotation by John W. Gardner is of vital importance in an age of great social, political, and technological change. Thus, this role of the school deserves a central focus, and certainly one that will demand constant attunement with society if education is to maintain a proper relationship between output and demand from a qualitative point of view.

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What are the implications for Industrial Arts in the above comments? As an integral part of the total school program and as an important element of general education, it surely must strive to identify its role. Industrial Arts must engage in those elements of human activity which contribute to the development of skills and habits of mind which will be the instruments of continuous change and growth on the part of the individual.

The processes whereby change as an <u>order of expectation</u> is developed, and the processes whereby the promoting of, and the contributing to change become basic outgrowths of the school are indeed fundamental areas for concentration by any area in the school. This is especially so in those areas of general education whose contact bridges the broad spectrum of the school population.

The relevance of this position to the program ideas growing out of the University of Maryland is in the continuing emphasis on the process of -- <u>how the individual arrives at his answers</u>.

This point has necessitated a radical change in the role of the teacher from one of a "dispenser" of facts, dates, qualities, numbers, etc., to one of a "manager of education." The role of

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the individual does not center alone on how one gets the answers. It also places great stress on what answers one wants, and a host of student identified problems that give rise to the need for answers.

The area of study in Industrial Arts is still maintained within the framework of the following definition:

> Industrial Arts as a curriculum area is defined as those phases of general education which deal with industry -- its organization, materials, occupations, processes and products -- and with the problems resulting from the industrial and technological nature of society.

The definition has particular significance because it identifies certain broad areas which will continue to have special relevance to the broad study of industry.

They include the organization, materials, occupations, processes, products, and problems.

Programs in Industrial Arts can be developed that would deal with each of these facets in a realistic and meaningful way. Numerous examples can be found that would substantiate the fact.

However, our teachers must, in themselves, have a level of sophistication about the organization of industry, the problems, products, processes, materials and occupations. The content is there, but it will demand a new or different brand of teacher. A neat, orderly set of demonstrations of tool processes will not suffice. Nor will a set series of sterile projects measure up to the requirement.

Two systems that have been tested over the past ten years that do in fact make possible a limitless study of all of these facets are the group project approach to the study of a major industry and the line production experience that extends from the various levels of personnel organization and finance through procurement, planning, production, distribution, and dividends. The depth and scope of such study and student-mental-manipulative activity is chiefly a factor of teacher background, ingenuity, judgment, and resourcefulness.

My second emphasis which has been a consistent one, is that the principal function of Industrial Arts is the development of people and not things. As a matter of retrospect I would like to

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present two points of view that have had a significant effect upon what is accomplished in Industrial Arts.

The much older one and certainly the one in practice that has had the greatest effect as far as Industrial Arts is concerned, is the "things" orientation which is based upon a "job" or "thing" analysis.

The second idea which I feel we must accept got considerable support in Industrial Arts in the late forties when such people as Hornbake, Ludington, Wilbur, Brown, Hammond, and others attempted to move the profession to think in terms of human "analysis" rather than thing "analysis".

The chart illustrates the points of differences between the two. (See next page)

I challenge you to start at the right (literally) side of that diagram, and I challenge you to design educational experiences that reach out towards the fulfillment of the human qualities of mankind.

These two listings spell the differences between an institution or a program that is based upon a "factory" notion whose prime reason for being is the production of things as compared with the more difficult and less popular idea of a program that

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Industrial Arts Approaches

Thing or Job Analysis	Boy and Girl or Human Need Analysis
focuses upon projects	focuses upon people
1. The materials to be used.	1. The developmental tasks of boys and girls.
2. The finishes to be applied.	2. The societal requirements and expectations of people. (a) social responsibility (b) economic sufficiency (c) self renewal (d) mobility (e) leadership (f) followership (g) problem solving (h) adaptability (i) social, economic, and political sophistication (j) Etc.,
3. The glues to be used.	3. The individual's interests.
4. The fasteners to be used.	4. The individual's capacities.
5. The tools to be used.	5. The individual's objectives.
6. The processes to produce the item.	6. Etc.,
7. The following of a prescribed procedure to construct the item.	
8. Etc.,	

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has as its base for existence the development of people -- people capable of living in and contributing to the contemporary culture.

It is quite apparent that the focus of attention in methodology is on what the individual does, and more specifically how he accomplishes what he does. I am concerned with the mental and manual learning processes by which the individual accomplishes what he does and how these learning processes contribute to the requirements of living in the contemporary age. As a point of retrospect again, I call your attention to a presentation that I made at the American Industrial Arts Association's national meetings in Indianapolis, Indiana; April, 1963, when I asked the profession to consider taking its direction from the outcomes of "Project Instruction" as presented by Dr. Ole Sands in a speech entitled "Curriculum Decisions for the Sixties." (8, p.9)

It is possible that in the next decade we should consider moving in the following directions:

	From	To
1.	The group	The individual
2.	Memory	Inquiry
3.	Stimulus-Response Psychology	Organismic psychology

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4. Spiritless climate	Zest for learning
.....	.....
6. Repetition	Spiral reinforcement
.....	.....
14. Teaching as telling	Teaching as a creative art with a scientific base

As another instance in retrospect, this speaker presented a paper at the Washington (1964) Convention of the A.I.A.A. in which the idea of "Industrial Arts as a Cultural Experience" was emphasized. The topic was based upon the following postulates:

1. A comprehensive and in-depth study of Industrial Arts is a cultural experience dealing with one of the most dominant factors in the contemporary society.

2. Many of the basic elements of content for the study of Industrial Arts have persisted throughout the history of mankind as matters of vital importance and primary cultural focus in the evolving societies.

3. There is an increasing void in the education of contemporary man with respect to his understanding of "industry and technology" as dominant cultural factors.

These ideas were supported by a number of documentations from the fields of sociology, anthropology, economics, history, and technology. A few of these supporting statements follow.

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Ashley Montagu, in his text Education and Human Relations, defines culture as "the way of life of a people." "It is the people's ideas, sentiments, religion and secular beliefs, its language, tools, pots and pans, its institutions." (7, p. 31)

Martin and Stendler, in their text Child Development (5, p. 154, 155) discuss the "common denominators" of culture and direct our attention to "the Yale Cross-Cultural Survey", which includes several hundred cultures from all over the world, has set up an index of these common denominators in the following categories:

language	reaction to nature	finance
communication	religion	family
exploitative activities	ethics	kinship
technology	property and contract	social organization
implements	social stratification	government
housing	drink and indulgence	social control
food	dress	ingroup conflict
transportation	daily routine	war
travel labor	labor	art
numbers and measures	specialization	reaction
lore and learning	exchange	

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From a historical point of view, the study of Industrial Arts in relation to the contributions of technology toward the evolving civilizations is vividly presented by Roger Burlingame in his discussion of "The Hardware of Culture".

"....The Carthaginian wars, the fall of the Roman Empire, the Norman Invasion, the Magna Carta, the discovery of America, the War of the Roses, the Spanish Inquisition, the French Revolution, the Louisiana Purchase, the Missouri Compromise were words with dates attached, loosely strung together by such terms and phrases as "the rise and fall of civilization," "the struggle for liberty," "Renaissance," "Reformation," "Enlightment" -- abstractions cooked up out of hindsight to give "dignity" to the record.

It was only when I discovered from the exploration of rare or forgotten writings and artifacts that the vast gulfs between these events were filled with galleys and sailing ships, roads, wagons, mines, canals, magnetic compasses, catapults, crossbows, engines, and dynamos that I began to see a real continuity and integrity to history." (1, p. 15)

Howard Mumford Jones, the noted professor of English at Harvard University has described the inadequacies of many scholars in matters dealing with tool and technological developments and their contributions.

".....a hundred scholars know something about Lucretius for one who realizes what a revolution in human culture took place in the ninth century when Western man put draft harnesses on his horses instead of choking their windpipes with a rope attached to a cart. A hundred scholars can discuss Darwin, a master of scientific prose, to one who knows that among the causes for the celerity of Napoleon's armies is the fact that Napoleon knew how to exploit the Chappe telegraph, whereas his opponents -- the Austrians, for example, -- did not.

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.....Among historians of ideas, then, a great deal of attention is given to the history of ideas, expressed in literary form, and very little attention to the history of ideas, chiefly technological, not commonly so expressed. It would, however, be jejune to remark that the effect of the idea of interchangeable parts upon the fortunes of mankind has been quite as great as the effect of the idea of progress." (4, p. 22)

Another issue of special significance to Industrial Arts is related to the topic of subject matter integration. I have long contended that Industrial Arts in its study of contemporary industry must draw its content and secure a great deal of its reality from the other subject areas of the school. Max Lerner in a presentation before an audience at the National Education Association in Washington stated that it is impossible to study any discipline or subject entirely within itself. I am therefore continuing to contend that the modern school is highly ineffective in many areas simply because of the compartmentation of the total program. The interdependency and interrelationship of subject matter demands that greater effort be made to develop the school curricula in terms of an organismic approach to the development of people, as opposed to the "cellular" and "storage vault" processes of so many secondary schools and institutions of higher education.

Alfred North Whitehead spoke out about this same practice as follows:

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> The solution which I am urging is to eradicate the fatal disconnection of subjects which kills the vitality of our modern curriculum. There is only one subject - matter for education, and that is Life in all its manifestations. Instead of this single unity, we offer children --------- Algebra, from which nothing follows; Geometry, from which nothing follows; Science, from which nothing follows; History, from which nothing follows; a couple of languages never mastered.....It is a rapid table of contents which a deity might run over in his mind while he was thinking of creating a world, and had not yet determined how to put it together. (9, p. 18)

Later on in the same writing Whitehead summarized the need in education by stating that "...The pupils have got to be made to feel that they are studying something and not merely executing intellectual minuets." (9, p. 21)

No other area in the school as it is currently organized or constructed has potential for such integration of subject matter in a life-like situation as does the Industrial Arts laboratory. The realistic application of the elements of mathematics, science, communications, social studies, art, music, and physical activity are inherent in the Industrial Arts objectives and functions.

Another concern that all education must face is the nature of experiences provided the learner. What are the forms of student participation? What are the levels of mental and physical

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involvement? And, to what degree does the experience provide practice in living and learning rather than a series of isolated super-organized fragments of information to be memorized or recorded in a notebook?

John Dewey some years ago challenged educators to examine these practices when he said:

> "... We must conceive of work in wood and metal, of weaving, sewing, and cooking, as methods of living and learning, not as distinct studies.
>
> We must conceive of them in their social significance, as types of the processes by which society keeps itself going, as agencies for bringing home to the child some of the primal necessities of community life, and as ways in which these needs have been met by the growing insight and ingenuity of man; in short, as instrumentalities through which the school itself shall be made a genuine form of active community life, instead of a place set apart in which to learn lessons." (2, p. 14)

Industrial Arts can and should be a direct, first-hand encounter with major segments of the materialism, the idealism, and the technology of mankind. It can be a living and learning experience completely compatible with the guidelines as previously referred to in the Ole Sands speech and the statement by Dewey.

Support for this line of reasoning is found in the work of Whitehead as follows:

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"... First-hand knowledge is the ultimate basis of intellectual life. To a large extent book-learning conveys second-hand information, and as such can never rise to the importance of immediate practice. Our goal is to see the immediate events of our lives as instances of our general ideas. What the learned world tends to offer is one second-hand scrap of information illustrating ideas derived from another second-hand scrap of information. The second-handedness of the learned world is the secret of its mediocrity. It is tame because it has never been scared by facts. The main importance of Francis Bacon's influence does not lie in any peculiar theory of inductive reasoning which he happened to express, but in the revolt against second-hand information of which he was a leader.

The peculiar merit of a scientific education should be, that it bases thought upon first-hand observation; and the corresponding merit of a technical education is, that it follows out deep natural instinct to translate thought into manual skill, and manual activity into thought." (9, p. 61)

One final item of retrospect that this speaker has ardently pushed for these many years is that the industrial arts teacher should be an expert in the "design of learning experiences" -- and in this respect it is implied that they be directed toward the development of people.

".....Through experiential laboratories, industrial arts offer those learning experiences which assist boys and girls to understand the industrial and technical aspects of life today. This curriculum area makes a realistic contribution to education as a process and shares with other areas of the school the responsibility for promoting the continuing development of the good citizen." (6, p. 46)

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The accomplishment of this idea of "design of learning experience" involves a broad perspective of what is possible by way of pupil experiences within the framework of the laboratory setting and the broad study of industry. Here again I challenge our teacher education institutions to produce teachers who are capable of designing learning experiences rather than the predominant emphasis on "project design".

The implementation of this broad and functional approach to Industrial Arts has had considerable success through the use of such flexible and "experiential" processes as:

The Unit Approach

The Group Project Study of Industry

The Line Production Study of Industry

Research and Experimentation

The Individual Project or Problem Approach

The Industrial Arts laboratory in its general framework is unequaled in its environmental hardware of electronics, metals, woods, drawing, design, testing, graphics, power, fabrication, communications, etc. The remaining essential elements so vital to maximum human potential development center in the areas of

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program, methodology, the teacher, as well as educational administrative leadership and support.

A program for the junior high school has been developed along the lines of this presentation. It is in use in a number of Montgomery County, Maryland schools and is being developed in the Fairfax County, Virginia schools. Selected facets of the program are being used in many other centers in and out of the State of Maryland. A diagram of this proposed program for the junior high school is shown on the following chart.

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THE JUNIOR HIGH SCHOOL PROGRAM

IN

INDUSTRIAL ARTS

Developed by

The Industrial Education Department

of the University of Maryland

An Anthropological approach to the study of certain basic elements common to all civilized mankind

7 th GRADE

Approach--The Unit Method

Units:

(1) Tools and Machines
(2) Power and Energy
(3) Communication and Transportation

A Contemporary Approach to the study of American Industry

8 th GRADE

Approach--Group Process

(1) The in-depth study of an industry using the group project approach.
(2) The in-depth study of industry using the line production approach.

9 th GRADE

Personal

Emphasis on the psychological needs of the individual as well as his resourcefulness.

CONTEMPORARY UNITS

RESEARCH AND EXPERIMENTATION

GROUP PROJECTS

LINE PRODUCTION

TECHNICAL DEVELOPMENT (Group or Individual)

Content

Emphasis on Contemporary Units of study, increased depth of study in industry, and greater understanding of problems of industry.

Capability, problem solving, ...

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