A GRAPHIC ARTS PROGRAM AT THE COLLEGIATE LEVEL

by

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CHAPTER I

INTRODUCTION

With the tendency toward more general subject areas becoming increasingly apparent in the current philosophy of industrial arts, it is evident that the teacher education centers cannot provide competency to the student in every facet of an industry. Rapid technological advances and the limited course hours allowed for technical preparation emphasize the necessity for a judicious selection of the elements constituting the content of these courses.

Need for the Study

A survey of state and city guides, textbooks, work books, and professional literature concerned with graphic arts during the last twenty-five years reveals that new concepts are being applied to the subject area traditionally referred to as printing. These new concepts are just now appearing in the language of the industrial arts people and it is only within the last decade that the term graphic arts has been applied somewhat generally to the subject.

Within the same relatively short space of time, written materials have begun to expand into graphic areas

other than letterpress printing. Typical in this trend are Marinaccio and Osburn's Exploring the Graphic Arts (19), and Johnson and Newkirk's The Graphic Arts (15). The Chicago, Los Angeles, and Denver school guides for industrial arts also are indicative of the newer approach to graphic arts in general education.

Prior to these contemporary explorations into a broader subject field, stereotyped experiences were generally confined to hand composition and letterpress printing, bordering on pre-vocational training in skill exercises. Representative of this discipline are such standard school texts as Polk's Practice of Printing (22), and Karch's Printing and the Allied Trades (17), still standard in many schools.

During this period of transition from the traditional printing unit to the more general approach--which is so apparent and considerably more advanced in other industrial arts subjects--no clear direction has been established as to where the trend will ultimately stabilize in terms of content.

A review of Summaries of Studies in Industrial Education published by the Educational Services Department of the Ford Motor Company, (21) reveals a total of only ten investigations concerned with graphic arts, none of which approach the broad aspect of over-all

content in relation to the objectives of general education. This also holds true of an earlier publication, the American Vocational Association Bulletin No. 4, (1) which lists a total of twenty-five studies during the period 1930-1948 bearing on printing or graphic arts.

The Biennial Survey of Education in the United States, 1948-50, (28, p.63) shows graphic arts ranking fifth in number of students enrolled in industrial arts subjects, having only one-eighth the number of students enrolled in general shop. Although the general shop occasionally includes graphic arts, the offering is usually very limited in scope.

These figures, the most comprehensive available, do not present an entirely true picture in that full-year printing courses are included. Although appearing under the heading "Industrial Arts--Non-vocational," one is led to suspect that they are at least pre-vocational on the high school level. Simple observation of these school plants bears out this suspicion. It is interesting to note at this point that 56,203 students were enrolled in year courses in the United States, while only 28,758 students are enrolled in half-year, presumably introductory, courses.

This salient point in itself leads one to presume that a majority of the courses are taught as

pre-vocational printing and not as exploratory graphic arts. It is upon the thesis that the broad industry of graphic arts merits a place in the general education of all students that this study is undertaken.

Several factors are responsible for the present distribution of classes in the various industrial arts areas, not the least of which is tradition. However, graphic arts has failed to develop fully because of two major problems: first, the temptation to exploit facilities to produce printing for the school to the detriment of the learning process; secondly, the tendency on the part of many teachers, particularly those drawn from the trade, to develop journeyman hand compositors rather than to provide broad exploratory experiences in this area so rich with truly educational opportunities. There are, of course, many other facets to the problem. It is not within the realm of this paper to investigate shortcomings in existing programs, but rather to determine as nearly as possible the most suitable content areas for a general exploratory graphic arts course and ultimately, the influence this pattern should exert in the preparation of teachers of the subject. Seefeld, in a study on Competencies of Industrial Arts Teachers, (24, p.21) points out:

> It becomes obvious then, that the success factors of good industrial arts teachers can be categorized into three areas; one, the knowledge of the subject; two, the pedagogical know-how; and three, the person as a teacher.

Little can be done in this thesis to add to the investigations already in progress in the two latter categories. However, if the teacher is to be adequately prepared with a knowledge of his subject, those charged with his training must have a clear-cut picture of what will be expected of him in the public schools.

In the last analysis, the problem becomes one of determining what is of value to include in an exploratory graphic arts ccurse. From the vast area encompassed by the graphic arts industry, some selection of material must be made that best meets the objectives of industrial arts. What should this selection include? What is of value and what is chaff? It is the concern of this paper to attempt a satisfactory answer to the question of content and to set forth some recommendations in the skill training of teachers in the light of these findings.

Purpose of the Study

The primary purpose of this study is to determine technical course content areas in the preparation of industrial arts teachers of graphic arts.

In the light of the objectives of graphic arts in

industrial arts and general education, an attempt will be made to indicate what selection of material from the vast graphic arts industry will most adequately meet these goals.

In arriving at a solution to this problem, some guides as to course sequence, organization, physical facilities, laboratory experiences, and teaching techniques will be provided.

Procedure

To establish the problem in workable form, studies of a similar nature were surveyed from the standpoint of organization, approach, and possible repetition of content. Personal observation over a period of years in close contact with the problem of exploratory graphic arts course content was a motivating factor in the selection of the field of study. However, broad and varied professional sources have been relied upon to furnish major data employed.

Prior to preparation of questionnaires, visits were made to many school systems recommended by the California state consultant in industrial arts as having superior graphic arts programs. Teachers and administrators were consulted with respect to the proposed research. Specific school systems visited included Los Angeles,

Pasadena, San Diego, Long Beach, Fresno, Oakland, and several smaller communities in California.

A special trip was made to New York City in June 1953 to attend meetings of the International Graphic Arts Education Association. A number of teacher education schools were represented and the place of graphic arts in general education was discussed with these representatives as well as with Mr. Fred Hartman, Educational Director, and Mr. Samuel Burt, Executive Secretary of the Association.

Suggestions as to procedure and content were also received from Mr. John Backus and Mr. John Porter, educational directors for American Type Founders, Incorporated.

One day was spent with Mr. John Fontant, graphic arts instructor at Somers Junior High School, Brooklyn. His program is considered outstanding by New York City supervisors and he has been commissioned by the International Graphic Arts Education Association to prepare a guide for junior high school instructors of the subject.

Arrangements were made to visit representative manufacturers in the graphic arts industry so that first-hand observations could be made of the many industrial processes involved. Visitations included California Rotogravure Company, Jeffries Banknote Company, Gangi Silk Screen Process Company, The Los Angeles Times, Pacific Press, Pacific Fibreboard Company, American Can

Company, Zellerbach Paper Company, International Printing Ink Company, Los Angeles Engraving Company, Western Lithograph Company, and Los Angeles Type Founders.

Several visits were made to libraries and book dealers having outstanding collections in the field of graphic arts. Among these were the Huntington Library, Clark Memorial Library, Los Angeles Public Library, and Dawson's Rare Book Shop. Particular research use was made of the materials available at these institutions, as well as of professional literature from other sources.

After preparation of the basic questionnaire, a number of authorities were asked to criticize the materials so that revisions could be made before the general distributions. Included were Dr. Chris Groneman, Texas A. & M.; Dr. Stanley Pawelek, Baltimore City Schools; Dr. Horace Schorling, Fresno State College; Dr. Lynne Monroe, Santa Barbara College; Mr. Fred Hartman, Graphic Arts Education Association; and Mr. John Porter, American Type Founders. Four separate questionnaires were prepared, each concerned with the same basic objective but directed to specific groups.

In the fall of 1953 the first questionnaire was mailed to 144 leaders in the graphic arts industry. Presidents of each unit of the International Association of Printing House Craftsmen throughout the United States

and Canada were contacted, as well as men selected by the Printing Industries Association of America as qualified to serve in this capacity.

A second questionnaire was directed to fifty-four instructors of graphic arts in industrial arts teacher education centers throughout the United States. Recipients of this questionnaire were also asked to submit names of outstanding public school teachers in their area and future teachers in their classes.

All state directors and supervisors were contacted for names of superior graphic arts teachers and these, with those received from teacher educators, provided the third group of 133 teachers contacted.

The fourth mailing included future teachers enrolled in industrial arts courses from the above two sources, in addition to all graphic arts majors at Santa Barbara College, University of California, during the last two years. Forty-five men comprised this listing.

Limitations of the Study

A cursory investigation of industrial arts in public education immediately reveals a myriad of interwoven problems and complexities not apparent on the surface. In order to gain adequate depth in any one area, it becomes necessary to limit the investigation. Although

the entire structure and philosophy of industry and education were considered in the study, these concomitant factors have been viewed in the light of the limited area selected--subject matter content for exploratory graphic arts in general education.

The school programs surveyed in the graphic arts area were of necessity restricted to the secondary level in larger communities and teacher education institutions providing graphic arts as an offering in their industrial arts departments. The survey was further restricted to a sampling from the professional lists of individuals, institutions and organizations currently available. Geographical, financial and time barriers confined most of the personal field work to states of Oregon and California.

It should be emphasized that the study is not concerned with the vocational or pre-vocational preparation of printers.

Terminology and Definitions

Printing. The term "printing" is today being replaced both in schools and industry by the broader designation of "graphic arts," particularly when referring to the industry rather than to a particular process.

The trade or craft of printing, performed by

"printers" (compositors and pressmen), continues to be the major reproduction process within the industry. However, other processes have been and are being developed in an expanding industry, all encompassed within the graphic arts.

Specifically, Webster's New International Dictionary (30, p.1090) defines printing as:

> act, art, or practice of impressing letters, characters, or figures on paper, cloth, or other material; the business of a printer, including type-setting and presswork, with their adjuncts; typography.

The same source defines graphic arts as:

> those arts, including printing, process engraving, etc., which pertain to the expression of ideas by means of lines, marks, or characters impressed on a surface.

Graphic Arts. The American Institute of Graphic Arts defines graphic arts as those methods and processes (manual or mechanical) which produce a number of copies of pictorial, decorative, or typographic arrangements on paper or other surfaces.

Carter V. Good (9, p.30) includes in the graphic arts those expressions of art produced by printing from various kinds of blocks, plates, or type; as etching, drypoint, lithography, wood and linoleum block printing, rotogravure, offset, letterpress and all other forms of printing.

The Industrial Arts Policy and Planning Committee of the American Vocational Association, in its statement of the Place and Purpose of Industrial Arts in Education (12, p.5) sets forth the following guide for graphic arts:

> This area should provide for experience using tools, materials, processes and problems related to the allied fields of printing and publishing. Basic units in the various applications of raised letter, gravure and offset methods of printing plus bindery, stenciling, photography and other graphic arts related to the printing and publishing industries should be included.

For the purposes of this thesis, graphic arts includes all of the graphic methods of reproduction (especially of quantity production), excluding the fine arts such as painting and drawing.

It is worthy of note here that this very concept of graphic reproduction is the basis upon which this study is predicated and that the trend in the most modern schools is to include photography and drawing in the graphic arts.

Industrial Arts. The graphic arts content proposed in this thesis would be contained within the framework of industrial arts. One of the earlier nationally accepted definitions of the term was published in 1923 by Bonser and Mossman (5, p.5). They described industrial arts as: "a study of the changes made by man in

the forms of materials to increase their values, and of the problems of life related to these changes."

More recently, Wilber's definition (31, p.2) bears out the industrial arts educational function when he says the industrial arts are "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."

Further clarification is presented by the California State Department of Education Bulletin (6, p.3) which states:

> Industrial arts is that part of general education concerned with satisfying man's innate desire to construct things with tools and materials and with the development of an intelligent understanding of our modern industrial civilization and the problems which have resulted from it. Contacts with a wide variety of manipulative experiences and industrial products are provided. Industrial arts occupies the same relationship to the school's curriculum as the areas which comprise social studies, health activities, language studies, or the fine arts. It does not attempt to develop skills needed in earning a livelihood or to train students for a specific occupation. That function belongs to another field of education known as vocational education.

In its statement of the Place and Function of Industrial Arts in Education, the Industrial Arts Policy and Planning Committee of the American Vocational Association (12, p.3) ascribes the following definition

and purposes to industrial arts:

> Industrial arts is instructional shopwork which provides for all youth sound educational experiences that contribute to the satisfaction of their purposes, needs and wants.
>
> It is an integral part of the general education program of all youth. It offers those learning experiences which assist boys and girls to understand the industrial and technical aspects of life today. It is a curriculum area that makes a realistic contribution to life adjustment education. It shares with other areas of the school, the responsibility for promoting the optimum development of the good citizen.
>
> The unique contributions of industrial arts are centered mainly around significant aspects of the manufacturing and construction industries and their effects on daily living. Those who participate in Industrial Arts programs receive orientation in the areas of production, consumption and recreation through actual experiences in planning, producing, servicing and repairing various types of consumer goods in common usage. Through these experiences young people learn about material goods. They learn how such goods are made. They learn how to use and maintain them intelligently. They develop general skill and resourcefulness in working with things, technical and mechanical. They learn facts, principles and procedures about tools, materials, processes, mechanics and design. They learn about woods, metals, plastics, ceramics, textiles, paper and other industrial materials. They learn about electricity, motors, engines, structures and other items of importance, interest and concern to all people at home, on the farm, at work and in recreation. They learn to do critical thinking in solving problems relating to these matters.
>
> Industrial arts is organized on a basis as representative of modern industry as is possible within practical limits. The program embraces such areas as woods, metals, graphic arts, power mechanics (electricity, engines, etc.), leather, plastics, and ceramics with general drawing and

> planning included in all of them. These areas should not be regarded as separate subjects but as areas of experience and segments of the total program.
>
> The purpose of Industrial Arts is to foster the development of a strong foundation in the skills, knowledges and attitudes regarding technical matters that are needed for happy and effective living in America. Public secondary education must give every youngster the chance to learn to work with tools and materials and to acquire reasonable judgment and some degree of technical know-how. Industrial arts serves that purpose.
>
> True sampling of industrial materials, processes, organization, occupations and problems will require the presentation of each subject area on as broad a basis as is practically feasible.

General Education. General education, of which industrial arts is an integral part, is defined by Good (9, p.183) as: "A broad type of education aimed at developing attitudes, abilities, and behavior considered desirable by society but not necessarily preparing the learner for specific types of vocational or avocational pursuit."

A synthesis of the many definitions of general education appearing in scores of professional publications, stated in its simplest terms, becomes that body of knowledge which is considered common or of benefit to all students, regardless of vocational aims.

CHAPTER II

THE RELATION OF GRAPHIC ARTS TO GENERAL EDUCATION

> Without the press civilization would not have made such wonderful progress. Regardless of the fact that journalism of today points to short-cuts to important positions we still depend on the boys who do the printing. No matter how we take it, we still owe our civilization mainly to those men who pioneered this field, particularly to those who invented the press and movable types.--Honorable Francis Case, Member of Congress (23, p.117)

In order to intelligently evaluate the place of graphic arts in general education today it seems only logical to examine the role it has played in developing our civilization and culture in the past. Some understanding of its present prominent position in industry as a medium of communication and its probable continued influence in contemporary and future activities of our society is also necessary in order to properly evaluate its potential as a field of study in the education of this country's youth.

Historical Development of Graphic Arts

Enthusiastic students of most areas of knowledge are frequently guilty of laying claim to all human progress for their particular field of interest. Those in such fields as medicine, law, science and mathematics,

all too often attribute to their profession, per se, the advance of the human race. The familiar quotations, "Printing, the Mother of Progress," and "Printing, the Art Preservative of All Arts," seem to indict those in graphic arts for the same error. Obviously no single factor has brought man from the cave to his present complex mode of living. Scholars existed and their contributions were added to those of their predecessors long before mass reproduction was a reality. Mass reproduction does not create ideas as such. It does, however, make those ideas available to all, and in turn may plant the seed which will bring forth still more creative efforts.

Gustave Arlt, professor of German at the University of California at Los Angeles, aptly delineated the importance of the graphic arts in a lecture delivered October 16, 1940:

> The invention and the rapid development of the art of printing in the middle of the fifteenth century was only one of the manifestations of the ingenuity and inventiveness of this new (middle) social class. The discovery of gun powder a century earlier and the speedy improvement of manufacturing processes in all industrial fields give similar evidence of the skill and ability of the burgher . . . Free men created the tool which was later to play a most important role in the preservation and extension of freedom itself. It is futile to speculate whether those who took an early part in the development of printing processes were fully aware of the momentous contribution they were making. It is likewise futile to wonder whether they were aware that the very things they were

> doing were made possible by a new freedom which their ancestors had not possessed or imagined. As in all social changes, it is impossible to segregate cause and effect; new modes of thought produce new modes of life, and new modes of life produce new modes of thought . . . The welfare of any self-determining nation requires on the part of its citizens substantial agreement on those fundamental and moral and social ideas the sum total of which forms the national ideal. In the achievement of this substantial agreement the printing press has rendered inestimable service--by recording and disseminating directly to the great masses the ideas of the leaders in liberal thought; by raising, through quantity production of books, the general level of information among the masses and therefore making them intelligently receptive to liberal thought; by making it possible through the cheapness and easy accessibility of books, for exceptional citizens to develop their exceptional abilities for the service of the whole community; and finally by the cultivation of civic morale through the medium of recreational reading. In recognition of these services we do homage not only to that obscure technician who in a small shop in Mainz first conceived the idea of printing words and sentences from movable type, but also to those countless generations of his successors in Europe and in America from whose presses has flowed the never-ending stream of books and newspapers and journals and pamphlets and broadsides in the service of democratic ideas and ideals. We, as citizens of the land which of all lands has been most richly blessed and fructified by the principles of democracy, owe them an inestimable debt of gratitude, a debt second only to that we owe to those thinkers who first formulated the ideals by which we live and those patriots who fought and died that those ideals might be established and perpetuated. (25, p.39)

One is tempted to speculate, as Arlt indicates, whether history and the destiny of man might not have taken a different path had the graphic arts been more

effective during those periods of intellectual achievement in Greece and Rome over one thousand years prior to the introduction of the press. Was the Renaissance delayed by the absence of mass reproduction processes--as surely it was implemented by their development?

It is significant to note that the printers during the period of the Renaissance, and for many subsequent decades, were frequently the scholars of their time, intent upon preserving and disseminating knowledge as it then existed and expanding the frontier of man's vision by introducing new concepts. A knowledge of Greek, Latin, and Hebrew was considered essential for the early craftsman, thus restricting the occupation to the educated of that day. Aldus Manutius, William Caxton, and later, Benjamin Franklin, are representative of those associated with the earlier development of what is now a major industry by any measure.

Anthropologists identify modern man as having inhabited Europe as early as 25,000 years ago. This man, commonly referred to as Cro-Magnon man, was endowed physically and possessed a brain capacity equal to his present-day ancestors (29, p.36). The process of evolution from Cro-Magnon man's crude existence to our complex contemporary civilization reveals a fabulous story of achievement, and the developments on the horizon

defy one to speculate as to the future (Figure 1). Not the least important in this remarkable advance has been the evolution of communication from pictographic representations, and the first phonetic alphabet, to our modern mass-produced periodicals.

A brief history of this facet of man's accomplishment reveals a rich heritage worthy of inclusion in any program of general education and logically precedes a study of the graphic arts curriculum under consideration here.

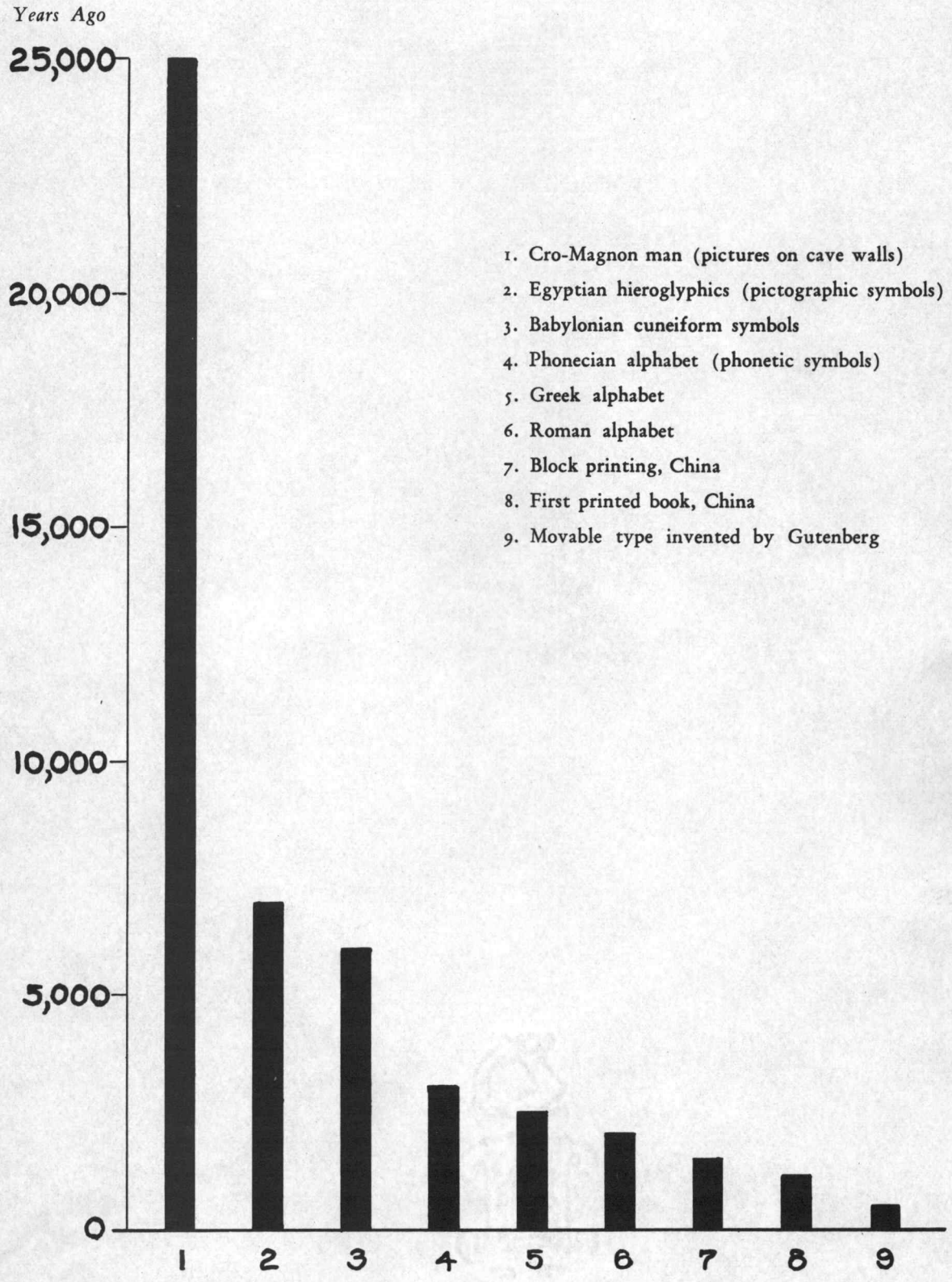
Graphic arts, as it is known today, is but the current expression of an instinctive desire to communicate. It has its roots in a past so remote that scholars continue to trace its origin.

The gradual development of speech, during prehistoric ages, enabled man to make known his wants to those within hearing distance. Beyond the reach of his voice he had no way of communicating except by signal. One of the first attempts to express ideas graphically are the paintings early man left on the walls of his cave. Through these pictures he overcame the barrier of time, a number of them having been discovered in recent times and found to be in an excellent state of preservation.

In addition to the limitation of exact interpretation of such drawings, the obstacle of mobility or

FIGURE I

THE EVOLUTION OF COMMUNICATION



dissemination persisted. Only those who came to the object could view it.

One of the earliest attempts to solve the problem of distance was the use of a knotted rope. The type and spacing of knots formed a code by which simple ideas could be conveyed to distant points.

The next great step forward was man's development of a simplified system of drawings. Through picture systems he could express more complicated ideas, and express them more accurately than could the cave dweller with his pictorial presentations.

Over a period of time and through repeated use, pictures were stripped of unnecessary ornamentation and the remaining outline simplified into a code, each arrangement of shapes and lines expressing an idea. However, the simplified drawing frequently retained a relationship to the ideas they expressed. A typical example being the symbol used to express "writer," consisting of a basic drawing indicating a reed case, sack of pigment, and a palette (20, p.4). This visual method of communication is known as the ideograph.

The Egyptians were one of the first peoples to develop a complete system of such writing, known as hieroglyphics, their original symbols being derived from pictures of objects. These symbols were adopted by

the Phonecians and simplified. They gradually lost their original meaning and became associated with certain sounds made by the human voice--syllables that could be combined to form words.

This notable achievement, linking speech with visual expression, marked one of man's greatest accomplishments. With this system of writing, man could record complex ideas precisely and send them great distances.

As civilization grew more complicated the need for an accurate quickly-written form of expression increased. The Greek alphabet was the first system of writing which adequately met this need; an alphabet with consistent, well-organized, pleasingly-shaped letters. For centuries Greek was the official language of communication. Many of the world's greatest classics were painstakingly recorded with this alphabet. It was the language of Plato, Socrates, Aristotle and scores of others whose thinking changed the course of history.

As the Roman Empire came into prominence it brought about a new alphabet to record a new language. These letters had true beauty and fine proportion of thick and thin lines--letters that have remained models to this day, and authorities such as Hayes (10, p.14) question whether the easthetics of the early Roman alphabet will ever be surpassed.

Simply stated, the origin and development of letters started with the sign or gesture language of Cro-Magnon man perhaps 25,000 years ago; was supplemented with the mnemonic or memory-aid devices, and ultimately evolved into pictures and symbols.

> Alphabetic writing had generally five successive stages. It began with ideograms, which were pictures, representing to those who made them either:
>
> (1) objects;
> (2) thoughts.
>
> Then came phonograms, which were merely ideograms by which sounds had come to be signified instead of things, and of these there were three sorts:
>
> (3) signs which stood for words;
> (4) signs which stood for syllables;
> (5) alphabetic signs which stood for the elementary sounds which constitute the syllable.
>
> This last is what our alphabet is now; its letters being phonograms which by the process of long continued detrition have reached an extreme stage of simplicity both as regards form and value. If the history of any one of our alphabetic symbols be traced backwards, it will be found to resolve itself ultimately into the conventionalized picture of some object. (26, p.40)

Thirteen centuries of development through manuscript writing followed the establishment of the Roman alphabet. Throughout Europe scribes spent countless hours recording the thinking of the times. The need for faster writing increased as more people learned to read, resulting in a

hurried line that departed from the formal Roman style. Over the years these letters changed shape gradually until they took the form that flowed fastest from the scribe's pen, resulting in present-day small or "lower-case" letters. Thus in Europe, by the eighth century, the scribes had two complete alphabets--Roman capitals and Roman small letters, and were combining the two on the same pages.

Until the fifteenth century, fine manuscript writing continued as an art of the scribes throughout Europe. But finally the time came when the scribes could no longer keep pace with the demand for written information. A faster method of reproduction was needed and out of this need was born printing.

Simultaneous with the increased necessity for a faster method of duplication was the ever-increasing demand for suitable writing surfaces. Papyrus was an important writing material in Greece and Rome, and a large number of manuscripts were written on it. The Egyptians developed its use as a writing material and perfected its manufacture. They also developed an extensive trade by exporting it in large quantities to other countries. Papyrus in sheet form was made from the pith of a water plant known as Ayperus Papyrus which, although in existence elsewhere, grew most abundantly in ancient

times along the banks of the Nile. This plant grew in water often up to a depth of six feet, sometimes attaining a height of fifteen feet, with a triangular stem about five inches thick.

After the stem was cut into sections, the pith was sliced into thin strips and laid side by side in two layers, one over the other and at right angles to each other. Some authorities are of the opinion that this arrangement of strips was pressed and beaten while wet to make them adhere tightly to each other and thus form a single sheet. Others say an adhesive was used. At any rate, a single sheet was obtained which, when scraped and polished with ivory or shells, produced an excellent writing material about as strong as paper of today.

The wax tablet was subordinate only to papyrus in Greece and Rome. It was usually made from a piece of wood or ivory of convenient size, its inside hollowed out to a depth of about one-sixteenth of an inch, and filled with a thin coating of wax. Writing was accomplished by inscribing the letters in the wax with a bronze or ivory stylus, an instrument pointed at one end and blunt at the other, the blunt end being used to smooth out the wax in making corrections.

Skins of animals were used from the earliest times throughout the ancient world and particularly in

Asia Minor, where the manufacture of parchment was perfected. By the fourth century parchment was used more than any other writing material. Because of its lasting quality, it was the ideal writing material for the wide reproduction of a book that was meant to last for generations. It is said that had not paper been introduced as a writing surface, it would have been necessary to slaughter all the animals in Europe to provide enough material for the Gutenberg Bible.

Many other materials were used throughout history on which to record the thoughts of man. Included among these were clay tablets of the Babylonians, leaves of various trees (palm leaves being used extensively in Ceylon and other Oriental lands), stone, metal (particularly lead), the bark of trees, and sheets of wood.

The invention of paper by the Chinese in 105 A.D. was not shared until the eighth century when the Arabs learned the craft. It was not until 1100 that paper-making was introduced into Spain and it was 1300 before the first paper appeared in books, and 1400 before that material began to replace parchment (11, p.8). With the advent of machine-made paper production was multiplied many fold and now is the universal writing material.

Dard Hunter makes the significant observation that the civilization of a country may be determined by the

amount of paper used--the annual per capita consumption being about 300 pounds in the United States while China, the birthplace of papermaking, has an annual per capita consumption of approximately one pound.

The continuing improvement of the alphabet, writing surfaces, and writing instruments inevitably led to the development of movable type characters, thus meeting the ever-increasing demand for mass reproduction of works in religion, science, the arts, and commerce.

Although no conclusive evidence remains to prove the identity of the inventor of printing it is generally conceded that the craft was perfected by Johann Gutenberg in the city of Mainz, Germany, not later than the year 1456. It was on August 15 of that year that Heinrich Cremer, vicar of a church at Mainz, completed the rubrication and binding of a copy of the great Latin Bible most commonly known as the 42-line Gutenberg Bible.

The question of proof is somewhat academic in that many persons carried on experiments in the graphic arts and Gutenberg's Bible is known to have been preceded by other printed pieces. But it is in his monumental undertaking of 1,282 pages, bound in two volumes, that the world was given its first real book printed from movable type--a book so perfect typographically that many experts claim it has never been surpassed (13, p.10). Gutenberg is to

be given credit for perfecting and popularizing the craft, for it is only after his work that printing came into general use.

The immediate successors of Gutenberg were Johann Fust and Peter Schoeffer, whose principal works consisted of a series of choir books or psalters. Schoeffer, the craftsman of the partnership, introduced commercial type-founding; was the first to identify his work with his name and the date of publication, and established printing on a business basis.

Within fifty years after the introduction of the art of printing by Gutenberg, it had spread from Mainz to most of Europe and England. Historians list the following printers who set up shop in certain cities on the dates noted (16, p.18):

Date	Place	Printers
1460	Strasburg, Germany	Johann Mentelin
1465	Subiaco, Italy	Conrad Sweynheym
1467	Rome, Italy	Ulrich Han
1468	Basel, Switzerland	Berthold Ruppel
1470	Venice, Italy	Nicholas Jensen
1470	Paris, France	Michael Fribruger and Martin Crantz
1473	Nuremberg, Germany	Anthony Koberger
1473	Utrecht, Netherlands	Gerardus Leempt and Nicholons Ketalaer
1473	Lyons, France	Guillaume Leroy
1477	London, England	William Caxton
1494	Venice, Italy	Aldus Manutins
1497	Paris, France	Henri Estienne

The first printing press in the New World was established by Juan Pablos in Mexico City and he is known to have produced a book there as early as 1539. It was only nineteen years after the landing of the Pilgrims in Massachusetts that the Reverand Jose Glover, of Sutton, England, arrived with a printing press. Stephen Daye, of Cambridge, England, was employed by Glover and the press established at Harvard Academy in 1639. The Boston Newsletter, established by John Campbell in 1704, was the first regularly published newspaper in America.

Printing spread as the colonies expanded and the following table indicates some of the first dates of the establishment of printing presses in North America (19, p.16):

Date	Place	Printers
1639	Cambridge, Mass.	Stephen Daye
1660	Boston, Mass.	Marmaduke Johnson
1685	Philadelphia, Pa.	William Bradford
1693	New York, N.Y.	William Bradford
1717	Boston, Mass.	James Franklin
1728	Philadelphia, Pa.	Benjamin Franklin

Among American printers, Benjamin Franklin occupies a place of honor and eminence and is often referred to as the patron saint of the industry. His contributions to our way of life are so significant in the education of youth today that the following

quotation seems most appropriate:

> Franklin's rise to leadership is an inspiration. He was always concerned with the welfare of his fellow men and made that interest his living creed. Space permits mention of only a few of his accomplishments, but these will show the versatility of this printer - genius. Franklin founded the public library system in America, printed Poor Richard's Almanac, famous for its wise sayings; organized the first fire department in America; became postmaster of Philadelphia and postmaster general of the Colonies; invented the first stove, the lightning rod, a smokeless chimney, bifocal lenses for glasses, and an improved harmonica; founded the American Philosophical Society, and printed the first novel in America. Franklin may be said to be the greatest of this country's diplomats, one of its wisest statesmen, most ardent patriots, deepest thinkers, ablest scientests, foremost journalists, truest humorists, keenest writers, and sincerest philanthropists, as well as the only man who wrote his name at the foot of all three of the immortal documents of American liberty--the Declaration of Independence, the Treaty of Peace with England, and the Constitution of the United States. After Franklin's death in 1790, the highest honors were accorded his memory by governments of foreign countries, the states of the Union, and the federal government. His will began, 'I, Benjamin Franklin, printer.' No mention of any other occupation or honor--it was sufficient for Franklin to be a printer and to know that printing had been the means of his education and the ladder by which he had scaled the heights of immortal fame (14, p.31).

In the area of technical improvement of the process, Ottmar Mergenthaler's invention of a machine capable of casting entire lines of type from matrices assembled at a keyboard (the Linotype), is considered to be the greatest revolution that has occurred in the printing industry in 400 years.

Frederic W. Goudy, noted American type designer, produced over sixty type faces in his life time and was instrumental in inculcating an appreciation for the easthetic on the part of both the producer and consumer of graphic arts. Others prominent in this movement were William Morris, Bruce Rogers, Theodore De Vinne, Daniel Berkeley Updike, John Henry Nash, and the Grabhorn brothers.

Simultaneous with the growth of printing from movable type was the development of other processes of mass reproduction.

Intaglio printing, employing a technique just the reverse of relief printing, was discovered by goldsmiths working with fine metals. They found that by filling engraved depressions with ink, wiping off the surface, and pressing paper over the inked engraving, they could reproduce the work in reverse. Martin Schongauer, in the latter part of the fifteenth century, was the first to engrave his name on a plate. Later, Callot, Van Dyck, Rembrandt, and many others popularized the art which today is used in the production of the finest social forms, stock certificates, and currency.

Second only to relief printing in terms of volume is planography or photolithography. The process of lithography was discovered in 1769 by Alois Senefelder,

who experimented for many years trying to reproduce music. His trials included writing with a wax crayon upon a smooth, porous surface of calcareous limestone, native to his Bavaria. The stone was then moistened, water not adhering to the waxy image. Using an ink with a varnish base, he then rolled a brayer over the moistened surface of the stone. The ink, being repelled by the moisture, adhered only to the dry image areas, thus allowing only the original drawing to be reproduced when paper was impressed upon the stone. Although metal plates have replaced stone, and presses and materials have been vastly improved, the theory applied by Senefelder in 1769 continues to be the basis of modern offset lithography. Today the process is used extensively in the production of labels, brochures, office forms, art reproductions, and bank checks. A whole new industry is building up around this method which does not employ a relief surface, and many machines are being developed which are replacing metal types with photographic negatives and positives used in the preparation of offset plates.

As the requirements of industry and commerce have become greater and more diversified, new processes have been developed to meet these needs. Bottles, decal transfers, electrical circuits, and fabrics are printed by the silk screen stencil process; collotype printing is

employed to reproduce works of art; the spirit duplicator, Mimeograph, and Multigraph are being employed more and more in business. One can only speculate as to the trend the industry will establish in the future, but by any measure it ranks among the greatest in the business world and will keep pace with future developments.

Graphic Arts in Industry

Probably no manufactured product plays such an intimate role in the life of the average American as does that of printing--in one form or another. And yet the consumer of this mass of printed material most likely has less appreciation and understanding of its production than he has of the atomic bomb.

From the cradle to the grave, printing is a constant part of man's life. His foot print is placed on a printed birth certificate; printed instructions direct his feeding and care; he is dressed in printed clothes; plays with printed toys; is educated with printed books; he receives a printed diploma upon graduation; reads a printed newspaper; carries on financial transactions with printed currency and checks; spends his leisure reading printed books and magazines; and ultimately passes to his reward leaving a printed obituary.

The tremendous productive capacity necessary to

supply the wants of man comprise an industry of a magnitude not commonly recognized. In an address before the Los Angeles Club of Printing House Craftsmen commemorating the birthday anniversary of Benjamin Franklin, Mr. Gordon Holmquist made the observation that if Franklin were to produce a single Sunday edition of a metropolitan newspaper, using his equipment of 1750, he would be obliged to work ten hours a day, six days a week, for 166 days in order to accomplish the task. Today many newspapers have a daily circulation in excess of one million copies, and each day the fantastic task of assembling hundreds of thousands of words into news and features flows smoothly through the production and distribution processes. The problem of coordinating such huge quantities of news is more readily appreciated when it is pointed out that a recent issue of the Los Angeles Times weighed over five pounds!

Thus the study of a few statistics relative to the graphic arts industry discloses that it is one of the giants of American industry. Its high place on the list of major industries with respect to number of establishments, number of employees, wages, salaries, and value of its products, is undoubtedly due to the fact that printing is closely related to and serves all other industries. It helps every manufacturer advertise and sell his

products, label his packages, and bill his customers.

Printing is also a service to every consumer, and every American is a consumer of manufactured products. The power of the press is a dominant factor in determining public opinion, electing political leaders, and in formulating our laws as well as directing our thinking on social, economic and educational matters.

Because the prominence of the printing industry is rivalled only by those industries essential to modern civilization; namely, food, clothing, shelter and transportation, it may be concluded that printing too, is a basic essential to our modern mode of living (7, p.6).

Figures from the "Statistical Abstract of the United States, 1952," (27, p.747) reveal that in 1950 the graphic arts industry recorded a sales volume of in excess five billion dollars--about one dollar out of every sixty-four of the national income being spent for printing. In the production of this great amount of printing, to supply the needs of the American people, over 750,000 people are employed. This is equivalent to one out of every 250 workers. These workers are divided among 29,427 printing establishments, most of which are relatively small. Nine-tenths of the plants employ less than 250 employees, while only eleven of the total employ more than 2,500 persons.

There is one printing plant for every 3,600 people and it is not uncommon for the hamlet of 400 to have its weekly newspaper. The largest printing plant in the world is operated by the United States Government in Washington, D.C., and employs 7,000 workers who produce as much as $80,000,000 worth of printing annually.

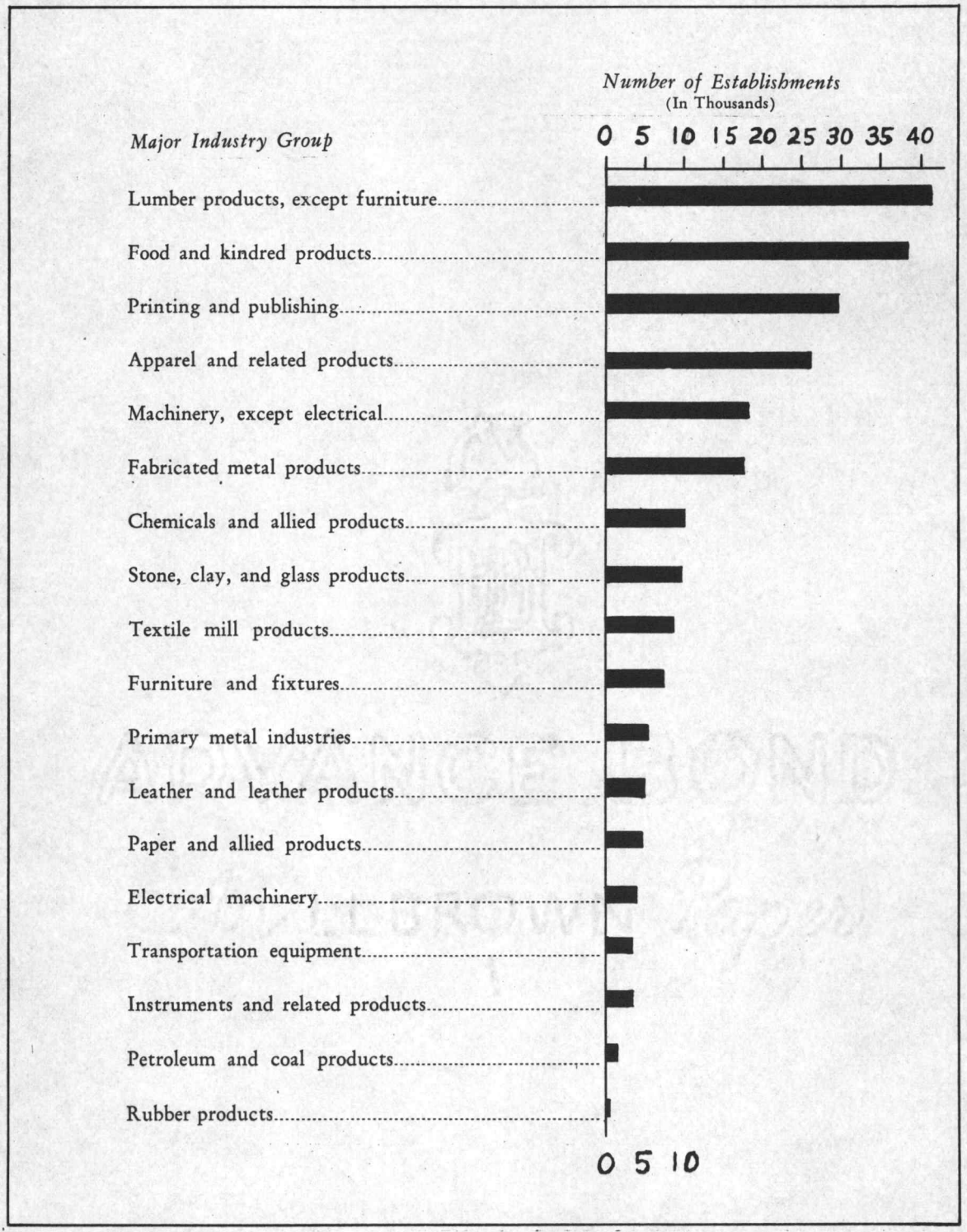
Compared to other industries, printing ranks third in the number of establishments (Figure II); first in the number of salaried people; ninth in the total number of employees (Figure III), and eighth in the value of the product (Figure IV).

There are 1,500 daily newspapers and 9,950 weekly newspapers published in the United States. Also published are over 500 weekly and monthly magazines. Trade journals, religious publications, catalogs, books and publications covering every conceivable subject under the sun are published in such large numbers that a complete and accurate tabulation of them would be impossible. The per capita consumption of printed matter by weight, is exceeded only by water and milk.

The graphic arts industry, with a history of continuing growth over more than 500 years, is today experiencing renewed vitality. A great deal of this impetus stems from the many new technical developments which will influence production operations of the future.

FIGURE II

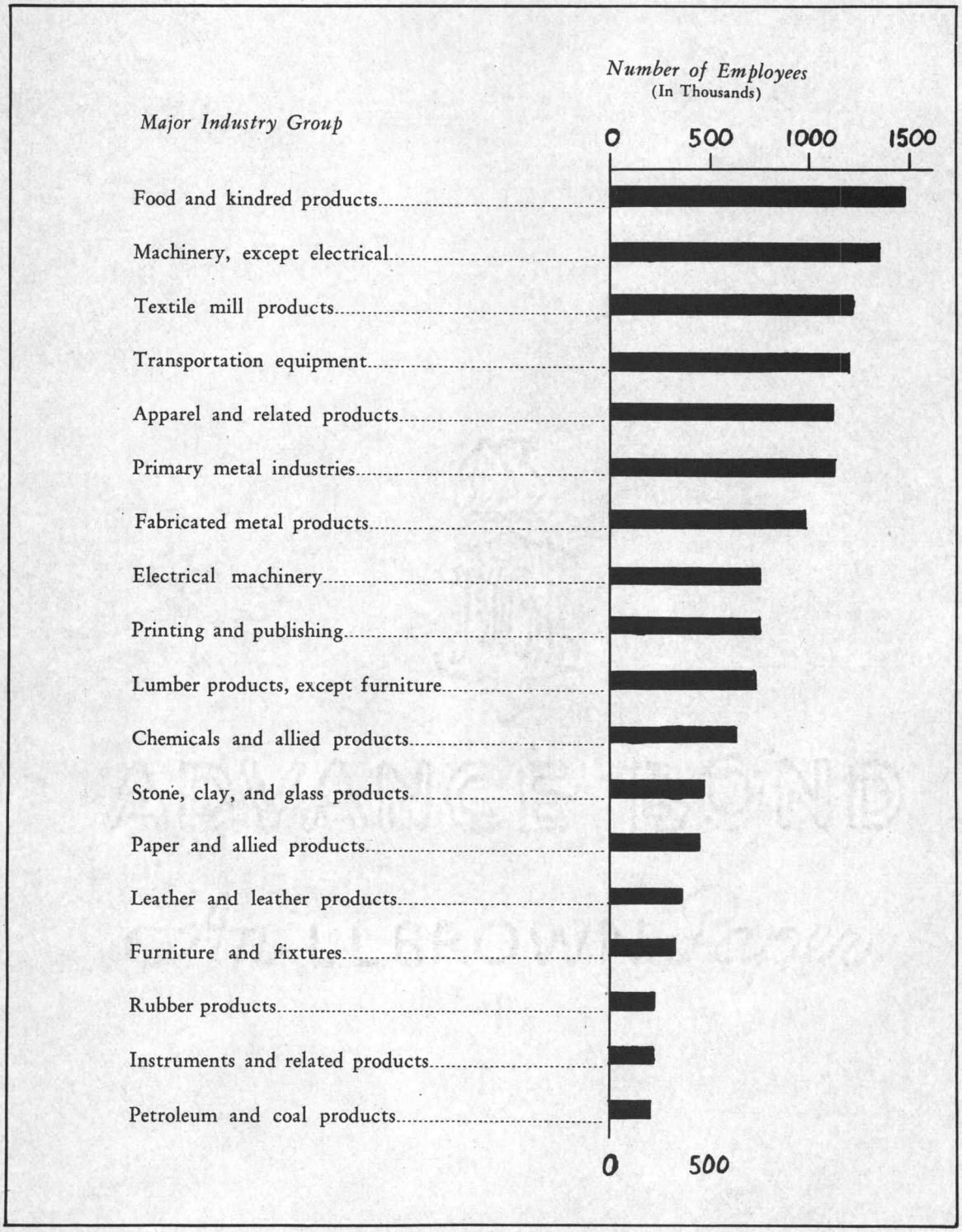
NUMBER OF ESTABLISHMENTS WITHIN MAJOR INDUSTRY GROUPS



Source: Dept. of Commerce, Bureau of the Census; Annual Summary of Manufacturers: 1949 and 1950

FIGURE III

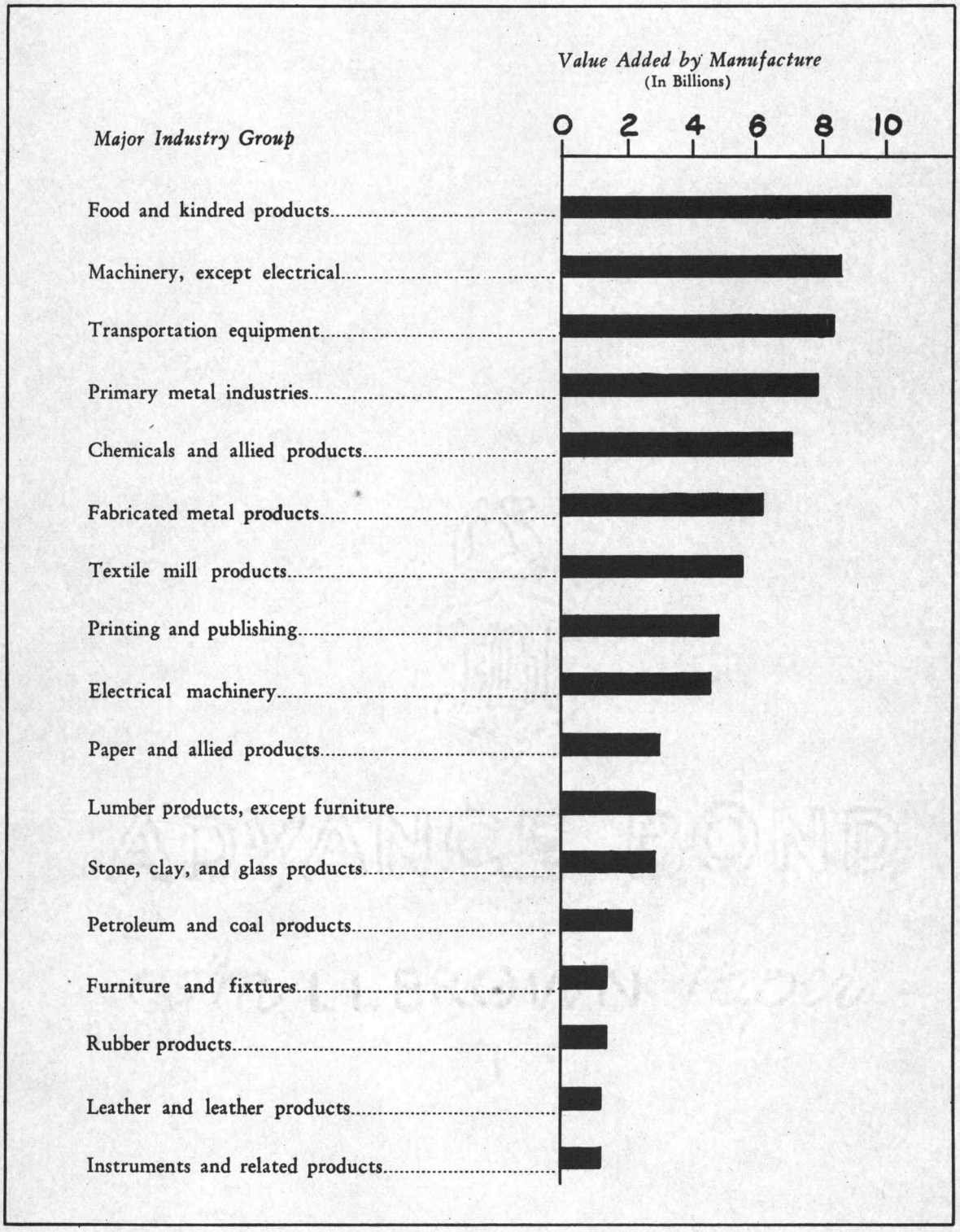
NUMBER OF EMPLOYEES WITHIN MAJOR INDUSTRY GROUPS



Source: Dept. of Commerce, Bureau of the Census; Annual Summary of Manufacturers: 1949 and 1950

FIGURE IV

VALUE ADDED BY MANUFACTURE IN MAJOR INDUSTRY GROUPS



Source: Dept. of Commerce, Bureau of the Census; Annual Summary of Manufacturers: 1949 and 1950

The traditional concept that printing is largely confined to items for reading has become outmoded. Today printing is done on packages, plastic film, wall coverings, oil drums and textiles. Even instrument dials, toy balloons, and walnuts are printed.

The Fairchild Camera and Instrument Corporation has developed an electric "engraver" that will produce a halftone of about eighty square inches in twenty minutes, whereas about two hours would be necessary to produce a similar plate in metal by conventional methods. The celluloid halftone plate is made without employing a single material, machine, or process used previously. The Intertype Corporation (Fotosetter) and the Mergenthaler Linotype Company (Linofilm) have machines that deliver a sheet of photographic film containing composed type images. The Ralph C. Coxhead Corporation (Vari-Typer), Commercial Controls Corporation (Justowriter), and Fairchild (lithotyper) now market keyboard-operated machines that deliver a typed copy in printers-type designs suitable for making printing plates. None of these methods uses type metal in producing type composition.

Another recent innovation in the graphic arts is Xerography, a duplicating process making use of a principle not previously applied to printing--electrically charged images and powdered ink. It is a rapid, completely dry

method of printing and duplicating, of taking pictures, or of making or reproducing line drawings. It has definite possibilities as a production printing process, and at present is employed in the Xerox Copier marketed by the Haloid Company.

Printing by offset lithography has experienced an amazing growth within the past decade. Several firms have introduced presensitized plastic and metal offset plates which are sufficiently low in cost to be discarded after a single use. Time, Inc., has developed a bimetal offset plate which has several advantages over the conventional aluminum plate. "Dry-lithography" is receiving much research attention. As a successful method of making plates for dry lithography is developed, it will add much to the volume of offset printing.

All branches of the printing and publishing industry are supporting this flood of new ideas. The Book Manufacturer's Institute, American Newspaper Publishers Association and others have been active. The newspaper publishers are building a new research laboratory and have an annual budget in excess of $200,000.

Individual firms also sponsor research programs. Crowell-Collier, Springfield, Ohio, has long been a leader. R. R. Donnelley and Sons Company, the country's largest commercial printer, maintains a formidable

research staff. Time, Inc., operates its own research laboratory and has an annual budget of about $1,500,000. More than a hundred other firms in the graphic arts are conducting effective research programs.

It seems apparent that such expenditures of time and energy will eventually lead to developments which will eliminate much of the ponderous machinery now employed to transfer a thin film of ink to a piece of paper.

Graphic Arts as a Part of General Education

> Every school boy and school girl should know something about the art of printing.
> --Horace Mann

The general education values of graphic arts as a school subject have been recognized by educators for over a hundred years, with impetus being derived from the contributions of Pestalozzi and Wehrli.

With Wehrli's successes, progressive schoolmasters began to see in well-organized industrial work a means of enriching that "liberal education" which the opponents of industrial work were demanding.

Perhaps the earliest reference to the introduction of graphic arts in this educational role is cited by Bennett (4, p.237) in his description of William Davis' Gower's Walk School, London, in the 1830's.

> He had been very much engaged in adapting schools to the plan of mixing industry with education. Mr. Davis believed that printing in his school had justified itself as a means of general education. In his school a boy usually began work in printing at the age of nine or ten years. He might then spend about three hours a day in the printing shop. This work was voluntary. It was, however, elected by the strongest students in the school. "The boys who did not avail themselves of the opportunities thus afforded were considerably less advanced in their intellectual studies than those who worked in the printing shop. The prizes given for reading, writing and ciphering, were invariably gained by those boys who were most employed in printing." Very few of the boys became printers after leaving school. In fact no attempt was made to teach printing as a trade, for no boy learned its processes throughout; the studious endeavor of the managers and teachers being that the whole school course should, as far as possible, by the inculcation of habits of industry and obedience, prepare the boy for his future life as a citizen, and in their opinion, the teaching of an industrial occupation during the school career considerably furthered that object.

The concept expressed by William Davis remained valid through the nineteenth century. Early in the Twentieth century John Dewey's influence broadened the application of industrial arts in general education, building on the work of Pestalozzi and his followers. In 1913, Frederick Bonser, professor of education at Teachers College, Columbia University, an advocate of the social philosophy of Dewey, expressed his view of graphic arts in the school curriculum (3, p.454):

> Study of the making of books is not primarily to produce skill or craftsmanship in bookmaking--few, if any, of the children in a given school will become bookbinders, and, if any of them do, it will probably not be handicraft bookbinding. The purpose is rather to develop insight into an Industry whereby the race has put itself on record for untold generations, improving its means and methods step by step, until the great mechanical typesetting machines are subjects of study and understanding; to study the design involved in the choice and arrangement of type, the arrangement of the page, the choice of paper, the design of binding and cover pages, and the appropriateness of all to the author's thought and feeling with the form and dress the bookmaker has given it; to learn of the debt we owe to Gutenberg, Coster, and Caxton, and perhaps, to enjoy a part of "Fust and His Friends" with Browning, and to push on for a little way into social and even political questions--the great army of laborers engaged in the printing and publishing industry, wood pulps, and tariffs, and the place of the press in business, education, and enjoyment. The historic aspects of the work may lead a long way back to notch sticks, obelisks, tablet and stylus, papyrus, parchment, scroll, primitive inks, and quill pens, the monk and the scriptorium, rare illuminated texts, wood block printing, and coming nearer and nearer to the present, to movable metal type, the linotype, the monotype, etchings, steel engravings, lithographs, electrotyping, and all of the marvelous possibilities of printing in form and color of today. Is there not here a subject matter which will make books and the great art of their making mean vastly more than is usual--which will develop permanent interests in books, and which will cultivate judgment of taste in the selection of books in all particulars of form? Compare this body of thought, experience, and activity with the usual course in paper folding, cardboard construction, and bookbinding to see wherein the difference lies.

A comparison of this statement by Bonser with the purposes of industrial arts in general education as set

forth by the Industrial Arts Section of the American Vocational Association, 1953, quoted in Chapter I, reveals very similar objectives. The only significant difference being a broader approach to today's highly industrialized economy.

Unfortunately, the ideals envisioned in the minds of the educators just cited have not been realized in adequate measure and the proper development of graphic arts in the scheme of general education continues to be of real concern to leading administrators and supervisors in the public schools.

It appears obvious that the teacher is primarily responsible for successful achievement of these purposes in education and in his preparation, among other things, a thorough acquaintance with those items of content which best serve these purposes must be included. As previously indicated, teachers drawn from the trade are all too often inclined to restrict their efforts to skill training, or even more disastrous, succumb to the pressure of demands from administrators to produce large volumes of printing for the schools. Undoubtedly pupils in situations such as this learn something, but the rich experiences of a broad program are sacrificed.

Personal observation of many graphic arts courses

in the schools of California reveals the salient fact that those teachers considered most successful in achieving the goals previously set forth are those who have received a strong liberal education plus preparation for their specific subject in a situation similar in content to that which they are teaching. They tend to teach as they have been taught--those from the trade continue, in general, to teach the trade.

The graphic arts content which will most adequately serve general education today is, of course, the concern of this study; and the integration of graphic arts into the total school program must be considered as a part of the problem. Indicative of the many possibilities for the achievement of the basic skills is this incident related by John A. Backus, formerly educational director for American Type Founders (2, p.14):

> While in conference with a Boston schoolmaster, a representative from the American Type Founders Department of Education learned that plans were being made to add a cabinet-making department to his industrial arts program. The ATF representative pointed out the danger of becoming top-heavy in wood. The conversation then turned to printing and its outstanding social and educational values. The schoolmaster hesitated but finally said, 'Tell me just why I should have a printing department?' The ATF representative called attention to the wide range of individual differences and interests in the school student body and explained how printing would appeal to the academic type not interested in the other shop activities. He said, 'Consider the interest it would add to

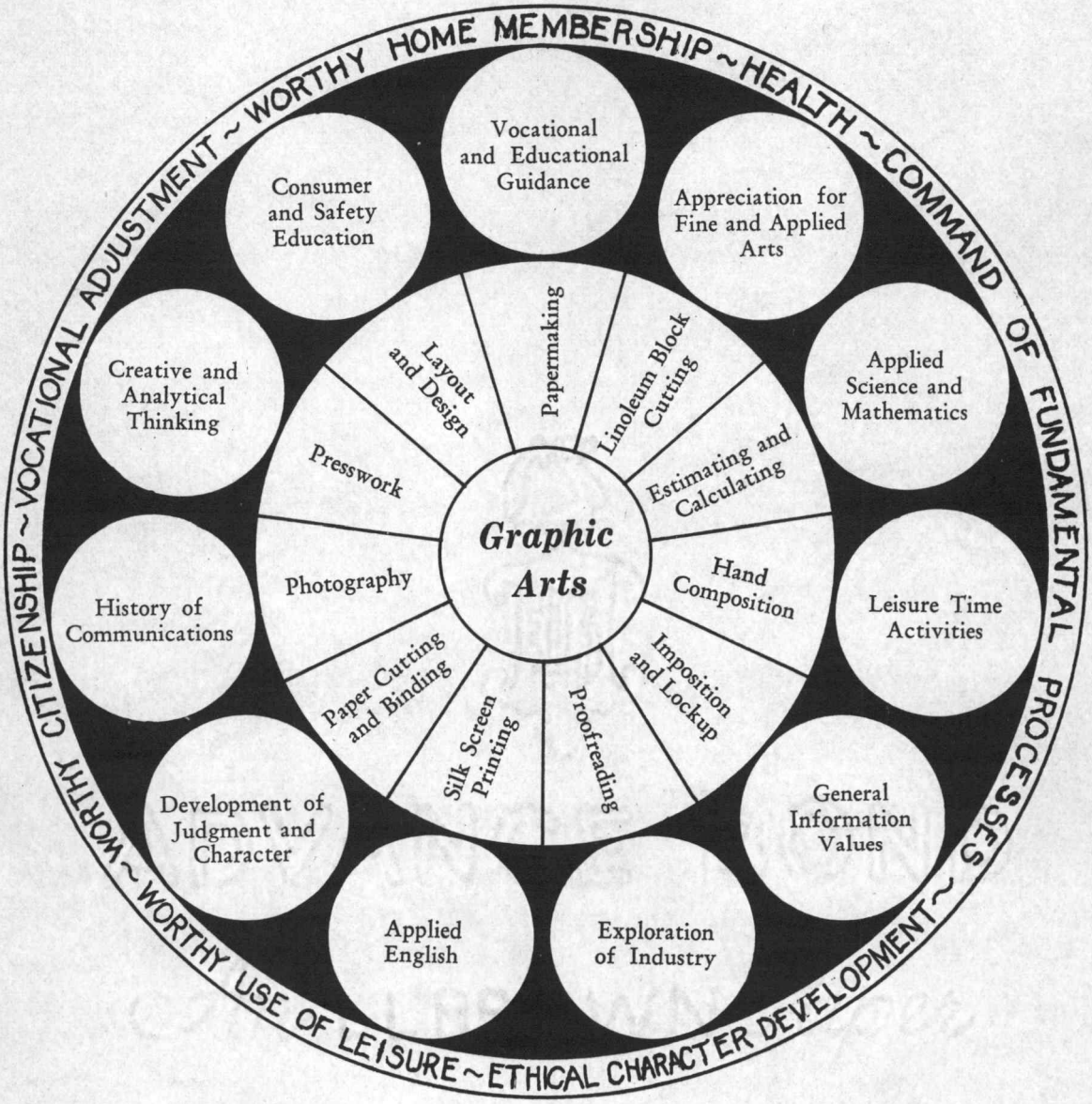
> your English classes. It would give English a purpose, and at the same time, serve as a vitalizing influence on the life of the entire school.' The school-master's face brightened. He said, 'My English department needs just that. It needs new life and interests. If a printing department will give it purpose through creative motivation, I am interested. I shall install a printing department, but mind you, it had better do all you claim.' Six months later, the ATF representative ventured back to the office of the school-master who greeted him with a serious look on his face. 'Come with me,' the school-master said, leading the way into a regular classroom. He pointed to an unabridged Webster Dictionary and said, 'What do you think of that?' The ATF representative fingered the pages and replied, 'Almost new, hardly been used.' Then he followed the educator down the corridor to the print shop. 'Now look those over,' the educator ordered, pointing to two dictionaries identical to the infrequently-used copy he had just examined. The ATF representative turned a few pages over. They were grimy with use and somewhat the worse for wear. 'They're all right,' he said, 'but why not give the printing students some nice new books the same as the one in the other room?' The school-master replied, 'These two dictionaries were purchased the same time as the other one. The students in the printing department use them. That is the difference.'

The wide application of graphic arts to the achievement of general education goals is perhaps best illustrated in the frequently-used wheel originated by Backus, from which Figure V was adapted.

Because graphic arts is the only industrial arts subject dealing primarily with visual communication it provides an ideal situation in which to apply motivation to learning situations involving the mechanics of the English language.

FIGURE V

THE RELATIONSHIP OF GRAPHIC ARTS TO GENERAL EDUCATION



Source: Graphic Arts, the Foundation of a Liberal Education, American Type Founders, Elizabeth, 1945

The written word, when printed, takes on a great deal more significance and gives the pupil an awareness of correct form he would not otherwise assume.

In the area of art there is probably no other school subject which offers greater possibilities in the practical application of color and design than does graphic arts. Other than the purely fine arts, this applies to the use of art in contemporary life. Modern advertising, book design, packaging, and display, rely on an understanding and cooperation between the artist and the graphic artist. Technical skill alone does not insure success in the printed piece--aesthetic appreciation must be integrated with mechanical competence to achieve worthwhile results. The school graphic arts shop offers the setting in which creative expression can be carried through in a functional application.

As a result of laboratory-type experiences gained through actual participation in the design and production of printed projects, the pupil gains an insight into an industry which offers occupational opportunities employing a wide variety of talents. Here he may actually explore, in a modest way, a segment of industry which employs over half a million Americans.

The American Type Founders Department of Education, in a recent publication, (2, p.8) attributes to

graphic arts the following general education benefits:

The graphic arts integrate and vitalize the entire school program by serving as a means of socializing the life and interests of all students by acting as a clearing-house for ideas and accomplishments.

The school graphic arts activity will motivate and coordinate all academic work in the school by providing a worth-while related program of creative activity.

It provides an opportunity for self-expression through the preparation of creative English and art projects.

The school graphic arts laboratory is an activity unit rich in cultural, social, and educational values.

The planning, preparation, and printing of a printed project requires analytical and creative ability.

The printing activity is especially strong in habit forming values such as correctness, neatness, accuracy in English construction, and honesty, all of which are character building qualities so essential to constructive leadership.

Through the working of hand and brain in the preparation and production of a project, a student forms a sense of proportion, and appreciation of lines and curves, a balance of perspective, and appreciation of the fine arts as exemplified by the greatest of arts.

The development of a worthy printing project requires foresight in planning, initiative, stick-to-it-iveness and understanding appreciation of human reactions.

Printing deals with facts. Therefore a printing, or graphic arts, educational program has unusual informational values.

> The varied aspects of graphic arts work such as composition, art work, estimating, proofreading, presswork, and bindery provide an outlet for many diverse talents and abilities.
>
> Printing education employs the modern activity philosophy of learning by doing in teaching methods, for learning in graphic arts is learning by doing.
>
> The industrial arts school graphic arts laboratory develops in each student a feeling of self-reliance and confidence in his ability to deal with people and to care for himself in an unusual or unfamiliar situation.

The use of arithmetic and problem solving techniques is a part of every paper and type calculation. A study of the development of communications and the alphabet in our culture is essential to an understanding of type. The science of ink, photography, and mechanics is inherent in the work of the graphic arts shop. Group and individual responsibilities become a living part of the daily shop activity--the rich experiences in this broad and basic field being far too numerous to list, it should suffice to point out that the extent to which graphic arts can be integrated with other school subjects will be limited only by the preparation, resourcefulness and ingenuity of the teacher.

CHAPTER III

CONTENT OF THE GRAPHIC ARTS PROGRAM

The Changing Nature of Graphic Arts Content

Graphic arts education in the past has for the most part been confined to the traditional area of "printing." That the trend today is in the direction of a broader application of graphic arts in industrial arts is assumed, but what content it will embody is as yet undefined. Changing technological conditions and educational philosophies preclude any part and durable solution but some clarification and evolutionary delineation is warranted at present.

The concern of national professional organizations with this problem is indicated in the following excerpt from Graphic Arts Education (8, p.17):

> The difficulty is that many industrial arts teachers handling graphic arts training are very poorly prepared. Many teachers are graduates of teacher training institutions who have had as little as two semesters in graphic arts shops. Many of these teachers have had little or no contact with the graphic arts industry. Inadequately prepared teachers cannot provide basic knowledge and skills, develop proper attitudes or stimulate interest of students in the graphic arts field. A study of graphic arts teacher preparation in teacher training institutions--with recommendations by the Education Council, International Graphic Arts Education Association, Printing Industries Association and Craftsmen's Clubs for more

thorough preparation--would undoubtedly pay large dividends to all concerned.

This investigation has been conducted, to a considerable extent, with the assistance and cooperation of the professional groups enumerated in Chapter I. Additional insight has been gained through participation as a member of the California Industrial Arts Curriculum Committee, sponsored by the State Department of Education. The writer has been charged with editing graphic arts content to be incorporated in the state publication, Suggested Courses of Instruction in Industrial Arts for the High School Level. The many lengthy deliberations of this committee emphasizes the need for revision and delineation in terms of present day conditions. Particularly apparent is the movement toward broader subject fields with less emphasis on technical specialization in keeping with the objectives of industrial arts.

As a part of general education, it is relevant to note that the trend toward broader fields of study permeates most subject areas. That trend is not unique with industrial arts or graphic arts. A three-day conference on Better Teaching sponsored by the California Teachers Association in January, 1954, concerned itself primarily with scope and integration and the problems of relating general education to our times.

Although the teaching of graphic arts may be a minor segment of the whole of education it is nonetheless important that it be accomplished effectively. This concept is eloquently presented by Kramer (18, p.5):

> Teachers more than anyone else determine not only the learning but the lives of coming generations. Since the teacher has absorbed some of the functions previously fulfilled by preachers, and has even had to take over a substantial part of the tasks formerly assumed by parents, the future of society rests to an increasing extent on the teaching profession.
>
> The graphic arts teacher is no exception. I suspect that the most important phase of his training will have to do with the points just mentioned since the future of this country is paramount. Upon this important base, however, there rests a problem of training which I feel has been quite adequately answered but is not always understood. This problem concerns the kind of training that should be given the industrial arts instructor. First off, what are the objectives of industrial arts work. We are, or at least we should be, quite familiar with these objectives--the opportunity to work with tools, discovery of vocational aptitudes, appreciation of industrial problems, consumer knowledge, appreciation of good workmanship, orderly work habits, and so on.
>
> The training of the industrial arts graphic arts instructor, then, should be so designed to meet these objectives. There needs to be wide acquaintanceship with all of education. A broad skill area, more appropriately termed graphic arts, is the work area, and the instructor needs to know a little about a lot of things.
>
> In the operation of an industrial arts graphic arts laboratory, such things as potato printing and paper-making have a definite and important part to play. Unfortunately, however, the industry frequently receives the wrong

> impression and evisions an army of potato printers soon seeking employment. Because of this problem, I feel that ample time should be given in the training of the industrial arts instructor so that he can fully appreciate the printing industry, its organizational problems, its desires in the way of recruitment of new prople and an acquaintanceship with the problems of an instructor's relationship with the industry.

In considering the technical preparation of graphic arts teachers in keeping with contemporary educational philosophy it becomes necessary to define the scope or content of graphic arts as a school subject. At the same time it would be desirable to provide the prospective teacher with the techniques and teaching skills to most effectively present the content. Obviously this should be kept in mind by those charged with their preparation and to a great degree will depend upon the inherent skill and ingenuity of the student. It is only practical here to set down what investigation indicates should be taught, which if accurate today will doubtless be questionable a decade from now. The problem of content is a continuous one based on changing needs and technical advances.

An examination of the card indexes in most libraries reveals that the printer has employed his presses to reproduce a profusion of material in every field except his own. As cited in Chapter I, texts in the graphic arts education field are limited. Texts by Marinaccio and

Osburn, and Johnson and Newkirk are representative of the general education approach.

In reviewing the periodical literature it was noted that the topic of exploratory graphic arts content is almost barren of published material. A considerable amount of writing has been done in the traditional printing education area and specific processes and techniques within the subject have been treated individually. Technical information and developments for the industry have also been the source of many articles in trade journals.

Those periodicals having to do with industrial arts education, i.e., Industrial Arts and Vocational Education Magazine, School Shop, The Industrial Arts Teacher, and the American Vocational Association Journal; have devoted little space to graphic arts in relation to other shop subjects. A search of the Industrial Arts Index and indexes of the journals revealed little over-all consideration of the topic. A number of authors have done considerable investigation into isolated phases of the whole which were of use in preparing items to be included in the questionnaire.

Content Shown by School Guides and College Bulletins

Industrial Arts guides or bulletins were requested from twenty-five states and several larger city school

systems. Most state publications were found to present the industrial arts in general terms of organization and administration with little reference to specific subject content. Where content was included, sixteen states made no reference to graphic arts, indicating it is not a part of their industrial arts program. Of the nine states including content, traditional printing courses appeared in six cases. The Florida guide is perhaps representative of the other extreme; designating the subject as the communications area and including all forms of visual and audio communication.

The Chicago, Denver and Los Angeles guides were considered the most progressive and practical of those surveyed and it is around such a program that the questionnaire was designed.

General catalogs were requested from the fifty-four colleges and universities reported by the American Industrial Arts Association as preparing industrial arts teachers in the area of graphic arts. An examination of course descriptions indicated that:

1. Most offerings are designed around technical skill units, with the titles Hand Composition, Machine Composition, Presswork, Bookbinding, and Management being most frequently mentioned.

2. Newer institutions, where graphic arts is being introduced for the first time (Fresno State College, San Diego State College) list

more general courses; Graphic Reproduction Processes, and General Graphic Arts appearing as course titles.

3. Course content and equipment described indicates greater emphasis on production than on general education.

4. The term "printing" is used to describe offerings with greater frequency than is "graphic arts."

Personal interviews, school visitations, and industrial tours proved more fruitful in providing data relative to specific problems in that persons professionally qualified were contacted directly and asked for information in particular areas under consideration. At the same time a number of individuals having no school or industry affiliation were asked to express opinions concerning graphic arts as a school subject. Most significant was the lack of understanding of the terms "graphic arts" and "printing," as applied to the education program, the majority relating these titles to some form of drawing, others interpreting content in the narrowest sense, with little conception of its application to general education. It was found that those skeptical of the educational value of such a subject invariably reached their conclusion because of a lack of understanding and when appraised of the methods and objectives set forth, they willingly accepted the viewpoint proposed.

School superintendents, principals, and other

administrators having no direct industrial arts background were found to be extremely cost conscious, a condition aggravated by the fact that many schools, particularly high schools, have an investment in equipment used for production far in excess of that justifiable or necessary to accomplish the aims of the course as an industrial arts offering. Again, a lack of understanding of the true educational values inherent in a study of the graphic arts resulted in an attitude that the shop must justify its existence in terms of usefulness to the school or district and not on its potential contribution to the educational program.

Content and Problems Revealed by Survey

A study of twelve typical Southern California high school print shops (Appendix A) revealed that all were doing some printing for the administration of the school in which they were located; letterheads, envelopes, attendance slips, record forms, purchase orders, and registration blanks were almost always printed in the school shop. An even greater quantity of work was done for use in student activities.

Ten of the twelve shops were printing weekly student newspapers. In two of the shops bi-weekly papers were printed for other schools in addition to their own.

Five of the twelve printing plants not only did most of the printing for their own schools, but for other schools in their districts as well. Usually such shops did only the simpler jobs for the other schools, refusing any which would tax their facilities or their manpower. But one printing teacher reported, with obvious pride, that his shop was doing most of the printing for 21 different schools in the system.

One cannot appreciate fully just what a problem production work can become to a teacher who wants to teach printing as an industrial arts subject until he realizes the great monetary value of such production work to the school administration. One teacher visited had records to show that in one recent school year his shop did production work amounting to $20,000 at the commercial rate. Another did $12,000 worth of printing at a cost, including his salary, to the school district of $6,000.

It was quite obvious that the presence of large quantities of production work in the shops was effecting the organization of the shops. Classes were seldom divided into "beginning" and "advanced," because to do so would most likely cause the presses and other machinery to remain idle while the inexperienced class was in session. Naturally this would reduce productivity. So in only three of the twelve schools were the printing

classes organized according to the experience of the pupils.

The most flagrant case of overproductivity was found in a shop where beginning students were instructed almost entirely from instruction sheets and reading. For the whole school year students did nothing but hand-set type, prove it on a proof press, turn it in for a grade, and then go on to the next instruction sheet, 38 in the series, hanging on large hooks on the wall.

It was found that moving pictures were seldom used for instructional purposes in the schools visited. The reason given was that there were too few good printing films and in most cases the students had seen them in junior high school.

One-half of the teachers interviewed were employed not on the usual nine-month teaching basis, but on an eleven-month basis. This was a direct result of the amount of production work which they were called upon to do--two months during the summer ware spent printing long runs of forms to be used by the school system the following year. These six also put in overtime, paid for on an hourly basis after 3:00 p.m. or on weekends.

All but one of the printing teachers visited had had practical trade experience in the field and was qualified by ability to handle volume production. A

common justification for the lack of attention to related information and broad skill training was attributed to the demand for production from the administration. Observation of such situations, however, leads one to believe that in many instances production was used to excuse the teacher from organizing and teaching a sound general course. Teachers trained in the trade and receiving a minimum of professional preparation appear to rely heavily on trade practices and methods and are in part responsible for the attitude assumed by administrators toward the subject.

Eleven supervisors of industrial arts interviewed were found to be aware of the potential of graphic arts as a part of the industrial arts program and rated it as having equal importance with other offerings. Those planning new school departments were including it as one of four or five basic areas and in several instances plans called for the inclusion of drawing facilities and a photographic darkroom as a part of the general graphic arts offering. This appears to be the trend in the junior high school plants in particular. Equipment in these installations is simple and relatively inexpensive and better suited to the program than has been the case in older shops.

Of major concern to supervisors is the preparation

of teachers. In 1953 only two of the eight California collegiate institutions preparing industrial arts teachers offered a credential in graphic arts and consequently an acute shortage of qualified personnel has existed, causing schools to curtail their programs or accept inadequately prepared teachers. Two state colleges expanded their offerings during the 1953-1954 school year and now include graphic arts as a credential area, with a basic course being required of all industrial arts majors. Content was determined with the assistance of an advisory committee composed primarily of supervisors of industrial arts in the larger city systems and the shift toward a general, non-technical, preparation is evident.

The pattern as observed in California is believed to be, from a superficial investigation, somewhat general throughout the United States.

Such institutions as the University of Maryland and the University of Minnesota are in the process of developing broad teacher education programs in industrial arts. As professional schools develop, additional qualified teachers will become available in turn introducing the subject in the industrial arts offerings of additional public schools to the point where it is believed it will commonly be considered an integral part of the area.

The contribution of any subject area to the

success of the general education program depends in large measure upon the enthusiasm, outlook, and preparation of the teacher. As graphic arts expands, it becomes increasingly important to examine the skill preparation of the prospective teacher. Professional literature previously cited indicates that progressive teacher educators, administrators, and supervisors, are in agreement that exploratory graphic arts does have a place in general education. It seems particularly appropriate at this time to give serious consideration to content and the most feasible means of presenting that special information and training to the prospective teacher.

Considerable information relative to this study was gained by interviewing and observing twenty recent graduates of Santa Barbara College who were recommended by their administrators as presenting an outstanding graphic arts offering in terms of content as well and method. These observations were carried on over a period of eighteen months and included schools in twelve California cities. Data gleaned from these sources were given further analysis and study by senior students at the college and applied to the development of teaching materials which they prepared, and after graduating, criticized in terms of application to their own teaching situations. These suggestions not only became a guide in

the formulation of the questionnaires employed in this study, but have served to continuously modify the instruction in professional courses at Santa Barbara College.

Content as Rated by Leaders in Industry

In order to obtain the widest possible sampling of qualified opinion within the limitations of the study, four separate groups were selected nationally to represent segments of the population having a close association with graphic arts education. As explained in detail in Chapter I, under procedure, these included leaders in the graphic arts industry, teacher educators in institutions preparing graphic arts teachers, men recommended as being outstanding graphic arts teachers in the public schools, and college students selected as most promising in achieving success as graphic arts teachers.

With the exception of the covering letter and the addition of a number of items relative to method for those going to educators, the questionnaires listed identical items in relation to content. These items were carefully selected from the data reviewed previously and covered the broadest application to graphic arts. The basic questionnaire was criticized by a select sampling of supervisors, teachers, and college professors, and revisions were incorporated prior to the first mailing.

In March, 1953, the first questionnaire was mailed to 114 men prominently identified with the graphic arts industry. The mailing list was selected from names submitted by the International Graphic Arts Education Association, International Club of Printing House Craftsmen, and Printing Industry of America, Inc. and included executives and craftsmen in all parts of the United States, Canada, and Hawaii.

Sixty-eight or 59 percent of the completed questionnaires were returned and included responses from such prominent authorities as Harry Gage, A. R. Tommasini, W. B. Wheelwright, and Perry Long. Contrary to what might be expected from representatives of industry, was the almost unanimous opinion that the content be broadly applied, with a minimum of emphasis on technical skill training. This was expressed not only in terms of items marked but by elaboration in the space provided under remarks. Typical, and of greatest significance, were these additional comments:

> Most business men at some time during each year have printing needs . . . a general knowledge of the industry is a valuable asset to any young person.

> It is my firm conviction that instruction in the graphic arts should emphasize the historical background, design, and use of processes and materials. Actual technical knowledge can be picked up much faster in industry.

In my opinion too many schools go into too much detail instead of teaching the fundamentals only. You can't make a printer in a school.

A course in general information about the graphic arts and their significance in the modern scene should be a part of every liberal program . . . minimum emphasis on shop operations--just enough to drive home the significance of printing surfaces and how they deposit an image on paper.

Every student should have a general knowledge of all the methods used in graphic arts and their specific uses. Beyond giving a student the how and why, I believe any technical instruction should come in a qualified trade school.

You will notice a double check on spelling and word division. The teachers in our elementary schools have been lax in their insistence on correct spelling.

Because the education of every young man or woman depends upon the printed word--or upon associates who have used the printed word as reference--every young person should have some knowledge of printing--truly it should be a basic academic. You have listed much technical detail which should, I believe, be left for the actual vocational training. General education should include the benefits of printing in our intellectual set-up--the psychology of preparations such as the various kinds of display, illustrations, and balance which appeal to different sections of humanity.

Your approach gives too much emphasis to the mechanical details--not enough to the principles that determine when and how we use the various processes.

It is my feeling that general education objectives are more nearly reached if graphic arts instruction gives a full coverage of the field with a minimum effort at skill development. It should be the 'general science' approach.

Of even greater importance than the choice of content or emphasis is the integrating of the

course with other general education materials.

I gave a top rating to Design and Layout because there should be developed the relationship between printing and the arts. Better printing will be produced (outside the school) when a discriminating public realizes that printing is not only a tool for language communication, but also reaches the emotions and feelings of the viewer. Legibility, then, is but one of the prime factors of a printing standard. This is an area of cooperative relationship between printing and art. There should be an inter-change of material and experience.

A second area of cooperation is in the units on English. Printing can be a severe disciplinarian of English in use. It is an excellent motivator for improved use of the language tool. The printing teacher and the English teacher should be a 'team.' Proofreading and editing might well be made a part of the English course. There are many opportunities for these two divisions of the school to provide a double impact on the student.

Press work, if properly approached, can do much to acquaint the student with mechanical phenomenon. This necessitates an approach somewhat different than is the custom. The student should be introduced to the press as a machine. A device made up of gears, cams, etc., operating within the physical laws that govern such devices. Pressure laws, laws relating to color, to paper surfaces, the chemistry of setting (as of ink), adhesives, cohesion, etc. All may add to the knowledge and experience of students in a way the chemistry and physics classes could not do alone. The same can be said of many bindery operations.

The photo-chemical operations (engraving, offset, gravure) provide an excellent science laboratory in chemistry, optics, light, color, etc. We could not find a better way to motivate a study of several of the science fields.

> Some investigation of 'future processes' is valuable as a device to show the relationship between science and industrial progress. It can contribute to the general awareness that the boy and girl of this age must be fortified with a wide range of knowledge if he is to be adequate to meet the needs of this rapidly changing world.
>
> This lengthy note is in part due to my feeling that your questionnaire is not going to produce the information needed. What is lacking is not so much 'content' but application or educational approach.

The foregoing numerous quotations are included to emphasize the spirit prevalent in industry toward the teaching of graphic arts in the schools. These statements have been made by business men who help to pay the educational bill, and they have perhaps indicated their sincere convictions more aptly in their writing than is expressed in the raw data presented (with the covering letter) in Appendix B and C.

Although these figures could be manipulated in countless arrangements and rearrangements illustrating numerous relationships, for the sake of clarity and emphasis of the problem at hand, the items have been ranked by gross total of Column One (High Value). This listing (Table I) graphically presents industry's evaluation of content in terms of frequency chosen and can be employed as a guide in that respect.

TABLE I

ITEMS OF CONTENT AS RANKED BY INDUSTRY REPRESENTATIVES

High Value Total	Item	High Value Total	Item
48	Relative importance in all industry	23	Silk screen in industry
47	Spelling	20	Halftones
47	Punctuation	19	Development of the alphabet
46	Necessity for planning	19	"Cold" type
37	Word division	18	History of writing instruments
36	Relation of photography to industry	18	Figuring and cutting stock
36	Principles of design and color	18	Use of intaglio process in industry
29	Preparation of layouts	17	Type classifications
28	Scope of industry	17	History of photoengraving
26	Appropriateness of type	17	Line etchings
23	Occupational information	17	History of lithography
23	Kinds of paper	16	Machines of industry (bindery)
23	Uses of paper	16	Display composition
23	Proofreaders' marks	16	Composing room tools and materials
23	Types of presses	16	Elements of photography
23	Lithography in industry	15	History of writing surfaces

High Value Total	Item	High Value Total	Item
15	Manufacture of paper	8	Kinds of ink
15	Care of presses	8	Rubber stamps in industry
14	Composing room machines	7	Simple lockup
14	Process color engravings	7	Imposition of signatures
14	Electrotypes	7	Straight matter composition
13	Uses of inks	7	Multiple color forms
13	History of intaglio process	7	Steel die process
13	Rotogravure	7	Rubber plates
13	Types of offset plates	6	Paper calculations
12	Xerography	6	Measurements
12	Imposition tools and materials	6	Type cases
12	Plastic plates	6	Scoring
11	History of ink	6	Linoleum block printing
11	Lay of the case	6	Development of negatives
11	Uses of linoleum blocks	5	Composition of inks
10	Platen press make-ready	5	Type demons
10	History of silk screen	5	Die cutting
9	Types of offset equipment	5	Linoleum block design and carving
9	Stereotypes	5	Enlarging (photography)

High Value Total	Item
5	Contact printing (photography)
4	Parts of type
4	Press feeding
4	Case binding
4	Perforating
4	Types of silk screen stencils
3	Type lice
3	Stitching
3	Manufacture of rubber stamps
3	Silk screen materials
2	Borders and rules
2	Rule forms
2	Padding
2	Decal transfers
2	Gold stamping
2	Embossing
2	Mimeograph process
2	Spirit duplicators
2	Single color linoleum blocks
1	Tabular composition
1	Flocking
1	Dusting
1	Collotype
0	Press parts
0	Thermography
0	Marbling
0	Rubber stamp materials
0	Multiple color linoleum blocks

ADVANCE BOND
BROWN Paper

Spiral Binding?

Content as Rated by Teacher Educators

The questionnaire prepared for teacher education institutions contained items identical to those distributed to industry and carried additional topics in the area of organization and method. Fifty-four questionnaires were mailed in October, 1953, to institutions listed in the 1952 yearbook of the American Council on Industrial Arts Teacher Education. Only those schools having an industrial arts staff of five or more and offering courses in graphic arts were contacted. Replies were received from thirty institutions, representing 55 percent of the total.

In addition to the simple response requested in marking the various items, an emphatic opinion was expressed concerning the place of "production work" in the school shop, a problem that warrants particular attention in the graphic arts area. Typical of the comments by teacher educators are the following:

> Production work is of value if it can be controlled by the instructor and does not prevent the offering of a broad graphic arts program.

> Approve if not too much and time is allowed to complete jobs without denying students of opportunity for personal jobs. Some production work will be helpful in giving students work with larger quantities than they usually do for their own personal work

Should be under strict control of instructor with authority to accept or reject jobs. It is desirable as long as it enhances the course of instruction.

It is necessary for a real life situation but must be subordinated to instruction.

Only as an educational experience, never to exploit and never to deny or circumvent free enterprise.

Should play a minor role, and then only when such work will benefit the student.

Production work has a place if it does not consist of rush jobs and is work that fits into the course guide or course of study. The graphic arts teacher and his supervisor should have power to accept or reject requests, keeping in mind the welfare of the pupil.

The frequency with which the questionnaire items were marked is shown in raw form (with the covering letter) in Appendix D and E, and a distribution of the topics by gross total of Column One (High Value) is presented in Tables II-V.

TABLE II

ITEMS OF CONTENT AS RANKED BY TEACHER EDUCATORS

High Value Total	Item	High Value Total	Item
27	Relative importance in all industry	20	Uses of inks
27	Spelling	20	Measurements
27	Punctuation	19	Display composition
26	Necessity for planning	19	Care of presses
26	Word division	18	Use of silk screen in industry
23	Uses of paper	18	Composing room tools and materials
23	Appropriateness of type	18	Lay of the case
23	Principles of design and color	18	Kinds of ink
22	Elements of photography	17	Figuring and cutting stock
22	Scope of industry	17	Designing and carving linoleum blocks
22	Kinds of paper	16	Simple lockup
21	Preparation of layouts	16	Straight matter composition
21	Relation of photography to industry	15	Type classifications
20	Use of lithography in industry	15	Line etchings
20	Occupational information	15	Halftones
		15	Platen Press makeready
		15	Uses of linoleum blocks

High Value Total	Item
15	Development of negatives
15	Use of intaglio in industry
15	Imposition tools and materials
14	Contact printing (photography)
14	Proofreader's marks
14	Press feeding
13	Linoleum block printing
12	Single color linoleum blocks
12	Silk screen materials
11	Photographic enlarging
11	Types of presses
11	Stitching
11	Manufacture of paper
10	Mimeograph process
10	Spirit duplicators
10	Types of offset plates
10	Padding
10	Rule forms
10	Development of alphabet
10	History of writing instruments
9	Types of silk screen stencils
9	Multiple color linoleum blocks
9	Process color engravings
9	Rubber stamps in industry
9	Case binding
9	Paper calculations
9	Type demons
7	Rotogravure
7	Types of offset equipment
7	Multiple color forms
7	Borders and rules
7	Type cases
6	"Cold" type
6	Machines of industry (bindery)
6	Imposition of signatures
6	History of writing surfaces
5	Steel die engravings

High Value Total	Item
5	Composition of tabular matter
5	Xerography
5	Composing room machines
4	History of intaglio process
4	History of silk screen process
4	Stereotypes
4	Electrotypes
4	Plastic plates
4	Perforating
4	History of lithography
4	History of photo-engraving
4	Spiral bindings
4	Press parts
4	Parts of type
3	Rubber stamp materials
3	Scoring
3	Die cutting
3	Gold stamping
3	History of inks
2	Rubber printing plates
2	Thermography
2	Marbling
2	Flocking
2	Embossing
2	Manufacture of rubber stamps
2	Collotype
2	Composition of inks
1	Decal transfers
1	Dusting
1	Type lice

TABLE III

TIME PERCENTAGE ALLOTTED TO VARIOUS AREAS
BY TEACHER EDUCATORS

Average Percent	Area
26	Hand composition
20	Press work
11	Layout
10	Binding
9	Silk screen
8	Photography
7	Linoleum block
5	Miscellaneous
4	Intaglio

TABLE IV

TEACHING TECHNIQUES RANKED
BY TEACHER EDUCATORS

High Value Total	Item
28	Demonstrations
27	Student projects
26	Visual aids
21	Field trips
16	Discussions or lectures
8	Written reports
6	Outside speakers

TABLE V

STUDENT MANIPULATIVE PROJECTS AS RANKED BY TEACHER EDUCATORS

High Value Total	Item
18	Display composition
17	Stationery
15	Photography
15	Paragraph composition
13	Business card
13	Centered composition
12	Case binding (memo pad)
11	Flush left composition
10	Bookplate (with border)
9	Cut and pad stock
9	Hand made paper
8	Intaglio (plastic plate)
5	Rubber stamp
3	Stereotype
1	Decal transfer

Content as Rated by Graphic Arts Teachers

A third questionnaire was mailed in October, 1953, to teachers of graphic arts in public schools throughout the United States. Items were identical to those contained in the previous mailing to collegiate institutions except for the omission of the request for names and addresses of outstanding graphic arts teachers and students preparing to teach graphic arts.

The mailing list was composed of teachers recommended by the colleges and supplemented with names submitted by supervisors who had been contacted earlier and asked to supply a listing of several superior graphic arts teachers in their school systems. A total of 133 questionnaires were distributed, with a return of 74, or 55 percent.

In addition to the requested responses, a number of teachers included remarks concerning the offering in a general education program and in most cases were critical of the tendency to overburden the class with production of school printing. Typical comments of those concerned with scope and content are the following:

> A general exploratory course in graphic arts should give general knowledge of the field and its contribution to society. It should also give pupils enough experiences in the area to know the industry's vocational opportunities. The so-called fundamental

> skills should be stressed through the exceptional opportunity to use practical application as found in the industrial arts.
>
> I would like to see a good, well-rounded graphic arts course for the junior high school. Many schools have reverted to the ten-week program because of increased enrollment and additional courses. The question of what should be taught, how much, and length of time it should receive, are problems that need exploration.

Pointing up the need for efficient employment of time devoted to teacher preparation is this typical observation:

> Too many instructors in the graphic arts field are 'learning on the job.' This practice of a man assuming the responsibility for a subject such as printing and attempting to convey the techniques and manipulative skills with a few months of college training is not, in the writer's opinion, sufficient.

Concern that the area may become so broad that any solid content may be lost, was expressed in the following remark:

> In the past few years related and often remote cousins of the printing industry have become attached to pure printing under the guise of 'graphic arts.' Each year new things are added--this year decal transfers; last year rubber stamps. It will become an impossibility soon to teach graphic arts as a general shop. Why not add casting of bronze plaques of sky writing? Photography, in my opinion, is a distinct occupation, like plumbing. It is acceptable to understand why photography, paper-making, ink making, and type casting are important to the printing industry without turning the graphic arts shops into paper mills, chemical laboratories, or smelters.

Many comments were evoked over reference to production work, the following being indicative of majority expression:

> In the general graphic arts course, production work should be non-existent. If such work does arise, it should be carefully controlled.
>
> Valuable if the instructor is allowed to exercise choice in accepting projects. Eliminates the pseudo project but the most objectionable feature is that the level of difficulty is hard to control.
>
> It has no place in a graphic arts shop, but let's face the facts--85 percent of the print shop teachers have too much production.
>
> If the instructor is the sole judge of jobs to be accepted, then school production is very valuable. When the school uses shop facilities because they afford cheap printing, then the graphic arts program loses a great deal of its value.
>
> It has a place--but I don't know where that place is!
>
> A necessary evil to some extent, but the tendency is to overdo it, not leaving enough time for individual instruction.
>
> A limited amount of production is desirable in most school situations. It helps build up school spirit among students.

Taking a different view was one teacher who declared:

> Production is absolutely necessary to a real, effective, and life-like 'feel' of a print shop. Most objections to production work are voiced by incompetent, ineffective, or indifferent teachers.

Appendix F shows the frequency with which the various questionnaire items were marked (raw data), and Tables VI-IX present a ranking of the topics based on the gross total of Column One (High Value).

Content as Rated by Future Graphic Arts Teachers

The last group selected to be surveyed consisted of 45 young men preparing to become teachers of graphic arts. These were chosen from seniors at Santa Barbara College and additional names submitted by other teacher education institutions previously referred to. Twenty-nine, or 64 percent, of the students responded to the questionnaire, which was mailed in October, 1953. It contained items identical to those of the form employed in the sampling from graphic arts teachers. The raw data appears in Appendix G, and a ranking of topics as indicated by the total of the High Value column is presented in Tables X-XIII.

The item marked "Other" in each section was rarely used and in most instances the addition appeared elsewhere in the questionnaire. In no case was an additional item found to appear more than twice in the total of 201 cases.

TABLE VI

ITEMS OF CONTENT AS RANKED BY GRAPHIC ARTS TEACHERS

High Value Total	Item	High Value Total	Item
66	Necessity for planning	44	Uses of inks
66	Spelling	42	Appropriateness of type
65	Punctuation	38	Relative importance in all industry
58	Simple lockup	37	Kinds of ink
58	Word division	37	Type demons
56	Measurements	36	Occupational information
55	Platen press makeready	35	Uses of paper
53	Composing room tools and materials	35	Use of offset in industry
52	Principles of design and color	34	Scope of industry
52	Lay of the case	34	History of writing instruments
52	Press feeding	33	Kinds of paper
51	Preparation of layouts	33	Classifications of type
50	Care of presses	32	Linoleum block design and carving
50	Figuring and cutting stock	32	Proofreaders' marks
48	Imposition tools and materials	32	Types of presses
45	Straight matter composition	32	Manufacture of paper
44	Display composition		

High Value Total	Item	High Value Total	Item
31	Paper calculations	20	Composing room machines
31	Padding	20	Multiple-color forms
27	Photography in industry	19	Stereotypes
27	Silk screen in industry	19	Line etchings
27	Type cases	19	Process color engravings
25	Printing linoleum blocks	17	History of writing surfaces
24	Single color linoleum blocks	16	Use of intaglio in industry
24	Halftones	16	Enlarging (photography
24	Stitching	16	History of lithography
24	Development of alphabet	15	Multiple color linoleum blocks
22	Elements of photography	15	Rubber stamp manufacture
22	Borders and rules	15	Tabular matter
21	Contact printing (photography)	14	Types of offset plates
21	Development of negatives	14	Use of rubber stamps in industry
21	Types of silk screen stencils	14	"Cold" type
21	Perforating	13	Rotogravure
21	Rule forms	13	Electrotypes
20	Silk screen materials		
20	Uses of linoleum blocks		

High Value Total	Item
13	Composition of ink
12	Types of offset equipment
12	Die cutting
11	Steel die engraving
11	Gold stamping
11	Scoring
11	Rubber stamp materials
11	Imposition of signatures
11	Machines of industry (binding)
10	Plastic plates
10	Rubber plates
10	History of photo-engraving
10	Xerography
9	History of ink
9	Parts of type
8	Thermography
8	Mimeograph process
8	Type lice
7	Case binding
7	Dusting
7	History of intaglio process
6	History of silk screen
6	Decal transfers
6	Embossing
6	Press parts
5	Marbling
5	Flocking
4	Spirit duplicators
1	Collotype

TABLE VII

TIME PERCENTAGE ALLOTTED TO VARIOUS AREAS
BY GRAPHIC ARTS TEACHERS

Average Percent	Area
23	Hand composition
20	Presswork
11	Miscellaneous
8	Layouts
8	Binding
7	Silk screen
6	Linoleum blocks
5	Photography
2	Intaglio

TABLE VIII

TEACHING TECHNIQUES RANKED
BY GRAPHIC ARTS TEACHERS

High Value Total	Item
69	Demonstrations
61	Student projects
53	Visual aids
35	Discussions and lectures
33	Field trips
8	Outside speakers
7	Written reports

TABLE IX

STUDENT MANIPULATIVE PROJECTS AS RANKED BY GRAPHIC ARTS TEACHERS

High Value Total	Item
54	Paragraph composition
52	Business card
50	Centered composition
49	Display composition
38	Flush left composition
37	Stationery
34	Case binding (memo pad)
30	Cut and pad stock
24	Photograph
24	Book plate (with border)
15	Rubber stamp
10	Hand made paper
9	Stereotype
8	Decal transfer
3	Intaglio

TABLE X

ITEMS OF CONTENT AS RANKED BY FUTURE GRAPHIC ARTS TEACHERS

High Value Total	Item	High Value Total	Item
26	Necessity for planning	13	Importance in all industry
20	Principles of design and color	13	Type demons
20	Uses of inks	13	Types of presses
20	Use of silk screen in industry	13	Linoleum block design and carving
20	Spelling	12	Scope of the industry
19	Punctuation	13	Occupational information
17	Uses of paper	12	Type cases
17	Measurements	12	Type classifications
17	Word division	12	Composing room tools and materials
17	Care of presses	12	Display composition
16	Appropriateness of type	12	Lithography in industry
16	Preparation of lay-outs	12	Intaglio process in industry
15	History of writing instruments	11	Imposition tools and materials
15	Kinds of paper	11	Simple lockup
15	Uses of linoleum blocks	11	Press feeding
14	Kinds of inks	11	Silk screen materials
14	Photography in industry		

High Value Total	Item
11	Elements of photography
10	History of writing surfaces
10	Types of silk screen stencils
9	Manufacture of paper
9	Proofreaders' marks
9	Rubber stamps in industry
9	Linoleum block printing
8	Straight matter composition
8	Multiple color printing
8	Platen press makeready
8	Machines of industry (bindery)
8	Stock figuring and cutting
8	Stitching
8	Case binding
8	Halftones
8	Mimeograph process
7	History of inks
7	Composition of inks
7	Padding
7	Decal transfers
7	History of silk screen
6	Type lice
6	Process color engravings
6	Manufacture of rubber stamps
6	Multiple color linoleum blocks
6	History of intaglio process
5	Parts of type
5	Borders and rules
5	History of lithography
5	Types of offset plates
5	Types of offset equipment
5	Gold stamping
5	Die cutting
5	Development of negatives
4	Rule forms
4	Composing room machines
4	Imposition of signatures
4	Spiral bindings

High Value Total	Item
4	History of photo-engraving
4	Marbling
4	Rubber stamp materials
4	Steel die engravings
4	Rotogravure
4	Contact printing (photography)
3	"Cold" type
3	Line etchings
3	Thermography
3	Dusting
3	Perforating
3	Single color linoleum blocks
3	Stereotypes
3	Electrotypes
3	Enlarging (photography)
2	Tabular composition
2	Xerography
2	Scoring
2	Embossing
2	Spirit duplicators
2	Plastic plates
2	Rubber plates
1	Collotype
0	Press parts

TABLE XI

TIME PERCENTAGE ALLOTTED TO VARIOUS AREAS
BY FUTURE GRAPHIC ARTS TEACHERS

Average Percent	Item
19	Hand composition
17	Presswork
13	Layouts
10	Silk screen
9	Miscellaneous
9	Photography
8	Linoleum blocks
8	Binding
7	Intaglio

TABLE XII

TEACHING TECHNIQUES RANKED
BY FUTURE GRAPHIC ARTS TEACHERS

High Value Total	Item
27	Visual aids
25	Demonstrations
19	Student projects
16	Discussions or lectures
14	Field trips
6	Outside speakers
2	Written reports

TABLE XIII

STUDENT MANIPULATIVE PROJECTS AS RANKED BY FUTURE GRAPHIC ARTS TEACHERS

High Value Total	Item
18	Paragraph composition
15	Display composition
13	Centered composition
11	Business card
11	Photography
10	Flush left composition
10	Stationery
8	Hand made paper
7	Book plate (with border)
7	Rubber stamp
7	Case binding (memo pad)
6	Decal transfer
5	Cut and pad stock
3	Intaglio (plastic plate)
2	Stereotype

Content as Rated by 201 Evaluators

A composite of all raw data (industry, colleges, teachers, and future teachers) appears in Appendix H and the ranking of topics based on total High Value frequencies from all sources is shown in Tables XIV-XVII. Of the 99 items presented in the section of this ranking concerned with content, the area of planning received the greatest number of high value selections, a total of 164, while Spelling received 160; Punctuation, 158; Word Division, 138; Principles of Design and Color, 131; and Relative Importance of the Industry, 126. All received greater than 60 percent of the selections indicating high value.

Content was presented in the questionnaire under twenty-two general headings and each heading preceded a group of items representative of that particular division concerning a study of the graphic arts.

An average of the frequencies in the High Value column of each division resulted in the following ranking:

LAYOUT AND DESIGN

164 Necessity for planning
131 Principles of design and color
118 Preparation of layouts

TABLE XIV

ITEMS OF CONTENT AS RANKED BY 201 EVALUATORS

High Value Total	Item	High Value Total	Item
164	Necessity for planning	92	Simple lockup
160	Spelling	91	Occupational information
158	Punctuation	91	Display composition
138	Word division	90	Use of offset in industry
131	Principles of design and color	88	Use of silk screen in industry
126	Relative importance in all industry	88	Platen press make-ready
118	Preparation of layouts	86	Imposition tools and materials
107	Appropriateness of type	81	Press feeding
101	Care of presses	79	Types of presses
99	Measurements	78	Proofreaders' marks
99	Composing room tools and materials	77	Type classifications
98	Relation of photography to industry	77	Kinds of inks
97	Uses of inks	77	History of writing instruments
96	Scope of industry	76	Straight matter composition
95	Uses of paper	71	Use of intaglio process in industry
93	Kinds of paper	71	Elements of photography
93	Lay of case		
93	Figuring and cutting stock		

High Value Total	Item
67	Linoleum block design and carving
67	Manufacture of paper
67	Halftones
64	Type demons
63	Development of the alphabet
61	Uses of linoleum blocks
54	Line etchings
53	Printing linoleum blocks
52	Type cases
50	Paper calculations
50	Padding
48	Process color engravings
48	History of writing surfaces
47	Development of negatives
46	Silk screen materials
46	Stitching
44	Contact printing (photography)
44	Types of silk screen stencils
43	Composing room machines
42	Single color linoleum blocks
42	History of lithography
42	Types of offset plates
42	"Cold" type
42	Multiple-color forms
41	Machines of industry (bindery)
40	Rubber stamps in industry
37	Rotogravure
37	Rule forms
36	Borders and rules
35	History of photoengraving
35	Photographic enlarging
35	Stereotypes
34	Electrotypes
33	Types of offset equipment
32	Perforating
30	Multiple-color linoleum blocks
30	History of intaglio process

High Value Total	Item
30	History of inks
29	Xerography
28	Plastic plates
28	Mimeograph process
28	Case binding
28	Imposition of signatures
27	Composition of inks
27	Steel die engravings
27	History of silk screen
26	Manufacture of rubber stamps
25	Die cutting
23	Tabular matter
22	Scoring
22	Parts of type
21	Gold stamping
21	Rubber plates
18	Rubber stamp materials
18	Spirit duplicators
18	Type lice
16	Decal transfers
15	Spiral binding
13	Thermography
12	Embossing
12	Flocking
12	Dusting
11	Marbling
10	Press parts
5	Collotype

TABLE XV

TIME PERCENTAGE ALLOTTED TO VARIOUS AREAS
BY 133 EVALUATORS

Average Percent	Item
25	Hand composition
18	Presswork
12	Miscellaneous
10	Layouts
9	Silk screen
8	Binding
7	Photography
7	Linoleum block
4	Intaglio

TABLE XVI

TEACHING TECHNIQUES RANKED
BY 133 EVALUATORS

High Value Total	Item
122	Demonstrations
107	Student projects
106	Visual aids
68	Field trips
67	Discussions or lectures
20	Outside speakers
17	Written reports

TABLE XVII

STUDENT MANIPULATIVE PROJECTS AS RANKED BY 133 EVALUATORS

High Value Total	Item
87	Paragraph composition
82	Display composition
76	Centered composition
76	Business card
64	Stationery
59	Flush left composition
44	Cut and pad stock
43	Case binding (memo pad)
41	Book plate (with border)
40	Photograph
27	Rubber stamp
27	Hand made paper
15	Decal transfer
14	Stereotype
14	Intaglio (plastic plate)

The various facets of this study have consistently pointed up the necessity for greater emphasis on planning, design, and the effective use of color. Presswork, imposition, and hand composition (the traditional skill areas) received average choices of slightly over one-half the 137 average assigned to Layout and Design. Planning carried the greatest total of any item in the questionnaire and an examination of other divisions concerned with general applications of knowledge were uniformly selected in preference to specific technical information.

ENGLISH

160 Spelling
158 Punctuation
138 Word division
78 Proofreaders' marks

An average of 133 selections were assigned to the area of English. Spelling and punctuation, traditionally the assigned responsibilities of the English class, were considered more worthy of emphasis than those of word division and proofreaders' marks, which are linked directly to the occupation under study. Integration in the area of language arts and the general education approach to the subject is apparent.

THE GRAPHIC ARTS INDUSTRY

126 Relative importance in all industry
96 Scope of industry
91 Occupational information

Totals reported under the heading of the Graphic Arts Industry yielded an average of 104 selections for each item in the High Value column. This average is greater than that assigned to any technical or skill item (with the exception of the foregoing) contained in the questionnaire and indicates a preference for a broad sampling of graphic arts rather than the development of specific competence in the craft. The first item, Relative Importance in all Industry, received greater emphasis than was assigned to Scope of Industry and Occupational Information, suggesting that pre-vocational aims be subordinate to a broad general understanding of the industry. It appears obvious, however, that a general appreciation of the industry implies scope and possibilities as a vocation.

PAPER

95 Uses
93 Kinds
67 Manufacture
50 Calculations

In reference to printing papers it is apparent that an understanding of the uses and kinds of papers is considered more important than an ability to make computations involved in the production of jobs. It is also significant to note that the average frequency assigned to the above items (76) is only slightly more than half that

recorded for the highest ranking area.

PRESSWORK

101 Care of presses
88 Platen press makeready
81 Press feeding
79 Types of presses
10 Names of parts

Presswork, a skill area frequently constituting a major portion of the pupil's experience (particularly when production is involved), appears to merit a position of lesser importance, on the basis of the selections presented above. The ability to name parts of the press, for which standard tests are available, was considered to be of high value by less than five percent of the evaluators. Care of the press, makeready, and an understanding of the types of presses were all given places of more importance than skill in press feeding. An average of 71 choices indicating High Value were assigned to these items.

IMPOSITION

92 Simple lockup
86 Tools and materials
28 Imposition of signatures

An average of 68 High Value selections were accorded the items under Imposition. Simple lockup and the use of lockup tools and materials were deemed to be of far greater importance than the imposition forms for book and pamphlet work.

TYPE

107 Appropriateness
99 Measurements (point and quad systems)
93 Lay of case
77 Classifications
64 Type demons
52 Type cases
22 Parts of type
18 Type lice (demonstration)

The composition and use of type, which is covered exhaustively and minutely in traditional texts (17, 19)--to the exclusion of other graphic reproduction processes--received an average of only 66 High Value choices per item in the questionnaire. Although type is a basic tool in the industry, it is significant to note that appropriateness in the selection of type faces carried the highest frequency. A knowledge of the parts of type, the basis for many charts and tests, was considered to be of much less importance. The search for "type lice," a prank reserved for the novice, apparently does not hold the humor it has held for many in the trade, including Lowell Thomas, who recalls it as one of the fondest memories of his early days in a print shop.

HISTORY

77 Writing instruments (including type)
63 Development of alphabet
48 Writing surfaces

The items appearing under History carried a High Value frequency average of 62, with the study of writing

instruments ranking highest. The development of a phonetic alphabet, considered by historians Wallbank and Taylor (29) as one of man's greatest achievements, merited only 31 percent of the High Value selections.

PHOTOGRAPHY

27 Relation to industry
22 Elements of photography
21 Development of negatives
21 Contact printing
16 Enlarging

Photography, not heretofore included as an integral component of most graphic arts programs, was given an average frequency selection of 59 for the items in that category. The relation of photographic processes to the industry was assigned the greatest number of choices, presumably due to the recent rapid growth of offset and intaglio processes involving photography. The development of negatives and contact printing, involving general education and hobby values, received fewer choices but still outranked experiences in composing tabular matter and rule forms, long traditional projects in printing courses.

INKS

97 Uses
77 Kinds
30 History
27 Composition

A knowledge of the kinds and uses of printing inks

received greater emphasis than a study of the composition of inks, indicating an understanding of general application to be more important than specific facts relative to ingredients employed. An average of 57 High Value selections were made for each of the items in this category.

HAND COMPOSITION

99 Composing room tools and materials
91 Display composition
76 Straight matter
43 Composing room machines
42 Multiple-color forms
37 Rule forms
36 Borders and rules
23 Tabular matter

Hand composition, around which most projects have been built in the past, was ranked tenth in a group of 22 categories. An average of 54 choices was assigned to each item under the High value column. Specific skills in the composition of straight matter (particularly prevalent where a school newspaper is hand set), tabular matter, and rule forms were chosen as subordinate to an appreciation of composing room tools and materials, and an understanding of display composition.

OFFSET LITHOGRAPHY

90 Use in industry
42 History
42 Types of plates
33 Types of equipment

The frequency distribution of items under Offset Lithography, with an average of 51, continues to place

emphasis on general information rather than specifics within the area. The use of the process within industry received the greatest number of choices, while types of plates and equipment employed were considered of lesser value.

SILK SCREEN

88 Use in industry
46 Materials
44 Types of stencils
27 History

Although silk screen printing is coming into wider use as a method of graphic reproduction and is readily adaptable to the classroom situation, items within the area were assigned an average of only slightly above 25 percent (51) as having high value. The frequency distribution may be attributed in part to a lack of understanding of the process and its application in industry, although the item referring to industrial uses received the greatest number of selections.

PHOTOENGRAVING

67 Halftones
54 Line etchings
48 Process color
35 History

Photoengraving, essential to the letterpress reproduction of illustrations, involves the use of specialized equipment not ordinarily found in schools. However, an understanding of the process can be obtained

through the use of visual materials. It is apparent that the content should include some material on photoengraving in that an average of 51 selections were assigned to the items in that category.

LINOLEUM BLOCKS

67 Designing and carving
61 Uses
53 Printing
42 Single color
30 Multiple color

An average frequency distribution of 50 High Value selections were assigned to the items under Linoleum Blocks. It is apparent that emphasis should be placed on designing, carving, and printing single color blocks.

BINDERY

93 Figuring and cutting stock
50 Padding
46 Stitching
41 Machines of industry
28 Case binding
15 Spiral and plastic bindings

Although the average item under bookbinding merited only 45 choices as having high value, the ability to figure and cut stock was assigned 93 choices. Simple bindery operations (stitching and padding stock) were considered to be of greater value than case binding, although the latter is prevalent where binding is a part of the course. The most modern method of binding, spiral and plastic, was considered to be of relatively little

value in a course.

INTAGLIO

71 Use in industry
37 Rotogravure
30 History
27 Steel die

Intaglio printing, a specialized area within the industry, can be explored through simple materials in the school shop. The use of the process by industry was indicated as being of most value, followed by rotogravure, an expanding segment of intaglio work. An average of 41 choices indicating high value was assigned to the items.

TRENDS IN INDUSTRY

42 "Cold" type
29 Xerography

It was rather surprising to discover that less than one-quarter of the evaluators considered a study of trends within the industry to be of high value in a general exploratory course. Various processes involving photography (Intertype's Fotosetter) and static charges (Haliod) are growing in popularity and conceivably could ultimately change the entire structure of the industry.

DUPLICATE PRINTING PLATES

35 Stereotype
34 Electrotype
28 Plastic plates
21 Rubber plates

Items appearing in the category of Duplicate Printing Plates were assigned an average frequency distribution

of 29 in High Value. The traditional stereotype and electrotype process were assigned more importance than was given the newer plastic and rubber plates.

RUBBER STAMPS

40 Use in industry
26 Manufacture
18 Materials

Although rubber stamp manufacturing is a relatively small part of the graphic arts industry, it involves principles of molding and vulcanizing typical of many manufacturing operations. New and improved materials readily lend themselves to the school shop situations and where introduced it has become unusually popular. However, the average frequency of the items selected as having high value was only 28. Presumably a lack of information concerning new processes and applications was in part responsible for the low rating.

SPECIAL OPERATIONS

32 Perforating
25 Die cutting
22 Scoring
21 Gold stamping
16 Decal transfers
13 Thermography
12 Flocking
12 Dusting
12 Embossing
11 Marbling

On the whole, Special Operations were considered to be of little value in the general graphic arts course,

the average high value frequency per item being 17. It is interesting to observe that several schools have recently purchased $400 machines to perform a process (Thermography) considered of high value by only 13 of 201 evaluators.

MINOR PROCESSES

28 Mimeograph
18 Spirit duplicators
5 Collotype

Of the minor processes, collotype ranked lowest. However, the common office duplicating machines were considered a valuable part of the exploratory program by about 15 percent of the evaluators.

In addition to the twenty-two divisions concerned with content, several problems relating to instruction were included in questionnaires mailed to educators. Therefore the following figures are based on 133 returns rather than the 201 used in the preceding analysis.

In response to the question of time allocation between manipulative and non-manipulative activities, the following average percentages were obtained:

74 percent time to be allotted to manipulative work.
26 percent time to be allotted to non-manipulative work.

Evaluators were also asked to consider the organization of courses in the preparation of graphic arts

teachers. Most college catalogs cited in the study indicated course offerings based on a segment of the craft closely resembling the divisions ordinarily found in the trade. Results of the questionnaire disclosed a preference of 78 percent for course organization based on a series of comprehensive general courses:

> In the preparation of graphic arts teachers do you feel that course sequences should be:
>
> 68 Offered as general courses in which all phases are taught simultaneously, the courses to be designated as elementary graphic arts, intermediate graphic arts, advanced graphic arts?
> 53 Offered in units such as typography, presswork, bookbinding, etc.?

Although production work was found to dominate the content of most schools visited (particularly in the case of high schools), the question "What is your opinion as to the place of production work in a school situation?" elicited the following response:

> 10 percent favored the inclusion of production work
> 25 percent favored the exclusion of all production work
> 65 percent favored production that is definitely controlled to meet the learning situation.

In evaluating time allotment to the various graphic areas, the following percentage distribution resulted:

Percent of time to be allotted to:

25 Hand composition
18 Presswork
12 Miscellaneous
10 Layouts
9 Silk screen
8 Binding
7 Linoleum block
7 Photography
4 Intaglio

Hand composition, presswork, and linoleum block printing accounted for 50 percent of the instructional time, the remainder to be devoted to other forms of graphic reproduction. Photography, intaglio printing, and silk screen printing--omitted from a majority of the programs observed--was given a definite place in the time schedule.

Student projects, a motivating teaching vehicle in the industrial arts, were presented for evaluation as to value in the following form:

STUDENT PROJECTS

High Value	
87	Paragraph composition
82	Display composition
76	Centered composition
76	Business Card
64	Stationery
59	Flush left composition
44	Cut and pad stock
43	Case binding (memo pad)
41	Bookplate (with border)
40	Photograph (entire process)
27	Rubber stamp
27	Hand made paper
15	Decal transfer
14	Stereotype
14	Intaglio (plastic plate)

A rather distinct correlation with the preceding time allotments given various processes is apparent. It is noted that projects in the letterpress area received the greatest number of selections in the High Value column. However, bindery work, photography, and rubber stamp making were considered of high value by almost half of those reporting.

Although this study is concerned primarily with content, it is obvious that method will determine to a considerable extent the success of its application in the learning situation. Therefore the following section was included in the questionnaire to serve as a guide in the selection and emphasis of teaching techniques:

TEACHING TECHNIQUES

High Value	
122	Demonstrations
107	Student projects
106	Visual aids
68	Field trips
67	Discussions or lectures
20	Outside speakers
17	Written reports

The use of demonstrations, student projects, and visual aids were indicated as the most valuable techniques to employ in the presentation of material; followed by field trips and discussions or lectures. The use of outside speakers was considered of high value by

twenty evaluators, eight of whom qualified their choice by recommending careful selection of the speaker for effectiveness of presentation as well as professional competence. Written reports, frequently employed in the academic areas, were considered least effective of the techniques rated.

ADVANCE BOND

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

This study has been based on the premise that there is a need to examine, in the light of today's educational needs, the place of graphic arts in the industrial arts program of the public secondary schools and the implications it presents for the preparation of teachers to fulfill those needs.

It was assumed that graphic arts education in many schools was restricted to a narrow pre-vocational specialization rather than encompassing the broad general education objectives. In order to ascertain course content areas in the technical preparation of graphic arts teachers the following objectives were employed to give direction to the study: (1) to select the major items of content within the total graphic arts area; (2) to ascertain the relative importance of each item in relation to the graphic arts program in the public schools; (3) to determine the degree to which each should be considered in the technical training of teachers; (4) to provide some guides in relation to method, course sequence, and projects.

Conclusions

On the basis of the investigation it is apparent that what is actually taught in graphic arts classes does not conform to the majority opinion of the qualified experts surveyed. There is evidence of general agreement among leaders in industrial arts that graphic arts should be presented as a general area for exploration with a minimum of emphasis placed on technical or vocational skills. This philosophy is not only evident in the frequency distribution of items ranked in the questionnaire but was expressed in personal interviews, educational meetings, and to some extent in contemporary writings.

It is clear that this approach is not shared by the majority of graphic arts teachers when one actually visits a cross section of school shops. Very few were found to contain facilities for activities other than hand composition and presswork. An examination of work books, texts and other written materials used by these teachers emphasizes the restricted subject area and tendency toward specialization.

A study of the questionnaire results proved the teachers in the field to be most conservative in their approach to the subject. It will be noted, for example, that skill items such as lockup and press makeready were

placed before such general topics as the principles of design and color, the preparation of layouts, and the relative importance of the graphic arts in all industry.

It is equally interesting to observe that industry representatives ranked the content items in a manner suggesting the broadest application of the subject, with little emphasis on skill units. They would appear to most nearly express the philosophy of industrial arts in contemporary education. The areas of industry exploration, scope and importance of the industry, design and color, the application of photography, and occupational information all ranked high in value whereas such commonly emphasized skills as press feeding, lockup, and straight matter composition fell at the lower end of the scale (Table I).

An examination of the responses by teacher educators and future teachers indicates a position between the two extremes just presented and a composite ranking (Table XIV) of the topics probably presents the most acceptable happy medium.

It seems evident, however, that the teacher education institutions must be looked to for leadership and future direction and that they would profit from the counsel of qualified industry representatives. Teachers who have been in the field for any length of time appear

to be restricted by existing facilities, custom, and a lack of contact with more progressive thought. In many situations it was observed that the teacher had fallen into an established pattern and accepted the line of least resistance. In such cases it is not uncommon to find charts and illustrations which have been hanging on the walls for twenty years and teaching materials and content that have never been modified to fit the changing times. One set of projects, printed on cards, had become so dog-eared over a fifteen-year period that they were almost illegible.

It is felt very keenly that the greater share of initiative in a progressive approach to graphic arts must come from the teacher education institutions and if this study can make any contribution it probably will be most helpful as a guide in the preparation of the graphic arts teacher.

It is significant to note that the average sampling recommended 26 percent of the course time be devoted to non-manipulative activities and the remainder (74 percent) to manipulative activities. That this is current practice is questionable. It was only in rare instances that school shops were visited in which a planning or discussion area was provided. Few shops had a seating area, planning tables, reference materials, or adequate visual aids. It

is encouraging to note, however, that the newer schools are including a combination planning and discussion area as a part of the facilities.

Of the total responding to the questionnaires, 77 percent favored the teaching of courses as general graphic arts with levels designated in terms of "elementary," "intermediate," and "advanced," in preference to such unit areas as "hand composition," "presswork," and "bookbinding." This preference indicates a broader approach to the field in that concentrations in specific areas are avoided. It also presents a more realistic attitude toward the objectives of industrial arts. It would appear difficult to divorce hand composition from the context without inferring specialization. A survey of course offerings previously noted indicates that many schools continue to present the subject as occupational parts of the whole, while the most recently introduced programs are organized into general levels.

The item receiving the most specific and pointed comment was that referring to production work in the school situation. Of the ninety-four replies received only ten favored production work, while twenty-three were definitely opposed and sixty-one qualified the response, suggesting that control shall rest with the instructor. It seems obvious that some production is justifiable

within the objectives of the course so long as it can be controlled in such manner as will make it of value in achieving the objectives.

Although most administrators are sympathetic to the problem, production jobs are presented in such a solicitous manner by the Parent-Teachers Association, the principal, music teacher, and other colleagues of the graphic arts teacher, as to make him appear extremely uncooperative if they are refused. In few instances does the job fit either the interest or the ability of the class and consequently the students or the teacher or both are exploited. Improved public relations techniques for promoting graphic arts as a general education subject of genuine value in the total school program appears to be the most effective solution to the problem.

Although graphic arts is a broad area in industry, it is significant to note that the traditional activities of hand composition and presswork account for 43 percent of the time allotted to the entire subject by the evaluators. Such a figure seems reasonable in that letterpress printing continues to be the "backbone" of the industry. Time allocations to the other areas indicates an examination of school offerings may be worth-while. In no instance was a school visited in which letterpress printing was not evident, however very few had all areas

represented. Again, the newer installations included facilities for photography and planning, but considerable attention is required in enriching the program to include the minor, but nonetheless important, processes of binding, silk screen printing, and gravure.

A ranking of student projects emphasizes the important position type occupies in most situations. The first six of fifteen projects involve hand composition. The less traditional projects including intaglio processes, rubber stamps, and hand made paper fell toward the lower end of the scale. The lack of acceptance of these processes is attributed to unfamiliarity with techniques and materials involved. The fact that few manufacturers produce tools and equipment suitable for the school situation is also considered a governing factor.

Of particular significance to the teacher educator is the ranking given teaching techniques by the evaluators. Demonstrations were given as the most valuable media for presenting content, followed by student projects, visual aids, field trips, discussions, outside speakers, and written reports.

Such evidence serves to emphasize the value of well-prepared demonstrations, supplemented with effective visual aids. Few teachers contacted gave evidence of careful planning for demonstrations and it appeared that

many were spontaneous and unorganized insofar as the total program was concerned. The emphasis given to teaching aids suggests that the preparation of such materials might well be incorporated into the manipulative work of the subject field in the teacher education institutions.

Field trips were acknowledged by most teachers to be high in value but were not used extensively because of the mechanics involved in released time and transportation. The most frequent solution noted to this problem was the scheduling of trips outside regular school hours and soliciting parent cooperation in providing transportation.

Recommendations

Over-all implications of the study indicate in general that the collegiate preparation of graphic arts teachers for the public schools should:

1. Include a broad approach to the area of graphic reproduction processes based on the twenty-two items of content presented in the following listing. The list is composed of all major topics surveyed and is ranked by the average frequency of items found in each division.

Rank Order	Average Frequency	Division
1	137	Layout and Design
2	133	English
3	104	Graphic Arts Industry
4	76	Paper
5	71	Presswork
6	68	Imposition
7	66	Type
8	62	History
9	59	Photography
10	57	Inks
11	54	Hand Composition
12	51	Offset Lithography
13	51	Silk Screen
14	51	Photoengraving
15	50	Linoleum Blocks
16	45	Bindery
17	41	Intaglio
18	35	Trends in Industry
19	29	Duplicate Printing Plates
20	28	Rubber Stamps
21	17	Special Operations
22	17	Minor Processes

2. Include courses organized as general offerings rather than specific areas such as presswork or hand composition. The subject should be studied as a whole rather than as segments of the whole.

3. Realize that letterpress printing continues to be basic to the industry and should receive emphasis in relation to its importance, but not to the exclusion of other graphic processes.

4. Attempt to prepare the future teacher to place production work in its proper perspective and control such work so that it will conform to the objectives of industrial arts.

5. Prepare the teacher to skillfully and effectively present demonstrations, supplemented with meaningful visual aids. Student projects should be planned and selected to implement the over-all course objectives.

Most significant of the data presented is that found in Tables XIV-XVII, based on 201 returns from the various groups sampled. Such a frequency distribution of graphic arts content should, to some extent, determine emphasis in the technical preparation of the graphic arts teacher. It is salient to point out that the necessity for planning heads the list, followed by English, design and color, importance in all industry, layouts, and appropriateness of type.

It is evident, merely from an examination of school projects, that emphasis in the past has been placed mainly on the mechanics of production, with evaluation based on these skills, and the esthetic values more or less incidental. Although technical correctness is necessary and the development of sound practice should be encouraged, it is apparent that considerably more thought should be given to form, design, color, planning and applications in industry. Good workmanship alone does not insure pleasing results. Planning and design are an integral part of the finished product.

The importance given to art elements, English, measurements, and occupational information suggests a closer integration with other school subjects than has existed in the past. These common factors deserve further study in achieving mutual goals.

That the course should be broadened is indicated by the prominent places given to photography, lithography, silk screen printing, linoleum block printing, intaglio processes, and the history of graphic arts. Equally significant is the low value placed on such specific concentrations as the naming of the parts of a press, and naming the parts of type--practices still evident in many school shops. Thermography appeared ninety-third in the list of ninety-nine items, yet in a recent visit to a new teacher education institution it was noted that a $350 machine had been included for this process--a process which could be illustrated almost as effectively with a $3.00 hot plate.

On the other hand some items were ranked low which possibly should occupy a more prominent place. Projects such as decal transfers and rubber stamps have wide application in the industry and provide motivation in the form of functional projects for the pupil. It is believed that the relatively low value placed on these items was due, in part at least, to the fact that those making the evaluation were not familiar with the process or its application to the school situation.

It became apparent in the pursuance of this study that several related problems warrant further investigation. As a logical sequence to the study just made, the

method of implementation deserves consideration. If the content is adequate to meet present conditions how is it to be introduced in the teacher education institutions? Obviously the circulation of this thesis will not cause established programs to conform to its pattern without additional measures. Some preliminary steps are being made in this direction through the International Graphic Arts Education Association but continued and concerted efforts will be necessary to achieve the goal.

Another problem brought into focus was the place of graphic arts--indeed all industrial arts--in the high school. There seems to be little question of scope and content in the junior high school where it is accepted as a general study. In the high school there begins to emerge the vocational aspect, coupled with the problem that industrial arts courses are elective and rarely available to the college-bound pupil.

The prevalence of print shops equipped with expensive equipment has led many administrators to the conclusion that the offering could not be included within the educational budget. A number of California school districts are currently planning graphic arts offerings but encounter difficulty in selecting equipment and supplies within their means. At present only one manufacturer is known to furnish plant plans, and prices are

considered far in excess of what is necessary for a modest program. Most educators familiar with equipment suitable for graphic arts agree that a program could be introduced for less than $8,000--a figure not inconsistent with other industrial arts offerings. Such a basic list of tools and equipment with sources and prices is worthy of further study.

This problem points up the need for equipment suited to the school shops. Manufacturers in the past have seen fit to produce little equipment not designed for the production plant, consequently schools have been equipped with machinery not most adaptable to their needs. There are some indications that industry is becoming aware of this need and will in the future direct further attention to the problem. Industrial exhibitors have been contacted at professional conventions where they have expressed an interest in supplying such items as small intaglio presses and rubber stamp machines. Lack of suitable equipment has been one factor which has prevented less ingenious teachers from offering experiences in these areas.

Perhaps the greatest barrier to the development of graphic arts as a general offering in the schools has been a lack of understanding of its rich contribution to industrial arts. The problem appears to be essentially

one of promotion. As has been noted, little has appeared in the literature to date spelling out the merits of graphic arts and its application to education in our time. It is to this end, by reason of a keen desire to assist in every way possible in the preparation of enthusiastic graphic arts teachers, that the writer will now apply his energy.

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A P P E N D I X A

TWELVE SOUTHERN CALIFORNIA HIGH SCHOOLS REPORTING ON QUANTITY OF PRODUCTION

TWELVE SOUTHERN CALIFORNIA HIGH SCHOOLS
REPORTING ON QUANTITY OF PRODUCTION

School	City
Van Nuys High School	Van Nuys
Burbank High School	Burbank
Monrovia-Duarte Union High School	Monrovia
El Monte Union High School	El Monte
Montebello High School	Montebello
Anaheim Union High School	Anaheim
Bellflower Union High School	Bellflower
Paramount Union High School	Paramount
Redondo Beach Union High School	Redondo Beach
Lincoln High School	Los Angeles
Carpinteria Union High School	Carpinteria
Santa Barbara High School	Santa Barbara

APPENDIX B

COVERING LETTER TO INDUSTRIAL LEADERS

The enclosed questionnaire is a part of an investigation into the place of the graphic arts in general education. This study is made in connection with graduate work at Oregon State College and will also serve as a guide to me personally in my work as an instructor of graphic arts teachers at Santa Barbara College, University of California.

I am particularly interested in the *general education* values of the subject as distinguished from a vocational printing program, and wish to emphasize that the study is not concerned with the training of printers. *General education* may be defined as that body of knowledge which is considered common or of benefit to all students, regardless of vocational aims.

The place industry occupies in our society is an important one, and many of our public schools offer pupils general education courses in graphic arts (non-vocational in nature) similar to the appreciation courses in music, art, and literature.

It is my hope that leaders in industry, such as yourself, will express an opinion as to what would be of value to include in a general exploratory course in graphic arts.

I realize you have many demands upon your time and I have attempted to be as brief as possible. However, because of your prominent place in the industry and the high value I place on your judgment, I hope that you will be able to give due consideration to these factors.

Thank you for your cooperation.

Sincerely yours,

Tom Weir
Assistant Professor of Industrial Arts
Santa Barbara College
University of California

APPENDIX C

CONTENT AS RATED BY INDUSTRIAL LEADERS

Content For A General Education Course In Graphic Arts

Please indicate by a check mark (✓) on the scale opposite each item the relative place you believe it should occupy in a general course in graphic arts. Those items you feel of importance should be checked at the left of the line under the heading High Value. Items of low value should be checked at the right end of the line under that heading. Items of a value between these two extremes should be checked under the heading Medium Value. When completed please return in envelope provided.

THE GRAPHIC ARTS INDUSTRY

High Value	Medium Value	Low Value	
48	8	2	Relative importance in all industry
28	32	1	Scope of industry
23	20	8	Occupational information
			*Other

HISTORY

19	17	16	Development of alphabet
15	21	17	Writing surfaces
18	20	13	Writing instruments (including type)
			*Other

PAPER

15	25	12	Manufacture
23	20	9	Kinds
23	21	8	Uses
6	18	25	Calculations
			*Other

INKS

11	18	21	History
8	22	21	Kinds
13	22	17	Uses
5	21	24	Composition
6	11	23	Measurements (point and quad systems)
			*Other

TYPE

6	16	28	Type cases
11	12	26	Lay of case
4	20	26	Parts of type
5	11	30	Type demons
17	24	8	Classifications
26	23	4	Appropriateness
3	4	37	Type lice (demonstration)
			*Other

LAYOUT AND DESIGN

46	5	2	Necessity for planning
36	13	3	Principles of design and color
29	15	8	Preparation of layouts
			*Other

*Please list as you may desire.

HAND COMPOSITION

High Value	Medium Value	Low Value	
16	21	14	Composing room tools and materials
7	20	21	Straight matter
16	22	13	Display composition
2	20	26	Rule forms
1	21	26	Tabular matter
7	24	17	Multiple-color forms
2	18	28	Borders and rules
14	23	11	Composing room machines
			*Other

ENGLISH

47	3	2	Spelling
47	3	2	Punctuation
37	13	2	Word division
23	15	13	Proofreaders' marks
			*Other

IMPOSITION

12	17	20	Tools and materials
7	20	22	Simple lockup
7	22	20	Imposition of signatures
			*Other

PRESSWORK

23	23	6	Types of presses
15	15	21	Care of presses
10	15	25	Platen press makeready
0	14	37	Names of parts
4	15	32	Press feeding
			*Other

BINDERY

16	27	9	Machines of industry
18	16	18	Figuring and cutting stock
2	10	38	Padding
3	11	35	Stitching
4	15	32	Case binding
2	19	28	Spiral and plastic bindings
			*Other

TRENDS IN INDUSTRY

19	20	11	"Cold" type
12	20	17	Xerography
			*Other

PHOTOENGRAVING

High Value	Medium Value	Low Value	
17	16	10	History
17	20	7	Line etchings
20	18	5	Halftones
14	20	8	Process color
			*Other

OFFSET LITHOGRAPHY

17	14	11	History
23	12	1	Use in industry
13	18	13	Types of plates
9	21	15	Types of equipment
			*Other

SPECIAL OPERATIONS

2	12	28	Decal transfers
0	17	24	Thermography
0	5	23	Marbling
1	4	23	Flocking
1	4	24	Dusting
2	9	29	Gold stamping
4	9	28	Perforating
5	15	22	Die cutting
6	7	27	Scoring
2	15	22	Embossing
			*Other

MINOR PROCESSES

1	16	26	Collotype
2	22	18	Mimeograph
2	16	25	Spirit duplicators
			*Other

RUBBER STAMPS

8	22	14	Use in industry
0	8	34	Materials
3	6	32	Manufacture
			*Other

*Please list as you may desire.

REMARKS:

LINOLEUM BLOCKS

High Value	Medium Value	Low Value	
11	19	13	Uses
5	18	19	Designing and carving
2	11	26	Single color
0	8	31	Multiple color
6	10	24	Printing
			*Other

DUPLICATE PRINTING PLATES

9	22	12	Stereotype
14	23	7	Electrotype
12	24	8	Plastic plates
7	25	11	Rubber plates
			*Other

SILK SCREEN

10	16	17	History
23	15	5	Use in industry
3	21	20	Materials
4	17	21	Types of stencils
			*Other

INTAGLIO

13	13	16	History
18	18	8	Use in industry
7	15	20	Steel die
13	19	11	Rotogravure
			*Other

PHOTOGRAPHY

36	6	1	Relation to industry
16	20	7	Elements of photography
6	15	22	Development of negatives
5	16	21	Enlarging
5	18	19	Contact printing
			*Other

A P P E N D I X D

COVERING LETTER TO EDUCATORS

125 South Ontare Road
Santa Barbara, California

Dear Sir:

The accompanying questionnaire is a part of an investigation into the place of the graphic arts in general education. This study is made in connection with graduate work at Oregon State College and will also serve as a guide to me personally in my work at Santa Barbara College, University of California, as an instructor of students preparing to teach graphic arts in the public schools.

I am particularly interested in the general education values of the subject as distinguished from a vocational printing program, and wish to emphasize that this study is not concerned with the training of printers.

The place industry occupies in our society is an important one. Many of our public schools offer pupils general education courses in graphic arts (non-vocational in nature) similar to the appreciation courses in music, art, and literature. Basically, the problem is to determine what should be the content of such a course; which in turn will indicate method, etc.

The results of this study will be used primarily to formulate the type of instruction to be given college students preparing to teach the subject in the public schools, and will be made available to those in the profession interested in the problem.

It is my hope that leaders in industrial arts, such as yourself, will express opinions as to what would be of value and especially appropriate to include in a general exploratory course in graphic arts.

I realize you have many demands upon your time and I have attempted to be as brief as possible. However, because of your prominent place in the profession and the high value I place on your judgment, I hope you will be able to give due consideration to these factors.

Thank you for your cooperation.

Sincerely yours,

Tom Weir
Assistant Professor of Industrial Arts
Santa Barbara College
University of California

APPENDIX E

CONTENT AS RATED BY TEACHER EDUCATORS

Content For A General Education Course In Graphic Arts

Please indicate by a check mark (✓) on the scale opposite each item the relative place you believe it should occupy in a general course in graphic arts. Those items you feel of importance should be checked at the left of the line under the heading High Value. Items of low value should be checked at the right end of the line under that heading. Items of a value between these two extremes should be checked under the heading Medium Value. When completed please return in envelope provided.

THE GRAPHIC ARTS INDUSTRY

High Value	Medium Value	Low Value	
27	1	0	Relative importance in all industry
22	6	0	Scope of industry
20	9	0	Occupational information
			*Other

HISTORY

10	15	5	Development of alphabet
6	20	4	Writing surfaces
10	15	5	Writing instruments (including type)
			*Other

PAPER

11	21	3	Manufacture
22	7	1	Kinds
23	5	2	Uses
9	16	5	Calculations
			*Other

INKS

3	15	12	History
17	12	0	Kinds
20	10	0	Uses
20	10	0	Composition
			Measurements (point and quad systems)
			*Other

TYPE

7	18	4	Type cases
18	7	4	Lay of case
4	15	9	Parts of type
9	11	8	Type demons
15	13	1	Classifications
23	6	0	Appropriateness
1	8	17	Type lice (demonstration)
			*Other
20	8	1	Measurements

LAYOUT AND DESIGN

26	3	0	Necessity for planning
23	6	0	Principles of design and color
21	7	1	Preparation of layouts
			*Other

*Please list as you may desire.

HAND COMPOSITION

High Value	Medium Value	Low Value	
18	12	0	Composing room tools and materials
16	14	0	Straight matter
19	11	0	Display composition
10	14	6	Rule forms
5	16	9	Tabular matter
7	20	3	Multiple-color forms
7	21	2	Borders and rules
5	19	5	Composing room machines
			*Other

ENGLISH

27	2	1	Spelling
27	2	1	Punctuation
26	3	1	Word division
14	12	3	Proofreaders' marks
			*Other

IMPOSITION

15	13	1	Tools and materials
16	12	1	Simple lockup
6	14	9	Imposition of signatures
			*Other

PRESSWORK

11	19	0	Types of presses
19	7	4	Care of presses
15	12	3	Platen press makeready
4	14	11	Names of parts
14	11	3	Press feeding
			*Other

BINDERY

6	19	4	Machines of industry
17	11	1	Figuring and cutting stock
10	14	5	Padding
11	13	5	Stitching
9	16	3	Case binding
4	19	5	Spiral and plastic bindings
			*Other

TRENDS IN INDUSTRY

6	17	3	"Cold" type
5	16	4	Xerography
			*Other

PHOTOENGRAVING

High Value	Medium Value	Low Value	
4	8	15	History
15	12	2	Line etchings
15	11	2	Halftones
9	17	3	Process color
			*Other

OFFSET LITHOGRAPHY

4	17	6	History
20	7	0	Use in industry
10	11	6	Types of plates
7	14	6	Types of equipment
			*Other

SPECIAL OPERATIONS

1	19	7	Decal transfers
2	20	6	Thermography
2	18	8	Marbling
2	20	7	Flocking
1	22	6	Dusting
3	19	4	Gold stamping
4	19	6	Perforating
3	19	5	Die cutting
3	21	5	Scoring
2	19	6	Embossing
			*Other

MINOR PROCESSES

2	15	8	Collotype
10	14	5	Mimeograph
10	15	4	Spirit duplicators
			*Other

RUBBER STAMPS

9	15	4	Use in industry
3	17	8	Materials
2	15	11	Manufacture
			*Other

*Please list as you may desire.

LINOLEUM BLOCKS

High Value	Medium Value	Low Value	
15	13	1	Uses
17	9	3	Designing and carving
12	11	5	Single color
9	12	8	Multiple color
13	13	3	Printing
			*Other

DUPLICATE PRINTING PLATES

4	16	6	Stereotype
4	18	5	Electrotype
4	18	5	Plastic plates
2	20	5	Rubber plates
4	19	6	*Other

SILK SCREEN

4	19	6	History
18	10	1	Use in industry
12	15	3	Materials
9	15	4	Types of stencils
			*Other

INTAGLIO

4	16	7	History
15	9	3	Use in industry
15	16	6	Steel die
7	14	6	Rotogravure
			*Other

PHOTOGRAPHY

21	6	1	Relation to industry
22	5	1	Elements of photography
15	10	3	Development of negatives
11	12	5	Enlarging
14	12	2	Contact printing
			*Other

25 percent time to be allotted to non-manipulative work.

75 percent time to be allotted to manipulative work.

In the preparation of graphic arts teachers do you feel that course sequences should be:

9 Offered in units such as typography, presswork, bookbinding, etc.?

18 Offered as general courses in which all phases are taught simultaneously, the courses to be designated as elementary graphic arts, intermediate graphic arts, advanced graphic arts?

What is your opinion as to the place of "production work" in a school situation?

Yes	No	Controlled
0	6	15

Percent of time to be allotted to:

26 Hand composition
20 Presswork
9 Silk screen
7 Linoleum block
10 Binding
8 Photography
11 Layouts
4 Intaglio
5 Other

(Over)

STUDENT PROJECTS

High Value	Medium Value	Low Value	
11	11	3	Flush left composition
15	10	2	Paragraph composition
13	12	2	Centered composition
18	9	0	Display composition
13	11	3	Business card
10	13	2	Bookplate (with border)
5	14	6	Rubber stamp
17	9	0	Stationery
9	10	8	Hand made paper
1	13	13	Decal transfer
15	8	3	Photograph (entire process)
9	17	2	Cut and pad stock
3	15	8	Stereotype
12	13	2	Case binding (memo pad)
8	14	4	Intaglio (plastic plate)
			Other

REMARKS:

TEACHING TECHNIQES

High Value	Medium Value	Low Value	
16	10	3	Discussions or lectures
26	2	1	Visual aids
28	1	0	Demonstrations
21	7	1	Field trips
6	17	5	Outside speakers
8	11	10	Written reports
27	2	0	Student projects
			Other

APPENDIX F

CONTENT AS RATED BY GRAPHIC ARTS TEACHERS

Content For A General Education Course In Graphic Arts

Please indicate by a check mark (✓) on the scale opposite each item the relative place you believe it should occupy in a general course in graphic arts. Those items you feel of importance should be checked at the left of the line under the heading High Value. Items of low value should be checked at the right end of the line under that heading. Items of a value between these two extremes should be checked under the heading Medium Value. When completed please return in envelope provided.

THE GRAPHIC ARTS INDUSTRY

High Value	Medium Value	Low Value	
38	32	1	Relative importance in all industry
34	36	2	Scope of industry
36	31	5	Occupational information
			*Other

HISTORY

21	31	18	Development of alphabet
17	38	16	Writing surfaces
34	28	10	Writing instruments (including type)
			*Other

PAPER

32	30	11	Manufacture
33	29	6	Kinds
35	31	6	Uses
31	27	14	Calculations
			*Other

INKS

9	29	34	History
37	28	8	Kinds
44	22	7	Uses
13	34	25	Composition
			Measurements (point and quad systems)
			*Other

TYPE

27	34	10	Type cases
52	20	1	Lay of case
9	37	27	Parts of type
37	23	12	Type demons
33	23	6	Classifications
42	26	2	Appropriateness
8	15	47	Type lice (demonstration)
			*Other
56	13	1	Measurements (point and quad systems)

LAYOUT AND DESIGN

66	7	0	Necessity for planning
52	20	1	Principles of design and color
51	22	0	Preparation of layouts
			*Other

*Please list as you may desire.

HAND COMPOSITION

High Value	Medium Value	Low Value	
53	19	1	Composing room tools and materials
45	22	6	Straight matter
44	25	4	Display composition
21	36	16	Rule forms
15	38	22	Tabular matter
20	40	12	Multiple-color forms
22	38	13	Borders and rules
20	39	14	Composing room machines
			*Other

ENGLISH

66	6	1	Spelling
65	7	1	Punctuation
58	14	1	Word division
32	37	4	Proofreaders' marks
			*Other

IMPOSITION

48	24	0	Tools and materials
58	14	1	Simple lockup
11	45	16	Imposition of signatures
			*Other

PRESSWORK

32	34	7	Types of presses
50	20	3	Care of presses
55	16	3	Platen press makeready
6	43	24	Names of parts
52	18	3	Press feeding
			*Other

BINDERY

11	47	13	Machines of industry
50	22	1	Figuring and cutting stock
31	36	6	Padding
24	42	7	Stitching
7	40	23	Case binding
5	39	28	Spiral and plastic bindings
			*Other

TRENDS IN INDUSTRY

14	13	17	"Cold" type
10	32	18	Xerography
			*Other

PHOTOENGRAVING

High Value	Medium Value	Low Value	
10	32	28	History
19	38	13	Line etchings
24	36	10	Halftones
19	38	13	Process color
			*Other

OFFSET LITHOGRAPHY

16	31	22	History
35	29	15	Use in industry
14	39	16	Types of plates
12	42	15	Types of equipment
			*Other

SPECIAL OPERATIONS

6	32	31	Decal transfers
8	39	22	Thermography
5	28	37	Marbling
5	30	35	Flocking
7	40	21	Dusting
11	40	17	Gold stamping
21	41	9	Perforating
12	40	17	Die cutting
11	49	11	Scoring
6	42	20	Embossing
			*Other

MINOR PROCESSES

1	35	38	Collotype
8	28	34	Mimeograph
4	36	39	Spirit duplicators
			*Other

RUBBER STAMPS

14	31	23	Use in industry
11	28	28	Materials
15	31	22	Manufacture
			*Other

*Please list as you may desire.

LINOLEUM BLOCKS

High Value	Medium Value	Low Value	
20	39	9	Uses
32	30	7	Designing and carving
24	34	10	Single color
15	32	21	Multiple color
25	34	9	Printing
			*Other

DUPLICATE PRINTING PLATES

19	31	19	Stereotype
13	33	23	Electrotype
10	33	26	Plastic plates
10	32	27	Rubber plates
			*Other

SILK SCREEN

6	31	30	History
27	34	7	Use in industry
20	45	5	Materials
21	39	7	Types of stencils
			*Other

INTAGLIO

7	31	28	History
16	39	14	Use in industry
11	30	25	Steel die
13	31	24	Rotogravure
			*Other

PHOTOGRAPHY

27	31	8	Relation to industry
22	39	11	Elements of photography
21	29	17	Development of negatives
16	31	20	Enlarging
21	28	18	Contact printing
			*Other

24 percent time to be allotted to non-manipulative work.

76 percent time to be allotted to manipulative work.

In the preparation of graphic arts teachers do you feel that course sequences should be:

33 Offered in units such as typography, presswork, bookbinding, etc.?

35 Offered as general courses in which all phases are taught simultaneously, the courses to be designated as elementary graphic arts, intermediate graphic arts, advanced graphic arts?

What is your opinion as to the place of "production work" in a school situation?

Yes	No	Controlled
10	12	38

Percent of time to be allotted to:

33 Hand composition
20 Presswork
7 Silk screen
6 Linoleum block
8 Binding
5 Photography
8 Layouts
2 Intaglio
11 Other

(Over)

STUDENT PROJECTS

High Value	Medium Value	Low Value	
38	31	1	Flush left composition
54	14	6	Paragraph composition
50	20	1	Centered composition
49	17	4	Display composition
52	20	1	Business card
24	31	15	Bookplate (with border)
15	30	21	Rubber stamp
37	24	5	Stationery
10	17	42	Hand made paper
8	17	41	Decal transfer
24	22	19	Photograph (entire process)
30	38	3	Cut and pad stock
9	29	28	Stereotype
34	31	12	Case binding (memo pad)
3	26	32	Intaglio (plastic plate)
			Other

REMARKS:

TEACHING TECHNIQES

High Value	Medium Value	Low Value	
35	29	4	Discussions or lectures
53	18	1	Visual aids
69	2	0	Demonstrations
33	27	10	Field trips
8	39	21	Outside speakers
7	23	40	Written reports
61	9	0	Student projects
			Other

ADVANCE BOND
Cut LL Brown Paper

APPENDIX G

CONTENT AS RATED BY FUTURE GRAPHIC ARTS TEACHERS

Content For A General Education Course In Graphic Arts

Please indicate by a check mark (✓) on the scale opposite each item the relative place you believe it should occupy in a general course in graphic arts. Those items you feel of importance should be checked at the left of the line under the heading High Value. Items of low value should be checked at the right end of the line under that heading. Items of a value between these two extremes should be checked under the heading Medium Value. When completed please return in envelope provided.

THE GRAPHIC ARTS INDUSTRY

High Value	Medium Value	Low Value	
13	14	2	Relative importance in all industry
12	14	2	Scope of industry
12	12	5	Occupational information
			*Other

HISTORY

10	9	10	Development of alphabet
10	15	3	Writing surfaces
15	10	3	Writing instruments (including type)
			*Other

PAPER

9	14	5	Manufacture
15	11	3	Kinds
17	10	2	Uses
2	17	7	Calculations
			*Other

INKS

7	6	14	History
14	11	3	Kinds
20	7	1	Uses
7	11	10	Composition
			Measurements (point and quad systems)
			*Other

TYPE

12	11	5	Type cases
12	11	6	Lay of case
5	17	6	Parts of type
13	11	4	Type demons
12	13	1	Classifications
16	11	1	Appropriateness
6	9	13	Type lice (demonstration)
			*Other

LAYOUT AND DESIGN

17 10 2 Measurements (point and quad systems)

26	1	0	Necessity for planning
20	6	1	Principles of design and color
16	9	2	Preparation of layouts
			*Other

*Please list as you may desire.

HAND COMPOSITION

High Value	Medium Value	Low Value	
12	15	1	Composing room tools and materials
8	16	3	Straight matter
12	15	1	Display composition
4	19	3	Rule forms
2	17	7	Tabular matter
8	15	5	Multiple-color forms
5	17	5	Borders and rules
4	16	7	Composing room machines
			*Other

ENGLISH

20	6	3	Spelling
19	7	3	Punctuation
17	9	3	Word division
9	14	5	Proofreaders' marks
			*Other

IMPOSITION

11	14	2	Tools and materials
11	15	2	Simple lockup
4	11	10	Imposition of signatures
			*Other

PRESSWORK

13	12	3	Types of presses
17	11	1	Care of presses
8	17	2	Platen press makeready
0	11	6	Names of parts
11	14	4	Press feeding
			*Other

BINDERY

8	14	7	Machines of industry
8	19	1	Figuring and cutting stock
7	18	3	Padding
8	17	2	Stitching
8	17	2	Case binding
4	16	6	Spiral and plastic bindings
			*Other

TRENDS IN INDUSTRY

3	16	6	"Cold" type
2	15	7	Xerography
			*Other

PHOTOENGRAVING

High Value	Medium Value	Low Value	
4	14	10	History
3	20	3	Line etchings
8	15	3	Halftones
6	17	3	Process color
			*Other

OFFSET LITHOGRAPHY

5	13	9	History
12	14	1	Use in industry
5	17	4	Types of plates
5	17	5	Types of equipment
			*Other

SPECIAL OPERATIONS

7	17	3	Decal transfers
3	19	5	Thermography
4	15	7	Marbling
4	18	6	Flocking
3	20	4	Dusting
5	20	2	Gold stamping
3	18	6	Perforating
5	17	5	Die cutting
2	18	7	Scoring
2	21	4	Embossing
			*Other

MINOR PROCESSES

1	11	13	Collotype
8	10	9	Mimeograph
2	12	12	Spirit duplicators
			*Other

RUBBER STAMPS

9	14	6	Use in industry
4	19	6	Materials
6	15	8	Manufacture
			*Other

*Please list as you may desire.

LINOLEUM BLOCKS

High Value	Medium Value	Low Value	
15	11	2	Uses
13	14	1	Designing and carving
3	19	5	Single color
6	14	7	Multiple color
9	17	2	Printing
			*Other

DUPLICATE PRINTING PLATES

3	18	5	Stereotype
3	18	5	Electrotype
2	18	5	Plastic plates
2	18	5	Rubber plates
			*Other

SILK SCREEN

7	11	9	History
20	8	0	Use in industry
11	14	3	Materials
10	15	3	Types of stencils
			*Other

INTAGLIO

6	13	5	History
12	13	3	Use in industry
4	15	9	Steel die
4	16	7	Rotogravure
			*Other

PHOTOGRAPHY

14	10	3	Relation to industry
11	14	3	Elements of photography
5	13	10	Development of negatives
3	17	7	Enlarging
4	16	8	Contact printing
			*Other

29 percent time to be allotted to non-manipulative work.

71 percent time to be allotted to manipulative work.

In the preparation of graphic arts teachers do you feel that course sequences should be:

11 Offered in units such as typography, presswork, bookbinding, etc.?

15 Offered as general courses in which all phases are taught simultaneously, the courses to be designated as elementary graphic arts, intermediate graphic arts, advanced graphic arts?

What is your opinion as to the place of "production work" in a school situation? Yes 0 No 5 Controlled 8

Percent of time to be allotted to:

19 Hand composition
17 Presswork
10 Silk screen
8 Linoleum block
8 Binding
9 Photography
13 Layouts
7 Intaglio
9 Other

STUDENT PROJECTS

High Value	Medium Value	Low Value	
10	14	3	Flush left composition
18	8	2	Paragraph composition
13	13	1	Centered composition
15	11	2	Display composition
11	14	2	Business card
7	17	4	Bookplate (with border)
7	16	5	Rubber stamp
10	17	2	Stationery
8	11	10	Hand made paper
6	15	7	Decal transfer
11	12	4	Photograph (entire process)
5	13	8	Cut and pad stock
2	20	4	Stereotype
7	16	3	Case binding (memo pad)
3	14	8	Intaglio (plastic plate)
			Other

REMARKS:

TEACHING TECHNIQES

High Value	Medium Value	Low Value	
16	11	3	Discussions or lectures
27	2	0	Visual aids
25	4	0	Demonstrations
14	12	1	Field trips
6	17	6	Outside speakers
2	14	12	Written reports
19	8	1	Student projects
			Other

APPENDIX H

CONTENT AS RATED BY 201 EVALUATORS

Content For A General Education Course In Graphic Arts

Please indicate by a check mark (✓) on the scale opposite each item the relative place you believe it should occupy in a general course in graphic arts. Those items you feel of importance should be checked at the left of the line under the heading High Value. Items of low value should be checked at the right end of the line under that heading. Items of a value between these two extremes should be checked under the heading Medium Value. When completed please return in envelope provided.

THE GRAPHIC ARTS INDUSTRY

High Value	Medium Value	Low Value	
126	55	5	Relative importance in all industry
96	88	5	Scope of industry
91	72	18	Occupational information
			*Other

HISTORY

63	72	49	Development of alphabet
48	94	40	Writing surfaces
77	73	31	Writing instruments (including type)
			*Other

PAPER

67	90	31	Manufacture
93	67	19	Kinds
95	67	18	Uses
58	78	51	Calculations
			*Other

INKS

30	68	81	History
77	73	32	Kinds
97	61	25	Uses
27	85	67	Composition
			Measurements (point and quad systems)
			*Other

TYPE

52	79	47	Type cases
93	50	38	Lay of case
22	89	68	Parts of type
64	56	54	Type demons
77	73	16	Classifications
107	66	7	Appropriateness
18	36	114	Type lice (demonstration)
			*Other

99 42 27 Measurements (point and quad systems)

LAYOUT AND DESIGN

164	16	2	Necessity for planning
131	45	5	Principles of design and color
118	53	11	Preparation of layouts
			*Other

*Please list as you may desire.

HAND COMPOSITION

High Value	Medium Value	Low Value	
99	67	16	Composing room tools and materials
76	72	30	Straight matter
91	73	18	Display composition
37	89	51	Rule forms
23	92	64	Tabular matter
42	99	37	Multiple-color forms
36	94	48	Borders and rules
43	97	36	Composing room machines
			*Other

ENGLISH

160	17	7	Spelling
158	19	7	Punctuation
138	39	7	Word division
78	78	25	Proofreaders' marks
			*Other

IMPOSITION

86	68	23	Tools and materials
92	61	26	Simple lockup
28	92	55	Imposition of signatures
			*Other

PRESSWORK

79	88	16	Types of presses
101	53	29	Care of presses
88	60	33	Platen press makeready
10	92	88	Names of parts
81	58	42	Press feeding
			*Other

BINDERY

41	107	33	Machines of industry
93	68	21	Figuring and cutting stock
50	78	52	Padding
46	83	57	Stitching
28	88	60	Case binding
15	93	67	Spiral and plastic bindings
			*Other

TRENDS IN INDUSTRY

42	84	37	"Cold" type
29	83	46	Xerography
			*Other

PHOTOENGRAVING

High Value	Medium Value	Low Value	
35	90	53	History
54	90	25	Line etchings
67	80	20	Halftones
48	92	27	Process color
			*Other

OFFSET LITHOGRAPHY

42	75	48	History
90	62	7	Use in industry
42	85	39	Types of plates
33	94	41	Types of equipment
			*Other

SPECIAL OPERATIONS

16	80	69	Decal transfers
13	95	57	Thermography
11	66	75	Marbling
12	72	71	Flocking
12	86	55	Dusting
21	88	52	Gold stamping
32	87	49	Perforating
25	91	49	Die cutting
22	95	49	Scoring
12	97	52	Embossing
			*Other

MINOR PROCESSES

5	87	85	Collotype
28	74	66	Mimeograph
18	79	80	Spirit duplicators
			*Other

RUBBER STAMPS

40	82	47	Use in industry
18	72	76	Materials
26	67	73	Manufacture
			*Other

*Please list as you may desire.

LINOLEUM BLOCKS

High Value	Medium Value	Low Value	
61	82	25	Uses
67	71	30	Designing and carving
42	75	46	Single color
30	66	67	Multiple color
53	74	38	Printing
			*Other

DUPLICATE PRINTING PLATES

35	87	42	Stereotype
34	92	40	Electrotype
28	93	44	Plastic plates
21	95	48	Rubber plates
			*Other

SILK SCREEN

27	77	62	History
88	67	13	Use in industry
46	95	31	Materials
44	86	35	Types of stencils
			*Other

INTAGLIO

30	73	56	History
71	79	28	Use in industry
27	76	60	Steel die
37	80	48	Rotogravure
			*Other

PHOTOGRAPHY

98	53	13	Relation to industry
71	78	22	Elements of photography
47	67	52	Development of negatives
35	76	53	Enlarging
44	74	47	Contact printing
			*Other

26 percent time to be allotted to non-manipulative work.

74 percent time to be allotted to manipulative work.

In the preparation of graphic arts teachers do you feel that course sequences should be:

53 Offered in units such as typography, presswork, bookbinding, etc.?

68 Offered as general courses in which all phases are taught simultaneously, the courses to be designated as elementary graphic arts, intermediate graphic arts, advanced graphic arts?

What is your opinion as to the place of "production work" in a school situation? Yes 10 No 23 Controlled 61

Percent of time to be allotted to:

25 Hand composition
18 Presswork
9 Silk screen
7 Linoleum block
8 Binding
7 Photography
10 Layouts
4 Intaglio
12 Other

STUDENT PROJECTS

High Value	Medium Value	Low Value	
59	56	7	Flush left composition
87	32	10	Paragraph composition
76	45	4	Centered composition
82	37	6	Display composition
76	45	6	Business card
41	61	21	Bookplate (with border)
27	60	32	Rubber stamp
64	50	8	Stationery
27	38	60	Hand made paper
15	45	61	Decal transfer
40	42	26	Photograph (entire process)
44	68	13	Cut and pad stock
14	64	40	Stereotype
43	60	17	Case binding (memo pad)
14	54	44	Intaglio (plastic plate)
			Other

REMARKS:

TEACHING TECHNIQES

High Value	Medium Value	Low Value	
67	50	10	Discussions or lectures
106	22	2	Visual aids
122	7	0	Demonstrations
68	46	12	Field trips
20	73	32	Outside speakers
17	48	62	Written reports
107	19	1	Student projects
			Other