THE CLASSIFICATION AND ANALYSIS OF INDUSTRIAL TOPICS REPRESENTED IN JUVENILE INFORMATION TRADE BOOKS

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ABSTRACT

THE CLASSIFICATION AND ANALYSIS OF INDUSTRIAL TOPICS REPRESENTED IN JUVENILE INFORMATION TRADE BOOKS

By

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The purpose of this study was to determine the extent to which major topics of industry were represented in information books written for upper elementary students. A classified list of ten major topics with forty-two subtopics was developed for inclusion in a data collection and analysis instrument.

The problem was expressed in the form of a question since comparisons were not made between differentiated samples. Of the major aspects of industry, which are given the greatest representation and which the least representation in juvenile information trade books?

From a population of 800 books written primarily for students in grades four through six and published from 1961 through 1970, a random sample of 200 books

was selected for content analysis treatment with the developed instrument as an aid in the quantification of the data.

The ten major industrial topics identified were (1) History and Development, (2) Resources, (3) Organization, (4) Research, (5) Production, (6) Occupations, (7) Construction, (8) Transportation, (9) Communication, and (10) Consumption.

Data analysis consisted of a two-way analysis of variance to determine if significant differences existed in the extent to which major topics were represented. The establishment of confidence intervals around topic mean scores allowed a graphic presentation of the topic ranking and grouping tendencies.

The results of the analysis indicated the following conclusions:

1. There is a significant difference in the extent to which major topics of industry are represented in juvenile information trade books.
2. The greatest representation is given to the two topics history and development, and production.
3. Four topics with nearly equal representation and with a position of central tendency are resources, research, occupations, and transportation.

4. Communication, which included both graphic and electronic media, ranked seventh in the degree of representation.

5. Three topics receiving the least representation in juvenile information trade books were organization, construction, and consumption. Consumption was given the least representation of the ten industrial topics.

This study suggests important implications for curriculum at the elementary and middle school levels. A wealth of information about aspects of industry is readily available to teachers and students. This study has provided an extensive list of children's books written for upper elementary students. It has also provided an arrangement of major topics and subtopics which could be used by teachers, librarians, and students to organize their approach to the presentation and study of industry and technology in our society.

Children are especially receptive to change. Changes in our style of living may be the significant factor in the maintenance of our highly developed technical society as we face shortages of resources and witness an alarming rate of environmental deterioration. The task of providing adequate information for the directed study of these problems must be assumed in part by our educational programs at all levels.

The reading abilities of many middle school or junior high school students are often lower than their grade level indicates. Materials of the type identified in this study could find expanded use in such programs both for specific reading improvement and for general classroom study.

Many of the major topics investigated in this study are the same as the career clusters recently defined for use in career education. These materials can prove to be significant resources for such programs from early elementary through high school. The study has also identified those areas in which additional publications are necessary in order to provide sufficient resources for our youth as they plan their future.

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By

Dennis Elroy Darling

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

DESCRIPTION OF THE PROBLEM

Introduction

American industry, supported by scientific research, has been the means by which technology has advanced throughout our country. This vehicle--industry--in effect has caused us to characterize America as an "industrial society." However simple or complex a social structure, it is maintained by an identifiable technology or organization of human and material resources. Our society is dependent upon a rapidly developing technology in which industry "has emerged as the decisive, the representative and the constitutive institution."[1]

Very few people in America, or the world, have not felt the results of the technology which penetrate most aspects of our society. Some of the resulting conditions are praised as progress healthy to our society while others demonstrate man's inability to exercise control over his inventions.

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[1]Peter F. Drucker, The New Society (New York: Harper and Brothers Publishers, 1950), p. 27.

Man acquires his knowledge and understanding of industry's role in the development of an industrial society from his own occupational and consumer experiences. Various media provide descriptive and evaluative comment on the status of labor, the decisions of management, the use of natural resources, and the effect of industry on the American economy. These experiences and informational sources influence the concepts of industry developed by people of all ages. As a result, it is these concepts which have a major effect upon man's behavior as he reacts with the elements of his environment. Woodruff explains the relationship of experience to concept formation and behavior:

> Our experiences with the world register within us in the form of concepts, values, and feelings for things, language, skills, and habits. They then become the controlling elements in determining what we try to do, and how well we do it.[2]

The perpetuation of any culture and its changing nature is dependent basically upon the education acquired by its children and youth--formal or informal. In the United States, as in all highly industrialized societies, the school has become the focal point for educational experience. "Within a balanced liberal education,"

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[2]Asahel D. Woodruff, Basic Concepts of Teaching (San Francisco: Chandler Publishing Company, 1961), p. 63.

Lux notes, "one must gain, among other things, industrial literacy."[3] He elaborates by saying:

> At one time, this may have been provided outside the formal school setting simply through family membership. This, of course, is only true in a primitive society where the family is an independent socio-economic entity. As interdependence increases and industrial technology becomes more complex, society must either provide for industrial literacy through the formal school program or expect a citizenry which is frustrated or even endangered by its lack of industrial literacy and which is unable to make a satisfactory accommodation between man and what is increasingly an industrially-produced environment.[4]

Students rely on printed materials in the form of texts and references as a major source of information to assist them in the study of particular subjects or in the exploration of their own interests. Many of the "facts" they are seeking are found in what are called information books.

Whatever the information provided, it is a source of concept development. Concept development, the "stuff" of education, is a continuous process. It begins in infancy and early childhood when "out of the initial buzzing confusion of the world the child

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[3]Donald G. Lux, "The Status and Future of Industrial Arts," Industrial Arts in A Changing Society: Representative Addresses and Proceedings of the 34th Annual Convention (Washington, D.C.: American Industrial Arts Association, 1972), p. 19.

[4]Ibid.

discovers regularities and makes generalizations."[5] A child entering school brings with him a store of several hundred concepts. Although simple, they are tools to think with. According to Havighurst the development of concepts necessary for everyday living is a major task of middle childhood. "The task is to acquire a store of concepts sufficient for thinking effectively about ordinary occupational, civic, and social matters."[6]

Industry is considered a major force affecting many aspects of our lives. We should consider its importance as a topic for exploration in early and middle childhood as well as adolescence and adulthood.

Children at an early age begin to gather information and arrange it for use in the development of concepts which will affect their future behavior. Therefore, the type and content of available information about America's industries should warrant some attention. Teachers, librarians, and parents, with a basic knowledge of the industrial topics represented in juvenile information books, may be able to provide educational activities which contribute to the developmental task of combining information and experience into useful concepts.

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[5]Robert J. Havighurst, Human Development and Education (New York: Longmans, Green and Co., 1953), p. 16.

[6]Ibid., p. 34.

Purpose of the Study

The purpose of this study was to determine the extent to which major topics of industry were represented in information books written for upper elementary students.

Providing information and reference materials for children to use requires a knowledge of their availability and content. In this study, through the use of a classified list of major topics and subtopics, a selected group of books were analyzed to determine which topics had the greatest representation and which topics were given little attention.

Need for the Study

Industry provides goods and services to meet most of man's material needs and desires. It has also created numerous problems which require new technical and social understandings and developments.

Providing our children with an understanding of the complex world we live in has become a formidable task for schools. An opportunity to study and discuss the nation's problems and their related solutions can begin, however, early in the life of students.

Construction activities under the name of industrial arts have existed for years in a number of elementary schools across the country. Teachers providing these activities need resources which will relate

experience and information. Little progress has been made in developing and organizing instructional materials to promote the study of American industry as it affects the social, economic, and cultural aspects of our society.

Some of the efforts of those interested in the study of industry at the elementary level, however, are worthy of note. Gilbert's Children Study American Industry[7] was written as a resource book to aid elementary school teachers in directing learning activities that involve the tools, machines, materials, and processes of industry. In addition to suggesting activities for children studying manufacturing, construction, communications, transportation, and power as industries, he emphasizes the value of such activity for students in relation to individual differences and motivation. He discusses the development of American industry from colonial craftsmen to automated mass production. Gilbert does not, however, provide references which may be used by children as they explore various industries.

A detailed portrayal of key characteristics of the major American industries is provided by Scobey in

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[7]Harold G. Gilbert, Children Study American Industry (Dubuque, Iowa: Wm. C. Brown Company Publishers, 1966).

her book Teaching Children About Technology.[8] Specific suggestions are given to help the teacher plan experiences that are historical in their approach to understanding modern industrial processes. An abundant list of references for children is supplied.

Perhaps one of the most interesting attempts to bring elementary children into contact with various aspects of our industrial society is the Technology for Children Project being carried on in a number of New Jersey schools. Initially under the direction of Elizabeth Hunt, it was presented by members of her staff and cooperating elementary teachers at the annual convention of the American Industrial Arts Association in Minneapolis in 1968. Dispensa, Pawlowski, and Hunt described the effect of the project on the elementary classroom environment.

> The Technology for Children Project is devising the kind of classroom environment which utilizes basic exploratory, manipulative drives, by including a wide variety of tools, materials and other items. The energy, interest and curiosity of a child is released in this environment, to accrue for him information through all of his sensory channels. Gathering data and/or information from the human and non-human environment through all sensory channels is synonymous with learning.[9]

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[8]Mary-Margaret Scobey, Teaching Children About Technology (Bloomington, Ill.: McKnight & McKnight Publishing Co., 1968).

[9]Barbara Pawlowski and Joseph Dispensa, Jr., "Environment for Learning," Thirtieth Annual Convention of the American Industrial Arts Association, Minneapolis, Minnesota, May 2, 1968.

> . . . each elementary teacher provides for exploratory experiences in technology to help children discover their own interests and abilities (basic to intelligent vocational choice) so that they are in a better position to handle information about, and identify with, what people do in the world of work.[10]
>
> The classroom environment which includes a wide variety of tools and materials and other concrete items and allows children the freedom to interact or deal with these materials in both directed and non-directed ways is the raw material or "stuff" out of which all of the cognitive, affective and psychomotor processes represented in the broad areas of the curriculum can be developed.[11]

Stunard, assistant director of the project, expressed his concern for changing the elementary classroom teacher and for the involvement of industrial arts educators:

> If education for children is to have a brighter outlook today, it must be through our elementary classroom teachers. The elementary classroom teacher must feel a need for curriculum change, and, in the final analysis, be the one to initiate new learning techniques.
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> If technology is ever to make an impact at the elementary school level, industrial arts educators must become increasingly concerned with how to change elementary teachers, in addition to being set on developing consultants to work in classrooms.[12]

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[10] Ibid.

[11] Elizabeth E. Hunt, "Strategy for Change," Thirtieth Annual Convention of the American Industrial Arts Association, Minneapolis, Minnesota, May 3, 1968.

[12] E. Arthur Stunard, "Effecting Change Through the Elementary Classroom Teacher: Institute Phase," Thirtieth Annual Convention of the American Industrial Arts Association, Minneapolis, Minnesota, May 3, 1968.

The study of technology as a part of the elementary school program is not new but these recent publications and experimental projects suggest that technology become the base for broad areas of the curriculum. Scobey[13] feels that the closest relationship exists between industry and the social studies program of the elementary school. She also presents in detail industry's relationship to science, fine arts, language arts, and mathematics. More research is needed to show not only the relationship between our industrial society and the elementary school subjects, but also to describe and develop instructional material which children may use to study this relationship.

No previous content analysis has been made of juvenile information trade books using classifications based on aspects of American industry. The analysis in this study is related to the following identified needs:

(1) The need to provide elementary teachers and librarians with a classified list of major industrial topics and subtopics;

(2) The need to indicate the types of information available which may be used in the study of industry;

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[13]Scobey, Teaching Children About Technology, pp. 17-22.

(3) The need to determine those aspects of industry and technology for which little information is available;

(4) The need to inform those in curriculum at all levels of the importance of industrial technology as an area of study.

Assumptions

The primary basis for this research was the assumption that a study of American industry is an important activity for elementary school children and that industrial topics need to be identified and organized to promote such study. It is also recognized that adequate concepts are developed only after information and experiences are properly combined.

The assumption is also made that various sources of information about industry can provide a sufficient number of common terms from which a classified list of major topics and subtopics can be developed.

Definition of Terms

Terms which were crucial to this study were defined as follows:

Juvenile information trade books.--Nonfiction, factual books, in hard-cover, published basically for children in the elementary grades.

Juvenile.--For the purpose of this study, a juvenile will refer to those youth between the ages of five and thirteen.

Industry.--A complex of organizations that utilize the basic resources of man, materials, machines, and money to produce goods or provide services to meet the needs of man.[14]

Concept.--A concept, from the psychological point of view, is the organized inferences--meaningful associations--that an individual has formed of objects or events. A concept is not a word; however, some words stand for concepts. An individual's concept of anything is a product of thought.[15]

Industrial topic.--A specific word or group of words which represent a function of industry, its related resources or supportive organizations.

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[14]G. S. Wall, ed., Approaches and Procedures in Industrial Arts, Fourteenth Yearbook of the American Council on Industrial Arts Teacher Education (Bloomington, Ill.: McKnight & McKnight Publishing Company, 1965), p. 64.

[15]Herbert J. Klausmeier and William Goodwin, Learning and Human Abilities (2nd ed.; New York: Harper and Row, Publishers, 1961), p. 215.

Limitations of the Study

The descriptive nature of the study required that limitations be placed on the types of materials studied and the inference of effects upon children. Sources of factual information in such forms as textbooks, periodicals, encyclopedias, and reading laboratories were not included in the materials selected for this study. Also, it was not the purpose of this study to determine the behavioral effects which the materials--juvenile trade books--may have upon children who read them. The industrial topics identified in the content were not used to imply degree of concept development possible.

Problem Statement

This research is a content analysis of selected juvenile information trade books in an attempt to answer the following question:

> Of the major industrial topics identified and used in the analysis, which topics have the greatest representation and which the least for the population of books investigated?

Overview of the Study

This study was an attempt to analyze juvenile information trade books to determine the type and extent of those topics which represent aspects of American industry as a major force in our technological society.

Major industrial topics and subtopics were identified and defined for the purpose of developing

a classified list to be used in the selection and analysis of the material. An instrument incorporating these items was designed and used as an aid in the collection of data and analysis of content.

The problem was based on the assumption that a study of American industry is an important activity for elementary school children and that industrial topics need to be identified and organized to promote such study.

The study was limited to determining the representation of industrial topics in the content and was not directed toward determining the effect these may have upon children using the books.

The problem was stated in the form of a question since comparisons were not made between differentiated samples.

A review of literature for the purpose of identifying industrial elements and definitions for classification is provided in Chapter II. These were used in the selection and analysis procedures.

A description of the design of the study appears in Chapter III. It includes the development of the analysis instrument and its reliability, the selection of the book sample, and use of the content analysis method in the collection of data.

The analysis of the quantitative representation of industrial topics is presented in Chapter IV.

A final summary of the study with stated recommendations and implications for elementary and middle school education is found in Chapter V.

CHAPTER II

A REVIEW OF LITERATURE TO DETERMINE A CLASSIFICATION OF INDUSTRIAL TOPICS

Introduction

Each of us has developed some concept of industry. Industry may encompass our daily work as an occupation or it may simply be recognized as a producer or manufacturer of the things we buy as a consumer. "The importance industry commands in modern society as well as its impact on other social institutions are but indirect results of its primary function or goal--that of production of material objects and services."[1] Our society is one in which industry stands out as the dominant social institution.[2]

Providing an understanding of our nation's institutions and their role in society is a major purpose of our educational program. Many authors

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[1]Joseph F. Luetkemeyer, ed., "Introduction to the Yearbook," A Historical Perspective of Industry, Seventeenth Yearbook of the American Council on Industrial Arts Teacher Education (Bloomington, Ill.: McKnight & McKnight Publishing Company, 1968), p. 16.

[2]Ibid., p. 15.

and curriculum projects have attempted to provide a structure for the study of industry in our educational system. Most of these efforts have been in vocational or industrial arts education, with emphasis placed at the secondary and post secondary levels. In recent years the study of industry in elementary schools has received a new impetus from those in industrial education. The foundation for these activities was laid early in this century by persons like Bonser and Mossman.[3]

This chapter is a review of those curriculum programs, proposals, and projects that revolve around industry as a subject area. The objective was to develop a classified list of industrial topics which could be used to select and analyze juvenile information trade books.

An easily applied definition of industry was considered a first essential. This is followed by identification of important American industries and a discussion of their common functions. From this base a classified list of major topics and subtopics was organized and developed for inclusion in the collection and analysis instrument.

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[3]Fredrick Bonser and Lois Mossman, Industrial Arts for Elementary Schools (New York: The Macmillan Company, 1924).

A Broad Definition of Industry

Such terms as "agriculture," "business," and "industry" often have an undefined relationship when it comes to identifying content for subject areas. Each takes on a limited definition from the discipline with which it is associated.

"Industry in geographical writings is usually taken to cover mining and manufacturing as distinct from agriculture, forestry, fishing, commerce, banking, insurance and personal service."[4]

The Dictionary of Education gives two levels of usage in its definition of industry and relates it directly to the field of industrial arts:

1. The combination of organizations and facilities that, through the effective coordination of capital, management, and labor, produces goods to meet the needs and desires of society;
2. A program of study in industrial arts dealing with the various phases of a given industry or group of industries as it affects man.[5]

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[4]Sir Dudley Stamp, ed., Longman's Dictionary of Geography (London: Longmans, Green & Co., Ltd., 1966), p. 203.

[5]Carter V. Good, ed., Dictionary of Education (New York: McGraw Hill Book Company, 1959), p. 285.

Wilber indicates that 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."[6]

The relationship between technology and industry also needs consideration. Olson states that "industry can be thought of as the means to today's technology, as the producer, the creator of technology," and that "technology be considered as the control which man has developed over his material, physical environment."[7] The discussion of this relationship continues:

> A broad interpretation of industry considers it as the system of enterprizes for the development, production, and utilization of material goods and services by which people gain control over their physical environment. Through rather logical deduction, then, technology becomes the science of industry. As such it becomes the systemized knowledge derived from study, experiment, research, development, design, invention, and construction with materials, processes, products, and energies. We find meaning and significance in technology as we study the contributions of industry to man's control over his physical environment and to the ends to which he uses this control.[8]

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[6]Gordon O. Wilber, Industrial Arts in General Education (Scranton: International Textbook Company, 1954), p. 2.

[7]Delmar W. Olson, Industrial Arts and Technology (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963), p. 54.

[8]Ibid., p. 55.

Typical industrial arts programs refer to industry as the source of their curriculum. The experiences offered, however, often reflect limited functions of perhaps a few industries. In A Guide to Improving Instruction in Industrial Arts, a program for industrial arts is suggested which would provide opportunities for students to study all facets of industry and to explore their interrelationships.

> Industry is a reflection of the development of civilization and human progress. It is directly related to social, economic, and educational programs and movements dating from the early beginning of history to the modern era of automation. As a result, it is more than a study of the factory system, for the term industry refers to man's adjustments to his environment, his use of resources, and the opportunities made possible by such advancements.[9]

Cochran compared seven different new approaches to industrial education and found that although there was wide diversity in several areas of content offered, common agreement among these innovative programs included:

1. The program provides for experiences in research and development as they are used in manufacturing.
2. The program provides for practical applications of scientific principles.
3. The program considers industry in its totality, including labor, capital, and distribution.
4. The program is based on a wide variety of selected experiences that sample several industries. Again, a broad approach to studying

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[9]American Vocational Association, A Guide to Improving Instruction in Industrial Arts (Washington, D.C.: American Vocational Association, 1968), p. 25.

> industry is promoted with a heavy emphasis on scientific principles, research and development, and other functions carried out in industry.[10]

Scobey, for the purpose of her book, Teaching Children About Technology, gives an expanded definition of industry in society. She states that:

> Industry is man's systematic effort to produce the necessities of life, including production of goods and services through established procedures and the use of available materials, tools, and processes. Industry involves the commercial agencies organized to produce the things we need. Today's method of operation includes research teams charged with improvement and invention. These inventions may be related to health, communication, and other areas of life not usually associated with industry. Industry has been a part of the life of every social group and has developed through the centuries from primitive hand-processes to highly complex, technical automation.[11]

The American Industry Project at Stout State University, during its five years of research using the concepts of industry with secondary students, used a broad definition of American industry which would seem to encompass most of the above characteristics and still provide the simplicity required for this study. Their definition is: "An institution in our society which, intending to make a monetary profit, applies knowledge

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[10]Leslie H. Cochran, "Innovation: A New Direction for Industrial Education," Industrial Arts and Vocational Education, LVIII, No. 10 (December, 1969), 22.

[11]Mary-Margaret Scobey, Teaching Children About Technology (Bloomington, Ill.: McKnight & McKnight Publishing Company, 1968), p. 3.

and utilizes natural and human resources to produce goods or services to meet the needs of man."[12]

These various attempts to focus on the nature of industry demonstrate not only the complexity of the concept "industry" but also the difficulties which may arise when one desires to relate it to others through organized curriculum.

The Classification of American Industries

Devising systems of classification for American industries and their functional elements is a problem faced by all authors. Some classifications of industry have been devised by the government for reporting economic and employment data. Other classifications have been used as a means of organizing industrial topics for a study of industry in educational programs.

"Classification may be on the basis of the work performed, the type of service handled, or other classification dealing with the nature of the product and its distribution."[13] Various industrial classifications

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[12]American Industry Project, Structure of American Industry: Production Model and Definitions (Menomonie, Wisc.: Stout State University, 1967).

[13]Harold S. Roberts, Roberts' Dictionary of Industrial Relations (Washington, D.C.: BNA Incorporated, 1966), p. 151.

are presented here to allow comparison of the major categories, industries, and associated functions which are usually represented.

One brief but logical classification using only three categories is: " . . . primary industry (collecting, processing and making available material provided by nature in agriculture, fishing, forestry, hunting, mining); secondary industry (transforming, the product of primary industry by manufacture etc.) and tertiary industry, such as transport, trade, finance, administration."[14]

The United States Government, in its 1970 Census of Population: Classified Index of Industries and Occupations, uses a comprehensive list of industrial categories. The main headings with some of the subheadings are:

AGRICULTURE, FORESTRY, AND FISHERIES
MINING
- Metal mining
- Coal mining
- Crude petroleum and natural gas extraction
- Nonmetalic mining and quarrying, except fuel

CONSTRUCTION
MANUFACTURING
- Durable goods
  - Lumber and wood products, except furniture
  - Furniture and fixtures
  - Stone, clay, and glass products
  - Metal industries
  - Machinery, except electrical
  - Electrical machinery, equipment, and supplies
  - Transportation equipment

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[14]Stamp, Longman's Dictionary of Geography, p. 204.

Professional and photographic equipment, and watches
Miscellaneous manufacturing industries
Nondurable goods
Food and kindred products
Tobacco manufacture
Textile mill products
Apparel and other fabricated textile products
Paper and allied products
Printing, publishing, and allied industries
Chemicals and allied products
Petroleum and coal products
Rubber and miscellaneous plastic products
Leather and leather products
TRANSPORTATION, COMMUNICATION, AND OTHER PUBLIC UTILITIES
WHOLESALE AND RETAIL TRADE
FINANCE, INSURANCE, AND REAL ESTATE
BUSINESS AND REPAIR SERVICES
PERSONAL SERVICES
ENTERTAINMENT AND RECREATION SERVICES
PROFESSIONAL AND RELATED SERVICES
PUBLIC ADMINISTRATION[15]

Olson, in Technology and Industrial Arts, reports an analysis of industries for the purpose of deriving subject matter in the industrial arts. He classified the various industries as:

MANUFACTURING INDUSTRIES
Ceramics
Chemicals
Foods
Graphic Arts
Drawing
Photography
Printing
Leather
Metals
Paper
Plastics
Rubber

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[15]U.S. Department of Commerce, 1970 Census of Population: Classified Index of Industries and Occupations (Washington, D.C.: U.S. Bureau of the Census, 1971), pp. VII-IX.

Textiles
Tools and Machines
Woods
CONSTRUCTION INDUSTRIES
POWER INDUSTRIES
TRANSPORATION INDUSTRIES
Airways
Highway Vehicles
Highways
Railways
Waterways
Conveyors
ELECTRONICS INDUSTRIES
INDUSTRIAL RESEARCH
SERVICE INDUSTRIES
INDUSTRIAL MANAGEMENT[16]

Another curriculum proposal for expanding industrial arts, the Enterprise: Man and Technology Project at Southern Illinois University, pictures technology in the major categories of "electronics and instrumentation, visual communications, materials and processes, and energy conversion and power transmission."[17]

The story of American industry as depicted in information books for children varies from the presentation of information specific to one product or industry to books written with the objective of providing a total or comprehensive view of many industries. The table of contents of books representative of the latter purpose are interesting and deserve consideration when one is

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[16]Olson, Industrial Arts and Technology, pp. 100-58.

[17]Ronald W. Stadt, et al., "Enterprise: Man and Technology," Industrial Arts and Vocational Education, LVIII, No. 8 (October, 1969), p. 23.

looking for industrial classifications. One such book, Marvels of American Industry, uses these divisions:

- Lifeblood of Industry
  - Finance
  - Power
  - Machinery
- Raw Materials
  - Mining
  - Petroleum
  - Rubber
  - Chemicals
  - Primary Metals
  - Lumbering
- Food
  - Farming
  - Sugar and Salt
  - Food Products
  - Fishing
- Shelter
  - Stone, Concrete, and Brick
  - Building
  - Paints and Varnishes
  - Furniture
  - Refrigeration and Air Conditioning
- Clothing
  - Wearing Apparel
  - Fashions
  - Furs
- Transportation
  - Automobiles
  - Railroading
  - Aviation
  - Shipping and Shipbuilding
  - Missiles and Rocketry
- Communications
  - Telegraph
  - Telephone
- Graphic Arts
  - Paper
  - Printing Ink
  - Photography
  - Printing
  - Publishing
- Entertainment
  - Stage
  - Motion Picture
  - Radio and Television
  - Music and Recording
  - Sports

Special Products
- Ceramics
- Glass
- Plastics
- Toys and Games
- Fabrics and Textiles
- Tobacco
- Pharmaceuticals
- Soaps and Detergents
- Jewelry

To Market, To Market
- Marketing
- Packaging
- Advertising[18]

Another author, Bertrand Boucher, Professor of Geography at Montclair State College, in a book entitled How Man Provides, illustrates man's life of work throughout the world and compares technological and industrial atmospheres in various international settings. Again, the method of presentation is of interest and can be best explained by the content divisions.

The World of Commerce
- When Trade Began
- Trade Today

The Need for World Trade
- Areas of Specialization
- Impediments to Trade

How Trade Is Carried On
- The Market Place
- Commodity Exchanges
- World Market Centers

How People Earn Their Living
- Tropical Agriculture
- Agriculture in Arid Land
- Farming in the Middle Latitudes
- The Livestock Industry

The World's Forests
- Paper

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[18]Donald E. Cooke, Marvels of American Industry (New Jersey: C. S. Hammond and Company, 1962), p. 5.

Food From the Sea
    Major Fishing Areas
Mineral Riches of the Earth
    Iron
    Bauxite
    Copper
    Zinc and Lead
    Tin
    Diamonds
    Gold
    Silver
Power for the World's Machinery
    Energy from Coal
    Energy from Petroleum
    Energy from Natural Gas
    Hydroelectric Power
    Energy from the Atom
Manufacturing
    Power
    Raw Materials
    Labor
    Market
    Transportation
    Capital
Conserving Our Resources
    Water
    Importance of Top Soil[19]

It can be readily seen that although these systems for classifying industrial enterprises differ in a number of categories they do have much in common. They provide us with more than just a list of major industries. Reference is made to the various facets of our industrial complex which are common to all industries. These common elements are often referred to as functions of industry or major topics and subtopics by those organizing curriculum materials.

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[19]Bertrand P. Boucher, How Man Provides (New York: Parents Magazine Press, 1963), p. 3.

The Functions of Industries

Concept development, according to Woodruff[20] and Gagné,[21] is based on an individual's ability to differentiate between the various objects and events in his environment and to classify his thoughts for generalization to new experiences. Duffy speaks of conceptualizing the functions of industry in his definition of industrial arts as "an activity-oriented curriculum area . . . concerned with developing concepts of function, organization and management, and socioeconomic influences of industry."[22] He also stresses the point that:

> . . . a concept is a mental image that can be expressed in symbolic language . . . this mental image is influenced by experience. Therefore, the development of correct concepts depends upon experiences that will permit associations to be made; transfer of knowledge with relationships developed. We should be interested in developing particularly those concepts that are timeless and general.[23]

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[20]Asahel D. Woodruff, Basic Concepts of Teaching (San Francisco: Chandler Publishing Company, 1961), p. 88.

[21]Robert M. Gagné, The Conditions of Learning (New York: Holt, Rinehart and Winston, Inc., 1965), p. 135.

[22]Joseph W. Duffy, "Conceptualizing the Functions of Industry," The Journal of Industrial Arts Education, XXIX, No. 5 (March-April, 1970), 11.

[23]Ibid., p. 12.

Duffy discusses in some detail the functions of industry in terms of material processing (production), service, transportation, information processing (communication), energy processing, research and development, organization and management, and socioeconomic influence.[24]

Bateson and Stern have suggested a functions of industry approach to the understanding of modern industry. They divided industry into two phases: "goods-producing" and "goods-servicing." The major functions of each of these are listed as:

Goods-producing	Goods-servicing
Research and Development	Diagnosis
Planning for Production	Correction
Manufacturing	Testing[25]
Distribution	

A Guide to Improving Instruction in Industrial Arts presents a comprehensive structure of industrial topics related to the total institution of industry. Its major divisions and subtopics are outlined as:

INDUSTRY AND CIVILIZATION
- Historical View of Man and Industrial Technology
- Evolution of Modern Industrial Technology
- History of Materials
- Technical Heritage
- General Education

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[24] Ibid.

[25] Lloyd P. Nelson and William T. Sargent, eds., Evaluation Guidelines for Contemporary Industrial Arts Programs, Sixteenth Yearbook of the American Council on Industrial Arts Teacher Education (Bloomington, Ill.: McKnight & McKnight Publishing Company, 1967), pp. 22-23.

THE INDUSTRY
- Relative Importance
- Historical Background
- Opportunities
- Allied Industries

ORGANIZATION
- Enterprise
- Administration
- Management
- Labor
- Associations
- Production Departments
- Plant Organization

RESEARCH AND DEVELOPMENT
- Original Concept
- Market Evaluation
- Product Research and Development
- Process Research and Development
- Materials Research and Development

PLANNING FOR PRODUCTION AND MANUFACTURING OPERATIONS
- Idea Visualization
- Design and Preparation of Visual Information
- Production Drawings
- Material Specifications
- Design of Tools, Jigs and Fixtures, and Special Machinery
- Plant Layout
- Plant Organization
- Estimating and Cost Accounting
- Procurement and Inventory
- Automation and Numerical Control
- Quality and Production Control Procedures and Scheduling
- Production Flow

PRODUCTION OR MANUFACTURING
- Custom
- Continuous or Mass
- Materials
- Processes
- Energy and Power

DISTRIBUTION
- Advertising (Promotion)
- Packaging and Shipping (Materials Handling)
- Marketing

SERVICING INDUSTRIAL PRODUCTS
- Diagnosing
- Correcting
- Testing[26]

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[26]American Vocational Association, A Guide to Improving Instruction in Industrial Arts, pp. 25-26.

The American Industry Project based its study of industry around thirteen major concepts: communication, transportation, finance, property, research, procurement, relationships, marketing, management, production, materials, processes, and energy.[27] Five additional concepts that represent the environment of American industry were identified. "They include government, private property, resources, competition and public interest."[28]

The Industrial Arts Curriculum Project (IACP), conducted by Ohio State University in cooperation with the University of Illinois, has limited its efforts to the broad areas of construction technology and manufacturing technology as the two major aspects of American industry. Within each of these the various functions of management, production, and personnel are listed:

Management	Production	Personnel
Planning	Pre-Processing	Hiring
Formulating		
Researching	Processing	Training
Designing		
Engineering	Post-Processing	Working

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[27] Richard H. Gebhart, "American Industry Instructional Materials," New Concepts in Industrial Arts, Selected Addresses and Proceedings of the American Industrial Arts Association's 30th Annual Convention at Minneapolis (Washington, D.C.: American Industrial Arts Association, 1968), pp. 244-45.

[28] Ibid.

Organizing
  Structuring
  Supplying
Controlling
  Directing
  Monitoring
  Reporting
  Correcting

Advancing

Retiring[29]

Manufacturing as it relates to our economic system consists of three major parts--input, process, and output. The following associated divisions are:

Input	Processes	Outputs
Natural resources	Management practices	Durable goods
Finance	Production practices	Nondurable goods[30]
Dapital	Personnel practices	
Energy		
Human resources		
Knowledge		

It becomes evident from these various sources that topics of industry will include terms identifying specific industries and the functions common to these industries. Various resources, occupations, and organizations upon which these industries depend also qualify as topics of industry. The combining and organizing of these many aspects of industry was necessary to provide a usable instrument.

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[29]Industrial Arts Curriculum Project, The World of Manufacturing (The Ohio State University Research Foundation, 1969), pp. 25-28.

[30]Ibid., pp. 23-24.

Organizing a Classified List of Industrial Concepts

The definitions, classifications, and functions of industry which have been presented identify the importance of certain industrial topics. This alphabetical list of terms was compiled from sources used in this chapter. The numerous terms representing aspects of industry clearly illustrate the need to group subtopics within the structure of major topic headings before an analysis instrument could be developed.

administration	capital	development
advertising	civilization	diagnosis
agriculture	commerce	distribution
atomic power	commodity	electronics
automation	communication	energy
banking	conservation	engineering
business	construction	enterprise
building	design	environment
experiment	management	publishing
farming	manufacturing	repair
finance	marketing	research
fishing	materials	resources, human
forestry	metals	resources, natural
furniture	mining	retail
goods	occupations	scientific
graphic arts	organization	services
hydroelectric	packaging	technology

industrial	plant	testing
industry	power	textiles
instrumentation	printing	tools and machines
insurance	process	trade
invention	production	transportation
labor	products	utilities
lumbering	profit	wholesale

This list of terms could be organized in numerous ways depending upon the required application. The classification of industrial topics developed for use in the analysis instrument of this study should be easily understood and applied to other types of literature by those seeking to determine the presence of industrial information. Major topics and subtopics with broad characteristics were selected for this reason.

The following descriptions will develop simple categories which will include directly or indirectly the terms previously listed as representative of aspects of industry.

History and Development

Industry has a definite history from man's earliest devising of tools and techniques for obtaining and restructuring natural resources to his role in today's complex technology. Hunting, fishing, and farming were some of the early activities for which

man developed first crude and then refined methods. From the self-sufficient household production and use of goods to craft specialization and mass production, the evolution of materials, tools, processes, and occupations is important to an understanding of present technology. Early inventors with their experiments and inventions paved the way for present use of automation and computers. The historical aspects of industry and its development may be represented by the following list of categories.

History and Development--technology past to present.

- Man and his environment
- Evolution of tools and materials
- The early craftsmen
- The Industrial Revolution
- Inventors and inventions
- Modern machine technology
  - Automation
  - Computers

Resources

Our future quality of life depends upon how successful we are in restoring and maintaining a healthy environment of water, air, and land. We have only recently become aware of the urgency with which we must meet environmental problems. Man and his industries are among the major sources of these problems.

The use and misuse of material and energy sources must be studied by everyone since it will require everyone's cooperation if we are going to develop a quality environment for human, animal, and vegetable life in the near future.

Resources may be analyzed through the use of these categories:

Resources--natural and man-made materials and energies.

- Location of raw materials
- Mining and refining
- Extending material uses
- Conservation of resources
  - Water
  - Air
  - Land
- Energy and power
  - Sources of energy
  - Generation (conversion)
  - Transmission
  - Utilization

Organization

America has social and economic systems which allow industries to function as free enterprises in competition with one another. Management must organize and direct the use of both human and natural resources in the operation of such an enterprise. The labor force made up of professional, technical (or skilled), and unskilled persons work as the productive body of industry. Labor unions, management, and businesses organize into

associations to further common goals. Without organization industry would not develop, expand, or contribute to our technology.

Organization may revolve around the following terms:

Organization--the management of men, materials, and money

Enterprise

Management

Manpower (Labor)

Associations

Capital and Finance

Research

Research is the means by which industry develops new knowledge, processes, and products. Research involves the gathering of information, the describing of known characteristics of materials, processes, or products, and the conducting of experiments by scientific methods. Research problems of all types must be solved by industry before it can successfully develop, produce, or market its products. Industrial research includes these functions:

Research--finding new and better ways to use our resources.

Experimentation

Product research

Process research

Materials research

Market research

Production

Production is primarily concerned with the methods, materials, and processes utilized in the manufacture of a product. The mass production of material goods has provided us with unlimited choice in purchasing the kinds of foods, clothing, shelter, and other items which we need or desire. All persons have either a direct or an indirect control over production with their purchasing power as consumers. Knowledge of production materials and processes and the products of industry assures a more responsible labor force and consumer population.

Topics basic to the production aspect of industry are as follows:

Production--the manufacture of a product in a factory, plant, or mill.

Materials selection

Processes (operations performed)

Machines and tools--mass production

Safety requirements

Products

Measurement/Standards

Occupations

Vocational choice is most often available to the informed or educated person. Limited job training often deprives the individual of freedom to choose his work situation and may cause unemployment. Children are not too young to develop concepts of work which may enhance their chance to choose a satisfying occupation as adults. Occupational information may be built around these aspects of work:

Occupations--workers needed to make products or provide services.

Employment opportunities

Education for a career

Job satisfaction

Avocations--hobbies

Construction

The products of construction are buildings, roads, bridges, dams, and various other on-site structures usually found outdoors as compared to in-plant manufacturing or production. New homes, schools, businesses, and highways are continually being built or maintained. These activities greatly affect our social, economic, and environmental conditions and must be considered major aspects of industry for us to study. Construction and its subdivisions include:

Construction--building structures or fixed improvements on a site.

Architecture

Homes and apartments

Public buildings

Commercial/Industrial

Landscaping

Roads, bridges, tunnels

Other engineering

Transportation

The movement of people, manufactured products, and raw materials is an immense activity. Vehicles traveling by land, water, or air are finding their movement more complex each year. New modes of transportation must be developed to make travel safer and more enjoyable. Transportation in the distribution of goods and services is a function common to all types of industry. Transportation elements can be categorized as follows:

Transportation--movement of persons or goods from place to place.

Airways

Spaceways

Highway vehicles

Railways

Waterways

Pipe lines and other conveyors

Communication

We communicate or exchange information with one another by means of the written or spoken word. The exchange, storage, or retrieval of information is accomplished by use of various graphic and electronic processes. Graphic media include such forms as letters, newspapers, books, drawings, signs, and the arts. Electronic media includes radio, television, telephone, telegraph, and various computer applications to information handling. Major categories in communication are represented in the following:

Communication--the exchange, storage or retrieval of information.

Graphic	Electronic
Drawing/Design	Radio
Photography	Radar
Printing	Telephone
Publishing	Telegraph
	Television
	Computer

Consumption

Everyone is a consumer of the products and services of industry. Our need or desire for material goods is so great that we are almost entirely dependent upon industry and business for food, clothes, homes, and jobs. Americans consume more goods and services than people in most other countries around the world. Industry spends millions of dollars on advertising and sales

promotion in order to sell its products. Topics related directly to consumption are as follows:

Consumption--consumer use of products and services.

Advertising/Marketing

Distribution and sales

Consumer information

Product Servicing

Summary

The review of literature was undertaken to determine those aspects of industry and technology which are considered of major importance for study by students in educational programs. Various authors and curriculum projects have proposed major elements, functions, or concepts of industry for programs in industrial education. These sources and others were used to (1) broadly define industry, (2) compare various industrial classifications, and (3) develop a classified list of major topics and subtopics for inclusion in a data analysis instrument.

Industry can be defined in the narrowest sense to include only those enterprises which substantially change the form of materials--as in manufacturing or construction. In a broader sense, all enterprises which apply technology in the development, production, and utilization of goods and services could be considered industries.

Agriculture, fishing, forestry, hunting, and mining are primary industries which collect, process, and make available material found in nature. Secondary industries such as manufacturing and construction further process or transform the products of primary industries. The distribution, sales, and servicing of industrial products are affected by tertiary industries such as transportation, communication, finance, administration, and public utilities.

The various industrial topics suggested by the materials reviewed were used to organize ten categories which reflect some major aspect of the industrial institutions in our technological society. Subtopics were selected to illustrate the extent of the major topic classifications. The inclusive nature of the study dictated the use of topics which would allow a broad interpretation. The major categories derived for this study were as follows: (1) History and Development, (2) Resources, (3) Organization, (4) Research, (5) Production, (6) Occupations, (7) Construction, (8) Transportation, (9) Communication, and (10) Consumption.

These major categories with their corresponding subdivisions were included in the data analysis instrument. The development of the instrument and its reliability, the selection of the sample books, and the procedure used in treating the data is described in Chapter III.

CHAPTER III

DESIGN OF THE STUDY

Introduction

This study was designed to provide a content analysis of selected juvenile information trade books to determine the type and extent of industrial topics commonly represented. Previously, a review of literature mainly related to industrial education curriculum was used as a base from which to establish a classified list of major industrial topics and subtopics. This list in the form of an analysis instrument was then applied to selected materials to identify the extent of major topic representation.

Included in this chapter is a description of the development of the analysis instrument and a test of its reliability, the criteria used in selecting the sample, and the content analysis method as it was applied in the collection of the data.

Analysis Instrument

Major topics of industry and their related sub-topics were the basis for the analysis instrument. After

reviewing literature on the nature of industry in general and proposed curriculum for industrial education in particular, the various elements of American industry were organized into a classified list of ten major categories with each of these having several subdivisions.

To facilitate the organization and analysis of information obtained from each book which met selection criteria, a data collection instrument (Appendix A) with the following characteristics was used:

(1) Author-title entry for identification and bibliographical listing;

(2) Column sections for indicating emphasis and frequency of topics in a book;

(3) List of topics for categorizing and limiting data obtained through content analysis.

Ten major industrial topics and their related subtopics were identified and classified in Chapter II. A further combining of some of the closely related subtopics was done to make the instrument more manageable. The subtopic groups were designed to include terms which could be easily understood and recognized during the analysis. The form in which these topics appear in the instrument is as follows:

1. History and Development
   a. Evolution of tools and materials
   b. Early craftsmen
   c. Inventors/inventions
   d. Modern technology--automation/computers
2. Resources
   a. Mining and refining of raw materials
   b. Conservation or pollution of water, air, land resources
   c. Energy and power sources, conversion, transmission, utilization
3. Organization
   a. Management
   b. Labor/Unions
   c. Capital and Finance
4. Research
   a. Experimentation
   b. New materials, processes, products
5. Production (manufacturing)
   a. Materials/processes
   b. Machine and tool use
   c. Safety
   d. Products
   e. Measurement/Standards
6. Occupations
   a. Employment opportunities/careers
   b. Education/training
   c. Avocations/hobbies

7. Construction

   a. Architecture

   b. Homes and apartments

   c. Commercial/industrial buildings

   d. Landscaping

   e. Roads, bridges, tunnels, dams

   f. Other engineering

8. Transportation

   a. Airways

   b. Space vehicles

   c. Highways/vehicles

   d. Railways

   e. Waterways/vehicles

   f. Pipelines/conveyors

9. Communication

   Graphic

   a. Drawing/design

   b. Photography

   c. Printing/publishing

   Electronic

   d. Radio/television

   e. Telephone/telegraph

   f. Computer-data processing

10. Consumption

   a. Advertising/marketing

   b. Distribution/sales

c. Consumer information

d. Product servicing

Instrument Reliability

To test the reliability of the collection instrument, three groups of four persons each applied the instrument to a random sample of fifteen books. Each group analyzed five different books selected at random from the sample of fifteen. The three groups were as follows:

(1) Elementary teachers (grades four through six);

(2) Elementary librarians; and

(3) College seniors majoring in elementary education.

Using each major topic as a separate dependent variable, summation scores from each group and from the researcher were compared to find (1) agreement within groups, and (2) researcher agreement with each group.

A two-way analysis of variance was applied to each group to obtain a reliability estimate of agreement within each group on each major topic. An indication of agreement between the researcher and each group was obtained by correlating group mean scores and researcher scores on each major topic. The results of this analysis for Group I (teachers) are shown in Table 3.1.

TABLE 3.1.--Agreement within Group I (teachers) and correlations between group mean scores and researcher scores for each major topic

Topic	Within Group I (teachers)	Group I With Researcher
History and Development	.41	.90
Resources	.03	.33
Organization	.--[a]	.--
Research	.94	.99
Production	.38	.59
Occupations	.87	.85
Construction	.90	.99
Transportation	.84	.97
Communication	.52	.82
Consumption	.14	.52
Average	.55	.77

[a]Insufficient scores for formula comparison.

The extent of agreement within Group I (teachers) is indicated by both low and high reliability values in Table 3.1. Low reliability values are often due to little topic representation. Variation in scoring where topics scored low indicates the subtle nature of topics presented in some books. Any substantial variation in scoring among group members results in low reliability. The average within group reliability over all topics for Group I (teachers) was .55. Group I agreement with the researcher over all topics resulted in an average correlation of .77. Table 3.2 shows the results for Group II (librarians).

TABLE 3.2.--Agreement within Group II (librarians) and correlations between group mean scores and researcher scores for each major topic

Topic	Within Group II (librarians)	Group II With Researcher
History and Development	.79	.98
Resources	.87	.99
Organization	.23	.73
Research	.20	.46
Production	.86	.96
Occupations	.--[a]	.--
Construction	1.00	1.00
Transportation	.91	.95
Communication	.48	.99
Consumption	.80	.99
Average	.68	.89

[a]Insufficient scores for formula comparison.

Within group agreement for Group II (librarians) was higher than for Group I (teachers) or Group III (elementary majors) as indicated by an average reliability of .68. Agreement with researcher was also higher for Group II (librarians) as shown by an average correlation of .89. Table 3.3 shows the results for Group III (elementary majors).

As with Group I and Group II, the within group reliability for Group III was less (.44) than the group agreement with the researcher (.85). The average correlation for the three groups with the researcher over all topics was .84.

TABLE 3.3.--Agreement within Group III (elementary majors) and correlations between group mean scores and researcher scores for each major topic

Topic	Within Group III (elementary majors)	Group III With Researcher
History and Development	.38	.87
Resources	.73	.98
Organization	.12	.--[a]
Research	.22	.80
Production	.12	.86
Occupations	.22	.40
Construction	.84	.99
Transportation	.94	.99
Communication	.59	.95
Consumption	.24	.--
Average	.44	.85

[a]Insufficient scores for formula comparison.

Fairly high correlations were obtained for each group to researcher comparison. This indicates that when using the instrument, groups familiar with children's books usually rated the presence of industrial topics in the same way as did the researcher. Where no correlations are indicated in the tables there were insufficient scores for comparison by formula.

Formula[1] for intraclass (within group) coefficient of correlation, or:

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[1]Robert L. Thorndike, ed., Educational Measurement (2nd ed.; Washington, D.C.: American Council on Education, 1971), p. 422.

$$\text{reliability} = \frac{MS_B - MS_{TB}}{MS_B + (t-1)\ MS_{TB}}$$

where:

MS_B = mean square for books

MS_{TB} = mean square interaction (teachers x books)

t = number of teachers

Sample Selection

The juvenile information trade books selected for this study qualified under the following limitations:

1. All book titles referred directly to one or more of the major topics or subtopics of industry or indirectly as cross-referenced with the Sears List of Subject Headings[2] as a guide.
2. All books were copyrighted in the United States from 1961 through 1970.
3. All books were listed in the Children's Catalog[3] editions or supplements for 1961 through 1971 or

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[2]Barbara M. Westby, ed., Sears List of Subject Headings (New York: The H. W. Wilson Company, 1965).

[3]Estelle A. Fidell, ed., Children's Catalog (12th ed.; New York: The H. W. Wilson Company, 1971).

in the Subject Guide to Children's Books in Print,[4] 1970 edition.

4. All books were indicated as suitable for grades four through six or inclusive of four, five, or six.

A list of books used in the study appears in Appendix B by major topic groupings.

Approximately 800 books were identified as appropriate for the study. Of these a random sample of 200 books was selected for analysis by use of a random table of numbers.

Data Collection

The various kinds of information which were a part of the content of the books selected were identified and classified in accordance with the major topics of industry. By means of content assessment it was then determined to what extent a major topic was represented.

Content Analysis

Students of sociology and communication research have displayed some interest in content analysis as a type of investigation into the factors that affect public opinion, attitudes, and social change. Berelson has

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[4]Lillian N. Gerhardt, ed., Subject Guide to Children's Books in Print (New York: R. R. Bowker Company, 1970).

written much about this type of investigation in his book, Content Analysis in Communication Research,[5] and in the Handbook of Social Psychology.[6] Good and Scates in their book, Methods of Research,[7] give a thorough identification and description of the kinds of quantitative (content) analysis of documentary materials. This study employed a number of the techniques of content assessment. "Content analysis is a research technique of the objective, systematic and quantitative description of the manifest content of communication."[8] "The content analyst aims at a quantitative classification of a given body of content, in terms of a system of categories devised to yield data relevant to specific hypotheses concerning that content."[9]

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[5]Bernard Berelson, Content Analysis in Communication Research (Glencoe, Ill.: Free Press, 1952).

[6]Gardner Lindzey, ed., Handbook of Social Psychology, Vol. 1 (Cambridge, Mass.: Addison-Wesley Publishing Company, Inc., 1954).

[7]Carter V. Good and Douglas E. Scates, Methods of Research (New York: Appleton-Century-Crofts, Inc., 1954).

[8]Lindzey, ed., Handbook of Social Psychology, p. 489.

[9]Ibid., p. 488.

Good and Scates state that:

> Simple statistical investigations utilize categories already existing, or easily made, with no particular subtle challenge; the categories do not have to emerge as to quality, only as to quantity. On the other hand, content analysis is highly subtle in its obligation to recognize, identify, and detect the presence of essential or significant factors represented in the categories, for the purpose of placement in larger categories.[10]

Procedure

For the purpose of this study the various industrial topics which emerged as a classified list provided the base for quantitative data analysis. Quantitative representation of major topics was expressed in two ways: (1) by the number of subtopics indicated during analysis, and (2) by the frequency with which each subtopic received little attention or major emphasis.

The procedure for using the instrument to collect data was as follows:

1. Each book selected for analysis was divided into ten equal sections.
2. Each section of the book was scanned sufficiently to obtain an indication of the major topics and subtopics represented.
3. The extent of topic representation was noted for each section by checking either the space for

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[10]Good and Scates, Methods of Research, p. 670.

little attention (L) or for major emphasis (M). No topic representation was indicated by leaving the spaces blank.

4. A summary of responses for each subtopic was recorded at the right side of each page.

A summation score for each major topic was obtained by applying a value of one to each L (little attention) response, a value of two to each M (major emphasis) response, and summing across all subtopics listed on the instrument for that major topic.

Summary

A classified list of ten major industrial topics and their related subtopics was arranged in the form of a data analysis instrument for the purpose of analyzing juvenile information trade books to determine the extent of topic representation.

Instrument reliability was tested by using groups of elementary teachers, elementary librarians, and college elementary majors to analyze random book samples. Agreement within groups (intraclass reliability) on a topic was often lowest when topic representation was subtle or given little attention. A comparison of group mean scores with researcher scores on each major topic resulted in generally high correlations indicating agreement on type and extent of topic representation.

A population of approximately 800 books was identified for the study. Of these, a random sample of 200 books was selected for analysis. Of the 200 books selected, 175 available books were analyzed with the instrument as an aid in the quantification of data.

An analysis of the data is presented in Chapter IV.

CHAPTER IV

ANALYSIS OF DATA

Introduction

This chapter provides a presentation and analysis of the data gathered for the study. The data were collected by use of an instrument designed to determine the extent to which ten major topics of industry were represented as indicated by the number of subtopics and their frequency of occurrence in each book. A two-way analysis of variance was applied to the data to determine if significant differences existed between the summation scores or means for the ten topics. In addition, confidence intervals for the topic means were computed to allow a more accurate description of the differences which were found.

The problem was initially stated as a question:

> Which industrial topics have the greatest representation and which the least for the population of books investigated?

An hypothesis was developed to assist in the interpretation of the data. For statistical purposes it was stated as a null hypothesis:

There are no significant differences in the extent to which the ten major industrial topics are represented as measured by the instrument developed for this study.

As a formal statement:

$$H_o: M_{c_1} = M_{c_2} = M_{c_3} \ldots M_{c_{10}}$$

or the mean scores for the ten topics are equal.

However, the question suggests the alternative hypothesis:

H_1: H_o is false,

or the topics are not equally represented.

Treatment of the Data

Table 4.1 lists the mean scores for the ten major industrial topics. The mean scores indicate a wide variation in the extent of industrial topic representation.

TABLE 4.1.--Mean scores for industrial topics represented

Topic	Mean[a]
History and Development	10.72
Resources	5.09
Organization	1.47
Research	5.17
Production (manufacturing)	8.94
Occupations	5.49
Construction	1.99
Transportation	6.23
Communication	3.36
Consumption	1.02

[a]A larger mean value represents greater topic representation.

An analysis of the data by a two-way analysis of variance is reported in Table 4.2.

TABLE 4.2.--Two-way analysis of variance test for no difference between topics represented on the total instrument

Two-Way Analysis of Variance				
Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F
Topics	16,038.31	9	178.70	2.01[a]
Books	13,118.77	174	75.40	
T X B	139,211.79	1566	88.90	

[a]Significant at the .05 level. The value of the F ratio at the .05 level of significance for 9 and 174 degrees of freedom is 1.96.

As indicated in Table 4.2, the overall F value is large enough to support a rejection of the null hypothesis. This, then, indicates significant differences in the extent to which the ten industrial topics were represented.

To determine which topics may be properly grouped as having the greatest representation, a central tendency on a continuum scale, or the least representation, a confidence interval[1] was constructed around each topic

[1]Gene V. Glass and Julian C. Stanley, Statistical Methods in Education and Psychology (New Jersey: Prentice-Hall, Inc., 1970), p. 263.

mean score. Table 4.3 shows the computed confidence intervals for each of the topic mean scores.

Formula[2] for 95 per cent confidence interval:

$$\bar{x} \pm t_{1-(\alpha/2)} \frac{S_x}{\sqrt{n}}$$

$$\bar{x} \pm (1.96) \frac{S_x}{\sqrt{175}}$$

where:

$\bar{x}$ = topic mean score

t = t-distribution value for $1 - (\alpha/2)$

S_x = standard deviation for given topic

n = number of books in the sample

Table 4.4 illustrates a graphic comparison of the confidence intervals for each topic mean score. From this we can observe the grouping of topics from those with the least representation to those with the greatest representation. History and development, and production are the topics receiving the greatest representation. Although significant, less attention is given to resources, research, occupations, and transportation. Those topics with the least representation are organization, construction, communication, and consumption.

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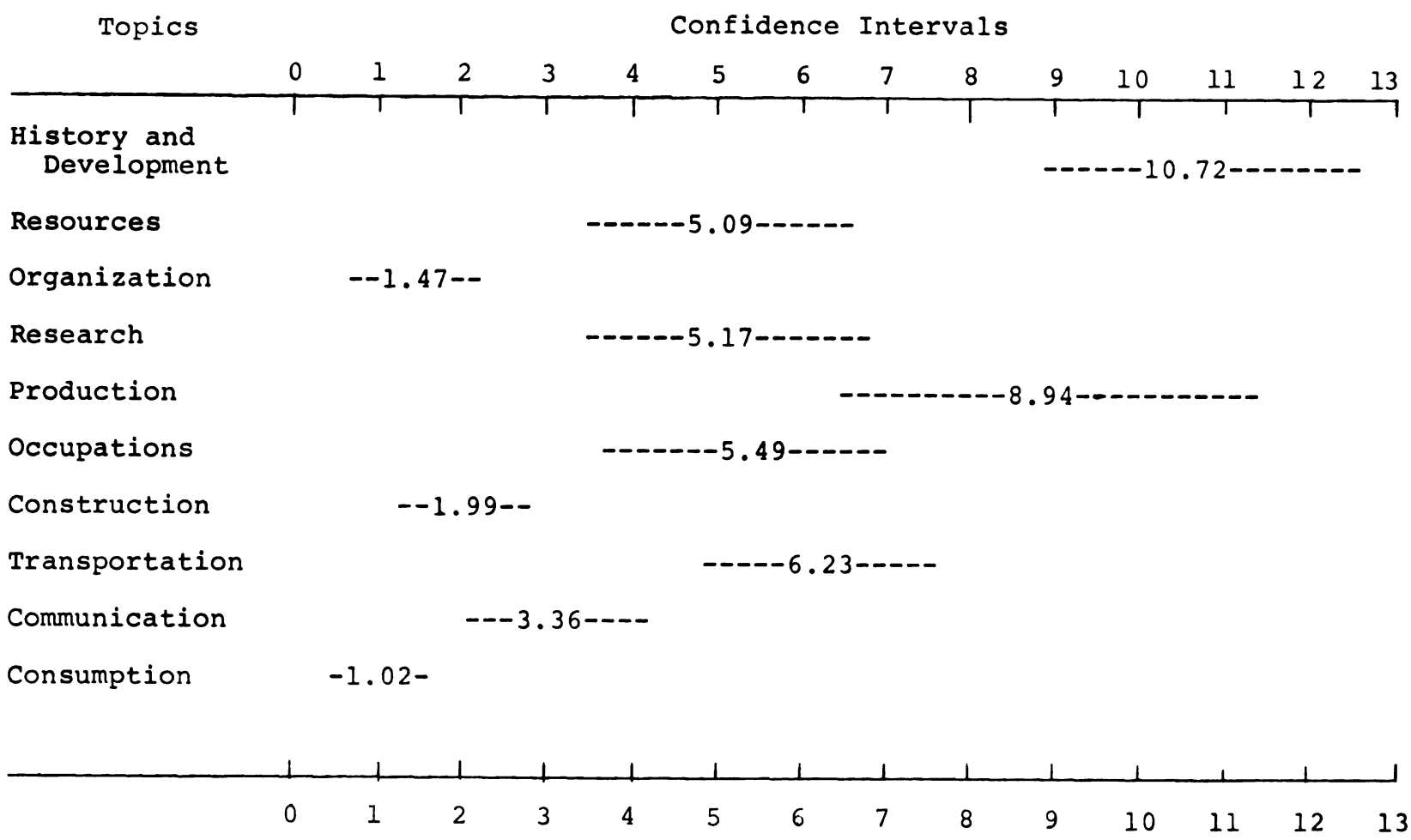
[2] Ibid., p. 294.

TABLE 4.3.--Confidence intervals for topic mean scores

Topic	95 Per Cent Confidence Intervals[a]
History and Development	10.72 ± 1.91 (8.81 ↔ 12.63)
Resources	5.09 ± 1.40 (3.69 ↔ 6.49)
Organization	1.47 ± 0.77 (0.70 ↔ 2.24)
Research	5.17 ± 1.62 (3.55 ↔ 6.79)
Production (manufacturing)	8.94 ± 2.45 (6.49 ↔ 11.39)
Occupations	5.49 ± 1.59 (3.90 ↔ 7.08)
Construction	1.99 ± 0.92 (1.07 ↔ 2.91)
Transportation	6.23 ± 1.34 (4.89 ↔ 7.57)
Communication	3.36 ± 1.08 (2.28 ↔ 4.44)
Consumption	1.02 ± 0.55 (0.47 ↔ 1.57)

[a] $\alpha = .05$, $t = 1.96$, $df = 174$

TABLE 4.4.--Graphic comparison of confidence intervals around topic mean scores



The scale of values provides for a more accurate comparison of topics.

Communication ranks highest of these four topics while consumption ranks the lowest in the total group of ten industrial topics studied.

Summary

Initially the problem was stated as a question:

> Which topics of industry have the greatest representation and which the least for the population of books investigated?

For statistical analysis the problem was stated as a null hypothesis:

> H_o: There are no significant differences in the extent to which the ten major industrial topics are represented as measured by the instrument developed for this study.

Also, the alternative hypothesis was stated as:

> H_1: The topics are not equally represented.

A listing of the topic mean scores indicated possible significant variations in the degree of topics representation. A two-way analysis of variance test for no difference between topic representation was applied to the data. The results provided evidence of significant differences at the .05 level. This suggested a rejection of the null hypothesis and further study of the alternative hypothesis.

Confidence intervals were computed for each topic mean score. Graphic representation of the confidence intervals around the topic means scores allowed one to conclude that there were significant differences

in the degree to which the ten industrial topics received representation in the population of books studied. The two topics receiving the greatest attention were history and development, and production. In the middle range of representation were resources, research, occupations, and transportation. Communication followed with a representation slightly greater than the topics of organization, construction, and consumption which received the least attention.

Chapter V includes a final summary of the study, conclusions based on the results of the study, statements of recommendation for further study, and implications for elementary and middle school education.

CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

Summary

This study was initiated to determine the extent to which major topics of industry are given representation in information books written for upper elementary students.

A review of literature provided numerous aspects of industry and technology which were considered important as topics for study in educational programs. From these sources a list of major topics and subtopics was developed for inclusion in an instrument designed to quantify data collected by means of content analysis. The ten major topics identified were as follows: (1) History and Development, (2) Resources, (3) Organization, (4) Research, (5) Production, (6) Occupations, (7) Construction, (8) Transportation, (9) Communication, and (10) Consumption.

The instrument developed was applied to a random sample of 175 books from an identified population of approximately 800 books written for students in grades

four through six. A test of the instrument's reliability using groups of teachers, librarians, and elementary majors resulted in generally high correlations between group mean scores and researcher scores.

Statistical treatment involved the use of a test for variance in the extent of industrial topic representation and a graphic comparison of the topic mean scores by use of confidence intervals.

Conclusions

Statistical treatment of the data provides evidence that the degree of industrial topic representation varies significantly in the sample of books analyzed. This study, however, is only one estimate of the character of the total population of books. The following conclusions are drawn with this fact in mind.

1. History and development, and production are two industrial topics which are given extensive representation in juvenile information trade books. History and development ranked first in representation and production ranked second. This is not surprising since most of our industries have a history dating back to early craftsmen followed by a growth dependent very much on inventors developing new materials and tools for use in mass production manufacturing

processes. These topics are very much related and are usually given good representation in information books for children.

2. Resources, research, occupations, and transportation are given almost equal representation as topics of industry and receive substantial attention as indicated by their central positions on the scale of representation. These four topics are also similar in nature in that they represent the material and human inputs required in the development and maintenance of industrial complexes.

3. The topic of communication ranks seventh in degree of representation. This topic includes both graphic and electronic media by which man transmits information about his activities. Industry uses and produces these various communication devices. Without further study it would be difficult to project on the reasons why communication would receive as little attention as the study indicates.

4. Organization, construction, and consumption are three topics which received the least representation of the ten industrial topics investigated. Consumption, which ranks tenth in degree of

representation, suggests that very little information was available on such topics as marketing, consumer information, and product servicing.

Recommendations

The findings of this study have indicated significant variations in the extent to which the ten industrial topics identified are given representation in information books available to upper elementary students. No attempt has been made to determine the extent to which these topics should be represented in materials studied by students at this age. However, based primarily on the assumption that information about industry should be available, organized, and presented, the following recommendations for application and further study are made.

Application

Juvenile information books cover a wide diversity of topics. Those topics which relate to aspects of industry can be used to enrich the elementary curriculum activities of social studies, language arts, fine arts, science, and mathematics. Books which relate these industrial topics can be found for the whole range of reading ability and are well written and illustrated by those experienced in their field.

Reading abilities of many middle school or junior high school students are sometimes lower than their grade indicates. Materials of the type identified in this study could find expanded use in specific reading improvement programs as well as in the various curriculum areas.

Career education, recently expanded and defined as a lifelong process, interrelates occupational roles with civic, family, and avocational roles. The fifteen broad occupational clusters suggested by the U.S. Office of Education employ over half of the ten major industrial topics which were investigated in this study. These materials can prove to be significant resources for elementary units or secondary courses offering career information. All teachers, counselors, and administrators need to become aware of the wealth of information available in the form of information books which can be incorporated into courses and other curricular activities at various levels.

Further Study

An effort should be made to determine to what extent materials of this nature are being used by elementary teachers in established curriculum. The teachers and librarians contacted during this study were very enthusiastic about possible assistance in locating and organizing resources of this type.

Each of the ten major topics in this study could be further investigated to determine which subtopics are given adequate coverage and which may need improved coverage by additional publications. Materials of this type should be provided for elementary students to use in directed study and discovery experiences to determine which topics of industry assume importance at various age/grade levels. The important question which arises is: what effect does the use of this information in organized teaching-learning situations have upon student behavior and expression?

Further study of the interrelationships which may exist between industrial topics or subtopics needs consideration to better understand the transfer process between information available to children and concepts developed by them.

Implications

The findings of this study suggest adequate representation of six major industrial topics. Four topics were indicated as having much less representation. Beyond the purely statistical information, however, results of the study provide important implications for curriculum at the elementary and middle school levels.

A wealth of information about aspects of industry is readily available to teachers and students. This

study has provided an extensive list of children's books written for upper elementary students. It has also provided an arrangement of major topics and subtopics which could be used by teachers, librarians, and students to organize their approach to the presentation and study of industry and technology in our society.

The high demand for goods and services in the United States in the past has been met by our industries and their supporting organizations. Today, and in the future, however, a new understanding of our "needs" is necessary as we face shortages of resources and witness an alarming rate of environmental deterioration. This understanding is not developed easily or quickly. The task of providing adequate information for the directed study of these problems must be assumed in part by our educational programs at all levels.

Children are especially receptive to change. Changes in our style of living may be the significant factor in the maintenance of our highly developed technical society. It follows then that we must consider carefully the information and experiences which our children receive so that they may develop concepts of industry and technology adequate for the future decisions they must make both as producers and consumers.

As recommended, juvenile information books could prove a valuable resource to those planning career

education programs. Biographies of inventors and leaders in the history of American industrial-technological development are numerous. Career opportunities are described in relation to all aspects of industry. Occupational clusters including, natural resources, communication, manufacturing, transportation, construction, consumer information, environmental control, and distribution and marketing are all topics of this study.

Concept development based on adequate information and good experiences is the primary purpose of our educational programs. Careful study of the use of information materials in the classroom can provide the teacher and the student with an understanding of and a guide to discovery and learning processes.

The numerous materials located during this study contain very useful and accurate information. They represent a very significant source of information for children and youth of all ages.

APPENDICES

APPENDIX A

INSTRUMENT USED IN THE STUDY

Call No._____ Author:_____ Title:_____

		Sample No._____	Section of Book--divide book into ten sections/_____pages each.																					
			Key: L = Little attention, M = Major emphasis (do not check both)																					
			1		2		3		4		5		6		7		8		9		10		Summary	
		Topic Represented:	L	M	L	M	L	M	L	M	L	M	L	M	L	M	L	M	L	M	L	M	L	M
1.	HISTORY & DEVELOPMENT	a. Evolution of tools and materials																						
		b. Early craftsmen																						
		c. Inventors/inventions																						
		d. Modern technology-- automation/computers																						
2.	RESOURCES	a. Mining & refining of raw materials																						
		b. Conservation or Pollution of water, air, land resources																						
		c. Energy & power sources, conversion, transmis- sion, utilization																						
3.	ORGANIZA- TION	a. Management																						
		b. Labor/Unions																						
		c. Capital & Finance																						

(cont. - Page 2 of 3)

		Topic Represented:	1		2		3		4		5		6		7		8		9		10		Summary	
			L	M	L	M	L	M	L	M	L	M	L	M	L	M	L	M	L	M	L	M	L	M
4.	RESEARCH	a. Experimentation																						
		b. New materials, processes, products																						
5.	PRODUCTION (manufacturing)	a. Materials/Processes																						
		b. Machine & Tool use																						
		c. Safety																						
		d. Products																						
		e. Measurement/Standards																						
6.	OCCUPATIONS	a. Employment opportunities /careers																						
		b. Education/training																						
		c. Avocations/hobbies																						
7.	CONSTRUCTION	a. Architecture																						
		b. Homes & Apartments																						
		c. Commercial/industrial buildings																						
		d. Landscaping																						
		e. Roads, bridges, tunnels, dams																						
		f. Other engineering																						

(cont. - Page 3 of 3)

		Topic Represented:	1		2		3		4		5		6		7		8		9		10		Summary	
			L	M	L	M	L	M	L	M	L	M	L	M	L	M	L	M	L	M	L	M	L	M
8.	TRANSPORTATION	a. Airways																						
		b. Space vehicles																						
		c. Highways/vehicles																						
		d. Railways																						
		e. Waterways/vehicles																						
		f. Pipelines/conveyors																						
9.	COMMUNICATION Electronic / Graphic	a. Drawing/design																						
		b. Photography																						
		c. Printing/publishing																						
		d. Radio/television																						
		e. Telephone/telegraph																						
		f. Computer--data processing																						
10.	CONSUMPTION	a. Advertising/marketing																						
		b. Distribution/sales																						
		c. Consumer information																						
		d. Product servicing																						

APPENDIX B

BOOKS USED IN THE STUDY

(total population)

APPENDIX B

History and Development*

Art Industries and Trade**

Colby, Carroll B. Early American Crafts: Tools, Shops and Products. gr. 3 up. 1967. Coward.***

Tunis, Edwin. Colonial Craftsmen and the Beginnings of American Industry. gr. 6 up. 1965. World Pub.

Automation/Calculating Machines

Blumle, Andrew. Automation. gr. 6-10. 1963. World Pub.

Chester, Michael and Nephew, William. Wonders of Robots. gr. 5 up. 1962. Putnam.

Hirsch, S. Carl. This is Automation. Il. by Anthony Ravielli. gr. 4-9. 1964. Viking Press.

Kenyon, Raymond G. I Can Learn about Calculators and Computers. gr. 5 up. 1961. Har-Row.

Lewis, Alfred. New World of Computers. gr. 3-9. 1965. Dodd.

Seldin, Joel. Automation: The Challenge of Men and Machines. gr. 6-8. 1965. Coward.

Vorwald, Alan and Clark, Frank. Computers: From Sand Table to Electronic Brain. gr. 5 up. 3rd. ed. 1970. McGraw.

Inventions

Barker [Baker], Eric J. and Hammer, C. L. Discoveries and Inventions. gr. 2-6. 1962. Verry.

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*Major topic heading.

**Subject headings from Subject Guide to Children's Books in Print 1970. New York: R. R. Bowker Company.

***See Publisher Index at end of Book List for complete addresses.

Bartlett, Margaret F. Exploring the Everyday World. Il. by Kelly Oechsli. gr. 3-6. 1968. Hawthorn.

Blow, Michael and Multhraup, R. P., eds. Men of Science and Invention. gr. 5 up. 1961. Har-Row.

Bonner, Mary G. Wonders of Inventions. Il. by Carol Cobbledick. gr. 4-9. 1961. Lantern.

Burlingame, Roger. Out of Silence into Sound: The Life of Alexander Graham Bell. gr. 6-8. 1964. Macmillan.

Chandler, Maurice H. Man the Inventor. Il. by M. Russo and F. Russo. gr. 3-6. Rand.

Cooke, David C. Inventions That Made History. gr. 5 up. 1969. Putnam.

Simpson, Wilma and John. About Pioneers: Yesterday, Today and Tomorrow. Il. by F. Kerechuk. gr. 3-6. 1963. Melmont.

Soule, Gardner. Tomorrow's World of Science: The Challenge of Today's Experiments. gr. 6-8. 1963. Coward.

Inventors

Bare, Margaret A. John Deere: Blacksmith Boy. gr. 3-7. Bobbs.

Cousins, Margaret. Thomas Alva Edison. gr. 4-8. 1965. Random.

Dobler, Lavinia. Cyrus McCormick: Farmer Boy. gr. 3-7. Bobbs.

_____. Lee De Forest: Electronics Boy. gr. 3-7. Bobbs.

Dunkam, Montrew. George Westinghouse: Young Inventor. gr. 3-7. 1963. Bobbs.

Evans, Idrisyn O. Inventors of the World. gr. 5-9. 1963. Warne.

Guy, Anne. Steinmetz: Wizard of Light. Il. by Leonard Rosoman. gr. 3-7. 1965. Knopf.

Hiebert, Roselyn and Ray E. Thomas Edison: American Inventor. gr. 5 up. 1969. Watts.

Howard, Robert W. Eli Whitney. Il. by David Cunningham. gr. 5 up. 1966. Follett.

Hutchings, David. Edison at Work: The Thomas A. Edison Laboratory at West Orange, N. J. gr. 6 up. 1969. Hastings.

Kaufman, Mervyn D. Thomas A. Edison: Miracle Maker. gr. 2-5. 1964. Garrard.

_____. Wright Brothers: Kings of the Air. gr. 2-5. 1964. Garrard.

Latham, Jean L. Eli Whitney: Great Inventor. gr. 2-5. 1963. Garrard.

_____. Samuel F. B. Morse: Artist and Inventor. gr. 2-5. 1961. Garrard.

Leipold, L. Edmond. Famous Scientists and Astronauts. gr. 5-7. Denison.

Lowitz, Sadyebeth and Anson. Tom Edison Finds Out. Il. by Anson Lowitz. gr. 2-6. rev. 1967. Lerner Pubns.

Montgomery, Elizabeth R. Alexander Graham Bell: Man of Sound. gr. 2-5. 1963. Garrard.

_____. Henry Ford: Automotive Pioneer. Il. by Russel Hoover. gr. 4. 1969. Garrard.

Myers, Elisabeth P. George Pullman: Young Sleeping Car Builder. gr. 3-7. 1963. Bobbs.

Paradis, Adrian A. Gail Borden: Resourceful Boy. gr. 3-7. 1964. Bobbs.

_____. Harvey S. Firestone: Young Rubber Pioneer. gr. 3-7. 1968. Bobbs.

_____. Henry Ford. Il. by Paul Frame. gr. 2-4. 1968. Putnam.

Pringle, Patrick. Young Edison. Il. by William Randell. gr. 6-10. 1963. Roy.

Radford, Ruby L. Inventors in Industry. Il. by Jim Fox. gr. 3-6. 1969. Messner.

Richards, Kenneth G. Henry Ford. gr. 6 up. 1967. Childrens.

Richards, Norman. Story of Monticello. Il. by Chuck Mitchell. gr. 4-8. 1970. Childrens.

Robbin, Irving. How and Why Wonder Book of Basic Inventions. Il. by Leonard Vosburgh. gr. 4-6. 1965. Wonder.

Sobol, Donald J. Wright Brothers at Kitty Hawk. gr. 4-7. 1961. Nelson.

Stevenson, Augusta. John Fitch: Steamboat Boy. gr. 3-7. 1966. Bobbs.

Webb, Robert N. James Watt: Inventor of a Steam Engine. gr. 6 up. 1970. Watts.

Widdemer, Mabel C. Aleck Bell: Ingenious Boy. gr. 3-7. 1964. Bobbs.

Silversmithing

Fisher, Leonard E. Silversmiths. Il. by Leonard E. Fisher. gr. 4 up. 1965. Watts.

Smithsonian Institution

Neal, Harry E. Treasures by the Millions: The Story of the Smithsonian Institution. gr. 6 up. 1961. Messner.

Technology/Civilization

Bertin, Leonard. Boy's Book of Modern Scientific Wonders. gr. 6-10. Roy.

Burland, Cottie. Men without Machines: The Story of Primitive Peoples. gr. 6-9. 1969. Natural Hist.

Fabell, Walter. Nature's Clues. Il. by Robert Patterson. gr. 4-6. 1964. Hastings.

Golstein, Kenneth K. World of Tomorrow. gr. 5 up. 1969. McGraw.

Halacy, D. S. Jr. Century Twenty-One: Your Life in the Year 2001 and Beyond. gr. 5-8. 1968. Macrae.

_____. Nine Roads to Tomorrow. gr. 6 up. 1964. Hale.

Tools, History

Adler, Irving and Ruth. Machines. Il. by Ruth Adler. gr. 3-5. 1964. John Day.

Jolliffe, Anne. Man the Maker. gr. 1-4. 1968. Hawthorn.

Poling, James. Story of Tools: How They Built Our World and Shaped Man's Life. gr. 5-9. 1969. Norton.

Zim, Herbert S. and Skelly, James R. Machine Tools. Il. by Gery Ruse. gr. 4-6. 1969. Morrow.

Miscellaneous

Fisher, Leonard E. Weavers. gr. 4 up. 1966. Watts.

Kelly, Regina Z. Paul Revere, Colonial Craftsman. gr. 4 up. 1963.

Sloane, Eric. A B C Book of Early Americana. gr. 4 up. 1963. Doubleday.

Stroese, Susanne. Candle-Making. gr. 5-8. 1968. Sterling.

Resources

Air

Adler, Irving and Ruth. Air. gr. 2-5. 1962. John Day.

Chandler, T. J. Air Around Us. gr. 1-6. 1969. Natural Hist.

Freeman, Mae. When Air Moves. gr. 4-6. 1968. McGraw.

Keen, Martin and Cuniff, Claire. How and Why Wonder Book of Air and Water. gr. 3-9. 1969. Wonder.

Knight, David C. First Book of Air. gr. 4-6. 1961. Watts.

Rosenfeld, Sam. Science Experiments with Air. Il. by James Barry. gr. 6 up. 1969. Harvey.

Air Pollution

Chester, Michael. Let's Go to Stop Air Pollution. Il. by Albert Micale. gr. 2-4. 1968. Putnam.

Marshall, James. Air We Live In. gr. 6-9. 1969. Coward.

Shuttlesworth, Dorothy E. Clean Air, Sparkling Water. gr. 3-5. 1968. Doubleday.

Atomic Energy/Atomic Power Plants

Anderson, William R. and Pizer, Vernon. Useful Atom. gr. 4 up. 1966. World Pub.

Barr, Donald. How and Why Wonder Book of Atomic Energy. Il. by George Zaffo. gr. 4-6. Wonder.

Beeler, Nelson and Branley, Franklyn M. Experiments with Atomics. Il. by A. W. Revell. gr. 5-9. rev. ed. 1965. T Y Crowell.

Colby, Carroll B. Atom at Work: How Nuclear Power Can Benefit Man. gr. 5-7. 1968. Coward.

Dukert, Joseph M. Atompower. Il. by John T. Gorsuch. gr. 6-8. 1962. Coward.

Gaines, Matthew. Atomic Energy. gr. 5 up. 1970. G&D.

Grey, Vivian. Secret of the Mysterious Rays: The Discovery of Nuclear Energy. Il. by Ed Malsberg. gr. 5-8. 1966. Basic.

Halacy, D. S. Energy & Engines. Il. by Haris Petie. gr. 6 up. 1967. World Pub.

Hatcher, Charles. Atom. gr. 5-9. 1963. St. Martin.

Hyde, Margaret O. Atoms Today and Tomorrow. Il. by Ed Malsberg. gr. 5 up. 4th ed. 1970. McGraw.

Kohn, Bernice. Peaceful Atom. Il. by Zenowij Onyshkewych. gr. 3-6. 1963. P-H.

Larsen, Egon. Atoms and Atomic Energy. gr. 3-6. 1963. John Day.

Moore, William. Atomic Pioneers. gr. 5-8. 1970. Putnam.

Polking, Kirk. Let's Go to an Atomic Energy Town. Il. by Charles Dougherty. gr. 3-6. 1968. Putnam.

Potter, Robert D. Young People's Book of Atomic Energy. gr. 6-10. rev. ed. 1967. Dodd.

Rosenfeld, Sam. Ask Me a Question about the Atom. Il. by James E. Barry. gr- 5-8. 1969. Harvey.

Woodbury, David O. New World of the Atom. gr. 4-6. 1965. Dodd.

Atoms

Adler, Irving and Ruth. Atoms and Molecules. Il. by Ruth Adler. gr. 3-5. 1966. John Day.

Bronowski, Jacob and Selsam, M. E. Biography of an Atom. Il. by Weimer Pursell. gr. 3-7. 1965. Har-Row.

Landin, Les. About Atoms for Junior. gr. 3-6. 1961. Melmont.

Rowland, John. Ernest Rutherford, Master of the Atom. gr. 5-9. 1964. Dufour.

Victor, Edward. Molecules and Atoms. Il. by Mel Hunter. gr. 2-4. 1963. Follett.

Coal Mines and Mining

Adler, Irving and Ruth. Coal. Il. by Ruth Adler. gr. 2-5. 1965. John Day.

Force and Energy

Cooper, Margaret. Gift from the Sun: The Mastering of Energy. gr. 5-8. 1969. Bradbury Pr.

Hellman, Hal. Energy and Inertia. gr. 4 up. 1970. M. Evans.

Moore, Jordan. Living Science: Energy. Il. by J. Reid. gr. 1-4. 1967. G&D.

Podendorf, Illa. True Book of Energy. gr. 2-5. 1963. Childrens.

Ross, Frank Jr. World of Power and Energy. gr. 5-9. Lothrup.

Ubell, Earl. World of Push and Pull. Il. by Arline Strong. gr. 2-5. 1964. Atheneum.

Valens, Evans. Motion. gr. 4-8. Hale.

_____, and Abbott, Bernice. Motion. Photos by Bernice Abbott. gr. 5 up. 1965. World Pub.

Walker, Charles. Progress with Energy. Il. by John Lathery. 1967. St. Martin.

Forest Products/Forests and Forestry

Brooks, Anita. Picture Book of Timber. gr. 4-7. 1967. John Day.

Dobrin, Norma. About Foresters. Il. by A. Dobrin. gr. 3-6. 1962. Melmont.

Farb, Peter, ed. Forest. gr. 4-8. Time-Life. Silver.

Gringhuis, Dirk. From Tall Timber. gr. 3-5. 1964. A. Whitman.

Hyde, Wayne. What Does a Forest Ranger Do. gr. 3-7. 1964. Dodd.

May, Julian. Evergreen Woods. gr. 5-9. 1970. Creative Ed.

_____. Forests That Change Color. gr. 5-9. 1970. Creative Ed.

Milne, Lorus J. and Margery. Phoenix Forest. Il. by Elinor Van Ingen. gr. 4-6. 1968. Atheneum.

Moore, Alma C. Friendly Forests. Il. by Matthew Kalmenoff. gr. 4-8. rev. ed. 1963. Viking Press.

Rich, Louise D. First Book of Lumbering. Il. by Victor Mays. gr. 4 up. 1967. Watts.

Selsam, Millicent E. Birth of a Forest. Il. by Barbara Wolff. gr. 3-7. 1964. Har-Row.

Silverberg, Robert. Vanishing Giants: The Story of the Sequoias. (Orig. Title: Big Trees). gr. 5 up. 1969. S&S.

Taylor, Arthur S. et al. Logging: The Story of an Industry. gr. 4-6. 1962. Lane.

Wood, Dorothy and Frances. Forests Are for People. gr. 5 up. 1970. Dodd.

Gold/Mines/Mining

Allen, Gina. Gold Is. gr. 6 up. 1969. Hawthorn.

Luhrmann, Winifred H. First Book of Gold. gr. 4-6. 1968. Watts.

Paradis, Adrian A. Gold: King of Metals. Il. by Lorence F. Bjorklund. gr. 3-6. 1970. Hawthorn.

Lumber and Lumbering

Floethe, Louise L. and Richard. Story of Lumber. Il. by Richard Floethe. gr. 1-5. 1962. Scribner.

MacConomy, Alma. Odd Jobs In Lumbering. Il. by C. Hawes. gr. 5-9. 1967. Putnam.

Patterson, Lillie. Lumberjacks of the Northwoods. Il. by V. Mays. gr. 3-6. Garrard.

Sterling Pub. Co. Lumber in Pictures. gr. 3-8. 1963. Sterling.

Mineralogy/Mines and Mineral Resources

Comfort, Iris T. Earth Treasures: Rocks and Minerals. Il. by Jan Fairservis. gr. 3-6. 1964. P-H.

Gallant, Ray A. and Schuberth, Christopher J. Discovering Rocks and Minerals. gr. 5-8. 1967. Natural Hist.

Gilbert, Miriam. Science Hobby Book of Rocks and Minerals. gr. 5-10. rev. ed. 1968. Lerner Pubns.

Keene, Melvin. Beginner's Story of Minerals and Rocks. Il. by Harry McNaught. gr. 3-7. 1966. Har-Row.

Page, Lou W. Rocks and Minerals. Il. by Robert Lee. gr. 2-4. 1962. Follett.

Pearl, Richard M. Wonders of Rocks and Minerals. gr. 4-6. 1961. Dodd.

Shuttlesworth, Dorothy. Story of Rocks. Il. by Suzan N. Swain. gr. 5-8. rev. ed. 1966. Doubleday.

Smith, Howard E. Jr. From Under the Earth: America's Metals, Fuels and Minerals. Il. by Howard E. Smith. gr. 5-9. 1967. HarBraceJ.

Smithline, Frederick. Answers About Rocks and Minerals. gr. 3-9. 1968. G&D.

White, Anne T. All about Rocks and Minerals. gr. 4-6. 1963. Random.

Natural Resources

Chilton, Shirley et al. Economics for Young People, Bk. 3: How Things We Use Are Made. Il. by N. Kay Stevenson and Kathleen McCarthy. gr. 3-5. 1970. Elk Grove.

Duffy, Eric. Conservation of Nature. gr. 5 up. 1970. McGraw.

McCoy, J. J. Shadows over the Land. gr. 5 up. 1970. Seabury.

Pringle, Laurence. Only Earth We Have. gr. 4-8. 1969. Macmillan.

Sootin, Harry. Young Experimenter's Workbook: Treasures of the Earth. Il. by Frank Aloise. gr. 4-6. 1965. Norton.

Worth, Jean. Man, Earth and Change. gr. 6-9. 1968. Coward.

Mattison, Charles W. and Alvarez, Joseph. Man and His Resources. gr. 4-8. 1967. Creative Ed.

Munzer, Martha E. Pockets of Hope: Studies of Land and and People. gr. 4 up. 1967. Knopf.

Noise

Navarra, John G. Our Noisy World: The Problem of Noise Pollution. gr. 6-9. 1969. Doubleday.

Nuclear Physics/Nuclear Propulsion

Beeler, Nelson F. and Branley, Franklyn M. Experiments With Atomics. Il. by A. W. Revell. gr. 5-9. rev. ed. 1965. T Y Crowell.

Grey, Vivian. Secret of the Mysterious Rays: The Discovery of Nuclear Energy. Il. by Ed Malsberg. gr. 5-8. 1966. Basic.

Petroleum

Brooks, Anita. Picture Book of Oil. gr. 4-7. 1965. John Day.

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Braude, Michael. Andy Learns About Advertising. Il. by Howard Lindberg. gr. 3-6. Denison.

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Consumption--Economics

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Erdoes, Richard. Peddlers and Vendors Around the World. gr. 3 up. 1968. McGraw.

APPENDIX C

PUBLISHER INDEX

APPENDIX C

Publisher Index

A-W	Addison Wesley Pub. Co. Reading, Mass. 01867 Imprint: Addisonian (Addisonian Press)
A Whitman	Albert Whitman & Co. 560 W. Lake St. Chicago, Ill. 60606
Abelard	Abelard-Schuman, Ltd. Div. of Intext Educational Publishers 6 W. 57th St. New York, N.Y. 10019
Abingdon	Abingdon Press 201 Eighth Ave. S. Nashville, Tenn. 37203
Arco	Arco Pub. Co., Inc. 219 Park Ave. S. New York, N.Y. 10003
Astor-Honor	Astor-Honor, Inc. Div. of International Communications, Inc. 205 E. 42nd St. New York, N.Y. 10017
Atheneum	Atheneum Pubs. 122 E. 42nd St. New York, N.Y. 10017
Basic	Basic Books, Inc., Publishers 404 Park Ave. S. New York, N.Y. 10016
Benefic	Benefic Press Pub. Div. of Beckley-Cardy Co. 10300 W. Roosevelt Rd. Westchester, Ill. 60153
Berg	Norman S. Berg "Sellanraa" Dunwoody, Ga. 30338
Bobbs	Bobbs-Merrill Co., Inc. Subs. of Howard W. Sams & Co., Inc. 4300 W. 62nd St. Indianapolis, Ind. 46268

Bowmar	Bowmar 622 Rodier Dr. Glendale, Calif. 91201
Bradbury Pr	Bradbury Press, Inc. Subsidiary of Prentice-Hall, Inc. Englewood Cliffs, N.J. 07632
Branford	Charles T. Branford Co. 28 Union St. Newton Centre, Mass. 02159
Childrens	Children's Press, Inc. Div. of Regensteiner Publishing Enterprises, Inc. 1224 W. Van Buren St. Chicago, Ill. 60607
Chilton	Chilton Book Co. 401 Walnut St. Philadelphia, Pa. 19106
Coward	Coward-McCann, Inc. 200 Madison Ave. New York, N.Y. 10016
Creative Ed	Creative Educational Society, Inc. 515 N. Front St. Mankato, Minn. 56001
Criterion	Criterion Books, Inc. Div. of Intext Educational Publishers 6 W. 57th St. New York, N.Y. 10019
D White	David White Co. 60 E. 55th St. New York, N.Y. 10022
Davis Mass	Davis Publications, Inc. 19-70 Printers Bldg. Worcester, Mass. 01608
Denison	T. S. Denison & Co., Inc. 5100 W. 82nd St. Minneapolis, Minn. 55431
Dial	The Dial Press Sub. of Dell Pub. Co., Inc. 750 Third Ave. New York, N.Y. 10017

Dodd	Dodd, Mead & Co. 79 Madison Ave. New York, N.Y. 10016
Doubleday	Doubleday & Co., Inc. 277 Park Ave. New York, N.Y. 10017 Orders to 501 Franklin Ave., Garden City, N.Y. 11530 Imprint: Anch (Anchor Books) Zenith. (On Doubleday entries, the letter "a" following the price signifies that the cost of the library binding is $0.75 net higher than the cost of the trade edition.)
Dufour	Dufour Editions, Inc. Chester Springs, Pa. 19425
Dutton	E. P. Dutton & Co., Inc. 201 Park Ave. S. New York, N.Y. 10003
Elk Grove	Elk Grove Press 17420 Ventura Blvd. Encino, Calif. 91316
Follett	Follett Pub. Co. 201 N. Wells St. Chicago, Ill. 60606
Four Winds	Four Winds Press Scholastic Book Services Div. of Scholastic Magazines, Inc. 50 W. 44th St. New York, N.Y. 10036
G&D	Grosset & Dunlap, Inc. 51 Madison Ave. New York, N.Y. 10010 Imprints: Sign (Signature Books), Tempo (Tempo Books), UL (Universal Library)
Garrard	Garrard Pub. Co. 2 Overhill Rd. Scarsdale, N.Y. 10583 All Orders to: 1607 N. Market St., Champaign, Ill. 61820
Golden Gate	Golden Gate Junior Books Div. of Nourse Pub. Co. Box 398 San Carlos, Calif. 94070

Golden Pr — Golden Press, Inc.
Div. of Western Pub. Co., Inc.
850 Third Ave.
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Hale — E. M. Hale & Co., Inc.
1201 S. Hastings Way
Eau Claire, Wis. 54701

Har-Row — Harper & Row, Pubs.
49 E. 33rd St.
New York, N.Y. 10016
(Orders to Keystone Industrial Pk.,
Scranton, Pa. 18512)
Imprints: HarpT (Harper Trade, Books), PL (Perennial Library), Torch (Torch Books), HarpR

HarBraceJ — Harcourt Brace Jovanovich, Inc.
757 Third Ave.
New York, N.Y. 10017
Imprints: HPL (Harbrace Paperback Library), Voy B (Voyager Books)

Harvey — Harvey House, Inc.
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Hastings — Hastings House Pubs.
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Hawthorn — Hawthorn Books, Inc.
70 Fifth Ave.
New York, N.Y. 10011

HM — Houghton Mifflin Co.
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Boston, Mass. 02107
Educational Div.: 110 Tremont St., Boston, Mass. 02107
Imprints: Piper (Piper Books), RivEd (Riverside Editions) RivSL

John Day — The John Day Co., Inc.
Div. of Intext Educational Pubs.
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New York, N.Y. 10010

Knopf — Alfred A. Knopf, Inc.
Subs. of Random House
Random House Bldg.
201 E. 50th St.
New York, N.Y. 10022

Lane	Lane Magazine & Book Co. Menlo Park, Calif. 94025
Lantern	Lantern Press, Inc., Publishers 257 Park Ave. S. New York, N.Y. 10010
Lerner Pubns	Lerner Publications Co. 241 First Ave. North Minneapolis, Minn. 55401
Lion	Lion Press 52 Park Ave. New York, N.Y. 10016
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Macmillan	Macmillan Co. Subs. of Crowell Collier & Macmillan Inc. 866 Third Ave. New York, N.Y. 10022 Imprints: Collier (Collier Books), CCPR, Acorn, Dove
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Meredith	Meredith Press Orders to Hawthorn Books, Inc., 70 5th Ave., New York, N.Y. 10011
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Morrow	William Morrow & Co., Inc. Wholly-Owned Subs. of Scott, Foresman & Co. 105 Madison Ave. New York, N.Y. 10016 Orders to 6 Hendricks Dr., West Caldwell, N.J. 07006
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Nelson	Thomas Nelson, Inc. Copewood & Davis Sts. Camden, N.J. 08103
Norton	W. W. Norton & Co. 55 Fifth Ave. New York, N.Y. 10003 Orders to Grosset & Dunlap, Inc., 51 Madison Ave., New York, N.Y. 10010
P-H	Prentice-Hall, Inc Englewood Cliffs, N.J. 07632
Pantheon	Pantheon Books Div. of Random House, Inc. 201 E. 50th St. New York, N.Y. 10022
Parents	Parents Magazine Press Div. of Parents Magazine Enterprises, Inc. 52 Vanderbilt Ave. New York, N.Y. 10017
Praeger	Praeger Publishers, Inc. Subs. of Encyclopaedia Britannica, Inc. 111 Fourth Ave. New York, N.Y. 10003

Putnam	G. P. Putnam's Sons 200 Madison Ave. New York, N.Y. 10016 Imprint: Cap (Capricorn Books)
Rand	Rand McNally & Co. P.O. Box 7600 Chicago, Ill. 60680
Random	Random House, Inc. Subs. of RCA Corp. 201 E. 50th St. New York, N.Y. 10022 Orders to Random House, Order Dept., Westminster, Md. 21157 Imprint: Vin (Vintage Trade Books)
Reilly & Lee	Reilly & Lee Books Subs. of Henry Regnery Co. 114 W. Illinois St. Chicago, Ill. 60610
Roy	Roy Publishers, Inc. 30 E. 74th St. New York, N.Y. 10021
S&S	Simon & Schuster, Inc. 630 Fifth Ave. New York, N.Y. 10020 Orders to 1 W. 39th St., New York, N.Y. 10018 Imprint: Clarion (Clarion Books)
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St Martin	St. Martin's Press, Inc. 175 Fifth Ave. New York, N.Y. 10010
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Sterling	Sterling Pub. Co. 419 Park Ave. S. New York, N.Y. 10016
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Transatlantic	Transatlantic Arts, Inc. North Village Green Levittown, N.Y. 11756
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VanN-Rein	Van Nostrand Reinhold Co. Div. of Litton Educational Pub., Inc. 450 W. 33rd St. New York, N.Y. 10001 Imprints: Anv (Anvil Books), IB (Insight Books), Mtum (Momentum Books), Srchl (Searchlight Books)
Verry	Lawrence Verry, Inc. 16 Holmes St. Mystic, Conn. 06355 Imprint: Pub. by Am U of Beirut (Published by American University of Beirut)
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Watts	Franklin Watts, Inc. Subs. of Grolier Inc. 845 Third Ave. New York, N.Y. 10022
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Wonder	Wonder-Treasure Books, Inc. Div. of Grosset & Dunlap, Inc. 51 Madison Ave. New York, N.Y. 10010
World Pub	World Pub. Co. Subs. of The Times Mirror Co. 110 E. 59th St. New York, N.Y. 10022

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