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# Analysis of occupational information in three junior high mathematics series.

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BOSTON UNIVERSITY  
SCHOOL OF EDUCATION

Major Paper

ANALYSIS OF OCCUPATIONAL INFORMATION  
IN THREE JUNIOR HIGH MATHEMATICS SERIES

Submitted by

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(A. B., Houghton College, 1942)

In Partial Fulfillment of Requirements for  
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## CHAPTER I

### THE PROBLEM AND ITS SIGNIFICANCE

#### Nature and Scope of the Study

Purpose of the study.-- The purpose of this study is to point out what occupational information is available in three series of typical junior high mathematics textbooks, to organize and classify the occupational information which is included, and to suggest simple methods by which teachers can make such information an integral part of their regular courses.

Scope and delimitation.-- This study will be limited to the examination and analysis of nine junior high school mathematics textbooks. The study is made assuming that there is occupational information available in mathematics texts of which teachers are not aware and thus are not using to the greatest advantage. The term "occupational information" as used in this study is best defined by Carroll L. Shartle.<sup>1</sup>

Accurate and usable information about jobs and occupations; information about industries and processes insofar as such information is directly related to jobs; pertinent and usable facts about occupational trends and the supply and demand of labor.

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<sup>1</sup> Carroll L. Shartle. Occupational Information, Prentice-Hall Incorporated, 1946, p. 1



## Justification

### The need for teaching occupational information.

When one considers the fact that the 1940 Census contained about 25,000 occupational titles and that the Dictionary of Occupational Titles contains the definitions of over 21,000 separate jobs or occupations, it is not difficult to see that there must be a definite effort made if students in high schools today are to get any kind of an adequate understanding of the world of work as it exists today. Billings<sup>1</sup> emphasizes the need for such training.

Present conditions have emphasized the need for the organized presentation of educational and vocational information through which may be developed concepts and understandings of occupational life and its problems, resulting in the development of right attitudes and the acquiring of skills needed for self-guidance and adjustment.

Training in occupations is necessary from a social as well as a vocational point of view in teaching students to respect useful work, to develop an interest and appreciation for the work of the world and a desire to participate in it. Study of occupations can do much

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<sup>1</sup> Mildred Lincoln Billings. Group Methods of Studying Occupations, International Textbook Company, Scranton, 1941, p.vi

to alleviate unwarranted prejudices toward certain types of work and in developing an increasing awareness of the contributions that all workers make to human welfare and progress. Students need this kind of information to enable them to discuss competently and to face intelligently some of the problems which will confront them as workers. Pupils in school need to learn how to study an occupation in order to make a choice of their own life work consistent with their interests and abilities. These major purposes of instruction in occupations are summed up by Koos and Kefauver.<sup>1</sup>

The course on occupations has two major purposes. The first to give information about occupational conditions and opportunities and to develop an understanding of occupational problems intended to qualify the individual to make the choice of an occupation and to contribute to success in it. The second purpose is social in nature: it gives an understanding of the interdependence of people in different occupations, and the working conditions of the vocational groups, an understanding believed to develop sympathy with and toleration of people in vocational groups other than one's own.

Gertrude Forrester<sup>2</sup> says "In order that each individual during his youth may make an execute plans for

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<sup>1</sup> Leonard V. Koos and Grayson N. Kefauver. Guidance in Secondary Schools, The Macmillan Company, New York, 1932, p.72

<sup>2</sup> Gertrude Forrester. Methods of Vocational Guidance, D. C. Heath and Company, Boston, 1944, p.4

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choosing an occupation and preparing for it he must know the requirements, opportunities, and trends of the various occupational fields. He must also know what the various fields are."

This course in occupations, valuable though it is in orienting the student to the broad fields of occupations, broken down into major classifications, is limited by time. Specific instruction must be included in the offering of all teachers to supplement that presented in the occupations class. Jones and Hand<sup>1</sup> would affirm that every classroom teacher is responsible in assisting toward this very important goal.

The classroom teacher who has the most to do with the shaping of the student's learning experiences must be intimately conversant with his needs, desires, and consequent purposes, and must be in large part responsible for assisting him in the formulation of his goals.

Importance of teaching occupational information  
regular school subjects. Since it is impossible for the teacher in this course in occupations to cover adequately the range of occupations from which students may choose their life work, this part of the guidance responsibility

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<sup>1</sup> Arthur J. Jones and Harold C. Hand. Guidance and Purposive Living, The Thirty-Seventh Yearbook of the National Society for the Study of Education, Part I, Public School Publishing Company, Bloomington, Illinois, 1938, p.25

falls to each individual teacher to teach the occupational information closely related to his subject according to Myers.<sup>1</sup>

Essential as is provision in secondary schools for special study of occupational information and however effectively this may be done, teachers of all other subjects in these schools also have a responsibility in this matter. Every subject teacher should be expected to assist his pupils to obtain significant information concerning the occupations which are closely related to, or depend to a large extent upon, his subject.

For example, the teacher of math should help his pupils to obtain a general picture of the opportunities and requirements of engineering, of actuarial work, of mathematics teaching, and of other occupations in which a considerable knowledge of mathematics is essential...The mathematics teacher should know more than any other member of the school staff, not excepting the teacher of occupational information himself, about these particular occupations and he should be expected to share this information with interested students and to help them find additional information that they may need.

C. Gilbert Wrenn<sup>2</sup> includes among his guidance functions of subject teachers "to arouse interest and develop right attitudes, to stress occupational information concerned with the subject."

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<sup>1</sup> George E. Myers. Principles and Techniques of Vocational Guidance, McGraw-Hill Book Company, Incorporated, 1941, p. 115

<sup>2</sup> C. Gilbert Wrenn. "Counseling With Students," Guidance in Educational Institutions, The Thirty-Seventh Yearbook of the National Society for the Study of Education, Part I, Public School Publishing Company, Bloomington, Illinois, 1938, p. 124

Smith and Roos<sup>1</sup> feel that the teacher has a definite contribution to make to the guidance program "by cooperating with the counselor in the presentation of new and old occupational, psychological, educational, cultural and vocational material in the home room period, and by presenting such material in the regular class period through planned and purposeful assignments."

Besides this fact, that it is impossible to attempt to teach students all the occupational opportunities available without the aid of all the subject-matter teachers to complement the work of the occupations course instructor, there is another responsibility which the school has, that of teaching the practical usefulness of each subject included in the curriculum. And this becomes a guide-and function of the subject teacher. Allen<sup>2</sup> states that "Every good subject teacher is expected to be deeply interested in her subject. She is expected to motivate or 'sell' the subject, to give attention to the problems of individual differences as they are related to interest and achievement in the subject, and to develop leadership through success in the subject."

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<sup>1</sup> Charles M. Smith and Mary M. Roos. A Guide to Guidance Prentice-Hall, Incorporated, New York, 1942, pp. 254-5

<sup>2</sup> Richard D. Allen. Organization and Supervision of Guidance in Public Education, Inor Publishing Company, New York, 1934, p. 120

In an attempt to determine the occupational knowledge of high school students, Roeber,<sup>1</sup> using two thousand boys and girls in grades nine through twelve in twenty-two different schools in Illinois and Wisconsin, found that these students generally were unable to indicate proper relationships between school subjects and occupations. Apparently the teachers are assuming that such relationships are self-evident, or else they are ignorant of the relationships that do exist. Roeber concludes that many teachers have only too little knowledge of the occupations directly related to their courses. Billings<sup>2</sup> feels that for these teachers an effort to introduce related occupational information can prove just as stimulating as for the pupils.

The effort to introduce pertinent occupational information into subject matter will of necessity put a teacher in touch with current sources of information, broaden his contacts outside school, and enliven his thinking as well as that of his pupils. It is reciprocally helpful and stimulating; that is, the subject matter grows in its importance to the student, and the teacher increasingly sees and bring out the vocational implications and practical values of his subject.

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<sup>1</sup> Edward C. Roeber. "High School Students Need Vocational Information, "Occupations, 23, 99, November 1944

<sup>2</sup> Op. cit., p. 227

Roeber<sup>1</sup> feels that related occupational material which contributes to the occupational knowledge of students can be introduced into school subjects without disrupting the continuity of the course. The occupations which have a definite relationship to the school subjects should be studied in conjunction with the regular activities, the class discussions and assignments. He would emphasize the responsibility which the school has of either indicating the uses of any school subject or else developing courses whose aim is to prepare students for future occupations.

The teacher of a subject, and in this study that subject will be mathematics, needs to realize that knowledge of related occupations and of the normal day-by-day activities that require mathematics will constitute a great stimulation to the students in their school as well as providing valuable guidance service. Butler and Wren<sup>2</sup> are of this opinion.

A very important means of stimulating interest in mathematics is through pointing out its applications to fields of work through which people gain their livelihood... All boys and many girls look forward to the intensely practical problem of selecting an occupation and earning a living and they are generally interested in learning something about

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<sup>1</sup> Op. cit., p. 100

<sup>2</sup> Charles H. Butler and F. Lynwood Wren. The Teaching of Secondary Mathematics, McGraw-Hill Book Company, Incorporated, New York 1941, p. 114

the opportunities and requirements in different fields. The extent to which mathematics enters into the upper levels of many lines of work is not realized by most people.

The teacher of mathematics in particular needs to be well informed as to the qualifications, trends in supply and demand, and remuneration of such occupations as bookkeeping clerical work, farming, and nursing. He needs up-to-date knowledge of the opportunities and the work involved in professional occupations in which mathematicians engage, the work of statisticians, of engineers, surveyors, accountants, actuaries, medical and health service workers and research workers in the various fields of science. He needs to know about the particular industries which employ large numbers of mathematicians, such as, communications, electrical manufacturing, aircraft manufacturing, and the petroleum industry. The class room teacher needs to be alert to the possibilities and his own responsibility for imparting such occupational information as is related to his school subjects.

The purpose of this study, then, is to point out the occupational information that is already contained in nine junior high texts in mathematics together with suggested methods and activities to aid the teacher in using such information to instruct his students in the occupations related to these specific courses. The study is being undertaken because it is felt strongly that the field of



occupational study is too broad to be adequately covered by a counselor in the limited time available for a course in occupations. This class instruction, if indeed such is even offered, needs to be supplemented by the teacher in each field of instruction who has reason to be an expert in occupations related to his specific courses. Secondly, it is believed that it is a definite responsibility of the school, and thus of the subject teachers involved, to teach the usefulness of each subject in the curriculum and thus the justification for its inclusion in the school program. Finally, the teaching of the occupational information pertinent to each individual subject can stimulate the pupil's interest in the course by relating it to fields of work and possibly guide him into the vocational choice best suited to his abilities and interests.

## CHAPTER II

### DESCRIPTION OF MATERIALS AND METHOD USED IN THE ANALYSIS OF THE PROBLEM

#### Preliminary Investigation

Criteria needed for the selection of texts.--In order to make a study of the amount and kinds of occupational information contained in junior high school mathematics texts it was necessary to set up some criteria for choosing the books. It was felt that series of texts would be more valuable than a heterogeneous assortment of books. Another criterion should be comparative recency of publication since there has been an increasing tendency in late years to make textbook material relate as closely as possible to the kinds of information that will be most useful in the student's future living. Such a functional approach one could assume would include kinds of information concerning fields of work toward which mathematical concepts pertain. Then, too, it would seem to be wise to use texts that are widely in use at the present in public schools in this country. Such texts would seem to be those most widely approved by the educators using them.

Range of series for the selection of texts.--In seeking out those series of Junior High Mathematics texts which would fulfill these criteria, a list was made of the series

of textbooks of recent publication which are now available at the various publishing house for classroom use. Those discovered were the following: Scott, Foresman and Company Mathematics and Life, Books one, Two, Three, by Knight, Studebaker, Tate; Ginn and Company, Everyday Junior Mathematics, Books One, Two, Three, by William Betz; Allyn and Bacon, First, Second and Third Courses in the New Mathematics by Edgerton and Carpenter; World Book Company, Modern School Mathematics, Books One, Two, Three, by Schorling, Clark, and Smith; D. C. Heath and Company, Mathematics in Action, Books One, Two, Three, Second Edition, by Hart and Jahn. Of these the World Book Company series and the Allyn and Bacon series each had a copyright dated before 1945. In consultation with Henry W. Syer of the mathematics department of the School of Education, Boston University, it was decided to use the three series of texts with copyright date later than 1945. Three series of books were considered ample to determine the information sought for.

#### Series Selected

Series A. Everyday Junior Mathematics, Books One, Two, Three  
Editor: William Betz  
Publisher: Ginn and Company  
Copyrights: 1944, 1945, 1946, Books One, Two, Three, respectively.

Series B. Mathematics and Life, Books One, Two, Three  
Editors: F. B. Knight  
J. W. Studebaker

Editors: Gladys Tate  
George E. Hawkins (Book Three only)  
Publisher: Scott, Foresman and Company  
Copyright: 1948

Series C. Mathematics in Action, Books One, Two, Three  
Second Edition  
Editors; Walter W. Hart  
Lora D. Jahn  
Publisher: D. C. Heath and Company  
Copyright: 1947

#### Description of Series Selected

The series as a whole.-- Each of these series was designed especially for use in the junior high school, grades seven through nine. Considering cases where the ninth year course would be many students' terminal course in mathematics, each series has attempted to provide materials adequate to insure understanding of the mathematical concepts basic for managing the economic aspects of life in our American society. For instance units are included on the kinds of service that insurance companies offer, on the benefits and dangers of installment buying, on bank services, on the intricacies of budget planning. The ninth year course in every case acts as a basic mathematics course in that it reviews the fundamental operations of arithmetic, takes the student through a thorough course in elementary algebra, and provides a good foundation course in the elements that make up geometry and trigonometry. Each text in each series has been designed for use independently of the other texts in the series. This means that the review is comprehensive enough

in each one to make up for lack of understandings which might have been brought about through use of another text-book previously. Each book is complete in itself as far as covering the basic concepts required at each grade level.

Series A. The Betz series, which hereafter in this study will be designated by Series A, is composed of three volumes for use in grades seven, eight and nine. The books are six by eight inches in size and are well bound with attractive blue, red, and green covers on Books One, Two, and Three, respectively.

The purpose of this series is well expressed by William Betz<sup>1</sup> in the following excerpt from his preface in Book Three:

These volumes present a continuous and integrated program in elementary mathematics, which provides for three types of emphasis: (1) an organic extension of the work begun in the earlier grades; (2) an introduction to the functional uses of mathematics in everyday life; (3) a dependable foundation for subsequent courses in mathematics.

Scattered throughout the Betz series are mastery tests, inventory tests, general review tests and comprehensive review exercises, also exercises intended to improve speed and accuracy in various skills. At the end of every chapter a test appears covering the work of that chapter. An interesting feature of this series is a summary

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<sup>1</sup> William Betz. Everyday Junior Mathematics, Book Three, Ginn and Company, Boston, 1946, p.v

box at the end of each chapter headed "In this chapter you have learned". There are two pages of tables and an index at the back of the book.

Book One. Everyday Junior Mathematics

This book contains 404 pages and 51 illustrations plus numerous sketches and line drawings to illustrate the text and problems such as circles, graphs, shapes of hexagons and the like. The text is well adapted to use in its division into five units, each complete in itself.

Unit One- Fundamental Human Needs: Shelter, Food and Clothing

Unit Two- Making Sure of Fundamentals

Unit Three- Important Mathematical Tools and Their Uses: Per Cents, Measurement, and Graphs

Unit Four- Using Arithmetic in Everyday Life

Unit Five- Using Geometry in Everyday Life

Book Two. Everyday Junior Mathematics

This book contains 484 pages and 90 illustrations, also many sketches and figures. The last unit contains a review of the fundamentals of arithmetic and geometry. It is arranged in five units plus the review unit.

Unit One- Computing, Measuring, and Drawing More Accurately

Unit Two- How Money Works For Us

Unit Three- Related Figures, Comparisons, and Indirect Measurement

Unit Four- Social Uses of Arithmetic

Unit Five- First Steps in Using the Shorthand of Mathematics

Review Unit- Arithmetic and Geometry

Book Three. Everyday Junior Mathematics

This volume contains 564 pages and 62 illustrations, also many sketches, graphs and line drawings. It is divided

into five units containing an extensive 52 page review unit for the fifth unit which covers the foundations of arithmetic.

Unit One- First Steps in Algebra  
Unit Two- Fundamental Processes and Their Uses  
Unit Three- Applying Mathematical Concepts, Skills,  
Formulas and Relations  
Unit Four- Making Progress in the Mastery of Algebra  
Review Unit- Rebuilding the Foundations of Arithmetic

Series B.-- The series Mathematics and Life, the publication of Scott, Foresman, and Company, will henceforth be designated by Series B. Books One and Two in this series measure five and one-half inches by eight, Book Three is six by nine inches; all three books are strongly bound and brown in color.

An interesting feature of this series is the colored drawings inside the front and back covers, twelve separate drawing in both cases, illustrating the areas in mathematics that are covered by the book, such as line graphs, finding interest, measuring angles, together with the pages on which these special problems are considered. Different from the other two series these texts contain no statement of the objectives of the authors, no plan for the organization of material, no description of the units to be studied, merely a table of contents in the beginning and a thorough index at the end. There is some use of colored illustration which adds to the appearance of the pages in which it appears. One interesting feature is the solution

of the various types of problems, at the time when they first appear, in boxes set apart for that purpose. Some of this is cleverly done in the form of comics. Sketches appear on almost every page adding greatly to the attractiveness of the books.

Practise drills, self testing drills and checkup drills at the end of each chapter are included, also a large section of review tests at the end of each book. Progress charts are to be found in the supplement.

In these texts occupational titles and other kinds of occupational information are worked very practically into the text where it can be most useful to the teacher who is alert. By this method the student learns the name of an occupation right along with problems which illustrate the practices of the occupation, as bank teller, for instance, when he is studying banking.

Book One. Mathematics and Life.-- This book contains 480 pages and 47 photographic illustrations, plus an abundance of sketch drawings, comics, and line drawings. Instead of words like "drill", "diagnostic Test", "mastery test", words like "warming-up", "check-up", and "learning thorough practise" are substituted. This would probably add to the children's enjoyment of these texts. The book is divided into the following chapters:

Chapter One- The Home and Mathematics

Chapter Two- Earning a Living for the Family



Chapter Three- Managing the Family's Income  
 Chapter Four- Taking Care of the Family's Savings  
 Chapter Five- Using Business Methods in the Home  
 Chapter Six- Working in the Home  
 Chapter Seven- Making Sure You Remember

Book Two. Mathematics and Life.-- Book Two contains 512 pages and 39 photographic illustrations, together with an abundance of illustrative material such as stick figures, graphs and geometric designs. The material is divided into seven chapters.

Chapter One- Mathematics and the Community  
 Chapter Two- The Merchant and the Community  
 Chapter Three- The Bank and the Community  
 Chapter Four- Business and the Community  
 Chapter Five- Community Planning  
 Chapter Six- The Community and Its Neighbors  
 Chapter Seven- Making Sure You Remember

Book Three. Mathematics and Life.-- This volume contains 592 pages along with 44 photographic illustrations and many types of illustrative material as described for the previous two books of the series. This book differs in its review-of-arithmetic chapter in the use of ten inventory tests. The text is divided into chapters in the following manner:

Chapter One- Review of Arithmetic  
 Chapter Two- Percentage  
 Chapter Three- Formulas  
 Chapter Four- Signed Numbers and Equations  
 Chapter Five- Direct Measurement  
 Chapter Six- Indirect Measurement  
 Chapter Seven- The Mathematics of Business  
 Chapter Eight- The Mathematics of Finance  
 Chapter Nine- Review of the Year's Work

Series C. Mathematics in Action (Section Edition).--

The series published by D. C. Heath and Company will be classified as Series C in the future in this study. All three books measure six by eight inches in size and are green in color. Each may be distinguished from the other by the contrasting color used in the geometric design and in the print on the cover.

One thing that is immediately apparent as one begins to examine this series is the use of real life problems, those relating to home, vocational, or business life. For instance in Book One, Page 42-1, the subject concerned with is a farm, how the acres are divided among barley, timothy, hay, oats, and clover. All nine problems on that page are concerned with the expected harvest, expenses, and probably receipts. There has been a special attempt made to bring prices, dates, and factual information up to date, as of the copyright date, 1947. Whether such wage and price information is really practical could be debated considering the great change there has been since then. They surely are more practical than 1950 prices as they appear in some texts and at least provide a basis for comparison for the teacher.

Many graphs and line drawings add to the interest of the books. Unit reviews and tests appear at the end of each unit and a cumulative review appears at the end of each unit after the first. A review of the year's work, a final test of the year's work, tables, and an index complete

each text.

Book One. Mathematics in Action (Second Edition).--

This volume contains 340 pages plus 41 illustrations. The new areas in the mathematics field to which the pupils are introduced include percentage and intuitive geometry. The construction of graphs is begun. The material is divided into units as follows:

- Unit One- Common Geometric Figures
- Unit Two-Integers
- Unit Three-Common Fractions
- Unit Four- Measurement
- Unit Five- Decimal Fractions
- Unit Six- Percentage
- Unit Seven- Graphs
- Unit Eight- Common Uses of Percentage
- Unit Nine- Straight Lines and Angles
- Unit Ten- Fractional Rates Per Cent
- Unit Eleven- Circles and Their Uses
- Unit Twelve- Triangles- Parallelograms- Trapezoids
- Unit Thirteen- Thrift
- Unit Fourteen- Banking Practises
- Unit Fifteen- Transportation

Book Two. Mathematics in Action (Second Edition).--

This book contains 324 pages along with 38 illustrations, plus geometric forms and figures to aid in the solution of the problems. Introduced into this year's mathematics are instructional devices to acquaint the student with federal income taxes and United States savings bonds. The book contains the following units:

- Unit One- Review of the Fundamentals
- Unit Two- Geometry in Industry
- Unit Three- Formulas
- Unit Four- Mensuration
- Unit Five- Percentage and Its Uses
- Unit Six- Insurance

Unit Seven- Banks and Banking  
 Unit Eight- Taxes  
 Unit Nine- Investments  
 Unit Ten- Equations  
 Unit Eleven- Indirect Measurement  
 Unit Twelve- Positive and Negative Numbers

Book Three. Mathematics in Action (Second Edition).--

This volume contains 438 pages and 33 illustrations, plus the usual graphs and line drawings to illustrate the problems. All the problems are designed to be practical and as up to date as possible. Division has been made into sixteen units.

Unit One- Everyone's Mathematics  
 Unit Two- Everyday Geometry  
 Unit Three- Scale Drawings and Graphs  
 Unit Four- Formulas  
 Unit Five- Laws For Solving Equations  
 Unit Six- Congruence- Similarity- Symmetry  
 Unit Seven- Indirect Measurement  
 Unit Eight- Signed Numbers and Monomials  
 Unit Nine- Taxes  
 Unit Ten- Investments  
 Unit Eleven- Polynomials  
 Unit Twelve- Equations and Problems  
 Unit Thirteen- Equations of the First Degree  
 Unit Fourteen- Factoring and Quadratics  
 Unit Fifteen- Algebraic Fractions  
 Unit Sixteen- Review of Fundamental Operations

Method Used for Analysis

Kinds of analysis.-- Since the field of occupational information is a broad one it was necessary to limit the study to certain kinds of analysis. The following kinds of analysis were decided upon as those most clearly presenting the types of information discovered:

(1) An analysis of the frequency of mention of

occupational titles in the written material of the texts.

- (2) An analysis of the frequency of mention of occupational titles in the photographic materials in the text.
- (3) An analysis of occupational titles revealed in the study by a functional classification, according to the groupings found in the Dictionary of Occupational Titles, Part IV.
- (4) An analysis of the occupational concepts or specific information about occupations and occupational workers.

Method of Summary.--A summary of the kinds and quality of occupational information will be given at the conclusion of each table and some final conclusions will be drawn in the final chapter.

## CHAPTER III

### ANALYSIS OF OCCUPATIONAL TITLES

#### Inventorying Occupational Titles

Procedure for selecting titles.-- It is the purpose of this chapter to present the findings with regard to frequency of distribution and type of distribution of the occupational titles found in the selected junior high school mathematics texts.

Because the occupational information was contained in introductory material, in explanatory material and in the problems presented in the text, it was necessary to review every page and every line in each text surveyed in order to get a complete inventory of the occupational material that was contained therein. To facilitate the handling of the titles in the alphabetizing and arranging into readable tables, three by five filing cards were used to record the information found. To simplify this recording on the cards, the various series were designated by capital letters; e.g. "A" represented the Everyday Junior Mathematics Series, "B" represented the Mathematics and Life Series, and "C" represented the Mathematics in Action Series. Since each of these series contains three books, one for each of the years seven, eight, and nine, it was simple enough to let the numerals

1, 2, 3 represent grades seven, eight, and nine respectively.

An occupational title was recorded whenever it appeared in the text and notation was made immediately concerning the kinds of information about that occupation which were given. In the event that only the title was mentioned and no information concerning it given, the notation was made "Limited Information". Thus each time an occupational title occurred, it was noted on an index card.

Variety and Frequency of occupational information recorded.-- After each of the nine textbooks had been inventoried for the occupational titles contained, the information was grouped as to like titles. It was found that of the 822 references to occupational titles, these titles were distributed among 119 occupations. The variety of titles and the frequency of their occurrence in the selected series is presented in Table I.

Table I. Frequency Distribution of Occupational Titles in Selected Mathematics Series

Occupational Title	Series A	Series B	Series C	Total
Farmer	26	27	38	91
Merchant Dealer	7	32	20	59
Dealer	6	1	36	43
Salesman	10	24	8	42
Engineer	15	11	7	33

Table 1. (continued)

Occupational Title	Series A	Series B	Series C	Total
Pilot	26	3	1	30
Surveyor	11	10	2	23
Clerk	1	6	15	22
Grocer	6	4	12	22
Carpenter	8	5	7	20
Manufacturer	5	8	5	18
Architect	8	6	4	18
Mathematician	0	9	8	17
Scientist	6	5	5	16
Teacher	1	4	11	16
Draftsman	14	1	1	16
Contractor	8	3	4	15
Real Estate Agent	7	0	8	15
Mechanic	5	4	5	14
Broker	0	6	6	12
Doctor	3	9	0	12
Agent	0	1	10	11
Builder	8	3	0	11
Painter	3	5	2	10
Machinist	6	1	2	9
Lawyer	0	4	3	7
Nurse	3	1	3	7
Teller	0	4	3	7
Astronomer	3	1	2	6
Jeweler	2	4	0	6
Navigator	6	0	0	6
Plumber	3	1	2	6
Assessor	1	2	2	5
Auctioneer	3	2	0	5
Designer	3	1	1	5
Druggist	1	3	1	5
Electrician	4	1	0	5
Factory Worker	0	1	4	5
Storekeeper	0	0	5	5
Housekeeper	1	4	0	5
Soldier	5	0	0	5
Bus Driver	1	1	2	4
Craftsman	4	0	0	4
Inventor	4	0	0	4
Mason	4	0	0	4
Milliner	0	0	4	4
Typist	4	0	0	4
Artist	1	2	0	3
Baker	1	1	1	3
Banker	2	0	1	3

(continued on next page)



Table I. (continued)

Occupational Title	Series A	Series B	Series C	Total
Buyer	0	2	1	3
Captain	1	1	1	3
Chemist	1	2	0	3
Garageman	1	0	2	3
Pharmacist	1	2	0	3
Secretary	0	0	3	3
Tailor	3	0	0	3
Army Officer	2	0	0	2
Bookkeeper	1	1	0	2
Blacksmith	1	1	0	2
Dedorator	1	1	0	2
Florist	0	1	1	2
Inspector	0	2	0	2
Lumberman	0	2	0	2
Mayor	0	1	1	2
Miner	0	2	0	2
Printer	1	1	0	2
Ranger	1	1	0	2
Stenographer	1	1	0	2
Gardener	2	0	0	2
Accountant	0	0	1	1
Appraiser	0	1	0	1
Basket Making	1	0	0	1
Beautician	1	0	0	1
Bill Collector	1	0	0	1
Bricklayer	1	0	0	1
Butcher	0	1	0	1
Confectioner	1	0	0	1
Cooking	1	0	0	1
Deliveryman	0	0	1	1
Diemaker	1	0	0	1
Dressmaking	1	0	0	1
Econmist	1	0	0	1
Explorer	1	0	0	1
Expressman	0	1	0	1
Fisherman	0	1	0	1
Horsetrainer	0	1	0	1
Insurance Agent	1	0	0	1
Janitor	1	0	0	1
Judge	0	1	0	1
Mailman	1	0	0	1

(concluded on next page)

Table I. (continued)

Occupational Title	Series A	Series B	Series C	Total
Photography	0	1	0	1
Policeman	0	1	0	1
Postman	0	1	0	1
President U.S.	1	0	0	1
Publisher	1	0	0	1
Rancher	0	1	0	1
Sailor	0	1	0	1
Shoemaker	1	0	0	1
Station Agent	0	1	0	1
Stonecutter	0	1	0	1
Telephone Operator	0	1	0	1
Ticket Seller	0	0	1	1
Tinsmith	1	0	0	1
Toolmaker	1	0	0	1
Tourist Agent	1	0	0	1
Vice President U.S.	1	0	0	1
Weaving	1	0	0	1
Writer	0	1	0	1
Total	289	264	269	822

Table I reveals that the occupation most frequently recorded of any is that of farmer, with merchant, dealer, salesman following not too closely. Duties performed by the farmer illustrated many areas which are included in the mathematics studied in these years, one could assume.

Many occupational titles occurred only once; these varied from the professional workers to those who could be designated unskilled. Examples of these would include writer, photographer, ticket seller, tinsmith, railroad worker, forest ranger, right down to the ditch digger on

a construction crew.

Analysis of occupational titles by series.-- In order to indicate the frequency of occupational titles by grade levels and series, Table II has been compiled.

Table II. Frequency of Occupational Titles Distributed by Books and Series

Series	Book One	Book Two	Book Three	Total
A	97	111	81	289
B	70	89	105	264
C	77	76	116	269
Total	244	276	302	822

Table II reveals that the greatest number of occupational titles is not limited to a specific year in the various series. Neither is there a great variation in the number of occupational references in the three series. Series A contained the greatest number of references in Book Two, while Series B and Series C each contained the largest number of references in Book Three. In the totals for each year's texts it is seen that the Book Three's contain 302 titles as compared with 276 in the Book Two's and 244 in the Book One's.

This table would seem to indicate that Series A contains slightly more occupational information than either

of the other two. But it is well to note that the number of occupational titles would seem to indicate that the occupational information contained is quite comparable in the three series; e.g. Series A, 289, Series B, 264, Series C, 269.

#### Analysis of Titles

Analysis of occupational titles by functional groupings.-- In order to determine the range or scope of occupational titles included in the three mathematics series, some method of classification according to groups of occupations or workers seemed advisable. A classification which is generally in use and which was adaptable for this purpose is that used in the Dictionary of Occupational Titles, Part IV.<sup>1</sup> Such a classification has been prepared and appears as Table III.

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<sup>1</sup> Dictionary of Occupational Titles, Part IV. War Manpower Commission, Division of Occupational Analysis, Washington, D.C., 1944 (Revised Edition)

Table III. Analysis of Occupational Titles by Functional Groupings According to the Classifications Found in the Dictionary of Occupational Titles, Part IV

Occupational Group	Series A		Series B		Series C		Total	
	Num-ber	Per Cent	Num-ber	Per Cent	Num-ber	Per cent	Num-ber	Per Cent
1. Professional	117	38.8	70	26.5	50	18.6	237	28.8
2. Clerical-Sales	70	24.2	124	46.9	152	56.5	346	42.1
3. Service Work,	5	01.7	4	01.5	0	00.0	9	01.1
4. Agricultural, Marine, Forestry	34	11.7	35	13.3	41	15.2	110	13.4
5. Mechanical Work	55	18.6	29	11.0	21	07.8	105	12.8
6. Manual Work	8	03.1	2	00.1	5	01.8	15	01.8
Total	289	98.0	264	98.3	269	99.9	822	100.0

In this functional grouping of the 822 titles, one can readily see that the Clerical-Sales group including general clerical workers and public contact workers leads with a total of 346 titles which is 42.1 per cent of all the titles contained in the three series of texts. The group of occupations which scored the lowest in this summary was the Service Workers group including cooking, child care, and personal service workers. This group of workers was mentioned only 9 times throughout the series, thus making up a scant 1.0 per cent of all the occupational titles.

It would be interesting at this point to compare the frequency of mention of some of these occupational groups as found in this study with the percentage distribution of the American labor force into occupational groups as compiled by the Bureau of the Census<sup>1</sup> in 1940.

According to the titles mentioned in these textbooks 28.8 per cent of the titles included were those of professional workers; in 1940, of the total employed population in the United States, 6.8 percent were employed in professional work. In this study 42.1 percent of the workers mentioned were in clerical-sales occupations; in 1940, 16.0 percent of United States workers were employed in this area. Manual or operative workers were mentioned by title only 15 times in the nine texts for a total of 1.8 percent; such workers in 1940 made up 18.1 percent of the United States labor force.

Summary.-- Such figures would tend to show that the frequency of mention of occupational titles in these texts is not at all proportionate to the importance the occupational groups represented by these titles command in the total labor force picture in the United States. Operatives and manual workers numbered the highest number of employees in the 1940 survey while professional workers ranked next to the lowest in number of employees.

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<sup>1</sup> Population- Volume III, The Labor Force, Part I, United States Summary, p. 10

Since the authors of these books made no profession of attempting to impart occupational information as such through these texts, and such information occurs probably mainly in an attempt to make the work covered as functionally as possible, one could say that there is quite a considerable spread throughout the major classifications. One can see that such material as is contained would be highly inadequate as a substitute for a total program of occupational information, however.

## CHAPTER IV

## ANALYSIS OF OCCUPATIONAL INFORMATION CONTENT

## Inventorying Occupational Concepts

Procedure for reporting.-- In the previous chapter reference has been made to the occupational titles appearing in the nine mathematics textbooks which had been selected for this study. Such discussion has been concerned with the frequency with which these titles occurred and with the classification of such titles according to a functional grouping widely in use in employment centers in this country. It is felt that however important the use of the titles themselves are from the standpoint of occupational information, even more important are the kinds of information contained about the specific occupation that are named.

In order to classify the kinds of information contained, some system of classification seemed necessary. Such a classification should contain in its major headings large groupings under which all possible kinds of occupational information might be organized. After a complete survey of Book one of Series A, it was decided that the general format devised by Beatrice Ward<sup>1</sup> for her

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<sup>1</sup> Beatrice M. Ward. Teaching Occupational Information Through the Study of Music, Unpublished Master's Thesis, Boston University, School of Education, 1949, p. 36-36



major paper would be adaptable for this study. The outline as revised for this study follows:

- Nature of the Work
  - Duties Performed
  - Equipment Used
  - Materials Handled
- Working Conditions
  - Indoors-Outdoors
  - Number of Workers
  - Expenses
- Remuneration
  - Earnings
  - Other Benefits
- Preparation-Training
  - General Education
  - Special Training
- Personal-Social Traits
- Limited Information

Before any recording of information was begun, each point in the outline was assigned a number. For example the major heading Nature of the Work became Roman numeral I, the points under this heading became Arabic numerals 1, 2, 3. Then when the information concerning an occupational title was recorded on a three by five card, these number designations were used to facilitate gathering the data.

These three by five cards which contained the occupational titles and the various kinds of information about each amounted to approximately 800 in number and had occasion to be handled many times in the process of summarizing and tabulating the various data.

Analysis of the kinds of occupational information.--

A summary of the kinds of information given in the texts

about the occupational titles which were mentioned has been prepared in Table IV. This is the kind of information which is essential to the student in making his choice concerning his field of work for the future, information concerning the duties connected with a job, the abilities that are necessary to fulfil the requirements of the job, conditions of work, and the training that is necessary.

A quick glance at the totals in the various major groupings reveals that there are more references to the nature of the work than to any other division. This area covering duties performed and materials and equipment handled would probably be the easiest to utilize in the formation of mathematics problems. Also this area of information might be classified as most important in one's choice of his life work. Such references included the surveyor's use of the transit, a clerk's handling of drygoods materials, a bank teller's use of an adding machine.

Next as far as number of references is concerned is the major grouping headed "preparation and training." This area too plays a vital part in one's effort to locate the kind of work for which he is most fitted. The general and specific training required was most often given in fields that are scientific in nature. Surveyors, scientists, and mathematicians, to name a few, are types of workmen frequently mentioned along with some information

Table IV. Analysis of Kinds of Occupational Information  
 Located in Selected Mathematics Series  
 Arranged by Occupational Titles

Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING		PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled				Earnings	Other Benefits	General Education	Special Training		
Accountant	C	3	119												
Agent (sales)	B	1	164												
Agent	C	3	14												
Agent	C	3	123												
Agent	C	3	159												
Agent	C	3	186												
Agent	C	3	281												
Agent	C	1	138												
Agent	C	1	177												
Agent	C	1	178												
Agent	C	1	178												
Aircraft foreman	A	2	128												
Aircraft workmen	A	2	142	X	X										X
Appraiser	B	2	228	X											
Architect	B	1	291												X
Architect	B	1	295										X		
Architect	B	1	5	X											
Architect	A	2	449							X					
Architect	A	2	40	X	X										
Architect	A	2	23	X	X										
Architect	A	3	101	X											
Architect	A	3	108	X											
Architect	A	3	548							X					
Architect	A	1	301												
Architect	A	3	238	X											
Architect	B	2	276	X											
Architect	C	1	86	X											
Architect	C	1	178	X						X					
Architect	B	2	31	X											
Architect	B	2	335	X											
Architect	C	3	2	X											
Architect	C	2	45	X											

(continued on next page)

Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK				Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION	Earnings	Other Benefits	PREPARATION-TRAINING	General Education	Special Training	PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled	WORKING CONDITIONS											
Army officer	A	1	101									X						
Army officer	A	1	183															
Armed services	A	2	4														X	
Artist	A	2	150	X	X													
Artist	B	1	135								X							
Artist	B	1	5	X														
Assessors	A	2	256	X	X													
Assessors	B	2	244	X	X													
Assessors	B	2	250	X														
Assessor	B	2	274	X													X	
Assessor	C	2	200	X														
Assessor	C	3	268	X	X													
Astronomer	A	3	296	X														
Astronomer	A	2	196												X			
Astronomer	A	2	2												X			
Astronomer	B	2	268	X											X			
Astronomer	C	3	69												X			
Astronomer	C	2	269	X											X			
Auctioneer	A	1	219								X							
Auctioneer	A	2	449								X	X						
Auctioneer	A	3	231								X	X						
Auctioneer	B	1	123								X	X						
Auctioneer	B	1	118								X							
Baker	A	3	216	X													X	
Baker	B	3	400														X	
Baker	C	1	142			X												
Banker	A	2	342												X			
Banker	A	3	77												X			
Banker	C	3	3												X			
Basket maker	A	2	1												X		X	
Beautician	A	1	225														X	
Bill collector	A	1	219								X							

(continued on next page)

Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION			PREPARATION-TRAINING		PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled				Earnings	Other Benefits	General Education	Special Training			
Blacksmith	B	1	353													
Blacksmith	A	2	142													
Bookkeeper	A	2	4	X												
Bookkeeper	B	2	144	X												
Bricklayer	A	1	131				X									
Broker	B	3	484	X	X											
Broker	B	3	486							X						
Broker	B	3	487	X												
Broker	B	3	488	XX												
Broker	B	3	489													
Broker	B	3	490													
Broker	C	3	296	X												
Broker	C	3	298													
Broker	C	3	325													
Broker	C	3	342													
Broker	C	2	223	X												
Broker	C	2	231													
Builder	A	3	77													
Builder	A	2	1													
Builder	A	2	342													
Builder	A	1	9													
Builder	A	1	66		X											
Builder	B	3	307	X		X										
Builder	B	3	371			X										
Builder	B	3	530													
Builder	A	1	131				X									
Builder	A	1	12				X									
Builder	A	1	13				X									
Bus driver	A	3	351													
Bus driver	B	3	110	X	X		X									
Bus driver	C	1	117			X										
Bus driver	C	1	119			X										

(continued on next page)

Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING		PERSONAL-SOCIAL TRAITS		LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled				Earnings	Other Benefits	General Education	Special Training			
Butcher	B	3	192	X	X											
Buyer	C	3	169	X	X											
Buyer	B	3	299							X						
Buyer	B	3	402	X										X		
Captain	B	1	282													X
Captain	A	3	354	X	X											X
Captain	C	3	3	X												
Carpenter	A	2	142											X		
Carpenter	A	3	110							X						X
Carpenter	A	3	322	X												
Carpenter	A	1	187	X	X											
Carpenter	A	1	14													X
Carpenter	A	1	301											X		
Carpenter	A	1	316											X		
Carpenter	A	1	13				X							X		
Carpenter	B	1	81	X	X											
Carpenter	B	1	291													
Carpenter	B	1	354	X		X										X
Carpenter (ship)	B	2	194											X		
Carpenter	B	2	9		X											X
Carpenter	C	3	3													X
Carpenter	C	3	427	X		X										
Carpenter	C	2	95			X										
Carpenter	C	2	269	X	X	X								X		
Carpenter	C	1	195	X	X	X										
Carpenter	C	1	212	X	X									X		
Chemist	A	3	465	X	X									X	X	
Chemist	B	1	38	X										X		
Chemist	B	2	403			X										
Clerk	A	3	219	X												
Clerk	B	1	51								X					
Clerk	B	1	73							X						

(continued on next page)

Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK				Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING		PERSONAL-SOCIAL TRAITS		LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled	WORKING CONDITIONS				Earnings	Other Benefits	General Education	Special Training			
Clerk	B	1	51														
Clerk	B	1	73														
Clerk (postal)	B	2	366	X							X						
Clerk	B	2	380	X											X		
Clerk	B	3	107								X						
Clerk	B	3	298	X													
Clerk	C	1	172	X													
Clerk	C	1	177								X						
Clerk	C	2	95			X											
Clerk (bank)	C	2	178	X													
Clerk	C	2	192	X													
Clerk (city)	C	2	200	X											X		
Clerk	C	2	202	X													
Clerk	C	2	43	X													
Clerk	C	2	143	X													
Clerk	C	2	248								X						
Clerk	C	3	3													X	
Clerk	C	3	5	X												X	
Clerk	C	3	17													X	
Clerk	C	3	427	X		X										X	
Confectioner	A	3	215	X											X		
Construction	B	3	448													X	
Contractor	A	2	105	X												X	
Contractor	A	2	129													X	
Contractor	A	2	61	X	X											X	
Contractor	A	2	40	X	X											X	
Contractor	A	2	373													X	
Contractor	A	2	375								X					X	
Contractor	A	1	179												X		
Contractor	A	1	66		X											X	
Contractor	B	1	323	X										X			
Contractor	B	2	172	X													

(continued on next page)

Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK				Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION			PREPARATION-TRAINING		PERSONAL-SOCIAL		LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled	WORKING CONDITIONS				Earnings	Other Benefits	General Education	Special Training	TRAITS			
Contractor	B	3	467	X														
Contractor	C	2	143															
Contractor	C	2	149						X									
Contractor	C	2	294						X						X	X		
Contractor	C	3	89						X						X	X		
Cook	A	1	115														X	
Craftsman	A	2	40	X	X									X	X	X		
Craftsman	A	3	77												X	X		
Craftsman	A	2	88	X											X	X		
Craftsman	A	2	342												X	X		
Dealer (clothing)	A	1	140									X						
Dealer (auto)	A	1	265	X				X	X			X						
Dealer (hardware)	B	2	122									X						
Dealer (furniture)	C	1	190												X			
Dealer	C	1	222	X														
Dealer (auto)	C	1	232						X			X						
Dealer	C	1	233						X			X						
Dealer	C	1	237						X			X						
Dealer (furniture)	C	1	140	X														
Dealer	C	1	145	X	X	X												
Dealer	C	1	172	X		X												
Dealer	C	1	174	X														
Dealer (shoe)	C	1	187						X			X						
Dealer	C	1	188												X			
Dealer (fruit)	C	2	146						X									
Dealer	C	2	149						X									
Dealer	C	2	196												X			
Dealer	C	2	211															
Dealer (car)	C	2	294	X											X		X	
Dealer (clothing)	C	2	214	X											X			
Dealer (shoe)	C	2	294	X											X			
Dealer	C	2	234	X														

(continued on next page)



Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION	Earnings	Other Benefits	PREPARATION-TRAINING	General Education	Special Training	PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled											
Dealer	C	2	44	X													
Dealer	C	2	87			X											
Dealer	C	2	89			X											
Dealer	C	2	96	X										X			
Dealer	C	2	141	X													
Dealer	C	2	141	X													
Dealer	C	3	12					X		X							
Dealer	C	3	30	X													
Dealer	C	3	118					X		X							
Dealer	C	3	157					X		X				X			
Dealer	C	3	179					X						X			
Dealer	C	3	224					X		X				X			
Dealer	C	3	302					X		X				X			
Dealer	C	3	358	X		X								X			
Dealer	C	3	359	X		X								X			
Dealer	A	1	265	X				X		X							
Dealer	A	3	450											X			
Dealer (candy)	A	3	370	X		X								X			
Dealer	A	3	215	X										X			
Decorator	A	2	144		X									X			
Decorator	B	1	354											X			
Deliveryman	C	3	17													X	
Designer	A	2	61	X	X												
Designer	A	2	23	X	X												
Designer	A	1	9											X			
Designer	B	1	5	X													
Designer	C	3	2	1										X			
Diemaker	A	2	146	X	X	X											
Doctor	A	2	446	X													
Doctor	A	1	83					X									
Doctor	A	1	219													X	
Doctor	B	1	50							X							
Doctor	B	1	49													X	

(continued on next page)

Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK				Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING		PERSONAL-SOCIAL TRAITS		LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled	WORKING CONDITIONS				Earnings	Other Benefits	General Education	Special Training			
Doctor	B	1	95			X											
Doctor	B	1	135								X						
Doctor	B	1	223													X	
Doctor	B	2	226													X	
Doctor	B	2	402										X				
Doctor	B	2	9			X											
Doctor	B	2	6														
Domestic help	C	2	165													X	
Draftsman	A	3	238	X									X			X	
Draftsman	A	2	145		X												
Draftsman	A	2	183													X	
Draftsman	A	2	196										X				
Draftsman	A	2	61	X	X												
Draftsman	A	2	62	X													
Draftsman	A	2	63	X													
Draftsman	A	2	64	X													
Draftsman	A	2	40	X	X												
Draftsman	A	2	23	X	X												
Draftsman	A	1	79	X	X												
Draftsman	A	1	301											X			
Draftsman	A	1	331	X	X												
Draftsman	A	1	181	X	X	X											
Draftsman	B	3	326	X	X	X											
Draftsman	C	3	3													X	
Dressmaker	A	1	101										X				
Dress dealer	A	1	264	X					X		X						
Druggist	A	3	465	X													
Druggist	B	3	292	X										X			
Druggist	B	3	293	X		X								X			
Druggist	B	2	111								X						
Druggist	C	1	188											X			
Economist	A	2	79		X												

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Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING		PERSONAL-SOCIAL TRAITS		LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled				Earnings	Other Benefits	General Education	Special Training			
Electrician	A	1	13						X							
Electrician	B	1	354													
Engineer	A	1	143	X										X		
Engineer	A	1	301											X		
Engineer	A	1	316											X		
Engineer	A	2	20	X										X		
Engineer	A	2	79	X	X									X		
Engineer	A	2	40	X	X									X		
Engineer	A	2	196											X		
Engineer	A	2	342											X		
Engineer	A	2	308	X										X		
Engineer	A	2	4											X		
Engineer (highway)	A	2	315	X	X	X								X		
Engineer (army)	A	2	316	X										X		
Engineer	A	3	457											X		
Engineer	A	3	296	X										X		
Engineer	A	3	77											X		
Engineer	B	1												X		
Engineer	B	1	93	X										X		
Engineer	B	1	5	X										X		
Engineer	B	3	61	X										X		
Engineer	B	3	92	X										X		
Engineer	B	3	374	X										X		
Engineer	B	3	495	X										X		
Engineer	B	3	532	X										X		
Engineer	B	3	6											X	X	
Engineer	B	2	6											X		
Engineer	B	2	16	X	X									X		
Engineer	C	3	pref	X										X		
Engineer	C	3	2	X										X		
Engineer	C	3	69											X		
Engineer	C	3	119											X		

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Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION	Earnings	Other Benefits	PREPARATION-TRAINING	General Education	Special Training	PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled											
Engineer	C	3	303														
Engineer	C	2	45	X													
Engineer	C	1	269	X													
Explorer	A	1	301														
Expressman	B	2	369	X													
Factory worker	B	1	122														
Factory worker	C	2	4				X										
Factory worker	C	2	78								X						
Factory worker	C	2	128														X
Factory worker	C	3	113					X									
Farmer	A	2	354	X	X												
Farmer	A	2	373														X
Farmer	A	2	401														X
Farmer	A	2	173							X							X
Farmer (dairy)	A	2	181														X
Farmer (dairy)	A	3	370	X		X											X
Farmer	A	3	112										X				
Farmer	A	3	208														X
Farmer	A	3	494			X											
Farmer	A	3	333			X											
Farmer	A	3	372			X				X							
Farmer	A	3	458	X													
Farmer	A	3	73														X
Farmer	A	3	93														X
Farmer	A	3	106			X											X
Farmer	A	2	85							X							
Farmer	A	2	1											X			
Farmer	A	1	121														X
Farmer	A	1	122														X
Farmer	A	1	145	X						X							X
Farmer	A	1	160	X													X
Farmer	A	1	173														X

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Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK				Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING		PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled	WORKING CONDITIONS				Earnings	Other Benefits	General Education	Special Training		
Farmer	A	1	207	X							X					
Farmer	A	1	216	X												
Farmer	A	1	38	X	X											
Farmer	A	1	244												X	
Farmer	A	1	35					X								
Farmer	A	1	56	X	X											
Farmer	A	1	93						X							
Farmer	B	1	391			X										
Farmer	B	1	354											X		
Farmer	B	1	115	X										X		
Farmer	B	1	124	X										X		
Farmer	B	1	142	X										X		
Farmer	B	1	52					X			X					
Farmer	B	1	50								X					
Farmer	B	1	49								X				X	
Farmer	B	1	65								X					
Farmer	B	1	98		X											
Farmer	B	2	208												X	
Farmer	B	2	216												X	
Farmer	B	2	230												X	
Farmer	B	2	393	X							X					
Farmer	B	2	441										X			
Farmer	B	2	9		X										X	
Farmer	B	3	49			X					X					
Farmer	B	3	51			X					X					
Farmer	B	3	60			X					X					
Farmer	B	3	109			X					X					
Farmer	B	3	253			X					X					
Farmer	B	3	263	X		X					X					
Farmer	B	3	294			X										
Farmer	B	3	422												X	
Farmer	B	3	436												X	

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Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION	Earnings	Other Benefits	PREPARATION-TRAINING	General Education	Special Training	PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled											
Farmer	B	3	487								X						
Farmer	B	3	496														
Farmer	C	1	23	X		X										X	
Farmer	C	1	89														
Farmer	C	1	91	X												X	
Farmer	C	1	93							X							
Farmer	C	1	105	X				X									
Farmer	C	1	113			X											
Farmer	C	1	121	X		X											
Farmer	C	1	178	X				X									
Farmer	C	1	183														
Farmer	C	1	225	X		X										X	
Farmer	C	1	229	X													
Farmer	C	1	294														
Farmer	C	1	311													X	
Farmer	C	1	326													X	
Farmer	C	1	313			X				X							
Farmer	C	2	9					X			X						
Farmer	C	2	24			X				X							
Farmer	C	2	30			X				X							
Farmer	C	2	87			X				X							
Farmer	C	2	89			X								X			
Farmer	C	2	102	X		X											
Farmer	C	2	103	X		X											
Farmer	C	2	124			X				X							
Farmer	C	2	297					X									
Farmer	C	2	135			X					X						
Farmer	C	2	260			X					X						
Farmer	C	2	291													X	
Farmer	C	2	295					X								X	
Farmer	C	3	3													X	
Farmer	C	3	13													X	

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Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING		PERSONAL-SOCIAL TRAITS		LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled				Earnings	Other Benefits	General Education	Special Training			
Farmer (poultry)	C	3	66	X		X							X			
Farmer (fruit)	C	3	87	X		X				X						
Farmer	C	3	102							X						
Farmer	C	3	103						X							
Farmer	C	3	160	X		X										
Farmer	C	3	109							X						
Fisherman	C	1	113			X					X					
Florist	B	3	196	X												
Florist	C	2	144	X					X		X					
Furniture maker	A	2	14											X		
Garageman	A	2	374							X	X					
Garageman	C	1	91							X	X					
Garageman	C	1	186						X		X					
Gardener	A	1	284												X	
Gardener	A	2	218	X												
Government employ	C	2	165												X	
Grocer	A	1	225												X	
Grocer	A	3	369	X		X									X	
Grocer	A	3	389	X		X									X	
Grocer	A	3	73													
Grocer	A	3	110								X					
Grocer	A	3	215	X										X		
Grocer	B	2	176											X		
Grocer	B	2	9		X											
Grocer	B	3	233	X												
Grocer	B	3	207						X							
Grocer	C	1	35	X												
Grocer	C	1	104	X												
Grocer	C	1	188											X		
Grocer	C	1	233							X						
Grocer	C	1	290	X												
Grocer	C	2	146				X									

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Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING		PERSONAL-SOCIAL TRAITS		LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled				Earnings	Other Benefits	General Education	Special Training			
Grocer	C	2	170	X		X										
Grocer	C	2	171	X		X										
Grocer	C	2	297					X	X							
Grocer	C	3	3													
Grocer	C	3	325												X	
Grocer	C	3	364	X		X						X	X			
Health experts	A	1	36	X												
Homemaker	A	2	342										X			
Horse trainer	C	1	247	X		X										
Housekeeper	B	2	6												X	
Housekeeper	B	2	9		X											
Housewife	B	1	105				X									
Housewife	B	1	111	X												
Inspector	B	1	64							X						
Inspector	B	1	92	X	X	X							X			
Insurance agent	B	3	426	X								X	X			
Inventor	A	3	77									X	X			
Inventor	A	2	40	X	X											
Inventor	A	2	342										X			
Inventor	A	2	308	X												
Janitor	B	3	22	X	X	X										
Jeweler	B	2	105	X									X			
Jeweler	B	2	188										X			
Jeweler	B	2	188							X						
Jeweler	B	1	345												X	
Jeweler	A	3	370	X		X										
Jeweler	A	3	465	X									X			
Judge	C	2	197												X	
Lawyer	B	1	209	X						X						
Lawyer	B	1	135							X	X					
Lawyer	B	1	50							X						
Lawyer	B	2	6												X	

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Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION	Earnings	Other Benefits	PREPARATION-TRAINING	General Education	Special Training	PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled											
Lawyer	C	1	178								X						
Lawyer	C	3	14								X						
Lawyer	C	3	224								X						
Lumberjack	B	3	345	X							X						
Lumbermen	B	1	51			X								X			
Machinist	B	1	49													X	
Machinist	C	3	3													X	
Machinist	C	3	43	X												X	
Machinist	A	2	26	X	X												
Machinist	A	3	245	X	X	X											
Machinist	A	1	187	X	X	X											
Machinist	A	1	66			X											
Machinist	A	1	301			X											
Machinist	A	2	4											X			
Mailman	B	1	127						X					X			
Manager (tea room)	B	2	112											X			
Manager	B	3	440	X										X			
Manufacturer	A	2	107	X	X									X			
Manufacturer	A	3	77											X			
Manufacturer	A	1	268											X		X	
Manufacturer	A	1	9											X			
Manufacturer	B	1	51			X								X			
Manufacturer	B	2	9		X									X			
Manufacturer	B	3	13	X	X									X			
Manufacturer	B	3	281											X			
Manufacturer	B	3	336	X		X								X			
Manufacturer	B	3	457	X		X								X			
Manufacturer	B	3	501											X		X	
Manufacturer	B	3	510											X		X	
Manufacturer	C	3	40											X			
Manufacturer	C	3	75			X								X			
Manufacturer	C	2	9					X						X			

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Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING	General Education	Special Training	PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled				Earnings	Other Benefits					
Mechanic	B	1	93	X												
Mechanic	C	1	195	X												
Mechanic	C	1	269	X												
Mechanic	C	2	17			X								X	X	
Mechanic	C	3	119											X		
Mechanic	C	3	336							X						
Merchant	A	2	373							X						
Merchant (seed)	A	3	221	X										X		
Merchant	A	3	260	X						X						
Merchant	A	3	370	X		X				X						
Merchant	A	1	266	X	X			X		X						
Merchant	A	1	268												X	
Merchant	A	1	270												X	
Merchant	B	1	50							X					X	
Merchant	B	2	86	X												
Merchant	B	2	5												X	
Merchant	B	2	100	X										X		
Merchant	B	2	106	X												
Merchant	B	2	116	X										X		
Merchant	B	2	128	X												
Merchant	B	2	186	X						X						
Merchant	B	2	69												X	
Merchant	B	2	193	X												
Merchant	B	2	215							X						
Merchant	B	2	375	X										X		
Merchant	B	2	428							X						
Merchant	B	2	55	X										X		
Merchant	B	2	57	X		X										
Merchant	B	2	65	X						X						
Merchant	B	2	68	X												
Merchant	B	2	75							X						

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Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION	Earnings	Other Benefits	PREPARATION-TRAINING	General Education	Special Training	PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled											
Merchant	B	2	82	X													
Merchant	B	3	43			X											
Merchant	B	3	48					X									
Merchant	B	3	64	X				X		X							
Merchant	B	3	67	X										X			
Merchant	B	3	69					X						X			
Merchant	B	3	406	X										X			
Merchant	B	3	416	X										X			
Merchant	B	3	451					X		X							
Merchant	B	3	454					X		X							
Merchant	B	3	457	X													
Merchant	B	3	501														
Merchant	B	3	510	X												X	
Merchant	B	3	413	X										X			
Merchant	C	1	35	X										X			
Merchant	C	1	174	X										X			
Merchant	C	1	187	X										X			
Merchant	C	1	188											X		X	
Merchant	C	2	140	X										X			
Merchant	C	2	144					X						X			
Merchant	C	2	146	X										X			
Merchant	C	2	147											X			
Merchant	C	2	214	X										X			
Merchant	C	3	314											X			
Merchant	C	3	365					X						X			
Merchant	C	3	413	X		X								X			
Merchant	C	3	431								X						
Merchant	C	3	358			X					X						
Merchant	C	3	12	X							X						
Merchant	C	3	12	X													
Merchant	C	3	13											X			
Merchant	C	3	108								X						

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Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK				Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION	Earnings	Other Benefits	PREPARATION-TRAINING	General Education	Special Training	PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled	WORKING CONDITIONS											
Merchant	G	3	279															
Merchant	C	3	338						X									
Metal worker	B	3	161	X	X										X	X		
Milliner	C	1	187							X					X	X		
Milliner	C	1	189						X	X					X	X		
Milliner	C	3	169						X	X	X				X	X		
Milliner	C	3	189						X	X	X				X	X		
Milliner	C	3	338						X	X	X				X	X		
Miner	B	1	52												X	X		
Miner	B	1	51					X										
Navigator	A	1	301			X										X		
Navigator	A	2													X	X		
Navigator	A	2	242												X	X		
Navigator	A	2	196												X	X		
Navigator	A	3	296	X											X	X		
Navigator	A	3	77												X	X		
Newsboy	C	2	245		X										X	X		
Nurse	A	2	78		X													
Nurse	B	3	15					X	X									
Nurse	C	3	3				X		X								X	
Nurse	C	3	365	X														
Nurse	C	1	183	X														
Nurse (visiting)	A	1	33	X														
Nurse	A	1	196	X					X									
Painter	A	2	144			X				X								
Painter	A	3	50	X		X									X			
Painter	A	1	267	X	X	X			X									
Painter	B	1	113	X					X									
Painter	B	1	291	X													X	
Painter	B	2	308	X											X			
Painter	B	2	354	X											X	X		
Painter	B	3	150	X											X	X		

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Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION	Earnings	Other Benefits	PREPARATION-TRAINING	General Education	Special Training	PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled											
Painter	C	1	88	X						X							
Painter	C	1	235	X						X							
Pharmacist	A	3	370	X		X											
Pharmacist	B	2	402											X			
Pharmacist	B	3	288	X		X									X		
Photography	B	3	259			X									X		
Pilot	A	2	362	X													
Pilot	A	2	36		X												
Pilot	A	2	196												X		
Pilot	A	2	342											X			
Pilot	A	2	234	X													
Pilot	A	2	268				X										
Pilot (test)	A	2	334	X													
Pilot	A	2	165													X	
Pilot	A	2	183	X	X	X											
Pilot	A	2	185		X												
Pilot	A	2	438													X	
Pilot	A	3	285													X	
Pilot	A	3	294													X	
Pilot	A	3	77											X			
Pilot	A	3	384	X													
Pilot	A	3	389											X			
Pilot	A	3	468													X	
Pilot	A	3	81	X													
Pilot	A	3	89													X	
Pilot	A	3	95													X	
Pilot	A	3	128													X	
Pilot	A	1	169													X	
Pilot	A	1	301											X			
Pilot	A	1	47													X	
Pilot	A	1	236													X	
Pilot	A	1	239													X	

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Occupational Title	Series	Book	Page	NATURE OF WORK				Indoors-Outdoors Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING		General Education	Special Training	PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled	WORKING CONDITIONS			Earnings	Other Benefits						
Pilot	B	2	49														
Pilot	B	3	353	X													
Pilot	B	3	356	X													
Pilot	C	3	3	X													
Playground director	B	2	242														
Plumber	A	3	109								X						X
Plumber	A	1	14														X
Plumber	A	1	13					X									X
Plumber	B	1	291														X
Plumber	C	2	168						X								X
Plumber	C	1	125							X							X
Policeman	B	2	274								X						X
Postman	B	2	378	X													X
Poultryman	A	1	224														X
Poultryman	A	1	120														X
President (U.S.)	A	1	95								X						X
Press operator	A	2	327	X	X												
Printer	A	2	165	X	X	X											
Printer	B	1	98		X												
Proprietor	B	2	196	X													
Proprietor	C	2	291						X								
Publisher	A	1	268	X							X						
Rail worker	C	3	24														X
Ranger	A	2	184	X	X	X											
Ranger	B	3	382	X	X												
Rancher	B	2	165	X													
Real estate agent	A	2	373								X						
Real estate agent	A	2	449								X						
Real estate agent	A	3	204								X						
Real estate agent	A	3	231								X						
Real estate agent	A	3	260								X						

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Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK				Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING		PERSONAL-SOCIAL TRAITS		LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled	WORKING CONDITIONS				Earnings	Other Benefits	General Education	Special Training			
Real estate agent	A	1	219								X						
Real estate agent	C	1	190						X								
Real estate agent	C	1	225								X				X		
Real estate agent	C	2	146									X					
Real estate agent	C	2	159		X								X				
Real estate agent	C	2	244		X												
Real estate agent	C	2	248		X												
Real estate agent	C	3	169		X												
Real estate agent	C	3	338		X									X	X		
Repair workman	A	1	124					X				X			X		
Repair workman	A	1	395									X					
Sailor	B	1	98			X						X					
Salesman	A	1	218	X		X											
Salesman	A	1	220									X					
Salesman	A	1	221									X					
Salesman	A	1	222									X					
Salesman	A	3	91									X					
Salesman	A	3	232									X					
Salesman	A	3	285									X					
Salesman	A	2	357									X					
Salesman	A	2	373									X					
Salesman	A	2	382									X					
Salesman	B	1	120									X					
Salesman	B	1	50									X					
Salesman	B	1	123									X					
Salesman	B	1	135									X					
Salesman	B	1	171									X					
Salesman	B	1	221									X					
Salesman	B	2	60									X					
Salesman	B	2	66		X												
Salesman	B	2	74		X												
Salesman	B	2	77									X					

(continued on next page)



Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING	General Education	Special Training	PERSONAL-SOCIAL TRAITS	LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled				Earnings	Other Benefits					
Salesman	B	2	107								X					
Salesman	B	2	111													
Salesman	B	2	123	X						X						
Salesman	B	2	390							X						
Salesman	B	3	68							X						
Salesman	B	3	70							X						
Salesman	B	3	86							X						
Salesman	B	3	182	X	X					X						
Salesman	B	3	231													
Salesman	B	3	233	X						X						
Salesman	B	3	247							X						
Salesman	B	3	298							X						
Salesman	B	3	445							X						
Salesman	C	1	178							X						
Salesman	C	1	179							X						
Salesman	C	1	190							X						
Salesman	C	1	191							X						
Salesman	C	1	234							X						
Salesman	C	3	3													
Salesman	C	3	186							X					X	
Salesman	C	3	278					X								
Scientist	A	3	77											X		
Scientist	A	2	79		X											
Scientist	A	2	308	X												
Scientist	A	2	342											X		
Scientist	A	2	301											X		
Scientist	B	1	95	X										X		
Scientist	B	1	5	X										X		
Scientist	B	2	268	X										X		
Scientist	B	2	402											X		
Scientist	B	3	285	X										X		
Scientist	C	3	40											X		

(continued on next page)

Table IV. (continued)

Occupational Title	Series	Book	Page	NATURE OF WORK				Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING		PERSONAL-SOCIAL TRAITS		LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled	WORKING CONDITIONS				Earnings	Other Benefits	General Education	Special Training			
Scientist	C	3	68														
Scientist	C	3	119														
Scientist	C	3	204	X													
Scientist	C	3	303														
Secretary	C	3	293											X			
Secretary	C	2	245													X	
Secretary	C	1	225						X		X						
Shoemaker	A	2	142								X						
Soldier	A	1	122													X	
Soldier	A	1	229													X	
Soldier	A	1	310									X				X	
Soldier	A	1	327	X													
Soldier	A	1	353		X	X											
Station Agent	B	3	15														
Stenographer	A	2	417								X					X	
Stenographer	B	1	49													X	
Stonecutter	B	3	169	X	X											X	
Storekeeper	C	1	129	X		X								X			
Storekeeper	C	1	183	X													
Storekeeper	C	3	23														
Storekeeper	C	3	87						X								
Storekeeper	C	3	358						X					X			
Street Commissioner	B	2	274	X										X			
Surveyor	A	1	319	X												X	
Surveyor	A	3	238	X													
Surveyor	A	3	296	X										X			
Surveyor	A	3	300														
Surveyor	A	3	302		X											X	
Surveyor	A	2	203		X												
Surveyor	A	2	206	X													
Surveyor	A	2	212													X	

(continued on next page)

Table IV. (Continued)

Occupational Title	Series	Book	Page	NATURE OF WORK			Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING		PERSONAL-SOCIAL TRAITS		LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled				Earnings	Other Benefits	General Education	Special Training			
Surveyor	A	2	196										X			
Surveyor	A	2	340		X											
Surveyor	A	2	193	X												
Surveyor	B	2	274													
Surveyor	B	2	288	X	X	X							X		X	
Surveyor	B	3	6										X		X	
Surveyor	B	3	122	X												
Surveyor	B	3	277	X		X										
Surveyor	B	3	307	X		X										
Surveyor	B	3	364	X		X							X			
Surveyor	B	3	382	X	X								X			
Surveyor	B	3	383	X									X			
Surveyor	B	3	536	X	X								X			
Surveyor	C	3	201	X	X								X			
Surveyor	C	3	219	X	X								X			
Tailor	A	2	142												X	
Tailor	A	3	231							X						
Tailor	A	1	274	X	X	X				X						
Teacher	A	1	275													
Teacher	B	3	32											X	X	
Teacher	B	2	151											X	X	
Teacher	B	2	214	X										X	X	
Teacher	B	2	6											X	X	
Teacher	C	3	4											X	X	
Teacher	C	3	8											X	X	
Teacher	C	3	227											X	X	
Teacher	C	2	165											X	X	
Teacher	C	2	203	X										X	X	
Teacher	C	1	24	X									X			
Teacher	C	1	59	X									X			
Teacher	C	1	139							X					X	
Teacher	C	1	146												X	

(continued on next page)

Table IV. (Concluded)

Occupational Title	Series	Book	Page	NATURE OF WORK				Indoors-Outdoors	Number of Workers	Expenses	REMUNERATION		PREPARATION-TRAINING		PERSONAL-SOCIAL TRAITS		LIMITED INFORMATION
				Duties Performed	Equipment Used	Materials Handled	WORKING CONDITIONS				Earnings	Other Benefits	General Education	Special Training			
Teacher	C	1	193														X
Teacher	C	1	238								X						
Telephone Operator	B	2	381	X													
Teller	B	3	462	X		X											
Teller	B	2	138	X		X											
Teller	B	2	155	X													
Teller	B	2	173	X													
Teller	C	2	190	X													
Teller	C	1	290	X	X	X											
Teller	C	3	284	X													
Textile Worker	A	1	57	X				X			X						
Ticket Seller	C	3	351	X							X						
Tinsmith	A	2	142														X
Toolmaker	A	2	79	X													
Tourist Agent	A	1	69	X													
Typist	A	3	284													X	
Typist	A	3	457													X	
Typist	A	2	181	X												X	
Typist	A	2	417								X						
Vice President U.S.	A	1	140								X						
Weaving	A	2	1								X					X	
Woodworker	A	1	217	X													
Writer	B	1	135								X						
Total				490	322	77	973	105	857	230	225	52	418	414	214	0	132

concerning the preparation required for entrance into the occupation.

The major grouping, remuneration, came next high as far as frequency of mention. One special occupation, that of salesman or agent, very often mentioned the part of remuneration that is derived from commission on sales. In other instances such wage information as is given would be highly erroneous according to 1951 standards, the five or more years intervening since the publication of the texts having effected such great changes.

Working conditions, as important as this kind of information is in regard to choosing an occupation, received little mention, proportionately speaking. What information there was was of a helpful nature and tended to give at least a partial picture of the work scene. The space which could be used in a single problem tended to limit this kind of information, one might assume.

Personal-social characteristics that are so important as far as one's ability to adjust and make a success in an occupation are concerned, received no mention at all throughout the series. This perhaps can be attributed to the fact that these were mathematics texts, more concerned with facts and figures possibly than with emotions and personal adjustment.

It is interesting to note that there were 132 references to occupational titles which had to be tabu-

lated "Limited Information". As far as information about the occupations named was concerned, there was none. Some of the occupational references which fell frequently into this grouping were teaching, stenographer, pilot, plumber, salesman, and surveyor. One can see at once that at least the first five are among the most familiar occupations. This perhaps accounts for the lack of specific information concerning them.

#### Sample Concepts Derived from Texts

Some samples of the kinds of information which are contained in these texts would further illustrate the kinds and amount of information contained. The following samples have been taken from the context of the three series and are presented under the major headings as found in Table IV. Samples from only five of the major groupings will be given since there were no references in the area of personal-social qualifications.

The quotations from the texts which will be used are arranged according to the following system: Occupation, Quotation, Location. The location includes first of all the capital letter which indicates the series, next an Arabic letter to designate the number of the book in the series, either book one, two or three, third will be the page number, and finally the number of the problem, if any, in which the reference occurred.

These quotations will be chosen from each of the major headings or divisions in the following order: Nature of the Work, Working Conditions, Remuneration, Preparation-Training, and Limited Information. Since there were no references found in the area of Personal-Social Qualifications, none can be given from that area.

Nature of the Work.-- This major heading has under it the topics, duties performed, equipment used, and materials handled. Samples will be given illustrating each topic.

<u>Occupation</u>	<u>Quotation</u>	<u>Location</u>
Draftsmen	"It was stated above that a large part of the world's important work is based on the careful drawings made by draftsmen and designers. The many drawings required...require not only the use of rulers and compasses, but also certain other instruments."	A-2-61
Scientists	"You may have read of the years of labor that were necessary to discover a satisfactory method of making synthetic rubber, high-test gasoline, new textile fabrics and the like."	A-2-308
Salesman	"A salesman sold 14 automobiles in a month. This was three more than he had sold in the previous month."	B-3-233-7
Architect	"In drawing plans to scale architects use a drawing board, special scales and instruments, and various kinds of squared paper."	A-2-23

<u>Occupation</u>	<u>Quotation</u>	<u>Location</u>
Engineers	"Engineers, inventors, architects, and so on plan the new business blocks and homes that we see in our modern cities as well as household appliances and improvements of all kinds."	A-2-40
Draftsman	"The draftsman above is drawing plans for a building. He is using good instruments and sharp pencils. The accuracy of his instruments and the sharpness of his pencils make his drawings more exact and therefore more useful."	B-3-326
Druggists	"Since apothecaries' weights is used by druggists, this pound has divisions different from those of a troy pound."	B-3-293-11
Farmer	"A farmer cut 42 tons of hay. He sold 6.75 tons to one man and 5.50 tons to another. He fed the rest to his stock. How many tons did he feed to his stock?"	C-1-113-10
Janitor	"At the end of the school year the Austin school janitor told Pete that the school had about $12\frac{1}{2}$ T. of coal left over. He also said that this was about one-fifth of the amount used by the school during the year. About how many tons of coal had the school used during the year?"	B-3-22-10
Clerk	"From a bolt containing $10\frac{1}{4}$ yards of cloth, a clerk sold $5\frac{1}{3}$ yard s. How many yards are left in the bolt?"	



Working Conditions.-- Included in the area "Working Conditions" were the topics, outdoors-indoors, number of workers, and expenses. Quotations from each of these sub-headings will be given to illustrate how this kind of information was included in the series.

<u>Occupation</u>	<u>Quotation</u>	<u>Location</u>
Bus driver	"Mr. Lynn, a bus driver, is paid 12 3/4¢ for each mile he drives his bus. How much does he earn during a day in which he drives 218 miles?"	B-3-110-7
Nurse	"Miss Henry, a nurse, goes to her patient's house at 8 A.M. and works until noon. Then she leaves and does not come back again until 3 P.M. How long must she work in the afternoon to put in an 8-hour day?"	B-3-15-17
Electricians	"In normal years about three million workmen are employed in American building industry including 300,000 electricians, 170,000 bricklayers and over a million general laborers. Make a list of the occupations connected directly with the building trades."	A-1-13-1
Textile workers	"In a recent year more than four billion dollars were invested in the textile industry; nearly two million workers were kept busy in the textile factories."	A-1-58
Car dealer	"A car cost the dealer \$300. He sold it for \$350 but had to pay a commission of \$24 to the agent. What percent of the selling price was his profit?"	C-1-232-3

<u>Occupation</u>	<u>Quotation</u>	<u>Location</u>
Doctor	"At various times during one month, Dr. Andrews spent \$8.20, \$4.40, and \$10 on his car. How much in all did he spend?"	A-1-83-3
Florist	"Mr. Grove, in one month, sold about \$2000 worth of flowers. The flowers had cost him about \$1400. He had other expenses amounting to \$400. When he was through, how much had he left for himself?"	C-2-144
Mailman	"Mr. Westberg is a mailman and walks an average of 10 miles a day. He bought a pair of shoes at a cost of \$4. They lasted him 75 working days. During this time he spent \$1.25 in getting the shoes repaired. What was his cost per mile for shoes?"	B-1-127-9
Dress shop owner	"The Elite Dress Shop sold a dress for \$15. The actual cost to the store owner was \$10. What was the net profit? What was the percent of profit based on the selling price?"	A-1-264-1
Merchant	"A merchant paid \$3.00 for a crate of grapefruit. He wants to sell it so that his profit will be 50¢ and his allowance for overhead \$1.00. For how much must he sell the crate of grapefruit?"	B-3-207-9

Remuneration.-- Under this heading are the two classifications "Earnings" and "Other Benefits" which means remuneration separate from salary. Samples from the texts will be given illustrating each of those headings.

<u>Occupation</u>	<u>Quotation</u>	<u>Location</u>
Vice President U.S.	"The salary of the Vice President of the United States is \$15,000 a year. What is his salary for each day of the year?"	A-1-140-5
Hardware dealer	"A hardware dealer sold a pair of scissors for 90¢. The wholesale price was 57¢, and his overhead was 19¢. How much was his profit?"	B-2-122-2
Farmer	"A farmer sells 100 bu. of potatoes to the government at \$1.96 a bushel. How much does he receive?"	A-1-145-1
Salesman	"Mr. Howe, a salesman, makes a 10% commission on his sales. Last year his total commissions amounted to \$2415.35. How much were his total sales?"	B-2-111-4
Grocer	"A grocer bought a shipment of 100 baskets of apples at 85¢ a basket and sold 92% of them at \$1.25 a basket. The remainder spoiled. What is the grocer's margin on a basket?"	C-2-197-6
Plumber	"A plumber's wages are double those of his helper. Both men worked together on a job for 4 days, and their combined wages were \$60. How much money did each receive?"	A-3-109-6
Real estate agent	"A real estate agent sold three houses. His profit from the second was \$900 more than that from the first, and the profit from the third was \$350 more than what he made on the second. If his total profit was \$2000, how did he make on each sale?"	A-3-204-28

<u>Occupation</u>	<u>Quotation</u>	<u>Location</u>
Lawyer	"Find the net proceeds to the owner if he pays a commission of $12\frac{1}{2}\%$ to a lawyer for collecting \$3,600."	C-3-224-7
Clerk	"Many large stores sell goods to their clerks for less money than they would have to pay for the same goods elsewhere. If the clerk does all his buying at his store, how has he increased his buying power?"	B-1-51-12
Agent	"The pay of an automobile agent is \$50 a month, plus a commission of 10% of the value of the cars he sells. Find his total income in a month when he sells six \$750 cars."	C-3-281-3

Preparation-Training.-- The kinds of information which were given in the area of preparation and training could be grouped under two heading, general education and special training. Samples of both kinds of information are included to show the nature and extent of the occupational information which was given.

<u>Occupation</u>	<u>Quotation</u>	<u>Location</u>
Farmer	"A farmer, having a certain number of young fruit trees, wished to set them in rows with a certain number in a row. But he lacked six trees in order to make seven rows and if set out six rows, he would have two trees remaining. How many trees did he wish to place in each row and how many trees had he?"	A-3-112-26

<u>Occupation</u>	<u>Quotation</u>	<u>Location</u>
Druggist	"A druggist bought alarm clocks at \$2.40 each. He marked them so that the margin would be 50% of the cost. At what price did he plan to sell the clocks?"	C-1-188-2
Grocer	"A grocer mixed pecan nuts selling for 56¢ a pound with 60 lbs. of walnuts selling for 44¢ a pound. How many pounds of pecans did he use if he sold the mixture at 48¢ a pound?"	A-3-215-1
Mathemati- cians	"Mathematicians know that the sum of the degrees of a triangle is always 180. When you measure the angles of a triangle and find the sum in degrees, why may the sum be more or less than 180?"	B-2-296-28
Doctor	"Dr. Murray paid a collector a commission of 8% for collecting \$350 of overdue bills. What were the net proceeds to the doctor?"	C-1-190-2
Furniture dealer	"What selling price will allow a margin of 80% of the cost if a table was bought by a furniture dealer for \$22.75?"	C-1-188-4
Architects Designers Engineers	"Our modern construction would be quite impossible without the architects, engineers, and designers who plan them. These men draw and measure geometrical figures and do a lot of computing while engaged in their work."	C-3-2

<u>Occupation</u>	<u>Quotation</u>	<u>Location</u>
Doctors Pharmacists Scientists	"The gram is a standard unit of weight in the United States and is much used by doctors, pharmacists, and scientists. Write a table of metric measures by weight using grams."	B-2-402-12
Architects Surveyors Designers	"Architects, surveyors, and draftsmen draw nearly all their plans to scale. Thus a draftsman may let a line one inch long represent one foot in the object he is drawing."	A-3-238
Carpenter	"The person who does carpentry about the home must know how lumber is measured, what sizes it comes in, what kinds are best for particular purposes, how it is sold."	B-1-354
Farmer	"A farmer planning a new barn must know how many animals he will need shelter for and how much room to allow for each one. He also must know how much feed they will eat and what space will be needed to store this feed. Before he can figure these things he must know how to find areas and capacities."	B-1-354

Limited information.-- By limited information is meant reference to an occupation or occupational worker with scarcely more than the name given, no information about the duties, training or conditions of work. A few references will suffice to illustrate this heading in the table.

<u>Occupation</u>	<u>Quotation</u>	<u>Location</u>
Jeweler	"Pure gold is called 24-carat gold by jewelers. However pure gold is too soft for jewelers to use; so other metals are mixed with it to give it hardness."	B-1-345-9
Draftsman	"If a draftsman use a scale of $\frac{1}{4}$ in. to 1 ft., show that he is using a scale ratio of 1:48.	A-2-183-9
Grocer Carpenter Banker Draftsman Farmer	"Try to learn some parts of mathematics that are used by each of the following."	C-3-3-3
Secretary	"Starting in April, 1935, Miss Thomas a secretary, bought a \$25 Savings Bond each month, after she received her salary."	C-3-293-9
Gardener	"How does a gardener make a circular flower bed?"	A-1-284-9
Mayor Judge	"Of course you realize that it takes money to pay for the schools that you go to, to pay the salaries of your mayor, other city officers, and the judges and the officers of the courts of your city."	C-2-197

Summary of the sample concepts.-- These sample concepts that have been given to show the kinds and extent of occupational information as it appears in the selected textbooks used for this study are sufficient to show that such information as is obtained is by no means exhaustive. If a teacher is interested in informing her students about such occupational titles as they are

mentioned from lesson to lesson, she would have to draw on a supply of personal information or upon such information as she could draw from the various members in her class. The kinds of information given in these mathematics series tended to deal largely with facts and figures and with the mathematical tools that are necessary for such workmen. Remuneration was a frequent kind of information and such information as was given in this area probably was already obsolete at the time of publication. As a whole the mathematics teacher could use the kinds of occupational information as given in those texts as a valuable springboard for giving further information to her students.



## CHAPTER V

### ANALYSIS OF OCCUPATIONAL INFORMATION CONTENT IN ILLUSTRATIONS

#### Inventorying Occupational Titles in Illustrations

The use of illustrations in general.-- Visual aids have proved an effective means of presenting teaching material in almost every phase of subject matter. Such is no less the case in the field of mathematics. Besides conveying ideas and information, illustrations tend to break up the appearance of a page of printed matter thus making it more pleasing to the eye. Mathematics texts with their continuous pages of problems are far more interesting when numerous illustrations are used.

Illustrations from the occupational information viewpoint.-- From the point of view of occupational information pictures are doubly important. One understands very much better the work and surroundings of a drill press operator, for instance, if one sees him in his own environment at work. Through the use of pictures illustrating different phases of work, one gets a much clearer understanding of the kinds of operations performed and the machinery and materials handled than many words could give.

One explanation should be made before any further discussion of the use of illustrations in the three series of mathematics texts is continued and that is to determine just what will be classified as illustrations. The pictures which were tabulated and will be discussed from an occupational point of view include only that kind of illustration which is photographic in nature. Illustrative material such as line drawings, the various types of graphs, sketches of geometric figures, sections of comics illustrating methods of solution, and stick figures have not been included in the analysis.

Occupational titles in illustration in the series.--

The following table is intended to be a summary of the occupational titles as they appeared or were suggested in illustration in the three series of texts. It happened in many cases that the occupational title as such was named in a caption underneath the picture, in other cases that the title could be found only by reading the problems directly following or surrounding the picture.

Table V. Analysis of Occupational Titles Found in  
Illustration in Selected Mathematics Series

Occupational Title	Series A	Series B	Series C	Total
Accountant	1	0	0	1
Air transport	2	0	0	2
Architect	1	0	0	1
Assembly line	1	0	1	2
Assessor	0	0	1	1
Auctioneer	0	1	0	1
Aviation	1	0	0	1
Baker	0	2	0	2
Banker	4	1	0	5
Basketball player	0	0	1	1
Bookkeeper	0	1	0	1
Broadcaster	1	0	0	1
Broker	0	0	1	1
Bus driver	0	2	0	2
Buyer	0	1	0	1
Calculator	1	0	0	1
Carpenter	0	3	1	4
Cement mixer	0	1	0	1
City engineer	0	1	0	1
Cleaner	0	1	0	1
Clerk	0	3	3	6
Coal dealer	0	0	2	2
Coast guard	0	1	0	1
Construction worker	5	0	0	5
Cook	1	0	0	1
Craftsman	1	0	0	1
Designer	1	0	0	1
Draftsman	3	1	1	5
Drill press worker	1	0	0	1
Druggist	0	2	0	2
Engineer	1	0	2	3
Express agent	2	1	1	4
Farming	4	6	7	17
Fireman	0	0	1	1
Flight engineer	1	0	0	1
Florist	0	2	1	3
Furniture maker	0	0	1	1
Garageman	1	0	1	2
Grocery clerk	0	3	2	5
Housekeeper	1	0	1	2
Ice blocker	1	0	0	1
Inspector	1	1	0	2

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Table V. (continued)

Occupational Title	Series A	Series B	Series C	Total
Insurance agent	0	1	1	2
Inventor	1	0	0	1
Laboratory worker	1	0	0	1
Linotype operator	1	0	0	1
Lumberman	0	0	1	1
Map maker	2	0	0	2
Manufacturer	3	0	0	3
Meat inspector	0	1	0	1
Mechanic.	0	0	1	1
Merchant	0	2	0	2
Microscopist	1	0	0	1
Navigator	3	0	0	3
Newsboy	0	0	1	1
Nurse	1	2	0	3
Oil refiner	1	0	0	1
Painter	2	0	0	2
Photographer	1	0	0	1
Pilot	2	1	0	3
Policeman	0	0	1	1
Post office	0	1	0	1
Pottery maker	1	0	0	1
Press operator	2	0	0	2
Ranger	1	0	0	1
Road worker	2	0	1	3
Salesman	2	2	1	5
Scientist	2	0	0	2
Secretary	1	0	0	1
Shipping	1	0	0	1
Soapmaking	1	0	0	1
Soldiers	1	0	0	1
Steel worker	1	0	0	1
Stock broker	1	0	0	1
Student	1	0	0	1
Surveyor	7	3	1	11
Switchboard	1	0	0	1
Tailor	0	1	0	1
Teacher	1	0	1	2
Telephone repair	0	1	0	1
Telescopist	1	0	0	1
Teller	1	6	3	10
Ticket agent	0	1	0	1

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Table V. (concluded)

Occupational Title	Series A	Series B	Series C	Total
Tower operator	1	0	0	1
Waitress	0	0	1	1
Weaving	2	0	0	2
Total	86	56	41	183

Examination of Table VI reveals that there were 419 illustrations in the three series of textbooks of which 183 or 44 percent were occupationally significant and 236 or 56 percent contained no specific occupational content. Series A lead the list in number of occupational illustrations with 86 as compared with 56 in Series B and 41 in Series C. Besides leading in number of such illustrations, it is also true that Series A contained more information about the occupations pictured.

Only nine of the occupational titles found in the various series appeared more than five times. These nine titles along with the number of times that each appeared included the following: banker (5), clerk (6), construction worker (5), draftsman (5), farmer (17), grocer (5), salesman (5), surveyor (11), and teller (10). One can readily see that "farmer" heads the list as far as frequency of appearance. This was also true in the

textual material in the series where the occupational title "farmer" appeared for a total of 91 times.

"Surveyor," which was illustrated eleven times was also high on the list for frequency of mention in the textual materials, appearing twenty-three times in all.

Mention should be made concerning the familiarity of the occupational titles that one sees included in this list of those most frequently illustrated. "Draftsman" and "surveyor" would be the only ones with which the average student would not be already familiar. For the purpose then of introducing the student to new occupational groups, one could conclude then that these illustrated occupations would not be too helpful.

Percentage of illustrations containing occupational information.-- At this point it is felt that a comparison of the proportion existing between the number of illustrations per series and the number of illustrations which gave occupational information would be advisable. Table VI has been prepared to show this relationship.

Table VI. Analysis of Illustration for Occupational Content Arranged According to Series

Series	Number of Illustrations		Total	Per Cent
	With Occupational Information	Without Occupational Information		
Series A	86	111	197	44
Series B	56	71	127	44
Series C	41	51	92	43
Total	183	233	416	44

One could gather from this table that occupational information was not the primary interest that dictated the choice of these illustrations since less than fifty percent of the illustrations in each series of the total number of illustrations contained occupational information. Series A surpassed the other series in occupational content, by three percent in the case of Series B, by five percent in the case of Series C.

#### The Use of Illustrations in the Individual Series

Since the various series differed in their method of using illustrations, also in their method of relating the picture presented to useful purposes, it seems wise to discuss the use of illustrations in each series separately. Discussion will follow in the usual order

of Series A first, then Series B, finally, Series C.

The use of illustrations in Series A.-- Just a casual glance at the number of illustrations that have occupational significance compared with the number that have no reference to workers or work as given in Table VI would almost cause one to decide that occupational information was not the concern of the author in the Betz series in his choice of illustrations, 86 references with such information, 115 references without any. But on careful examination of the occupationally significant illustrations one finds a variety of kinds of information about the worker in the caption underneath the picture. For example one can observe a definite purpose in this quotation taken from an illustration in Betz<sup>1</sup> which shows a draftsman at work on a blueprint, also the equipment that he is using, and the extreme detail of the work that he is doing. "Scale drawings, maps, and charts require accurate computations and careful draftsmanship, which involve the knowledge of geometric forms and relations". Throughout the series there has been a definite attempt made through the explanations underneath the pictures to explain the kinds

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<sup>1</sup> William Betz. *Everyday Junior Mathematics*, Book Three, Ginn and Company, Boston, 1946, p 77



of skill required for the particular job and to explain at least partially the kinds of conditions under which such work is done.

The kinds of illustration which were included in this series which were not considered to contain direct occupational information did tend to fulfil a definite purpose from the author's point of view. Such illustrative material contains pictures such as the Empire State Building, numerous bridges as that over the Potomac River in Washington, D.C., and large engineering projects such as the Coulee Dam. One can see that this information contributes greatly to a functional understanding of mathematics. Each of these structures exemplifies mathematical principles, each is the work of a great number of skilled workmen and professional workers. The students themselves, if such pictures are called to their attention, should be able to supply the names of many occupations involved, from the designing stage right up to the completion of construction. These structures illustrate geometric forms such as the triangle, arch, rectangle and show quite definitely how the science of mathematics is contributing to this modern age of science.

The use of illustrations in Series B.-- The illustrations in Series B, the Scott, Foresman publication, Mathematics and Life, are designed almost exclusively

to follow the text of the book. No captions appear below the pictures either to name the type of worker or to explain his duties or the actions he was performing. It is necessary for one to read the text that follows to determine the nature of the work if it is not immediately apparent to the eye. It is true that only illustrations of types of workmen that should be familiar to most people are included. For example some of the subjects of illustrations were farmers, clerks, nurses, tellers and carpenters. The fact that only known workers are used in these pictures would tend to limit the teacher as far as contributing to a student's knowledge of occupations is concerned.

At the beginning of each chapter a page is devoted to illustrations of various kinds of workers, in some cases as many as eight pictures appearing on a page. No designation is made as to the kind of worker pictured and often this can lead to ambiguity. A picture of a man examining a beaker could be any one of a number of workers, a chemist, a pharmacist, a scientist, anything the reader's imagination or experience would indicate. A man looking over a piece of cloth could be a tailor or perhaps a clerk in a drygoods store.

The illustrations that appeared along with the text, if there was difficulty as to their classification could be determined by reading the introduction to the problems

underneath the picture. Some special explanation beneath the picture would have improved the illustrations from an occupational information point of view.

The 71 illustrations which were considered non-occupational in their significance did have value in explaining mathematical principles and their use. Again the teacher could adapt this kind of information to suit her own ends or the extension of information that his students have of the variety of occupations.

The use of illustrations in Series C.-- In the Mathematics in Action series, the number of illustrations tended to be lower than in either of the other two series, 95 illustrations in all as compared 197 in all in the Betz series, and 127 in the Mathematics and Life series. Of this total number 41 of the illustrations showed workers in action as opposed to 51 which did not convey any definite occupational information.

Here again the comment could be made that the illustrations which were contained in the texts could have presented more detailed information about the work or the worker if a caption had been placed underneath the picture to explain it and to clear up any ambiguity which might arise as to the identity of the workmen or the instruments or materials which he handled. It is true that in this series as it was in Series B that some explanation of a picture is to be found in the text imme-

diately following or surrounding the illustration. As in all nine of the books examined, there was an abundance of line drawings and graphs that added to the book's appearance.

One example of the use of illustration by Hart and Jahn in this series might be helpful at this point. At the top of the page is a picture showing a man doing some carpentry work while two young boys look on. The picture shows the man measuring a length of board with a rule and pencil while a saw lies near by. The board that he is measuring is suspended on two sawhorses while he measures.

Illustrations as a method of imparting occupational information.-- The writer feels that illustrations do play an important part in giving the kinds of information needed by pupils in choosing their life work. The type of illustrations which seem to be most valuable as far as contributions to an occupational information program are those which showed the workman at his work, whether at a desk or in an assembly line, and gave the clearest detail about materials handled and equipment used along with some explanation of the special skills or training required for that particular kind of work. It is felt that illustrations could have been used even more effectively than they were in the series of texts surveyed in this study.

## CHAPTER VI

### SUGGESTED HELPS FOR TEACHING OCCUPATIONAL INFORMATION

#### Nature of this Section

Purpose.-- Since many classroom mathematics teachers have had little if any training in ways of imparting occupational information, it seems wise to present some suggestions and helps to such teachers in the hope that they may be encouraged to do their part in contributing to the total program of occupational information, thus enabling students to choose their future occupations more intelligently in the light of their understanding of opportunities in world of work.

Methods to be used.-- Simple suggestions will be made which can be implemented by the classroom teacher to fit the needs of his particular group, and sources will be cited where further information may be obtained. It is hoped that through such media the classroom teaching will be enriched, the students will be made more aware of the functional value of their mathematics courses in relation to their future lives, and the teacher himself may increasingly realize the vocational aspect of the courses which he teaches.

## Techniques Available to Teachers

Some of the techniques that can be utilized by mathematics teachers are listed below.

1. Exhibits and Displays
  - a. Bulletin Boards
  - b. Picture Displays
  - c. Book Displays
  - d. Posters
2. Field Trips or Visits to Industry
3. Career Conferences
4. Civil Service Announcements
5. The Newspaper
6. Radio, Films and Recordings
7. Dictionary of Occupational Titles and The Report of the Census
8. Other Pertinent Publications

The following discussion is presented to show the various ways in which each of these techniques may be used by the classroom teacher in imparting occupational information through mathematics courses.

Exhibits and displays.-- This is a medium of approach to occupational information available to any subject matter teacher. The importance of the eye gate is disseminating information, capitalized on so extensively as it is by advertisers in magazines, news-

papers, and billboards, need not be dwelt upon here. Such a technique proves doubly valuable if the teacher can succeed in getting groups to participate in that it will incline to stimulate career planning and bring members into contact with vocational issues. Some methods for involving groups in the preparation and responsibility for displays as suggested by Karp<sup>1</sup> would include the following:

1. Request members of groups to bring in materials as they run across them in newspapers or magazines.
2. A contest among groups to prepare an exhibit on a selected vocational topic.
3. Suggestions for care of the bulletin board by rotating groups.
4. An art group may be asked to cooperate in preparing signs or posters.
5. Permit groups who are planning an activity on a vocational topic to use the bulletin board as a publicity medium.

Since the aim of such exhibits should always be to attract attention and enlist interest sufficient to stimulate the student to seek out information on his own initiative, care should be taken that the material is vivid and attractive. Forrester<sup>2</sup> recommends that the commercial advertiser be followed in his use of abstract designs, pictorial symbols, decorative elements,

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<sup>1</sup> William Karp. "The Bulletin Board as a Tool of Vocational Guidance," Occupations, 661-3, May 1943

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<sup>2</sup> Gertrude Forrester. Methods of Vocational Guidance, D.C. Heath and Company, Boston, 1944, P.44

balance, symmetry, and color, which are responsible for the attention a display will receive. It should be stimulating rather than detailed in its explanation or information. To secure this end it is often necessary to cut some material or to rewrite it entirely for the purpose of display.

The teacher therefore will use or place at the disposal of the groups working on the displays bright poster paper and lettering materials. The appearance of a display line or slogan at a focal point in the exhibit serves as a centralizing theme, a means of integrating the varying types of material as "Workers Who Live By Mathematics." This may take the form of a leading question printed on a thin strip of cardboard as "Why Study Mathematics?", "Statistical Workers-- Are They Needed?"

a. The Bulletin board. The bulletin board is a means of exhibit which has been little utilized for any purpose and one which readily adapted to the spread of occupational information. Often its location in the room with a faded, outdated clipping or cartoon is a detriment rather than an asset to any cause. It should be placed at a focal point in the room but out of the direct line of traffic, and the teacher should make certain that no one display remains up too long. The board should be large enough to permit a large amount



of material, whether pictures, paper covers from books, or clippings. Eunice Spencer<sup>1</sup> offered some suggestions for those needing practical, durable bulletin boards. She suggests gluing together two thicknesses of heavy corrugated cardboard, the ribs of one going at right angles to those of the other. The front can be covered with blotting paper to increase its attractiveness. A piece of burlap with a one-inch board fastened at each end for weighting makes an effective board to which exhibit material may be pinned. Three-ply wood makes an inexpensive bulletin board which can be covered with blotting paper or wrapping paper from the grocery store to preserve a fresh exterior. Two other possibilities are half-inch masonite and wood-backed cork linoleum.

Sources of bulletin board material are varied. The newspaper has its "Help Wanted" section, and notices of contract awards to construction companies. Such notices may be tabulated and summaries charted weekly, monthly, or at the end of the semester or year. Civil service announcements provide material concerning the need for workers. Bulletins from the United States Office of Education or the State Education Department make good exhibits. Such displays should show the duties, requirements, opportunities and conditions of work.

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<sup>1</sup> Eunice Spencer. "The Bulletin Board--An Able Assistant," *The Business Education World*, 22,269, November 1941

b. Picture displays. Magazines such as the National Geographic, Look, Fortune, and the Dupont Magazine, provide excellent colored pictures for display. Advertisements in current magazines as the Ladies Home Journal and McCall's provide such as can be readily adapted to occupational information usage. McIntire<sup>1</sup> found that colored photographic advertisements make pictures that are for classroom displays because they are dramatic and vivid. The mathematics teacher can choose pictures with regard to the point of view he wants to put over, cut them out and paste them on a cardboard. She used this method in a poor English section, the "job English" section, to teach occupational information by pasting on the reverse side a short, pertinent paragraph including the information she wanted to impart and passed the pictures around the class. For display purposes such information could be placed in a neatly typed or printed caption beneath the picture.

Besides these pictures from magazines and periodicals, it is possible to obtain photographs from industrial concerns and institutes. These are usually of a size large enough (8 x 10 glossy prints) to use for posters. Snapshots of local people at work provide local interest and offer challenge to the camera fans

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<sup>1</sup> Gloria McIntire. "Let Pictures Tell the Story," Occupations, 124-6, November 1941

within the group. The school photography club might be persuaded to assist in this display. Underneath such pictures there should be captions directing the interested observer to information in the file where he can obtain further relevant material.

c. Book displays. Book displays which are arranged about a central theme can contribute to the occupational information program. The teacher can make use of books which pertaining to specific occupations and books which portray the lives of individuals who successfully practiced that occupation. Kitson<sup>1</sup> in his book I Find My Vocation maintains that a vocation is made up of the persons who work in it so that if one wants to find the essences of an occupation he needs to read the life histories of the men who do that kind of work. The one difficulty here lies in the preponderance of biographical literature concerning successful men in the professions and the lack of it in the trade lines. The plumber, carpenter, or brick layer seldom receives public acclaim. Also, it is often the outstanding individual, not the average worker, whose life is written up. The outline for the study of biography for occupational information purposes and a list including the names of some outstanding bio-

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<sup>1</sup> Harry Dexter Kitson. I Find My Vocation, McGraw Hill Book Company, Inc., New York, 1931, p.66

ographies, can be obtained in the aforementioned book.

For those who desire biographical sketches of men from other vocations, it would be well to look up the occupations in the Reader's Guide to Periodical Literature, where perhaps a reference may be found to a biographical sketch in a magazine. Many biographical sketches are to be found in the various encyclopedias or in Who's Who In America. The reader who studies biography for the purpose of discovering occupational information should look for ways that have succeeded before ~~in~~ choosing, preparing for, entering into and progressing in the vocation.

d. Posters. Posters for the walls or blackboards provide an excellent method of getting information across to the pupil for the occupationally minded teacher. These could be either made at home or purchased. A samples poster, useful for the math room bulletin board, is one prepared by a committee of the Michigan Section of the Mathematical Association of American which is available for only five cents by writing to Philip S. Jones at the University of Michigan, Ann Arbor. Posters comparable to this are the "Tree of Life" ones as seen in the Mathematics Teacher. Other posters may be obtained from the following:

B'nai B'rith Vocational Service Bureau, 1003 K Street, N.W., Washington, D.C.

Brewer's Chart of Vocational Opportunities, U.S. Government Printing Office, Washington, D.C.

Champaign Guidance Charts, Champaign Senior High School, Champaign, Illinois

Guidance Posters, Science Research Associates, Chicago, Illinois

College Majors Charts, Glamour Magazine, 420 Lexington Avenue, New York 17, N.Y.

Contests are effective toward stimulating poster competition with prizes being awarded for the posters submitted which best portray workers in their regular environment or working conditions. Manila envelopes, each containing occupational titles, may provide the stimulus needed to get the pupils to bring in occupational information pertinent to their vocational interests. These envelopes can be strung on a wire at the ledge of the blackboard to be a reminder, or committees can be set up in the various classes to choose some title and work as groups in searching for appropriate pictures.

Calendars, charts, placards, or similar surfaces should be saved by the teacher as bases for poster. One very effective means of matching job fields with the necessary abilities is that prepared from Part IV of the Dictionary of Occupational Titles. Entry titles

can be pasted onto a placard together with the kinds of abilities considered necessary for this type of job. Such a poster enables the student to survey entry occupations and the requirements for each group.

Field trips or visits to industry.-- The importance of on-the-job observation cannot be underestimated in the total field of occupational orientation. Some things can be learned from books or from talking to workers, but according to Billings,<sup>1</sup> "even visual materials cannot depict the noise, hurry, dust, and odors accompanying many industrial processes." The locality determines to some extent the variety of working establishments available to observe. The mathematics student is able to visualize without a trip the working environment of a math teacher. In Boston or Hartford he has abundant opportunities to observe the work of an insurance actuary. Research and technological laboratories would be available in special areas. But one does not have to visit working establishments to see men whose work requires mathematics. Many apprenticeable trades require mathematics. One can watch the cabinet maker, the electrician, the glazier, the lithographer, the mechanic and the radio technician often without leaving his home.

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<sup>1</sup> Mildred Lincoln Billings. Group Methods of Studying Occupations, International Textbook Co., Scranton, Pa. 1941

If the teacher does plan trips to industrial concerns, there are certain details he should keep in mind. The students should have preparation before they go so that they can have certain objectives in their observation. Details should be arranged with the plant as to the number of students, time, specific points of interest, and then be carefully adhered to. Of course, students need to understand what is expected of them in the situation and their responsibility in preserving the opportunity for future trips by other groups.

It is interesting to note that mechanical aptitude tests, given for entrance into apprenticeship- such tests as those given at the Government Printing Office, United States Navy Yard, and in certain large industries include questions on elementary trigonometry, simple machines, interpretation of drawings and diagrams, and measurement of figures and solids.

Career conferences.-- A modification of the career conference is another device which could be effectively used by the mathematics teacher. Either a school period could be devoted to a group of speakers using a panel system or the time could be arranged in after-school meetings. Interested business men and professionals are very often glad to come in for short periods to work with the classroom teacher in this important

phase of the school's job. They, better than the teacher, can impress upon the students the important part that the various phases of mathematics play in preparation for their work. Illustrations that they can present are more vivid than any second-hand relating by the teacher, important as that may be.

Preparation of the speakers at some time in advance is advisable. Gertrude Forrester<sup>1</sup> includes a list of such instructions both to the speaker and to the student chairman. He needs to know the number of students he will face and their interests. He needs to know the amount of time that he will be allowed and what preparation the students have had in his field of specialization. If he is to serve with other members as a panel in which he will participate, he should be thus informed. Many teachers find it wise to present the invited speaker with a suggested outline, the same one that the students use in their study of an occupation. This gives him a basis for organizing his material and will tend to keep him from rambling too far afield in his discourse. Knowing what time he has will help him to make the minutes count. He should always be advised to save fifteen to twenty minutes at the end for

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<sup>1</sup> Gertrude Forrester. Methods of Vocational Guidance, D.C. Heath and Company, 1944, pp. 159-163



student questions as this is one of the most valuable phases of the meeting.

It would be highly advisable when old students drop in, those who are continuing in their training or already in some field of work, to have them explain in a few minutes how they use their math training or in what manner their present study would be impossible without the earlier high school mathematics. (It might be wise to find out ahead of time whether they feel that such previous training has been a benefit!)

Civil service announcements.-- This is a method of occupational information especially adapted to the mathematics teacher since most every type of mathematics job is available through the federal, state, or local civil service. In the federal service alone, the United States Civil Service Commission employs clerical workers, craftsmen, farmers, nurses, statisticians, engineers, surveyors, accountants, scientific researchers, and research assistants of every type. The teacher can obtain these announcements for the classroom by writing to the Civil Service Commission but they are also posted on bulletin boards in post offices and other public places. Students in this way learn of opportunities in the civil service while learning at the same time, such specific information

as job requirements, experience needed, salary, and personal qualifications.

The newspaper.-- The regular school newspaper or a newsletter or paper put out by the guidance department can prove a decided benefit to the mathematics teacher. Careers in mathematics could be a regular feature if the paper is a guidance-sponsored paper. Joseph Samler<sup>1</sup> states that it is important from a guidance point of view "to keep a proper balance between extremes of statement and caption calculated to secure attention, and the rather prosaic dictates of the planning program. News values of stories, contests, puzzles, interviews, columns, cuts, and attractive lay out are important."

Newspaper statements acquire the validity associated with printed words. Such magazines as Seventeen and Occupations, are especially good sources for ideas for style and content in the preparation of articles with occupational objectives in mind. Such articles are a kind of bulletin board that the students can take home and the information contained in them should aim to stimulate the individual to a concern over his own future and should help him in his planning.

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<sup>1</sup> Joseph Samler. Vocational Guidance Through Groups, B'nai B'rith Vocational Service Bureau, Washington, 1943, p. 54

Also the vocational quiz is often a source of real interest. The mathematics teacher will relate mathematics courses to occupations; and here economic trends affecting work choices, armed service and civil service opportunities, and especially the necessity of planning can be aired.

Radio, films, and recordings.-- While radio programs themselves often are produced at times impossible to fit into the school program, the increasing use of wire and tape recordings is proving an acceptable method for use in the classroom or in clubs for getting this needed information to the student. The individual teacher, interested in this approach, can contact the local radio station for a program schedule and information concerning the availability of such recordings. Because of the rapidly changing broadcasts the teacher may consult Occupations, which reports the schedules of vocational guidance programs several times a year. Such announcements are included in the monthly announcements of the general education broadcasts, obtained regularly by placing one's name on the mailing list. The National Broadcasting Company in New York City distributes "NBC Presents"; Columbia Broadcasting Company offers the "CBS Student Guide." By posting such guides, interested students may be encouraged to

listen and bring reports to the group. Information about scripts and transcriptions of recent radio broadcasts will be given by the Educational Radio Script and Transcription Exchange, U.S. Office of Education, Washington, D.C.

To use such broadcasts or transcriptions effectively, Forrester<sup>1</sup> suggests that some preparation be made to stimulate interest such as raising questions in advance. Each broadcast should be considered primarily as a springboard for further investigation and discussion. The teacher herself needs to give complete attention to the listening; otherwise pupils will be encouraged to do other things too. To utilize the stimulating values of the broadcast, supplementary reading, interviews with workers, visits to places of employment should be encouraged. The student's suggestions themselves should be welcomed.

It is not necessary to add to what has been said about the importance of visual aids for presenting information, imparting desirable attitudes, and developing insights. The motion picture has yet to be utilized to the full in any phase of education and especially in the field of vocational education. Samler<sup>2</sup> would em-

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<sup>1</sup>Forrester, op. cit., p. 39

<sup>2</sup>Samler, op. cit., p. 65

phasize the importance of the teacher's previewing the film for various reasons. "Dated" films by reason of their clothing, language or action, may prove a type of entertainment different from that desired. The teacher should inspect the reel to be sure that the film shows what the worker does, not just how a product is made. The value of a picture is measured by the extent which it can give a view of the occupation as a whole, its working conditions, methods of advancement, places of employment, and related occupations.

Moreover the film should not be an isolated activity. Rather, it should include preparation by the leaders, motivation of the group, discussion of the content and a summary pointing up the desired conclusion. If time permits, it might be advisable to show the film a second time to the students in order to secure its full value in later discussions.

Three methods are possible for obtaining films. A great many are free and available on payment of packing and transportation charges; some can be rented; others are for sale only. Some sources for vocational guidance films are listed below. Forrester<sup>1</sup> gives further details.

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<sup>1</sup> Forrester, op. cit., pp. 19-22

Vocational Guidance Films, Inc., Des Moines, Iowa  
Society for Visual Education, Inc., Chicago, Illinois  
Coronet Productions, Glenview, Illinois  
Encyclopedia Britannica Films, University of Chicago  
Forum Films Inc., 8913 Sunset Boulevard, Los Angeles,  
California

Division of Visual Experiment of the Harmon Found-  
ation, 140 Nassau Street, New York City

Federal Security Agency, Social Security Board,  
Washington, D.C.

In addition to the sources suggested, libraries of many  
university schools of education rent films at reasonable  
rates.

Dictionary of occupational titles and the report  
of the census.-- The teacher who has not used the dic-  
tionary will find valuable help toward his own under-  
standing in Shartle<sup>1</sup> and Forrester<sup>2</sup>. The teacher's  
work would depend largely on whether the students had  
had any previous training in the use of the Dictionary  
or Census. For those students who have had no occu-  
pational training, it will be necessary first to in-  
troduce them to the broad classifications of the fields  
of work. Parts I and IV would be ideal for such an

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<sup>1</sup> Carroll L. Shartle. Occupational Information,  
Prentice-Hall, Inc., New York, 1946, pp. 133-160

<sup>2</sup> Forrester, op. cit., pp. 74-88

introduction. Activities which are useful in such a program are suggested by Forrester<sup>1</sup>.

The 1940 Census, Population-Volume III, The Labor Force, gives the number of workers in each occupation for the census year, the nationality of the workers, their duration of employment or lack of employment during that census year, the average wage received during one week in March, the geographic distribution of workers in the country, and the personal characteristics of the labor force including age, sex, race, and marital status. After the summary for the whole United States in Part One, Parts Two through Five give breakdowns for the various states, alphabetically arranged. From this publication one can observe the proportion of fluctuation from census to census, and the general relationship between educational and occupational opportunity can be drawn by comparing the highest grade of school completed with the age, occupation, wage and salary information given in the Census report.

Below are some suggested activities which the teacher may use in making the census information available to the students.

1. List the five occupations that appeal to you as a life work. According to the Census determine which

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<sup>1</sup> Forrester, Op. cit., pp. 74-88

section of the country employs the greatest number in this type of work.

2. For each occupation selected compare the number of male and female workers.

3. What percentage were unemployed in each occupation during the year 1940.

4. What was the average weekly wage in 1940.

Both Report of the Census and the Dictionary of Occupational Titles are available from the Government Printing Office, Washington D.C.

Other pertinent publications.--- To the alert mathematics teacher, interested in having available to students the most recent information on trends in occupations and future prospects, The Occupational Outlook Handbook is a necessity. The publication is available from the Occupational Outlook Service, U. S. Bureau of Labor Statistics, Washington, D.C. Reprints of articles and special pamphlets to bring the present handbook up to date are available from the Outlook Service as they are published. Such information is also published in the Monthly Labor Review, an effective vocational guidance tool. This is one way of keeping informed of trends and changing conditions in the world of work.

The teacher who desires to relate his course to



life activities will want to be on the mailing list of the Government Printing Office, Washington 25, D.C., for the "Selected List" of regular U.S. Government Publications; also of the United States Office of Education, Washington, D.C., for their guidance publications. Such a teacher should also have a list of the occupational briefs and guidance publications of Science Research Associates, 228 South Wabash Avenue, Chicago 4, Illinois. From these he will be able to secure monographs, bibliographies, and pamphlets, from which he can choose references to the occupations for which his subjects prepare.

Besides these formal helps that can be made use of, the teacher will find many opportunities in the ordinary course of classroom procedure. She can plan her units to contain well chosen questions and activities which will direct the pupils' attention to the occupational significance of the material being studied. This is probably one of the most useful ways to introduce a new unit since the student often asks what profit such a study will be to him in the future. As students become occupationally minded they will suggest new occupations that they learn of and thus introduce opportunities for class discussion.

### Summary

The mathematics teacher who is on his toes, cognizant of the vital need of his students for occupational information, and the necessity for his being the agent for that which is pertinent to his courses, will first acquaint himself with the various occupations for which his subjects are the tools. He will make use of all the occupational references and inferences in his texts. He will early in the course, preferably as orientation at the beginning, initiate by a series of assignments, student research into the occupations to which these courses pertain. This will stimulate their curiosity and awareness throughout the course. In addition to this orientation to the course, throughout the year as he sets up each unit of study, the wise teacher will point out by special activities, the occupational significance of the unit at hand. He will emphasize the material which has a practical significance in the students' own lives. He will at all times be interested and helpful in referring the student to pertinent material which can assist him in making his occupational choice.

As suggested in the introduction, this study has not been intended to exhaust the methods by which occupational information can be imparted through the mathematics courses. It has been the purpose of the

study to offer suggestions and helps which may stimulate the math teacher's own imagination, or which may be adapted directly for use in his classroom teaching or to locate sources which can be utilized by the teacher in gaining the skills needed.

## CHAPTER VII

### SUMMARY AND CONCLUSIONS

#### Kinds of Occupational Information Presented

Recapitulation.-- The primary purpose of this study as stated in Chapter I was to ascertain what kinds of occupational information were available to Junior High School mathematics teachers in mathematics texts and to show how such occupational information could be utilized to contribute to a total program of occupational information.

In Chapter II there was a presentation of the criteria used for the selection of the materials to be used, a description of the series to be used, and the procedure to be used in the analysis of the problem.

Chapters III and IV contain the analysis and classification of the occupational titles found in the three selected mathematics series. These occupational titles were analyzed as to frequency of reference, according to occupational areas, and to specific information about the occupational title mentioned.

Chapter V was devoted to the analysis of occupational information found in the illustrations in the three mathematics series.

Chapter VI contained helps and sources of information for the mathematics teacher who would like to utilize

this information for teaching occupational information through her regular classes.

Summary of findings.-- This study revealed that 74 different occupational titles appeared in Series A, 70 in Series B, and 46 in Series C, for a total of 119 different occupational titles in all. There were 822 references in the nine texts. The largest number of titles appeared in the ninth grade texts, a total of 302 in all; there were 276 references in the eighth grade books, and 244 in the seventh year books. In addition to these references which appear in the written material in the texts, 183 occupational titles or pictures of workers occurred in the illustrative material in the books, 53 in the seventh grade, 77 in the eighth grade, and 53 in the ninth grade.

When the classification was made according to major occupational groups using the divisions as found in the Dictionary of Occupational Titles, it was found that the occupational titles appeared in greatest frequency under three major occupational groups, professional, clerical-sales, and mechanical workers. The smallest number of occupational titles appeared in the service workers classification.

#### Conclusions

As a result of this study, the following conclusions

can be drawn:

- (1) There is a great variety of occupational information of educational significance found in junior high mathematics textbooks which could be used effectively to teach occupational concepts to junior high school students.
- (2) This information seems to be too limited in its scope to be used for a complete picture of the occupations mentioned. Such information needs to be implemented by the teacher to be really effective toward a total occupational information program.
- (3) Illustrations provide a valuable supplement in that they tend to give a broader picture of the nature of the occupation.
- (4) The teacher can use junior high mathematics as an effective means for presenting the occupational information related to her subjects.

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