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THE UNIVERSITY OF OKLAHOMA
GRADUATE COLLEGE

THE APPLICABILITY OF SPECIFIC PHONIC GENERALIZATIONS
TO ELEMENTARY MATHEMATICS TEXTBOOKS

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THE APPLICABILITY OF SPECIFIC PHONIC GENERALIZATIONS
TO ELEMENTARY MATHEMATICS TEXTBOOKS

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THE APPLICABILITY OF SPECIFIC PHONIC GENERALIZATIONS
TO ELEMENTARY MATHEMATICS TEXTBOOKS

CHAPTER I

THE STUDY

Introduction and Background

Mathematics plays a very important role in every area of our complex society. As the result of such a role there have been many changes in the mathematics programs during the past decade. Ragan¹ states that one of the most striking features of the modern approach in mathematics is the increasing emphasis on concept development; however, he stresses that a mathematics curriculum consisting of sound and meaningful mathematical concepts is not sufficient; pupils must learn to use these concepts in problem solving situations. The mathematics program in the elementary school must be concerned with developing the child's skill in solving his everyday problems, that are quantitative in nature. Many problem solving exercises will be presented in printed form in the mathematics textbooks. The solution of

¹William B. Ragan, Modern Elementary Curriculum (3rd ed., New York, Holt, Rinehart and Winston, 1966), pp. 326-59.

these exercises depends largely upon the child's reading skills; therefore, as one accepts Ragan's statement on the importance of mathematics in society there is also an awareness of the great importance of reading skills in elementary mathematics.

Bremer¹ says as society's complexity increases, our dependence on symbols becomes greater, and no educational system that does not help students master the basic skills in the basic symbolic systems, language and mathematics, will serve our purposes. These have to be at the center of any curriculum. Therefore, we realize the importance of interpreting language symbols, whatever the task may be.

In the primary grades and to a decreasing degree in the intermediate grades the comprehension of arithmetic problems is largely a reading rather than a mathematical task. The simple arithmetic problem presents the basic reading task of word recognition, word meaning, and comprehension. Thus, in the lower grades the improvement of fundamental reading skills reflects in improved reading in arithmetic.²

It is evident that reading skills play a very important part toward the achievement attained in every content

¹John Bremer, "A Curriculum, A Vigor, A Local Abstraction", The Center Forum, (March, 1969), pp. 1-5.

²George D. Spache, Reading In the Elementary School (New Jersey, Allyn and Bacon, Inc., 1969), p. 305.

area. With this in mind it is only fitting that concern should be directed to the methods used for the teaching of reading skills. A child cannot become an independent reader without adequate skills for word attack. There is probably more time devoted to instruction in phonics and phonic generalizations for use in word attack than to any other method for this all important task. Burmeister¹ says that although most educators today favor the teaching of phonic generalizations very few of them are able to enumerate with any degree of certainty the generalizations which are worthy of being taught.

Robinson,² by means of a study, endeavored to discover what the fourth grade reader actually does in attacking unfamiliar words. His conclusions was that no word identification technique was used very successfully by the subjects. He thought the subjects would profit from instruction in the use of context clues. When parts of the word form were presented, most subjects seemed to concentrate all effort on sounding the parts without regard to context. Most authorities of reading advocate the teaching of phonics in some

¹Lou E. Burmeister, "Usefulness of Phonic Generalizations," The Reading Teacher, XXI (January, 1968), 349-56.

²H. Alan Robinson, "A Study of the Techniques of Word Identification," The Reading Teacher, XVI (January, 1963), 238-242.

form. Nevertheless, the issue of phonics remains cloaked in an aura of controversy.¹

The first Harvard Report recommended that no one method of word attack, in particular, phonetic analysis, be used to the exclusion of all others. The assumption was then made that phonetic and structural analysis would be included in any list of techniques of word recognition. Since many prospective teachers do not know these techniques it was further recommended that college instructors take greater responsibility in making certain that their students have mastered the principles of phonetic and structural analysis.² Curry and Rigby identify word analysis skills as being two different but related skills, phonics and structural analysis; the two being related because in many situations it becomes necessary to divide the word into its structural elements before the phonic principles can be applied.³ Zintz⁴ defines structural analysis skills as the means by which the parts of the word, which form meaning

¹Robert Emans, "The Usefulness of Phonic Generalizations Above the Primary Grades," The Reading Teacher, XX (February, 1967), 419-25.

²Mary C. Austin and Others, The Torch Lighters (Cambridge: Harvard University Press, 1961), p. 146.

³Robert L. Curry and Toby W. Rigby, Reading Independence Through Word Analysis (Columbus: Charles E. Merrill Publishers, 1969), p. 5.

⁴Miles V. Zintz, Corrective Reading (Dubuque, Iowa: Wm. C. Brown Company Publishers, 1966), pp. 340-42.

units or pronunciation units within the word, are identified. Phonetic analysis is defined as the application of a knowledge of consonants and vowel sound clues to the pronunciation of a word.

Clymer¹ has reported research toward the evaluation of phonic generalizations. In his study he attempted to answer the following questions: (1) What phonic generalizations are being taught in basic reading programs for the primary grades? (2) To what extent are these generalizations useful in having a reasonable degree of application to words commonly met in the primary grade material? (3) Which of the generalizations that stand the test of question 2 can be learned and successively applied to unknown words by primary children? Since Clymer's study, several others have been reported in the field of reading and a few in other curriculum areas, but seemingly none in the field of mathematics.

The Need for the Study

Russell states that reading arithmetical and other mathematical material involves perception, understanding, and use of mathematical symbols and verbal problems.² Erickson emphasizes that it should not be overlooked that the ability

¹Theodore Clymer, "The Utility of Phonic Generalizations in the Primary Grades," The Reading Teacher, XVI (January, 1963), 252-58.

²David H. Russell, Children Learn To Read, (New York: Ginn and Company, 1961), p. 342.

to read accompanies, to a very great extent, the ability to solve thought problems which pupils are expected to read.¹ Research points out the fact that poor readers are sometimes very successful in working number problems in which the operations are indicated; however, as pupils proceed through the grades the problem of reading becomes more burdensome in the arithmetic situation as more stress is placed on verbalized problems. In some instances inability to read is mistaken for inability to apply arithmetic concepts to thought problems.

Word perception is one of the very important components of the reading process. The ultimate goals in word perception are to bring to the level of instantaneous perception a maximum number of highly useful words that are common to different types of materials that a child wants and needs to read and to develop understandings, skills, and abilities that enable him to attack unfamiliar words in reading.²

It can be seen that unlocking new words is an integral part of the process of learning to read and the child must learn to perform this task in the most efficient manner. Since our English language is not phonetically stable we must expect our children to learn many ways to attack a new word

¹Leland H. Erickson, "Certain Ability Factors and Their Effect on Arithmetic Achievement," The Arithmetic Teacher, V (December, 1958), 287-93.

²William S. Gray, On Their Own In Reading, (Chicago: Scott Foresman and Co., 1960), p. 37.

if they are to be independent in word attack. Phonics is not an end in itself, but one constantly used means to the end.¹

In the so-called "unphonetic" English language, the letter one sees in a word may stand for the sounds that are usually associated with the letters in the word, or the spelling of the word may not be an indication of the sounds that are heard when the word is spoken. Because the spelling of a word may give little or no indication of the word's pronunciation, failure to distinguish between letters and sounds in a word accounts for many of the pitfalls in teaching phonics.²

It is evident that skills play a very important role in all reading instruction. Therefore, much study has been directed toward the improvement of the instructional programs of reading. The use of phonic generalizations is recommended by many reading textbooks and basal reading series including the following as an important part of their instructional program. Clymer,³ Bailey,⁴ and other authorities in the field of reading have completed

¹Ralph C. Staiger, "Your Child Learns Phonics," The Reading Teacher, IX (December, 1955), 95-99.

²Anna D. Cordts, Phonics for the Reading Teacher (New York: Holt, Rinehart and Winston, Inc., 1965), p. 69.

³Clymer, "Utility of Phonic Generalization,s" pp. 252-58.

⁴Mildred Hart Bailey, "The Utility of Phonic Generalizations in Grades One Through Six," The Reading Teacher, XX (February, 1967), 413-18.

if they are to be independent in word attack. Phonics is not an end in itself, but one constantly used means to the end.¹

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It is evident that reading skills play a very important role in all subject matter areas. Therefore, much study has been directed toward methods used in the instructional programs of reading. The teaching of phonic generalizations is recommended by many authors of reading textbooks and basal reading series include phonic generalizations as an important part of their instructional program. Clymer,³ Bailey,⁴ and other authorities in the field of reading have completed

¹Ralph C. Staiger, "Your Child Learns Phonics," The Reading Teacher, IX (December, 1955), 95-99.

²Anna D. Cordts, Phonics for the Reading Teacher (New York: Holt, Rinehart and Winston, Inc., 1965), p. 69.

³Clymer, "Utility of Phonic Generalization,s" pp. 252-58.

⁴Mildred Hart Bailey, "The Utility of Phonic Generalizations in Grades One Through Six," The Reading Teacher, XX (February, 1967), 413-18.

research in determining the utilization of phonic generalizations in various reading textbooks and reading vocabulary lists. These studies placed a limited value on many generalizations which are commonly taught. Bailey recommended that further research be done, relative to the utility of phonic generalizations for vocabulary derived from the various subject matter areas in the elementary school - such as science, social studies, and arithmetic. With this recommendation in mind this study was done in the area of mathematics.

Statement of Problem

The problem of this study was to investigate the applicability of specific phonic generalizations against words used in selected series of mathematics textbooks in grades one through six. The following sub-problems were used for study and reporting: (1) What is the per cent of applicability of each generalization to the words and to the "frequency of occurrences" of these words for the combined programs at each grade level? (2) What is the per cent of applicability of each generalization to the composite vocabulary and to the "frequency of occurrences" of these words? and (3) What are the comparisons in the applicability of generalizations to the composite vocabulary of the mathematics programs to those of reading, spelling, and science programs?

Basic Assumptions

The following assumptions were basic to the study:

1. That Clymer's¹ forty-five phonic generalizations were representative of phonic generalizations that would be required for word identification in the elementary mathematics textbooks.

2. That adopted texts of the State of Oklahoma for the elementary mathematics program will be adequate in meeting "selection criteria" for this study.

3. That the Clymer,² Bailey,³ Davis,⁴ and Jernigan⁵ studies of phonic generalizations used in selected reading, spelling, and science programs could be used as a suitable

¹Theodore Clymer, "Utility of Phonic Generalizations," pp. 252-58.

²Theodore Clymer and the International Reading Association granted permission for the use of generalizations, procedure, and criteria reported as follows: Theodore Clymer "The Utility of Phonic Generalizations in the Primary Grades," The Reading Teacher, XVI (January, 1963), 252-58.

³Mildred Hart Bailey and the International Reading Association granted permission for the use of data collected and reported in the following article: Mildred Hart Bailey, "The Utility of Phonic Generalizations in Grades One Through Six," The Reading Teacher, XX (February, 1967), 413-18.

⁴Lillie Smith Davis has granted permission for the use of data collected and reported as follows: Lillie Smith Davis, "The Applicability of Phonic Generalizations to Selected Spelling Programs," (unpublished Ed.D. dissertation, University of Oklahoma, 1969).

⁵Mary Lois Jernigan has granted permission for the use of data collected and reported as follows: Mary Lois Jernigan, "The Utility of Phonic Generalizations to Selected Science Series," (unpublished Ed.D. dissertation, University of Oklahoma, 1969).

basis for comparison of phonic generalizations used in the elementary mathematics programs.

Definition of Terms

The following definitions were applied to terms relevant to the study:

Applicability refers to the extent of effective use that can be made of phonic generalizations in correct pronunciation of unrecognized words.

Phonetics may be defined as the scientific study of the sounds (broadly classified as consonants and vowels) used in talking.¹

Phonics is actually an application of phonetics to reading and spelling.²

Phonic generalizations are conclusions drawn from principles in regard to symbol sounds associated with letters and combinations of letters.

Frequency is a term used to denote the number of times each word appears in the running words throughout the printed material of the selected mathematics series.

Delimitations of the Study

The following were the delimitations of the study:

1. The study was limited to an investigation of

¹Frank B. Robinson, "Phonetics or Phonics," The Reading Teacher, IX (December, 1955), 84.

²Ibid.

only three series of state adopted elementary mathematics textbooks in the State of Oklahoma.

2. The study was limited by the exclusion of words used in the textbooks as proper nouns and adjectives, place names, abbreviations, foreign words, contracted forms, and words with the apostrophe and s.

3. The study was limited to the applicability of Clymer's¹ forty-five phonic generalizations.

4. The study was limited only to the use of Webster's New Collegiate Dictionary² as authority for pronunciation, accentuation, and syllabication of words contained in the composite word list.

Materials Used in the Study

The following materials were used in this study: Webster's New Collegiate Dictionary,³ the Clymer Study,⁴ the Bailey Study,⁵ the Davis Study,⁶ the Jernigan Study,⁷ and

¹Clymer, "Utility of Phonic Generalizations," pp. 252-58.

²Webster's New Collegiate Dictionary, (Springfield, Mass: G and C Merriam Company, Publishers, 1961).

³Ibid.

⁴Clymer, "Utility of Phonic Generalizations," pp. 253-58.

⁵Bailey, "Utility of Phonic Generalizations," pp. 413-18.

⁶Davis, "Applicability of Phonic Generalizations to Spelling Programs."

⁷Jernigan, "Utility of Phonic Generalizations to Science Series."

from various subject areas, such as science, social studies, and arithmetic.

Emans,¹ in a study to determine the usefulness of phonic generalizations, used the same forty-five generalizations and procedure as Clymer² used in his study. The investigation was made on a random sample of ten per cent of the words (1,944) beyond the primary level (grade four) in The Teacher's Word Book of 30,000 Words by Thorndike and Lorge.³ In the Clymer study no difference was made between primary and secondary generalizations, although some generalizations are explanations for the exceptions to other generalizations. Emans concluded that since generalizations may be learned as aids and not fast and hard rules, levels of generalizations may be established.

Emans⁴ later reported some possible modifications in Clymer's generalizations which may increase their utility. In some cases a simple rewording of the generalization could increase the utility from a few percentage points to nearly a hundred. Since generalizations need not be applied in

¹Robert Emans, "The Usefulness of Phonic Generalizations Above the Primary Grades," The Reading Teacher, XX (February, 1967), 419-26.

²Clymer, "Utility of Phonic Generalizations," pp. 252-58.

³Thorndike, E. L., and Lorge, I., The Teacher's Word Book of 30,000 Words, (New York: Teachers College, 1944).

⁴Robert Emans, "When Two Vowels Go Walking and Other Such Things," The Reading Teacher, XXI (December, 1967) 262-70.

isolation, but can be applied in conjunction with each other, their usefulness could be increased greatly by combining them.

The purpose of this later report of Emans is not to encourage keeping practices which are basically weak, but to avoid discarding practices which may require only modification and not abandonment. In some cases he suggests the rewording of generalizations which already have a fairly high per cent of utility. Sometimes such rewording increases the utility even more.

Burrows and Lourie¹ tested the validity of the "two-vowels-together" rule by analyzing the five thousand words of highest frequency on the Rinsland² list. A total of 1,728 words were found to have two adjacent vowels. Of this number only 668 words followed the "Big Brother Rule" (Big Brother speaks, Little Brother is silent). The adjacent vowels in the largest sub-group of words was ea. In this group 157 followed the rule; 111 did not conform. Another large sub-group of adjacent vowels was represented by the combination of ie. There were 122 words in this combination. Only 29 in this group followed the "Big Brother Rule"; 81 did not. The other 12 formed another category in which the vowels were in separate syllables, as in di·et. Other sub-groups

¹Alvina Trent Burrows, and Zyra Lourie, "When Vowels Go Walking," The Reading Teacher, XVII (November, 1963) 79-83.

²Henry D. Rinsland, A Basic Vocabulary of Elementary School Children, (New York: Macmillan, 1945), pp. 79-82.

with adjacent vowels were compiled. The data revealed that in many of the vowel cases the child has less than a fifty-fifty chance of being right.

A study by Fuld¹ was done to investigate the frequency with which single vowels that immediately precede pairs of consonants actually have short sounds. By "pairs of consonants" is meant either double consonants (tt) or dissimilar consonants (st). The words used for analysis were those introduced in five of the most widely used basal reading series, together with other primary vocabulary lists. There were 1,450 words on the list, which extended from pre-primer to high third reader. The words that contained a single vowel followed by two consonants were used for the study. There were 613 words identified for research. Of the 613 words there were 431 that contained a short vowel before two consonants. Thus, 70 per cent of the VCC (vowel, consonant, consonant) words tended to favor the usefulness of the rule.

Winkley² did study and research on the worth of teaching accent generalizations. Eighteen accent generalizations by Gray³ were tested. Two groups of pupils of average

¹Paula Fuld, "Vowel Sounds In VCC Words" The Reading Teacher, XXI (February, 1968), 442-44.

²Carl K. Winkley, "Which Accent Generalizations Are Worth Teaching?" The Reading Teacher, XX (December, 1966), 219-25.

³Gray, On Their Own In Reading, pp. 121-25.

ability and above at the intermediate grade levels were compared in the study. One group received instruction in applying accent generalizations to unfamiliar words. The other group learned only the dictionary skill of pronouncing words in which the accented syllables were marked. The pupils who had been taught the accent principles were found to have greater power in (a) ability to attack unknown words, (b) vocabulary development, and (c) comprehension. It was concluded, therefore, that the reading proficiency of intermediate grade pupils with average ability was improved by a word recognition program that included the teaching of accent generalizations.

Winkley concluded that the per cent of usefulness of ten of the eighteen clues was too low to warrant the teaching of these generalizations. Omitting these ten, the possible utility of twelve of the generalizations was demonstrated. The recommended list of accent generalizations to be taught was shortened and simplified by combining and rewording, thus resulting in seven generalizations.

Davis¹ did a study to determine the applicability of phonic generalizations to selected spelling programs. The forty-five generalizations of the Clymer² study were used

¹Davis, "Applicability of Phonic Generalizations to Spelling Programs."

²Clymer, "Utility of Phonic Generalizations," pp. 252-58.

as the basis for computing the per cent of applicability in relation to the composite vocabulary developed from six spelling textbook series, grades two through six. Davis concluded from the findings that there was a high overlap of the vocabularies used for reading and spelling which indicated a need for coordinated instruction for these two areas. The findings of per cent of applicability for the phonic generalizations, as a whole, indicated the generalizations were only moderately useful to spelling.

Stone¹ did a study which presented basic frequency data for sound-symbol relations, which will allow a more efficient approach to teaching those most used at the beginning level. The data was gathered from research done on 6,000 sounds in a list of words common to five basal reading series; grades one, two, and three. When the composite list of the sounds was classified, it was found that greater variability of sound-symbol relationships occurred for vowels as compared to consonants. There were 311 regular long vowels as compared to 262 irregular. There were 567 regular short vowels as compared to 107 irregular without short u. The short u had 103 regular and 188 irregular. There were 3,526 regular consonants as compared to 447 irregular. It was concluded that emphasis should be placed on the teaching of the most frequent sound-symbol combinations.

¹David R. Stone, "A Sound-Symbol Frequency Count," The Reading Teacher, XIX (April, 1966), 498-504.

Jernigan¹ did a recent study to investigate the utility of phonic generalizations to selected science programs. The same generalizations as those used by Clymer² were used in the science study. From the collected data and findings Jernigan included the following in her conclusions: that skills taught in the reading programs would also be useful in the content field; that there is a positive relationship between the number of generalizations which were considered useful; a consistency of usefulness was established by those generalizations concerned with the sound of consonants, syllabic division, and accent placement when twenty of the generalizations were considered useful. The conclusions indicated that there were many exceptions to the generalizations being taught to children.

Summary

After reviewing the studies on the usefulness of phonic generalizations, one may conclude that there is great concern on the part of reading authorities in relation to the instruction of phonics in the classroom and how effective the instruction is for word attack in the reading required for textbook situation. The researchers seem to agree that a number of phonic generalizations being taught do not have a

¹Jernigan, "Utility of Phonic Generalizations to Science Series."

²Clymer, "Utility of Phonic Generalizations," pp. 252-58.

high per cent of applicability. Several of the researchers have recommended that further research be done on the utilization of phonic generalizations to the vocabulary in content areas - science, social studies, and mathematics. In view of this recommendation the research for this study has been completed on the applicability of phonic generalizations in the mathematics programs.

CHAPTER II

PROCEDURES

This research extended the Clymer,¹ Bailey,² Davis,³ and Jernigan⁴ studies of the applicability of phonic generalizations in reading, spelling, and science programs to mathematics programs. The generalizations and criteria developed by Clymer were used in this study. The procedure for collecting data and reporting findings goes beyond Clymer's, inasmuch as the "frequency of occurrences" for words has been included in the data; the frequency, in addition to vocabulary, has been included for computation in the per cent of applicability; and the applicability has been reported for the specific grade levels, in addition to the composite vocabulary list.

¹Clymer, "Utility of Phonic Generalizations," pp. 252-58.

²Bailey, "Utility of Phonic Generalizations," pp. 413-18.

³Davis, "Applicability of Phonic Generalizations to Spelling Programs."

⁴Jernigan, "Utility of Phonic Generalizations to Science Series."

Selection of the Generalizations

The generalizations used in this study were the ones developed by Clymer¹ for his recent study. After examining basal reading materials for the primary grades Clymer selected the teachers' manuals of four basal series as the source of phonic generalizations to be investigated. Forty-five generalizations were identified for study. Clymer² gave the following explanations of the generalizations:

These generalizations dealt with (1) vowels, (2) consonants, (3) endings, (4) syllabication, and (5) miscellaneous relationships.

Any statement was considered a separate generalization when its phrasing excluded or included different sets of words than another statement. For example, the generalization, "When there are two vowels side by side, the long sound of the first is heard and the second one is usually silent" and "When ea come together in a word, the first letter is long and the second is silent" were counted as two separate generalizations, although the second statement is a special application of the first.

A list of the forty-five generalizations are given in Appendix A of this paper.

Selection of Mathematics Programs

The selection of mathematics programs for analysis was made through a review and study of the mathematics series listed in Textbooks in Print.³ This publication lists

¹Clymer, "Utility of Phonic Generalizations," pp. 252-58.

²Ibid.

³Textbooks in Print. (New York: R. R. Bowker Company, 1968).

fifty-five different series in print in the United States. The following criteria were established for selecting the programs for study:

1. Each of the series encompasses grades one through six.
2. The series was written or revised since 1965.
3. The series was one of the seven elementary mathematics programs which were selected by the State Textbook Committee as adoptions for the State of Oklahoma.
4. Each of the series has a distinct approach to mathematics: one would be termed modern, one would be termed traditional, and one termed as a transitional program.

The following three series were selected for analysis:

Addison and Wesley Series

Robert E. Eicholz, and others Elementary School Mathematics, (Palo Alto: Addison and Wesley, 1968).

Ginn and Company Series

William A. Brownell, and others, Mathematics We Need, (Boston: Ginn and Company, 1966).

Silver Burdett Series

Robert Lee Morton, and others, Modern Arithmetic Through Discovery, (Morristown, New Jersey: Silver Burdett Company, 1966).

Compilation of Word Lists and "Frequency of Occurrences"

Data was gathered for the study by developing the following lists:

1. A vocabulary list was compiled for each grade level of each series with the "frequency of occurrences" of each word.

2. Utilizing the lists in number 1, a combined vocabulary list of the three series at each grade level was compiled, with the total "frequency of occurrence" for each word.

3. Utilizing the lists in number 2, a composite vocabulary list with the "frequency of occurrence" of each word was compiled for the combined grades of all three series.

The lists of words were controlled by the following restrictions:

1. Each word in the compiled lists for specific grade levels was entered only once even though it appeared in more than one series of the mathematics textbooks at the same grade level.

2. Each word in the composite list was entered only once even though it appeared in more than one of the grade level lists for the combined series.

3. The following types of words were eliminated from the grade level lists and the composite list: abbreviations, contracted forms, place names, names of persons, proper adjectives, and words written with the apostrophe and s.

4. Single-letter words found in the vocabulary lists were included, for example, a and I.

A composite word list of between five and six thousand words was compiled from the three combined series of the mathematics textbooks.

Recording of Word Pronunciations

Since this study was extended research on the applicability of the phonic generalizations identified by Clymer¹ for his study, the necessity of utilizing the same dictionary of authority as that used in the original study was significant. Therefore, the 1961 edition of Webster's New Collegiate Dictionary² was used to develop a recorded list of the phonetic spelling, syllabication, and accentuation of each word on the composite list. In some instances two pronunciations were given for a word. The first pronunciation listed was used throughout for the phonetic spelling, syllabication, and accentuation.

Determination of Applicability of the Phonic Generalizations

Each phonic generalization was checked against the words in the specific grade level lists of the combined series and in the composite list of all grades in the

¹Clymer, "Utility of Phonic Generalizations," pp. 252-58.

²Webster's New Collegiate Dictionary, 1961.

combined series, to determine (a) the words pronounced as the generalization claimed and (b) the words which were exceptions to the generalization. The per cent of applicability was computed for each generalization by dividing the number of words pronounced as the generalization claimed by the total number of words to which the generalization could be expected to apply. For example, if the generalization stated that "When words end with silent e the preceding a or i is long," words containing an a or i and a final e were located on the specific grade lists of the combined series. This total made up the list to which the generalizations should apply. The phonetic respellings of these words were then examined to see how many words actually had the long a or i sound. This number was divided by the first total (the words to which the generalization should apply). In this case there were 337 words on the composite list to which the generalization should have applied. There were 212 of the 337 words conforming. The per cent of utility became $212/337$ or 63.

The per cent of applicability as related to "frequency of occurrences" was computed by adding the frequencies for all words to which the generalization should apply; the frequencies for all words conforming were then totaled; the total of frequencies for words conforming was then divided by the total of frequencies for all words to which the generalization should apply. In the case above the

total frequencies for all words to which the generalization should apply was 35,349. The total frequencies for words conforming was 20,884. In computing, the per cent of applicability was $20,884/35,349$ or a per cent of 59.

Criteria for Degree of Applicability

After computing the per cent of applicability for each generalization for the specific grade level vocabulary lists and for the composite vocabulary list the same criteria were used, for deciding what constituted a "reasonable" degree of application, as Clymer¹ used. They were as follows:

The composite list must contain a minimum of twenty words to which the generalization might apply. Generalizations with lower frequencies of applications do not seem to merit instructional time.

The per cent of utility must be at least 75. To state the matter another way, if the pupil applied the generalization to twenty words, it should aid him in getting the correct pronunciation in fifteen of the twenty words.

The same criteria were used in determining the usefulness of generalizations for the "frequency of occurrences" of words.

¹Clymer, "Utility of Phonic Generalizations," pp. 252-58.

Comparison of the Applicability of Phonic
Generalizations to Spelling, Reading,
Science, and Mathematics Programs

The last part of the study was a comparison of the applicability of phonic generalizations to spelling, science, reading, and mathematics programs. The findings of the applicability of the generalizations as related to both, words and frequencies, were reported for the mathematics study in the comparisons. All studies used the same criteria and procedure in determining applicability of the phonic generalizations.

Summary

A list of words with the total number of frequencies for each grade level of each series was compiled. These lists were combined to form a composite list for each grade level of the combined series. The grade level lists of words and frequencies were combined to develop a composite word list and frequencies for all grade levels of all programs. Phonetic respelling, syllabication, and accentuation for each word were recorded. The forty-five generalizations were applied to the developed lists of words and frequencies. A per cent of utility was determined for each generalization. A comparison was then made between the mathematics study, two reading studies, a science study, and a spelling study. These findings are reported in Chapter III.

CHAPTER III

FINDINGS

This research was concerned with the applicability of forty-five phonic generalizations to the combined vocabulary list and to the frequency of occurrences of these vocabulary words according to separate grade levels of three selected elementary mathematics series; the applicability of the generalizations to the composite word list and to the "frequency of occurrences" of these words in the three mathematics series; and the relative applicability of the generalizations to mathematics, spelling, science, and reading vocabularies. The findings related to each of these concerns are reported in this chapter.

Applicability of Generalizations to the Combined Vocabulary and Frequencies According to Grade Levels

A combined list of vocabulary words, including the "frequency of occurrences" for each word, was developed for separate grade levels, one through six. The forty-five generalizations (Appendix A) were tested against the phonetic respelling, accentuation, and syllabic division of each word

as given by Webster's New Collegiate Dictionary.¹ The conforming words, with the frequency count of each, and the exceptions with the frequency count of each, were recorded. Two criteria as used by Clymer,² were set to determine a "reasonable" degree of application for the words. The two criteria were:

1. The composite list must contain a minimum of twenty words to which the generalization might apply.
2. The per cent of utility must be at least 75 per cent.

The per cent of utility for words was obtained by dividing the number of words conforming by the total number of words to which the generalization could be expected to apply.

The criteria used for determining the degree of application as related to frequencies were the same as those used for the word list, with frequency count, instead of word count, being used for computation of per cent of utility as stated in the second criterion. The per cent of utility for frequencies was obtained by dividing the frequencies of words conforming by the frequencies of words to which the generalization could be expected to apply. The data for these findings are reported in Table 1.

First Grade Program

There was a total of 345 words, with a frequency count of 6,616, in the combined list of the three first

¹Webster's New Collegiate Dictionary, 1961.

²Clymer, "Utility of Phonic Generalizations," pp. 252-58.

TABLE 1
APPLICABILITY OF GENERALIZATIONS RELATED TO GRADE LEVELS OF THE COMBINED SERIES

Generalizations	Grade Level	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applicability as Related to	
								Words	Frequencies
1. When there are two vowels side by side, the long sound of the first one is heard and the second is usually silent.	1	87	950	26 (each) ^a	236	61 (out) ^a	714	30	25
	2	206	2,083	74 (cream)	732	132 (ahead)	1,351	36	35
	3	757	18,516	312 (boat)	7,285	445 (ounce)	11,231	41	39
	4	792	21,556	304 (chain)	8,337	488 (canoe)	13,219	38	39
	5	957	23,816	336 (treat)	6,830	621 (your)	16,986	35	29
	6	994	27,732	337 (remain)	7,788	657 (point)	19,944	34	28
2. When a vowel is in the middle of a one-syllable word, the vowel is usually short.	1	104	1,816	71 (bags)	1,352	33 (was)	464	68	74
	2	247	5,377	170 (did)	3,956	77 (bird)	1,421	69	74
	3	464	21,724	316 (clubs)	15,637	148 (front)	6,087	68	72
	4	408	22,968	280 (flag)	14,201	128 (signs)	8,767	69	61
	5	453	24,435	319 (which)	14,396	134 (start)	10,039	70	59
	6	468	25,943	299 (fresh)	16,362	169 (worth)	9,581	64	63
middle letter.	1	35	359	29 (red)	246	6 (far)	113	83	72
	2	75	1,853	61 (man)	1,413	14 (for)	440	81	77
	3	148	7,841	116 (slept)	6,469	32 (won)	1,372	78	83
	4	148	8,889	115 (graph)	5,835	33 (war)	3,054	78	66
	5	137	9,737	109 (drunk)	6,139	28 (short)	3,598	81	63
	6	140	9,489	109 (shell)	6,005	31 (cross)	3,484	78	63
one of the middle two letters in a word of four letters.	1	51	1,207	34 (back)	929	17 (hold)	278	67	77
	2	110	2,752	71 (this)	2,009	39 (what)	743	65	73
	3	200	11,783	128 (ring)	7,920	72 (girl)	3,863	64	67
	4	171	11,499	109 (pick)	6,857	62 (mark)	4,642	64	60
	5	209	12,424	140 (them)	7,043	69 (yard)	5,381	67	57
	6	210	13,976	129 (film)	9,297	81 (turn)	4,679	61	67
one vowel <u>within</u> a word of more than four letters.	1	18	250	8 (match)	177	10 (girls)	73	44	71
	2	62	772	38 (blanks)	534	24 (kinds)	238	63	68
	3	116	2,100	72 (fifth)	1,248	44 (world)	852	62	59
	4	89	2,580	56 (prints)	1,509	33 (yards)	1,071	63	58
	5	107	2,274	70 (lunch)	1,214	37 (wants)	1,060	65	53
	6	118	2,478	61 (spring)	1,060	57 (right)	1,418	51	43
3. If the only vowel letter is at the end of a word, the letter usually stands for a long sound.	1	12	834	7 (no)	138	5 (do)	696	58	17
	2	17	2,555	11 (be)	464	6 (who)	2,091	65	18
	3	18	15,854	12 (she)	2,112	6 (to)	13,742	67	13
	4	19	17,674	13 (so)	2,637	6 (two)	15,037	68	15
	5	24	21,006	16 (go)	2,991	8 (flu)	18,015	67	14
	6	21	29,442	15 (he)	4,708	6 (two)	24,734	71	16
4. When there are two vowels, one of which is final <u>e</u> , the first vowel is long and the <u>e</u> is silent.	1	33	669	19 (five)	286	14 (are)	383	58	43
	2	87	2,153	57 (name)	1,013	30 (edge)	1,140	66	47
	3	162	7,952	110 (page)	5,075	52 (prove)	2,877	68	64
	4	154	10,294	107 (wrote)	6,252	47 (some)	4,042	70	61
	5	162	12,042	116 (plate)	7,132	46 (where)	4,910	71	59
	6	177	10,933	126 (state)	5,892	51 (dove)	5,041	69	54

^aWords in parentheses are examples of words that conform or of exceptions

TABLE 1--Continued

Generalizations	Grade Level	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applicability as Related to	
								Words	Frequencies
5. The <u>r</u> gives the preceding vowel a sound that is neither long nor short.	1	73	1,023	65 (for)	974	8 (more)	49	89	95
	2	171	2,041	154 (bars)	1,816	17 (store)	225	90	89
	3	439	14,019	385 (garden)	13,170	54 (zero)	849	88	94
	4	570	18,547	508 (chord)	17,683	62 (oral)	864	89	95
	5	700	18,445	621 (worm)	17,439	79 (merit)	1,006	89	95
	6	810	19,077	723 (there)	17,990	87 (arrow)	1,087	89	94
6. The first vowel is usually long and the second silent in the digraphs <u>ai</u> , <u>ea</u> , <u>oa</u> , and <u>ui</u> .	1	16	290	8 (each)	112	8 (pair)	178	50	39
	2	60	566	33 (trails)	380	27 (fruit)	186	55	67
	3	218	3,905	126 (seat)	2,943	92 (great)	962	58	75
	4	241	4,926	138 (coach)	3,578	103 (hear)	1,348	57	73
	5	257	5,899	140 (easy)	3,543	117 (broad)	2,356	54	60
	6	291	6,455	167 (juice)	3,560	124 (built)	2,895	57	58
<u>ai</u>	1	7	123	4 (paid)	5	3 (said)	118	57	4
	2	21	137	9 (sail)	20	12 (fair)	117	43	15
	3	62	672	41 (rain)	366	21 (certain)	306	66	55
	4	69	1,023	47 (chain)	673	22 (again)	350	68	66
	5	70	1,156	49 (raise)	818	21 (pair)	338	71	71
	6	79	1,142	61 (nail)	736	18 (hair)	406	77	64
<u>ea</u>	1	8	163	3 (means)	103	5 (greater)	60	37	51
	2	27	390	15 (each)	330	12 (learn)	60	56	85
	3	121	3,015	63 (peak)	2,396	58 (bread)	619	52	79
	4	128	3,494	62 (beach)	2,555	66 (meant)	939	48	73
	5	144	4,155	68 (easily)	2,435	76 (heard)	1,720	47	59
	6	161	4,615	77 (reason)	2,465	84 (steak)	2,150	48	53
<u>oa</u>	1	1	4	1 (boats)	4	0	0	100	100
	2	9	30	9 (coats)	30	0	0	100	100
	3	21	162	21 (load)	162	0	0	100	100
	4	28	327	28 (coach)	327	0	0	100	100
	5	23	288	22 (loaf)	287	1 (broad)	1	99	99
	6	26	355	24 (roast)	348	2 (broadest)	7	92	98
<u>ui</u>	1	0	0	0	0	0	0	0	0
	2	3	9	0	0	3 (penguin)	9	0	0
	3	14	56	1 (juice)	19	13 (guide)	37	7	34
	4	16	82	1 (juice)	23	15 (build)	59	7	28
	5	21	300	1 (juice)	3	20 (quite)	297	5	1
	6	25	343	5 (suit)	11	20 (liquid)	332	20	3
7. In the phonogram <u>ie</u> , the <u>i</u> is silent, and the <u>e</u> has a long sound.	1	1	1	1 (piece)	1	0	0	100	100
	2	8	49	3 (pieces)	32	5 (friend)	17	38	65
	3	36	316	4 (believe)	81	32 (review)	235	11	26
	4	44	708	5 (field)	180	39 (lie)	528	11	25
	5	61	870	4 (infield)	79	57 (science)	791	7	9
	6	65	739	6 (chief)	94	59 (tried)	645	9	13

TABLE 1--Continued

Generalizations	Grade Level	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applicability as Related to	
								Words	Frequencies
8. Words having double <u>e</u> usually have the long <u>e</u> sound.	1	2	30	2 (between)	30	0	0	100	100
	2	15	88	15 (feed)	88	0	0	100	100
	3	59	951	54 (sweet)	869	5 (been)	82	91	91
	4	62	1,168	58 (cheese)	1,068	4 (deer)	100	94	94
	5	77	1,478	75 (keen)	1,385	2 (coffee)	93	93	93
	6	77	1,543	76 (week)	1,408	1 (been)	135	91	91
9. When words end with silent <u>e</u> , the preceding <u>a</u> or <u>i</u> is long.	1	22	463	17 (dime)	263	5 (are)	200	77	57
	2	59	741	47 (made)	602	12 (have)	139	78	81
	3	140	5,920	105 (kite)	4,294	35 (give)	1,626	75	73
	4	152	7,579	104 (price)	4,558	48 (service)	3,021	68	60
	5	197	10,120	119 (place)	5,363	78 (share)	4,757	61	52
	6	229	10,526	141 (wife)	5,804	88 (were)	4,722	62	56
10. In <u>ay</u> , the <u>y</u> is silent and gives <u>a</u> the long sound.	1	3	101	3 (away)	101	0	0	100	100
	2	21	210	20 (play)	209	1 (always)	1	95	99
	3	30	916	27 (stay)	894	3 (says)	22	90	98
	4	42	1,122	40 (gray)	1,081	2 (says)	41	95	96
	5	41	917	38 (may)	891	3 (always)	26	93	97
	6	42	860	40 (array)	832	2 (always)	28	95	98
11. When the letter <u>i</u> is followed by the letters <u>gh</u> , the <u>i</u> usually stands for its long sound, and the <u>gh</u> is silent.	1	1	6	0	0	1 (eight)	6	0	0
	2	9	41	4 (right)	25	5 (weigh)	16	44	61
	3	22	364	11 (high)	197	11 (weight)	167	50	57
	4	26	513	15 (night)	350	11 (Weight)	163	58	62
	5	39	755	21 (light)	374	18 (straight)	381	54	50
	6	44	911	26 (might)	504	18 (weighs)	407	59	55
12. When <u>a</u> follows <u>w</u> in a word, it usually has the sound <u>a</u> as in <u>was</u> .	1	3	9	1 (wanted)	2	2 (wagon)	7	33	22
	2	17	147	9 (watch)	61	8 (walk)	86	53	42
	3	29	751	10 (wash)	314	19 (wall)	437	34	42
	4	35	774	9 (swan)	449	26 (warm)	325	25	58
	5	41	886	11 (waffle)	479	30 (way)	407	27	54
	6	40	789	10 (kilowatt)	387	30 (aware)	402	25	49
13. When <u>e</u> is followed by <u>w</u> , the vowel sound is the same as represented by <u>oo</u> .	1	0	0	0	0	0	0	0	0
	2	3	42	0	0	3 (new)	42	0	0
	3	12	144	0	0	12 (sew)	144	0	0
	4	14	160	2 (drew)	15	12 (few)	145	14	9
	5	18	111	4 (grew)	16	14 (knew)	95	22	14
	6	21	128	5 (flew)	23	16 (power)	105	24	18
14. The two letters <u>ow</u> make the long <u>o</u> sound.	1	18	152	10 (show)	53	8 (how)	99	56	35
	2	23	1,156	15 (below)	467	8 (town)	689	66	40
	3	50	4,729	35 (shown)	1,857	15 (cows)	2,872	70	39
	4	53	4,119	31 (slow)	1,799	22 (now)	2,320	58	44
	5	58	3,890	35 (know)	1,802	23 (brown)	2,088	60	47
	6	64	3,774	36 (mow)	1,524	28 (power)	2,250	56	40

TABLE 1--Continued

Generalizations	Grade Level	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applicability as Related to	
								Words	Frequencies
15. <u>W</u> is sometimes a vowel and follows the vowel digraph rule.	1	21	192	10 (know)	53	11 (how)	139	50	28
	2	30	1,293	15 (snow)	467	15 (draw)	826	50	57
	3	70	5,121	35 (grow)	1,857	35 (few)	3,264	50	36
	4	70	4,644	31 (own)	1,799	39 (saw)	2,845	44	39
	5	84	4,366	35 (lower)	1,802	49 (knew)	2,564	42	41
	5	98	4,570	36 (mower)	1,524	62 (saw)	3,046	37	33
16. When <u>y</u> is the final letter in a word, it usually has the vowel sound.	1	10	205	6 (by)	101	4 (away)	104	60	50
	2	47	965	35 (only)	778	12 (may)	187	77	81
	3	97	4,471	84 (any)	4,057	13 (pay)	414	87	91
	4	115	5,296	95 (fairly)	4,508	20 (they)	788	82	85
	5	156	4,489	132 (carry)	3,599	24 (gray)	890	85	80
	6	154	4,891	128 (entry)	4,085	26 (lay)	806	84	81
17. When <u>y</u> is used as a vowel in words, it sometimes has the sound of long <u>i</u> .	1	6	101	2 (try)	10	4 (many)	91	33	10
	2	58	1,011	6 (by)	78	52 (cymbal)	933	10	8
	3	133	4,648	15 (why)	608	118 (gym)	4,040	11	11
	4	157	6,034	17 (dry)	1,147	140 (syrup)	4,887	11	19
	5	211	5,022	19 (type)	1,337	192 (bicycle)	3,685	9	27
	6	229	5,562	25 (analyze)	1,379	204 (symbol)	4,183	11	25
18. The letter <u>a</u> has the same sound (ä) when followed by <u>i</u> , <u>w</u> , and <u>u</u> .	1	19	196	11 (tall)	131	8 (equals)	65	60	67
	2	36	478	21 (caught)	342	15 (half)	136	61	72
	3	66	1,784	36 (draw)	759	30 (gallon)	1,025	55	43
	4	103	2,628	50 (wall)	1,212	53 (shall)	1,416	48	47
	5	156	3,546	51 (talk)	1,278	105 (local)	2,268	33	36
	6	195	4,041	53 (balsa)	1,380	142 (aware)	2,661	26	34
19. When <u>a</u> is followed by <u>r</u> and final <u>e</u> , we expect to hear the sound heard in <u>care</u> .	1	1	171	0	0	1 (are)	171	0	0
	2	2	264	1 (square)	12	1 (are)	252	50	5
	3	6	1,465	5 (share)	94	1 (are)	1,371	83	6
	4	5	1,080	4 (fare)	102	1 (are)	978	80	9
	5	6	1,499	5 (care)	279	1 (are)	1,220	83	18
	6	9	1,633	8 (aware)	276	1 (are)	1,357	89	17
20. When <u>c</u> and <u>h</u> are next to each other, they make only one sound.	1	9	120	9 (each)	120	0	0	100	100
	2	27	515	27 (child)	515	0	0	100	100
	3	77	3,475	77 (inch)	3,475	0	0	100	100
	4	80	3,793	80 (cherry)	3,793	0	0	100	100
	5	95	3,931	95 (touch)	3,931	0	0	100	100
	6	93	3,901	93 (lunch)	3,901	0	0	100	100
21. <u>Ch</u> is usually pronounced as it is in <u>kitchen</u> , <u>catch</u> , and <u>chair</u> , not like <u>sh</u> .	1	9	120	9 (change)	120	0	0	100	100
	2	27	515	27 (watch)	515	0	0	100	100
	3	77	3,475	76 (such)	3,450	1 (machine)	25	99	99
	4	80	3,793	79 (chart)	3,744	1 (machine)	49	99	99
	5	95	3,931	85 (choose)	3,821	2 (machines)	110	98	97
	6	93	3,901	93 (peach)	3,855	3 (machinist)	46	97	99

TABLE 1--Continued

Generalizations	Grade Level	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applicability as Related to	
								Words	Frequencies
22. When <u>c</u> is followed by <u>e</u> or <u>i</u> , the sound of <u>s</u> is likely to be heard	1	10	84	10 (cent)	84	0	0	100	100
	2	19	177	19 (circus)	177	0	0	100	100
	3	70	2,659	69 (ice)	2,649	1 (ocean)	10	99	99
	4	97	2,654	91 (cereal)	2,581	6 (ocean)	73	94	98
	5	137	3,404	126 (office)	3,310	11 (ancient)	94	92	97
	6	174	5,036	160 (except)	4,932	14 (special)	104	92	98
23. When the letter <u>c</u> is followed by <u>o</u> or <u>a</u> , the sound of <u>k</u> is likely to be heard.	1	24	255	24 (can)	255	0	0	100	100
	2	63	541	63 (card)	541	0	0	100	100
	3	154	3,428	154 (corn)	3,428	0	0	100	100
	4	195	4,430	195 (cover)	4,430	0	0	100	100
	5	224	4,510	224 (carpet)	4,510	0	0	100	100
	6	269	4,584	269 (cand)	4,584	0	0	100	100
24. The letter <u>g</u> often has a sound similar to that of <u>j</u> in <u>jump</u> when it precedes the letter <u>i</u> or <u>e</u> .	1	4	17	1 (change)	2	3 (given)	15	25	12
	2	25	150	12 (edge)	34	13 (gift)	116	48	23
	3	36	756	22 (page)	511	14 (girl)	245	61	67
	4	76	2,177	49 (fudge)	1,238	27 (begin)	939	64	57
	5	92	2,304	61 (geometry)	1,240	31 (finger)	1,064	66	56
	6	102	2,496	75 (oxygen)	1,325	27 (give)	1,171	73	53
25. When <u>ght</u> is seen in a word, <u>gh</u> is usually silent.	1	1	3	1 (caught)	3	0	0	100	100
	2	8	84	8 (right)	84	0	0	100	100
	3	20	362	20 (weight)	362	0	0	100	100
	4	27	686	27 (straight)	686	0	0	100	100
	5	33	641	33 (freight)	641	0	0	100	100
	6	36	745	36 (bought)	745	0	0	100	100
26. When a word begins <u>kn</u> , the <u>k</u> is silent.	1	1	20	1 (know)	20	0	0	100	100
	2	2	29	2 (knew)	29	0	0	100	100
	3	7	300	7 (knock)	300	0	0	100	100
	4	8	284	8 (knots)	284	0	0	100	100
	5	5	206	5 (knives)	206	0	0	100	100
	6	6	422	6 (knee)	422	0	0	100	100
27. When a word begins <u>wr</u> , the <u>w</u> is silent.	1	1	126	1 (write)	126	0	0	100	100
	2	4	348	4 (wrap)	348	0	0	100	100
	3	7	1,062	7 (wrong)	1,062	0	0	100	100
	4	10	948	10 (wrist)	948	0	0	100	100
	5	8	852	8 (wrote)	852	0	0	100	100
	6	8	710	8 (write)	710	0	0	100	100
28. When two of the same consonants are side by side, only one is heard.	1	20	129	20 (apple)	129	0	0	100	100
	2	63	362	63 (telling)	362	0	0	100	100
	3	157	1,972	154 (butter)	1,955	3 (suggest)	17	98	99
	4	202	3,551	199 (dollar)	3,523	3 (suggested)	28	99	99
	5	336	5,959	329 (array)	5,866	7 (accepted)	93	98	98
	6	363	6,224	355 (lesson)	6,181	8 (accidents)	43	98	99

TABLE 1--Continued

Generalizations	Grade Level	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applicability as Related to	
								Words	Frequencies
29. When a word ends in <u>ck</u> , it has the same last sound as in <u>look</u> .	1	5	33	5 (clock)	33	0	0	100	100
	2	10	66	10 (stack)	66	0	0	100	100
	3	19	334	19 (rock)	334	0	0	100	100
	4	18	447	18 (quick)	447	0	0	100	100
	5	18	424	18 (truck)	424	0	0	100	100
	6	17	242	17 (stock)	242	0	0	100	100
30. In most two syllable words, the first syllable is accented.	1	97	891	79 (after)	681	18 (away)	210	81	76
	2	351	3,764	316 (item)	3,385	35 (correct)	379	90	90
	3	894	18,576	776 (method)	16,309	118 (enough)	2,267	87	88
	4	950	22,895	815 (service)	19,724	135 (omit)	3,171	86	86
	5	1,150	25,887	964 (camel)	21,849	186 (along)	4,038	84	84
	6	1,212	26,382	982 (surface)	22,048	230 (suggest)	4,334	81	84
31. If a, <u>in</u> , <u>re</u> , <u>ex</u> , <u>de</u> , or <u>be</u> is the first syllable in a word, it is usually unaccented.	1	16	166	14 (about)	163	2 (into)	3	88	97
	2	32	293	30 (before)	286	2 (being)	7	94	98
	3	101	3,215	86 (degree)	2,519	15 (extra)	696	85	78
	4	160	4,096	129 (express)	3,304	31 (able)	792	81	81
	5	227	5,010	189 (deposit)	3,974	38 (inner)	1,036	83	79
	6	278	6,736	233 (return)	5,195	45 (being)	1,541	84	77
32. In most two-syllable words that end in a consonant followed by <u>y</u> , the first syllable is accented and the last is unaccented.	1	4	20	4 (many)	20	0	0	100	100
	2	19	414	19 (study)	414	0	0	100	100
	3	47	3,099	47 (pony)	3,099	0	0	100	100
	4	47	2,909	46 (merry)	2,903	1 (supply)	6	98	99
	5	47	1,785	46 (ready)	1,782	1 (supply)	3	98	99
	6	49	2,160	48 (penny)	2,158	1 (supply)	2	98	99
33. One vowel letter in an accented syllable has its short sound.	1	81	700	57 (little)	475	24 (paper)	225	70	68
	2	228	2,410	143 (digests)	1,715	85 (open)	695	63	71
	3	979	21,446	614 (visit)	14,740	365 (corner)	6,706	63	69
	4	1,067	24,567	668 (chapter)	16,874	399 (cider)	7,693	62	69
	5	1,414	31,540	876 (winter)	21,170	538 (woman)	10,370	62	67
	6	1,693	36,343	1,026 (album)	24,991	667 (baby)	11,352	61	69
34. When <u>y</u> or <u>ey</u> is seen in the last syllable that is not accented, the long sound of <u>e</u> is heard.	1	5	97	0	0	5 (study)	97	0	0
	2	17	52	0	0	17 (any)	52	0	0
	3	64	2,972	0	0	64 (carry)	2,972	0	0
	4	93	3,096	0	0	93 (money)	3,096	0	0
	5	109	2,565	0	0	109 (very)	2,565	0	0
	6	129	3,133	0	0	129 (every)	3,133	0	0
35. When <u>ture</u> is the final syllable in a word, it is unaccented.	1	1	4	1 (picture)	4	0	0	100	100
	2	2	110	2 (picture)	110	0	0	100	100
	3	2	297	2 (picture)	297	0	0	100	100
	4	3	219	3 (nature)	219	0	0	100	100
	5	6	197	6 (nature)	197	0	0	100	100
	6	6	161	6 (posture)	161	0	0	100	100

TABLE 1--Continued

Generalizations	Grade Level	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applicability as Related to	
								Words	Frequency
36. When <u>tion</u> is the final syllable in a word, it is unaccented.	1	6	146	6 (addition)	146	0	0	100	100
	2	8	177	8 (fraction)	177	0	0	100	100
	3	11	738	11 (question)	738	0	0	100	100
	4	29	1,247	29 (solution)	1,247	0	0	100	100
	5	38	1,341	38 (location)	1,341	0	0	100	100
	6	55	1,671	55 (mention)	1,671	0	0	100	100
37. In many two- and three-syllable words, the final <u>e</u> lengthens the vowel in the last syllable.	1	9	104	6 (inside)	84	3 (measure)	20	67	81
	2	24	255	14 (before)	107	10 (message)	148	58	42
	3	59	1,428	34 (concrete)	616	25 (above)	812	58	43
	4	82	2,292	40 (replace)	1,045	42 (practice)	1,247	49	46
	5	144	3,832	69 (realize)	1,528	75 (become)	2,304	48	40
	6	189	3,969	93 (mistake)	1,554	96 (voyage)	2,415	49	39
38. If the first vowel sound in a word is followed by two consonants, the first syllable usually ends with the first of the two consonants.	1	54	403	33 (into)	286	21 (tallest)	117	61	71
	2	177	1,599	133 (upper)	1,275	44 (teacher)	324	75	80
	3	610	10,407	439 (rabbit)	8,894	171 (other)	1,513	72	85
	4	631	13,233	465 (winter)	10,746	166 (between)	2,487	74	81
	5	812	16,925	618 (almost)	14,049	194 (abruptly)	2,876	76	83
	6	910	17,313	700 (enlarge)	14,378	210 (migrates)	2,935	77	83
39. If the first vowel sound in a word is followed by a single consonant, that consonant usually begins the second syllable.	1	59	695	31 (paper)	329	28 (cover)	366	53	47
	2	135	1,152	67 (even)	542	68 (finish)	610	50	47
	3	387	10,727	185 (erase)	4,362	202 (ever)	6,365	48	41
	4	498	12,492	240 (vanilla)	5,890	258 (seven)	6,602	48	47
	5	640	15,194	316 (radio)	7,175	324 (second)	8,019	50	47
	6	682	15,369	351 (aloud)	7,308	331 (editor)	8,061	51	48
40. If the last syllable of a word ends in <u>le</u> , the consonant preceding the <u>le</u> usually begins the last syllable.	1	4	23	4 (table)	23	0	0	100	100
	2	11	64	11 (bicycle)	64	0	0	100	100
	3	22	841	22 (candle)	841	0	0	100	100
	4	27	1,145	27 (example)	1,145	0	0	100	100
	5	34	1,739	34 (uncle)	1,739	0	0	100	100
	6	34	2,064	34 (maple)	2,064	0	0	100	100
41. When the first vowel element in a word is followed by <u>th</u> , <u>ch</u> , or <u>sh</u> , these symbols are not broken when the word is divided into syllables and may go with either the first or second syllable.	1	5	30	5 (other)	30	0	0	100	100
	2	9	34	9 (father)	34	0	0	100	100
	3	33	309	33 (teacher)	309	0	0	100	100
	4	44	687	44 (within)	687	0	0	100	100
	5	50	762	50 (neither)	762	0	0	100	100
	6	45	768	45 (wishes)	768	0	0	100	100
42. In a word of more than one syllable, the letter <u>v</u> usually goes with the preceding vowel to form a syllable.	1	7	127	5 (seven)	123	2 (even)	4	71	97
	2	20	105	16 (cover)	58	4 (over)	47	80	55
	3	51	608	41 (travel)	303	10 (divide)	305	80	50
	4	73	1,609	54 (never)	755	19 (review)	854	74	47
	5	91	1,618	59 (average)	780	32 (event)	838	65	48
	6	114	1,898	75 (every)	1,174	39 (avoid)	724	66	62

TABLE 1--Continued

Generalizations	Grade Level	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applicability as Related to	
								Words	Frequency
43. When a word has only one vowel letter, the vowel sound is likely to be short.	1	135	4,140	84 (fill)	2,612	51 (pint)	1,528	62	63
	2	287	10,924	191 (help)	6,357	96 (from)	4,567	67	58
	3	530	57,202	352 (truck)	32,010	178 (worm)	25,192	66	56
	4	504	58,532	320 (which)	29,976	184 (might)	28,556	63	51
	5	499	66,429	313 (thumb)	34,573	186 (watch)	31,856	63	52
	6	513	78,158	320 (belt)	38,538	193 (toss)	39,620	62	49
44. When there is one <u>e</u> in a word that ends in a consonant, the <u>e</u> usually has a short sound.	1	20	766	20	766	0	0	100	100
	2	36	1,279	35	1,35	2 (her)	44	94	97
	3	77	4,674			3 (clerk)	134	96	99
	4	79	5,197			4 (terms)	276	95	95
	5	85	6,21			5 (per)	387	94	94
	6	87	5,			5 (term)	583	94	89
45. When the last syllable is the sound <u>r</u> , it is unaccented.	1	15				0	0	100	100
	2	40				0	0	100	100
	3	126				3 (appear)	9	99	99
	4	148				3 (disappear)	11	98	99
	5	174				1 (occur)	41	97	99
	6	197				1 (prefer)	158	96	97

TABLE 1--Continued

Generalizations	Grade Level	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applicability as Related to	
								Words	Frequency
43. When a word has only one vowel letter, the vowel sound is likely to be short.	1	135	4,140	84 (fill)	2,612	51 (pint)	1,528	62	63
	2	287	10,924	191 (help)	6,357	96 (from)	4,567	67	58
	3	530	57,202	352 (truck)	32,010	178 (worm)	25,192	66	56
	4	504	58,532	320 (which)	29,976	184 (might)	28,556	63	51
	5	499	66,429	313 (thumb)	34,573	186 (watch)	31,856	63	52
	6	513	78,158	320 (belt)	38,538	193 (toss)	39,620	62	49
44. When there is one e in a word that ends in a consonant, the e usually has a short sound.	1	20	766	20 (nest)	766	0	0	100	100
	2	36	1,279	34 (desk)	1,235	2 (her)	44	94	97
	3	77	4,674	74 (press)	4,540	3 (clerk)	134	96	99
	4	79	5,197	75 (check)	4,921	4 (terms)	276	95	95
	5	85	6,216	80 (step)	5,829	5 (per)	387	94	94
	6	87	5,386	82 (rest)	4,803	5 (term)	583	94	89
45. When the last syllable is the sound <u>r</u> , it is unaccented.	1	15	153	15 (color)	153	0	0	100	100
	2	40	580	40 (order)	580	0	0	100	100
	3	126	3,230	123 (ever)	3,221	3 (appear)	9	99	99
	4	148	4,285	145 (other)	4,274	3 (disappear)	11	98	99
	5	174	5,346	169 (differ)	5,305	5 (occur)	41	97	99
	6	197	6,105	190 (ruler)	5,947	7 (prefer)	158	96	97

grade programs. An inspection of the data of these words and the frequencies, in accordance with the established criteria, indicated there were five generalizations (5, 23, 28, 30, 44) useful for both situations. Generalization 9 was found useful for the word list but not for the frequency count. There were seventeen generalizations (7, 8, 10, 20, 21, 22, 25, 26, 27, 29, 31, 32, 35, 36, 40, 41, 45) which met the requirement of the second criterion for both words and frequencies, but failed to meet the requirement of a minimum count of twenty words as stated in the first criterion. There were fourteen generalizations (3, 6, 11, 12, 13, 14, 16, 17, 18, 19, 24, 28, 30, 34) which failed in meeting either of the established criteria for words or frequencies. There were eight generalizations (1, 2, 4, 15, 33, 38, 39, 43) which met the first criterion but did not have a per cent of utility high enough to be considered useful for words or frequencies. Generalizations 37 and 42 failed to meet both requirements of the criteria as related to the word list; however, these generalizations met the requirement of 75 per cent utility for frequencies of words conforming.

The five generalizations found useful for words and frequencies were of the following types: generalization 44 related to short vowels, generalizations 5 and 23 related to vowel and consonant sounds, generalization 28 related to silent consonants, and generalization 30 related to accented

syllables. Generalization 9, which was found useful for words but not for frequencies, was related to long vowels.

Second Grade Programs

There was a total of 920 words, with a frequency count of 22,327 in the combined list of the three second grade programs. An inspection of the data of these words and frequencies, in accordance with the established criteria, indicated there were thirteen generalizations (5, 9, 10, 16, 20, 21, 23, 28, 30, 31, 38, 44, 45) useful for both situations. Generalization 42 was found useful for the word list but not for the frequency count. There were eleven generalizations (8, 22, 25, 26, 27, 29, 32, 35, 36, 40, 41) which met the requirement of the second criterion for both words and frequencies, but failed to meet the requirement of a minimum count of twenty words as stated by the first criterion. There were seven generalizations (3, 7, 11, 12, 13, 19, 34) which failed in meeting either of the established criteria for words or frequencies. There were thirteen generalizations (1, 2, 4, 6, 14, 15, 17, 18, 24, 33, 37, 39, 43) which met the first criterion but did not have the per cent of utility high enough to be considered useful for words or frequencies.

The thirteen generalizations found useful for words and frequencies were of the following types: generalizations 9 and 10 were related to long vowels; generalizations 5, 16, and 23 were related to vowel and consonant sounds;

generalizations 20 and 21 were related to consonant diagraphs; generalizations 30, 31, and 45 were related to accented syllables; generalization 44 was related to short vowels; generalization 28 was related to silent consonants; and generalization 38 was related to syllabic division. Generalization 42, which was found useful for the word list but not for frequencies, was related to syllabic division.

Third Grade Programs

There was a total count of 1,922 words, with a frequency count of 113,485, in the combined list of the third grade programs. An inspection of the data of these words and frequencies, in accordance with the established criteria, indicated seventeen generalizations (5, 8, 10, 16, 20, 21, 22, 23, 25, 28, 30, 31, 32, 40, 41, 44, 45) were useful. Generalizations 9 and 42 were found useful for the word list but not for the frequency count. Generalizations 6 and 38 were found useful for the frequency count of conforming words but not for the word list. There were sixteen generalizations (1, 2, 4, 7, 11, 12, 14, 15, 17, 18, 24, 33, 34, 37, 39, 43) which met the criterion for a minimum count of twenty words but failed the criterion used for determining per cent of utility in both situations, words and frequencies. There were five generalizations (26, 27, 29, 35, 36) which did not meet the first criterion, requiring a minimum word count of twenty words; however, these generalizations were found to have 75 per cent utility as stated in

the second criterion; as related to both, words and frequencies. Generalizations 3 and 13 did not meet the criteria requirement for word count or utility in either situation, words or frequencies. Generalization 19 did not meet the established criterion which related to the required minimum number of words; however, it had the per cent of utility required for usefulness at it related to the word list.

The seventeen generalizations which were found useful for the word and frequency situations may be divided into the following types: generalizations 5, 16, 22, and 23 were related to vowel and consonant sounds; generalizations 8 and 10 were related to long vowels; generalizations 20, 21, and 41 were related to consonant diagraphs; generalizations 30, 31, 32, and 45 were related to accented syllables; generalization 40 was related to syllabic division; and generalization 44 was related to short vowels. Generalization 9, which was found useful for words but not frequencies, related to long vowels; generalization 42, found useful for the word situation, was related to syllabic division. Generalization 6, found useful for the frequency situation and not the word situation, was related to vowel diagraphs and phonograms. Generalization 38, found useful in the frequency situation, was related to syllabic division.

Fourth Grade Programs

There were 2,601 words, with a frequency count of 117,391, in the combined list of the fourth grade programs.

An inspection of the data of these words, in accordance with the established criteria, indicated eighteen generalizations (5, 8, 10, 16, 20, 21, 22, 23, 25, 28, 30, 31, 32, 36, 40, 41, 44, 45) were found useful in both situations. Generalization 38 met both requirements of the criteria in relation to the frequencies but failed to meet the 75 per cent utility to be termed useful for the word list. There were nineteen generalizations (1, 2, 4, 6, 7, 9, 11, 12, 14, 15, 17, 18, 24, 33, 34, 37, 39, 42, 43) which met the requirement of the first criterion, a minimum count of twenty words, but failed to meet 75 per cent utility for either of the situations. Generalizations 26, 27, 29, and 35 failed to meet the first criterion in regard to word count; however, all four met the 75 per cent of utility for both words and frequencies. Generalizations 3 and 13 failed to meet either criterion for words or frequencies. Generalization 19 did not have a minimum count of twenty words; however, it met the 75 per cent utility requirement for the word list.

The eighteen generalizations found useful for words and frequencies were assigned to the following types: generalizations 5, 16, 22, and 23 were related to vowel and consonant sounds; generalizations 8 and 10 were related to long vowels; generalization 44 was related to short vowels; generalizations 25 and 28 were related to silent consonants; generalizations 20, 21, and 41 were related to consonant diagraphs; generalization 40 was related to syllabic division;

generalizations 30, 31, 32, 36, and 45 were related to accented syllables. Generalization 38, which was found useful for frequencies but not for the word list, was related to syllabic division.

Fifth Grade Programs

There was a total count of 3,025 words, with a frequency count of 130,893, in the combined list of the fifth grade programs. An inspection of the data of these words and frequencies, in accordance with the established criteria, indicated nineteen generalizations (5, 8, 10, 16, 20, 21, 22, 23, 25, 28, 30, 31, 32, 36, 38, 40, 41, 44, 45) were useful. There were twenty generalizations (1, 2, 3, 4, 6, 7, 9, 11, 12, 14, 15, 17, 18, 24, 33, 34, 37, 39, 42, 43) which met the first criterion requirement of a minimum count of twenty words; however, the second criterion requirement of 75 per cent utility was not met for either situation, words or frequencies. Generalizations 26, 27, 29, and 35 failed to meet the first criterion; however, all four met the 75 per cent utility requirement for both situations, words and frequencies. Generalization 13 failed to meet both requirements of the criteria in each situation. Generalization 19 failed to meet the minimum of twenty words; however, it did meet the 75 per cent of utility for the word list but not for the frequencies.

The nineteen generalizations found useful for both situations, words and frequencies, were classified in the following types: generalizations 5, 16, 22, and 23 were related to vowels and consonant sounds; generalizations 8 and 10 were related to long vowel sounds; generalization 44 was related to short vowels; generalizations 25 and 28 were related to silent consonants; generalizations 20, 21, and 41 were related to consonant diagraphs; generalizations 38 and 40 were related to syllabic division; generalizations 30, 31, 32, 36, and 45 were related to accented syllables.

Sixth Grade Programs

There was a total count of 3,384 words, with a frequency count of 151,035, in the combined list of the three sixth grade programs. An inspection of the data of these words and frequencies, in accordance with the established criteria, indicated nineteen generalizations (5, 8, 10, 16, 20, 21, 22, 23, 25, 28, 30, 31, 32, 36, 38, 40, 41, 44, 45) were useful for both situations. There were twenty-one generalizations (1, 2, 3, 4, 6, 7, 9, 11, 12, 13, 14, 15, 17, 18, 24, 33, 34, 37, 39, 42, 43) which met the first criterion of a minimum word count of twenty, but failed to meet the second criterion of 75 per cent utility for either situation, word or frequencies. Generalizations 26, 27, and 35 failed to meet the minimum word count of twenty; however, 75 per cent utility was met for both situations,

words and frequencies. The word count of twenty was not met by generalization 19 and the 75 per cent utility was not met for frequencies; however, the criterion for utility was met for the word list.

The nineteen generalizations found useful for words and frequencies were assigned to the following types: generalizations 5, 16, 22, and 23 were related to vowel and consonant sounds; generalizations 8 and 10 were related to long vowels; generalization 44 was related to short vowels; generalizations 25 and 28 were related to silent consonants; generalizations 20, 21, and 41 were related to consonant diagraphs; generalizations 38 and 40 were related to syllabic division; and generalizations 30, 31, 32, 36, and 45 were related to accented syllables.

Summary

An investigation of the data, in accordance with the established criteria, indicated there were twenty generalizations (5, 8, 9, 10, 16, 20, 21, 22, 23, 25, 28, 30, 31, 32, 36, 38, 40, 41, 44, 45) applicable for both situations, words and frequencies at one or more of the grade levels, one through six. Generalizations 5, 23, 28, 30, and 44 were found applicable and common for all six grade levels. Twelve of the generalizations (5, 10, 16, 20, 21, 23, 28, 30, 31, 38, 44, 45) were applicable and common for the five grade levels, two through six. Seventeen of the generalizations

(5, 8, 10, 16, 20, 21, 22, 23, 25, 28, 30, 31, 32, 40, 41, 44, 45) were found applicable and common for the four grade levels, three through six. Eighteen generalizations (5, 8, 10, 16, 20, 21, 22, 23, 25, 28, 30, 31, 32, 36, 40, 41, 44, 45) were found applicable and common for the three upper grade levels; four, five, and six. Nineteen generalizations (5, 8, 10, 16, 20, 21, 22, 23, 25, 28, 30, 31, 32, 36, 38, 40, 41, 44, 45) were found applicable and common for grades five and six. Generalization 9 and 38 were also found applicable for words and frequencies at grade level two. Generalization 9 was applicable for words at grade levels one and three but not for frequencies. Generalization 42 was applicable for words at grade levels two and three but not for frequencies. Generalization 6 was applicable for frequencies but not words at grade level three. There were five generalizations (13, 19, 26, 27, 35) which did not meet the first criterion of a minimum word count of twenty for any one of the grade levels. There was high correlation in applicability according to grade level for the four grades, three through six.

Applicability of Generalizations to
Words and Frequencies of the
Mathematics Textbooks

A list of 5,314 words, with 541,747 frequencies was compiled from the three mathematics series, grades one through six. The generalizations (Appendix A) were tested

against the phonetic respelling, accentuation, and syllabic division for each word as given in Webster's New Collegiate Dictionary.¹ The same criteria as that used for the grade levels was used to determine the applicability for the composite word list and frequencies. The applicability for the words was determined by dividing the total number of words conforming to the generalization, by the total number of words to which the generalization could be expected to apply. The report of the findings as given in the following sections is shown in Table 2.

1. Generalization one, which was concerned with the principle of adjacent vowels, had a word count of 1,642, with a frequency count of 94,653. There were 605 words conforming, with a frequency count of 31,208. There were 1,037 exceptions, with a frequency count of 63,445. An applicability of 37 per cent was established for the words and 33 per cent for the frequencies.

2. Generalization two, which was concerned with the placement of one vowel within a one-syllable word had a word count of 651 with 102,262 frequencies. There were 448 words conforming with 65,904 frequencies. There were 203 exceptions with 36,359 frequencies. An applicability of 69 per cent for words and 64 per cent for frequencies was established.

¹Webster's New Collegiate Dictionary, 1961.

TABLE 2
APPLICABILITY OF GENERALIZATIONS AS RELATED TO THE COMPOSITE VOCABULARY
AND FREQUENCIES OF THE COMBINED SERIES

Generalizations	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applica- bility as Related to	
							Words	Frequencies
1. When there are two vowels side by side, the long sound of the first one is heard and the second is usually silent.	1,642	34,653	605 (wheel) ^a	31,208	1,037 (bread) ^a	63,445	37	33
2. When a vowel is in the middle of a one-syllable word the vowel is usually short.	651	132,263	448 (trips)	65,904	203 (child)	36,359	69	64
middle letter.	216	38,168	174 (slept)	26,107	42 (skirt)	12,061	81	68
one of the middle two letters in a word of four letters.	280	53,641	184 (runs)	34,055	96 (roll)	19,586	66	64
one vowel <u>within</u> a word of more than four letters.	155	10,454	90 (punch)	5,742	65 (night)	4,712	58	55
3. If the only vowel letter is at the end of a word, the letter usually stands for a long sound.	25	37,607	18 (he)	13,050	7 (flu)	74,557	72	15
4. When there are two vowels, one of which is final <u>e</u> , the first vowel is long and the <u>e</u> is silent.	261	14,043	176 (tame)	25,650	85 (some)	18,393	67	58
5. The <u>r</u> gives the preceding vowel a sound that is neither long nor short.	1,428	73,152	1,273 (world)	69,072	155 (wire)	4,080	89	94
6. The first vowel is usually long and the second silent in the digraphs <u>ai</u> , <u>ea</u> , <u>oa</u> , and <u>ui</u> .	431	22,041	247 (flea)	14,116	184 (learn)	7,925	57	64
<u>ai</u>	134	4,253	97 (wait)	2,618	37 (said)	1,635	72	61
<u>ea</u>	204	15,832	98 (meals)	10,284	106 (steak)	5,548	48	65
<u>oa</u>	48	1,166	46 (goal)	1,158	2 (broad)	8	96	99
<u>ui</u>	45	790	6 (suit)	56	39 (quick)	734	13	7

^aWords in parenthesis are examples - either words which conform or of exceptions, depending on the column

TABLE 2--Continued

Generalizations	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applica- bility as Related to	
							Words	Frequencies
7. In the phonogram <u>ie</u> , the <u>i</u> is silent and the <u>e</u> has a long sound.	116	2,683	10 (chief)	467	106 (lie)	2,216	9	17
8. Words having double <u>e</u> usually have the long <u>e</u> sound.	136	5,258	128 (freeze)	4,848	8 (been)	410	94	92
9. When words end with silent <u>e</u> , the preceding <u>a</u> or <u>i</u> is long.	337	35,349	212 (drive)	20,884	125 (olive)	14,465	63	59
10. In <u>ay</u> the <u>y</u> is silent and gives <u>a</u> the long sound.	67	4,126	64 (array)	4,008	3 (always)	118	95	97
11. When the letter <u>i</u> is followed by the letters <u>gh</u> , the <u>i</u> usually stands for its long sound and the <u>gh</u> is silent.	68	2,590	40 (knight)	1,450	28 (weigh)	1,140	59	57
12. When <u>a</u> follows <u>w</u> in a word it usually has the sound <u>a</u> as in <u>was</u> .	75	3,356	19 (want)	1,692	56 (water)	1,664	25	50
13. When <u>e</u> is followed by <u>w</u> , the vowel sound is the same as represented by <u>oo</u> .	28	585	8 (blew)	54	20 (view)	531	28	9
14. The two letters <u>ow</u> make the long <u>o</u> sound.	104	17,820	66 (own)	7,502	38 (power)	10,318	63	42
15. <u>W</u> is sometimes a vowel and follows the vowel digraph rule.	151	20,186	66 (known)	7,502	85 (flew)	12,684	44	37
16. When <u>y</u> is the final letter in a word, it usually has the vowel sound.	253	20,317	227 (pretty)	17,128	26 (away)	3,189	90	84
17. When <u>y</u> is used as a vowel in words, it sometimes has the sound of long <u>i</u> .	408	22,278	42 (style)	4,559	366 (symbol)	17,719	10	20
18. The letter <u>a</u> has the same sound (<u>ä</u>) when followed by <u>l</u> , <u>w</u> , and <u>u</u> .	330	12,673	99 (also)	5,102	231 (calves)	7,571	30	40

TABLE 2--Continued

Generalizations	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applicability as Related to	
							Words	Frequencies
19. When <u>a</u> is followed by <u>r</u> and final <u>e</u> , we expect to hear the sound heard in <u>care</u> .	11	6,112	10 (spare)	763	1 (are)	5,349	90	1
20. When <u>c</u> and <u>h</u> are next to each other, they make only one sound.	163	15,735	163 (chord)	15,735	0	0	100	100
21. <u>Ch</u> is usually pronounced as it is in <u>kitchen</u> , <u>catch</u> , and <u>chair</u> , not like <u>sh</u> .	163	15,735	160 (peach)	15,505	3 (machine)	230	98	98
22. When <u>c</u> is followed by <u>e</u> or <u>i</u> , the sound of <u>s</u> is likely to be heard.	265	14,014	245 (center)	13,733	20 (ocean)	281	92	98
23. When the letter <u>c</u> is followed by <u>o</u> or <u>a</u> , the sound of <u>k</u> is likely to be heard.	429	17,748	429 (candy)	17,748	0	0	100	100
24. The letter <u>g</u> often has a sound similar to that of <u>j</u> in <u>jump</u> when it precedes the letter <u>i</u> or <u>e</u> .	189	7,900	141 (page)	4,350	48 (begin)	3,550	75	55
25. When <u>ght</u> is seen in a word, <u>gh</u> is usually silent.	59	2,521	59 (fight)	2,521	0	0	100	100
26. When a word begins <u>kn</u> , the <u>k</u> is silent.	15	1,261	15 (knee)	1,261	0	0	100	100
27. When a word begins <u>wr</u> , the <u>w</u> is silent.	13	4,046	13 (wrap)	4,046	0	0	100	100
28. When two of the same consonants are side by side, only one is heard.	618	18,197	606 (appear)	18,016	12 (accident)	181	98	99
29. When a word ends in <u>ck</u> , it has the same last sound as in <u>look</u> .	33	1,546	33 (clock)	1,546	0	0	100	100
30. In most two syllable words, the first syllable is accented.	1,940	98,395	1,649 (ribbon)	83,996	291 (supply)	14,399	85	85
31. If <u>a</u> , <u>in</u> , <u>re</u> , <u>ex</u> , <u>de</u> , or <u>be</u> is the first syllable in a word, it is usually unaccented.	378	19,516	312 (relate)	15,441	66 (recent)	4,075	83	79

TABLE 2--Continued

Generalizations	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applica- bility as Related to	
							Words	Frequencies
32. In most two-syllable words that end in a consonant followed by <u>y</u> , the first syllable is accented and the last is unaccented.	86	10,387	85 (carry)	10,376	1 (supply)	11	99	99
33. One vowel letter in an accented syllable has its short sound.	2,805	117,006	1,734 (attic)	79,965	1,071 (apron)	37,041	62	68
34. When <u>y</u> or <u>ey</u> is seen in the last syllable that is not accented, the long sound of <u>e</u> is heard.	205	11,915	0	0	205 (money)	11,915	0	0
35. When <u>ture</u> is the final syllable in a word, it is unaccented.	9	988	9 (picture)	988	0	0	100	100
36. When <u>tion</u> is the final syllable in a word, it is unaccented.	66	5,320	66 (mention)	5,320	0	0	100	100
37. In many two- and three-syllable words, the final <u>e</u> lengthens the vowel in the last syllable.	282	11,880	145 (device)	4,934	137 (above)	6,946	51	42
38. If the first vowel sound in a word is followed by two consonants, the first syllable usually ends with the first of the two consonants.	1,603	51,880	1,210 (willow)	49,628	393 (title)	10,252	75	83
39. If the first vowel sound in a word is followed by a single consonant, that consonant usually begins the second syllable.	1,117	55,629	555 (zero)	25,606	562 (ever)	30,023	50	46
40. If the last syllable of a word ends in <u>le</u> , the consonant preceding the <u>le</u> usually begins the last syllable.	60	5,876	60 (double)	5,876	0	0	100	100

TABLE 2--Continued

Generalizations	Total Number of Words	Frequency of Words	Words Conforming	Frequencies of Words Conforming	Number of Exceptions	Frequencies of Exceptions	Per Cent of Applica- bility as Related to	
							Words	Frequencies
41. When the first vowel element in a word is followed by <u>th</u> , <u>ch</u> , or <u>sh</u> , these symbols are not broken when the word is divided into syllables and may go with either the first or second syllable.	66	2,590	66 (gather)	2,590	0	0	100	100
42. In a word of more than one syllable, the letter <u>v</u> usually goes with the pre- ceding vowel to form a syllable.	180	5,965	120 (never)	3,193	60 (even)	2,772	67	54
43. When a word has only one vowel letter, the vowel sound is likely to be short.	757	275,385	501 (depth)	144,066	256 (skirt)	131,319	66	52
44. When there is one <u>e</u> in a word that ends in a consonant, the <u>e</u> usually has a short sound.	113	23,518	105 (rest)	22,094	8 (term)	1,424	93	94
45. When the last syllable is the sound <u>r</u> , it is un- accented.	309	19,699	298 (cider)	19,480	11 (refer)	219	96	99

a. A subdivision of generalization two, which was concerned with vowel placement as the middle letter, had a word count of 216 with 38,168 frequencies. There were 174 words conforming, with a frequency count of 26,107. There were 42 exceptions with 12,061 frequencies. An applicability of 81 percent was established for the words and 68 per cent for the frequencies.

b. A subdivision for generalization two, which was concerned with a vowel letter as one of the middle two letters in a word of four letters, had a total word count of 280 with 53,641 frequencies. There were 184 words conforming, with 34,055 frequencies. There were 96 exceptions with 19,586 frequencies. An applicability of 66 per cent was established for the words and 64 per cent for the frequencies.

c. A subdivision of generalization two, which was concerned with one vowel within a word of more than four letters, had a total word count of 155, with 10,454 frequencies. There were 90 words, with 5,742 frequencies conforming. There were 65 exceptions, with 4,712 frequencies. There was an applicability of 58 per cent for the words and an applicability of 55 per cent for the frequencies.

3. Generalization three, which was concerned with one vowel in a word and it placed on the end of a word, had a total word count of 25 with 87,365 frequencies. There were 18 words conforming, with 13,050 frequencies. There

were 7 exceptions with 74,315 frequencies. There was an applicability of 72 per cent for the words and an applicability of 15 per cent for the frequencies.

4. Generalization four, which was concerned with two vowels one of which was a final e, had a total word count of 261, with 44,043 frequencies. There were 176 words conforming, with 25,650 frequencies. There were 85 exceptions, with 18,393 frequencies. There was an applicability of 67 per cent for the words and an applicability of 58 per cent for the frequencies.

5. Generalization five, which was concerned with a single vowel followed by the letter r, had a total word count of 1,428 with 73,152 frequencies. There were 1273 words with 69,072 frequencies conforming. There were 155 exceptions, with 4,080 frequencies. There was an applicability of 89 per cent for the words and an applicability of 94 per cent for the frequencies.

6. Generalization six, which was concerned with diagraphs (ai, ea, oa, ui) had a total count of 431 words, with 22,041 frequencies. There were 247 words conforming, with 14,116 frequencies. There were 184 exceptions with 7,925 frequencies. There was an applicability of 57 per cent for the words and an applicability of 64 per cent for the frequencies.

a. The subdivision ai of generalization six had a word count of 134 with 4,253 frequencies. There were 97

words conforming, with 2,678 frequencies. There were 37 exceptions with 1,635 frequencies. There was an applicability of 72 per cent for the words and an applicability of 61 per cent for the frequencies.

b. The subdivision ea of generalization six had a total word count of 204, with 15,832 frequencies. There were 98 words conforming, with 10,284 frequencies. There were 106 exceptions, with 5,548 frequencies. There was an applicability of 48 per cent for the words and an applicability of 65 per cent for the frequencies.

c. The subdivision oa of generalization six had a total word count of 48 with 1,166 frequencies. There were 46 words conforming, with 1,158 frequencies. There were 2 exceptions, with 8 frequencies. There was an applicability of 96 per cent for the words. There was an applicability of 99 per cent for the frequencies.

d. The subdivision ui of generalization six had a total word count of 45, with 790 frequencies. There were 6 words conforming, with 56 frequencies. There were 39 exceptions, with 734 frequencies. There was an applicability of 13 per cent for the words. There was an applicability of 7 per cent for the frequencies.

7. Generalization seven, which was concerned with the phonogram ie had a total word count of 116, with 2,683 frequencies. There were 10 words conforming, with 467 frequencies. There were 106 exceptions with 2,216 frequencies.

There was an applicability of 9 per cent for the words.

There was an applicability of 17 per cent for the frequencies.

8. Generalization eight, which was concerned with words having the double e, had a total count of 136 words, with 5,258 frequencies. There were 128 words conforming with 4,848 frequencies. There were 8 exceptions with 410 frequencies. There was an applicability of 94 per cent for the words. There was an applicability of 92 per cent for the frequencies.

9. Generalization nine, which was concerned with words ending in silent e and how this affects the preceding a or i had a total word count of 337, with 35,349 frequencies. There were 212 words conforming with 20,884 frequencies. There were 125 exceptions with 14,465 frequencies. There was an applicability of 63 per cent for the words. There was an applicability of 59 per cent for the frequencies.

10. Generalization ten, which was concerned with the ay combination, had a total count of 67 words, with 4,126 frequencies. There were 64 words conforming, with 4,008 frequencies. There were 3 exceptions, with 118 frequencies. There was an applicability of 95 per cent for the words. There was an applicability of 97 per cent for the frequencies.

11. Generalization eleven, which was concerned with the letter i followed by gh, had a total word count of 68, with 2,590 frequencies. There were 40 words conforming

with 1,450 frequencies. There were 28 exceptions with 1,140 frequencies. There was an applicability of 59 per cent for words and an applicability of 57 per cent for frequencies.

12. Generalization twelve, which was concerned with the letter w followed by the letter a, had a total word count of 75 with 3,356 frequencies. There were 19 words conforming with 1,692 frequencies. There were 56 exceptions, with 1,664 frequencies. There was an applicability of 25 per cent for words and an applicability of 50 per cent for the frequencies.

13. Generalization thirteen, which was concerned with the letter e followed by w, had a total word count of 28, with 585 frequencies. There were 8 words, with 54 frequencies, conforming. There were 20 exceptions, with 531 frequencies. There was an applicability of 28 per cent for words. There was an applicability of 9 per cent for frequencies.

14. Generalization fourteen, which was concerned with the letter o followed by the letter w, had a total word count of 104 with 17,820 frequencies. There were 66 words conforming, with 7,502 frequencies. There were 38 exceptions with 10,318 frequencies. There was an applicability of 63 per cent for words. There was an applicability of 42 per cent for frequencies.

15. Generalization fifteen, which was concerned with w used with another vowel to form a digraph, had a

total word count of 151, with 20,186 frequencies. There were 66 words conforming, with 7,502 frequencies. There were 85 exceptions, with 2,684 frequencies. There was an applicability of 44 per cent for words. There was an applicability of 37 per cent for frequencies.

16. Generalization sixteen, which was concerned with y as the final letter in a word, had a total word count of 253, with 20,317 frequencies. There were 227 words conforming, with 17,122 frequencies. There were 26 exceptions, with 3,189 frequencies. There was an applicability of 90 per cent for words. There was an applicability of 84 per cent for the frequencies.

17. Generalization seventeen, which was concerned with the use of y as a vowel, had a total word count of 408, with 22,278 frequencies. There were 42 words conforming, with 4,559 frequencies. There were 366 exceptions, with 17,719 frequencies. There was an applicability of 10 per cent for words. There was an applicability of 20 per cent for the frequencies.

18. Generalization eighteen, which was concerned with the letter a in combination with letters l, w, or u, had a total word count of 330, with 12,673 frequencies. There were 99 words conforming, with 5,102 frequencies. There were 231 exceptions with 7,571 frequencies. There was an applicability of 30 per cent for words. There was an applicability of 40 per cent for frequencies.

19. Generalization nineteen, which was concerned with the letter r and final e had a total word count of 11, with 6,112 frequencies. There were 10 words conforming, with 763 frequencies. The one exception was the word are with 5,349 frequencies. The applicability for words was 90 per cent. The applicability for frequencies was 1 per cent.

20. Generalization twenty, which was concerned with the letters c and h used together as a digraph, had a total word count of 163, with 15,735 frequencies. There were 163 words conforming, with 15,735 frequencies. There were zero exceptions. There was an applicability of 100 per cent for the words. There was an applicability of 100 per cent for the frequencies.

21. Generalization twenty-one, which was concerned with the pronunciation of ch, had a total word count of 163, with 15,735 frequencies. There were 160 words conforming, with 15,505 frequencies. There were 3 exceptions, with 230 frequencies. There was an applicability of 98 per cent for words. There was an applicability of 98 per cent for frequencies.

22. Generalization twenty-two, which was concerned with the pronunciation of the letter c followed by e or i, had a total word count of 265, with 14,014 frequencies. There were 245 words conforming, with 13,733 frequencies. There were 20 exceptions, with 281 frequencies. There was an applicability of 92 per cent for words. There was an applicability of 98 per cent for frequencies.

23. Generalization twenty-three, which was concerned with the pronunciation of the letter c followed by o or a, had a total word count of 429, with 17,748 frequencies. There were zero exceptions. There was an applicability of 100 per cent for words. There was an applicability of 100 per cent for frequencies.

24. Generalization twenty-four, which was concerned with the sound of letter g followed by i or e, had a total word count of 189, with 7,900 frequencies. There were 141 words conforming, with 4,350 frequencies. There were 48 exceptions, with 3,550 frequencies. There was an applicability of 75 per cent for the words. There was an applicability of 55 per cent for frequencies.

25. Generalization twenty-five, which was concerned with the pronunciation of the ght in words, had a total of 59 words, with 2,521 frequencies. There were 59 words conforming with 2,521 frequencies. There were zero exceptions. There was an applicability of 100 per cent for words. There was an applicability of 100 per cent for frequencies.

26. Generalization twenty-six, which was concerned with words beginning with kn, had a total word count of 15, with 1,261 frequencies. There were 15 words conforming, with 1,261 frequencies. There were zero exceptions. There was an applicability for words of 100 per cent. There was an applicability of 100 per cent for frequencies.

27. Generalization twenty-seven, which was concerned with words which begin with wr, had a total word count of 13, with 4,046 frequencies. There were 13 words conforming, with 4,046 frequencies. There were zero exceptions. There was an applicability of 100 per cent for the words. There was an applicability of 100 per cent for the frequencies.

28. Generalization twenty-eight, which was concerned with the pronunciation of like consonants side by side, had a total word count of 618, with 18,197 frequencies. There were 606 words conforming, with 18,016 frequencies. There were 12 exceptions, with 181 frequencies. There was an applicability of 98 per cent for words. There was an applicability of 99 per cent for frequencies.

29. Generalization twenty-nine, which was concerned with the pronunciation of consonants ck at the end of words, had a total word count of 33, with 1,546 frequencies. There were 33 words conforming, with 1,546 frequencies. There were zero exceptions. There was an applicability of 100 per cent for words. There was an applicability of 100 per cent for frequencies.

30. Generalization thirty, which was concerned with the accenting of two-syllable words, had a total word count of 1,940, with 98,395 frequencies. There were 1,641 words conforming, with 83,996 frequencies. There were 291 exceptions, with 14,399 frequencies. There was an

applicability of 85 per cent for words. There was an applicability of 85 per cent for frequencies.

31. Generalization thirty-one, which was concerned with the accent of the first syllable when it consisted of a, in, re, ex, de, or be, had a total word count of 378, with 19,516 frequencies. There were 312 conforming words, with 15,441 frequencies. There were 66 exceptions, with 4,075 frequencies. There was an applicability of 83 per cent for the words. There was an applicability of 79 per cent for frequencies.

32. Generalization thirty-two, which was concerned with two-syllable words which end with a consonant followed by y, had a total count of 86 words, with 10,387 frequencies. There were 85 words conforming, with 10,376 frequencies. There was 1 exception, with 11 frequencies. There was an applicability of 99 per cent for the words. There was an applicability of 99 per cent for the frequencies.

33. Generalization thirty-three, which was concerned with the sound of one vowel letter in an accented syllable, had a total word count of 2,795, with 117,006 frequencies. There were 1,734 words conforming, with 79,965 frequencies. There were 1,071 exceptions with 37,041 frequencies. There was an applicability of 62 per cent for words. There was an applicability of 68 per cent for frequencies.

34. Generalization thirty-four, which was concerned with the sound of y or ey in an unaccented last syllable, had a total word count of 205, with 11,915 frequencies. There were zero words conforming. There were 205 exceptions, with 11,915 frequencies. The applicability for words was zero per cent. The applicability for frequencies was zero per cent.

35. Generalization thirty-five, which was concerned with the accent of ture as the final syllable, had a total word count of 9, with 988 frequencies. There were 9 words conforming, with 988 frequencies. There were zero exceptions. There was an applicability of 100 per cent for words. There was an applicability of 100 per cent for frequencies.

36. Generalization thirty-six, which was concerned with the accent of tion as the final syllable, had a total word count of 66, with 5,320 frequencies. There were 66 words conforming, with 5,320 frequencies. There were zero exceptions. The applicability for words was 100 per cent. The applicability for frequencies was 100 per cent.

37. Generalization thirty-seven, which was concerned with the effect final e in two or three syllable words would have on other vowels in the last syllable, had a total word count of 282, with 11,880 frequencies. There were 145 words conforming, with 4,934 frequencies. There were 87 exceptions, with 6,946 frequencies. There was an

applicability of 51 per cent for words. There was an applicability of 42 per cent for frequencies.

38. Generalization thirty-eight, which was concerned with syllabication of words having two consonants following the first vowel, had a total word count of 1,603, with 59,880 frequencies. There were 1,210 words conforming, with 49,628 frequencies. There were 393 exceptions, with 10,252 frequencies. The applicability for words was 75 per cent. The applicability for frequencies was 83 per cent.

39. Generalization thirty-nine, which was concerned with syllabication of words having one consonant following the first vowel sound, had a total word count of 1,117, with 55,629 frequencies. There were 555 words conforming, with 25,606 frequencies. There were 562 exceptions, with 30,023 frequencies. There was an applicability of 50 per cent for words. There was an applicability of 46 per cent for frequencies.

40. Generalization forty, which was concerned with the le ending of a word and the preceding consonant, had a total word count of 60, with 5,876 frequencies. There were 60 words conforming with 5,876 frequencies. There were zero exceptions. There was an applicability of 100 per cent for words. There was an applicability of 100 per cent for frequencies.

41. Generalization forty-one, which was concerned with the consonants th, ch, or sh following the first vowel

sound, had a total word count of 66, with 2,590 frequencies. There were zero exceptions. There was an applicability of 100 per cent for the words. There was an applicability of 100 per cent for frequencies.

42. Generalization forty-two, which was concerned with syllabication of words with more than one syllable as related to y and the preceding vowel, had a total word count of 180, with 5,965 frequencies. There were 120 words conforming, with 3,193 frequencies. There were 60 exceptions, with 2,772 frequencies. There was an applicability of 67 per cent for the words. There was an applicability of 54 per cent for the frequencies.

43. Generalization forty-three, which was concerned with the sound of an only vowel in a word, had a total word count of 757, with 275,385 frequencies. There were 501 words conforming, with 144,066 frequencies. There were 256 exceptions with 131,319 frequencies. There was an applicability of 66 per cent for words. There was an applicability of 52 per cent for frequencies.

44. Generalization forty-four, which was concerned with words which contain one e and end with a consonant, had a total word count of 113 words, with 23,518 frequencies. There were 105 words conforming, with 22,094 frequencies. There were 8 exceptions, with 1,424 frequencies. There was an applicability of 93 per cent for the words. There was an applicability of 94 per cent for the frequencies.

45. Generalization forty-five, which was concerned with the accent of the last syllable which has the sound r, had a total word count of 309, with 19,699 frequencies. There were 298 words conforming, with 19,480 frequencies. There were 11 exceptions, with 219 frequencies. There was an applicability of 96 per cent for the words. There was an applicability of 99 per cent for the frequencies.

Summary

An inspection of the data, in accordance with the established criteria, for the words and frequencies of the mathematics series, indicated there were twenty generalizations (5, 8, 10, 16, 20, 21, 22, 23, 25, 28, 29, 30, 31, 32, 36, 38, 40, 41, 44, 45) applicable for both, words and frequencies. Generalization 24 was applicable for words but not for frequencies.

Three of these generalizations (8, 10, 44) were related to vowel sounds. Five generalizations (5, 16, 22, 23, 24) were related to vowel and consonant sounds. Six of the generalizations (20, 21, 25, 28, 29, 41) were related to consonants and consonant diagraphs. Seven generalizations (38, 40, 30, 31, 32, 36, 45) were related to syllabic division and accentuation.

Seven of the generalizations (20, 23, 25, 29, 36, 40, 41) had an applicability of 100 per cent. There were nine of the remaining generalizations (5, 8, 10, 21, 22, 28,

32, 44, 45) which had an applicability for both, words and frequencies, that ranged between 89 and 99 per cent.

The "total word count" range for the generalizations was between 9 and 2,795. The frequency range was between 585 and 275,385. There were fifteen generalizations (3, 10, 11, 12, 13, 19, 25, 26, 27, 29, 32, 35, 36, 40, 41) with a word count below 100. Only five of these generalizations (3, 19, 32, 36, 40) had a frequency count beyond 5,000. Twenty-one generalizations (4, 6, 7, 8, 9, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 31, 34, 37, 42, 44, 45) had a word count range between 100 and 500. There was a frequency range between 5,000 and 44,000 for these twenty-one. Three generalizations (2, 28, 43) had a word count range between 500 and 1,000, with a wide frequency range between 18,000 and 276,000.

Six generalizations (1, 5, 30, 33, 38, 39) had a word count of 1,000 or more, with a frequency range between 55,000 and 117,000. Three of these generalizations (5, 30, 38) met both criteria for establishing applicability.

Four generalizations (19, 26, 27, 35) failed to meet the first criterion, a minimum word count of 20. Three of these (26, 27, 35) met the second criterion with a utility per cent of 100. Generalization 19 met the second criterion as related to words but not for frequencies.

Comparison of the Applicability of Generalizations
to Mathematics Series, Reading Series,
Science Series and Spelling Series

This study extended the Clymer¹ and Bailey² studies of the utility of forty-five phonic generalizations in reading programs to mathematics programs. Davis³ recently completed research in spelling which was an extension of the same two studies. Jernigan⁴ recently completed research in science which was also an extension of the reading research. The following is a comparison of the findings from the research in reading, science, spelling, and the mathematics study,⁵ which includes findings for both, words and frequencies. The findings for these studies have been reported in Table 3.

An inspection of the data, in accordance with the established criteria, indicated that eighteen generalizations (5, 8, 10, 16, 20, 21, 22, 23, 25, 28, 29, 30, 31, 32, 40, 41, 44, 45) were useful to all five studies. Further investigation indicated that generalizations 36, 38, and 24 were also useful to the Bailey, Jernigan, Davis, and mathematics

¹Clymer, "Utility of Phonic Generalizations," pp. 252-58.

²Bailey, "Utility of Phonic Generalizations," pp. 413-18.

³Davis, "Applicability of Phonic Generalizations to Spelling Programs."

⁴Jernigan, "Utility of Phonic Generalizations to Science Series."

⁵The mathematics study, throughout the remainder of this report, refers to the problem that was researched in this study.

TABLE 3
COMPARISON OF APPLICABILITY OF PHONIC GENERALIZATIONS TO MATHEMATICS.
SCIENCE, SPELLING, AND READING PROGRAMS^a

Generalizations	Per Cent of Applicability					
	Primary Readers (Clymer)	Primary and Intermediate Readers (Bailey)	Elementary School Science Textbooks (Jernigan)	Elementary School Spelling Programs (Davis)	Elementary School Mathematics Textbooks (Words)	Elementary School Mathematics Textbooks (Frequencies)
1. When there are two vowels side by side, the long sound of the first one is heard and the second is usually silent.	45	34	34	32	37	33
2. When a vowel is in the middle of a one-syllable word the vowel is usually short.	62	71	64	66	69	64
middle letter.	(69) ^b	(78)	(76)	(74)	(81)	(68)
one of the middle two letters in a word of four letters.	(59)	(68)	(61)	(64)	(66)	(64)
one vowel <u>within</u> a word of more than four letters	(46)	(62)	(61)	(61)	(58)	(55)
3. If the only vowel letter is at the end of a word, the letter usually stands for a long sound.	74	*76	*81	*77	72	15
4. When there are two vowels, one of which is final <u>e</u> , the first vowel is long and the <u>e</u> is silent.	63	57	*76	63	67	58

^aPer Cent of Applicability marked with an asterisk was found "useful" according to the criteria

TABLE 3--Continued

Generalizations	Per Cent of Applicability					
	Primary Readers (Clymer)	Primary and Intermediate Readers (Bailey)	Elementary School Science Textbooks (Jernigan)	Elementary School Spelling Programs (Davis)	Elementary School Mathematics Textbooks (Words)	Elementary School Mathematics Textbooks (Frequencies)
5. The <u>r</u> gives the preceding vowel a sound that is neither long nor short.	*78	*86	*89	*86	*89	*94
6. The first vowel is usually long and the second silent on the digraphs <u>ai</u> , <u>ea</u> , <u>oa</u> , and <u>ui</u> .	66	60	64	58	57	64
<u>ai</u>	(64)	(72)	(74)	(74)	(72)	(61)
<u>ea</u>	(66)	(55)	(57)	(53)	(48)	(65)
<u>oa</u>	(97)	(95)	(89)	(95)	(96)	(99)
<u>ui</u>	(6)	(10)	(28)	(5)	(13)	(7)
7. In the phonogram <u>ie</u> , the <u>i</u> is silent and the <u>e</u> has a long sound.	17	31	20	14	9	17
8. Words having double <u>e</u> usually have the long <u>e</u> sound.	*98	*87	*94	*86	*94	*92
9. When words end with silent <u>e</u> , the preceding <u>a</u> or <u>i</u> is long.	60	50	74	58	63	59
10. In <u>ay</u> the <u>y</u> is silent and gives <u>a</u> the long sound.	*78	*88	*96	*83	*95	*97

*Per Cent of Applicability marked with an asterisk was found "useful" according to the criteria

TABLE 3--Continued

Generalizations	Per Cent of Applicability					
	Primary Readers (Clymer)	Primary and Intermediate Readers (Bailey)	Elementary School Science Textbooks (Jernigan)	Elementary School Spelling Programs (Davis)	Elementary School Mathematics Textbooks (Words)	Elementary School Mathematics Textbooks (Frequencies)
11. When the letter <u>i</u> is followed by the letters <u>gh</u> , the <u>i</u> usually stands for its long sound and the <u>gh</u> is silent.	71	71	*81	68	59	57
12. When <u>a</u> follows <u>w</u> in a word it usually has the sound <u>a</u> as in <u>was</u> .	32	22	22	22	25	50
13. When <u>e</u> is followed by <u>w</u> , the vowel sound is the same as represented by <u>oo</u> .	35	40	50	42	28	9
14. The two letters <u>ow</u> make the long <u>o</u> sound.	59	55	61	54	53	42
15. <u>W</u> is sometimes a vowel and follows the vowel digraph rule.	40	33	55	37	44	37
16. When <u>y</u> is the final letter in a word, it usually has the vowel sound.	*84	*89	*91	*86	*90	*84
17. When <u>y</u> is used as a vowel in words, it sometimes has the sound of long <u>i</u> .	15	11	20	10	10	20
18. The letter <u>a</u> has the same sound (ø) when followed by <u>i</u> , <u>w</u> , and <u>u</u> .	48	34	32	35	30	40

*Per Cent of Applicability marked with an asterisk was found "useful" according to the criteria

TABLE 3--Continued

Generalizations	Per Cent of Applicability					
	Primary Readers (Clymer)	Primary and Intermediate Readers (Bailey)	Elementary School Science Textbooks (Jernigan)	Elementary School Spelling Programs (Davis)	Elementary School Mathematics Textbooks (Words)	Elementary School Mathematics Textbooks (Frequencies)
19. When <u>a</u> is followed by <u>r</u> and final <u>e</u> , we expect to hear the sound heard in <u>care</u> .	90	*96	*91	*96	90	1
20. When <u>c</u> and <u>h</u> are next to each other, they make only one sound.*100	*100	*100	*100	*100	*100	*100
21. <u>Ch</u> is usually pronounced as it is in <u>kitchen</u> , <u>catch</u> , and <u>chair</u> , not like <u>sh</u> .	*95	*87	*98	*85	*98	*98
22. When <u>c</u> is followed by <u>e</u> or <u>i</u> , the sound of <u>s</u> is likely to be heard.	*96	*92	*97	*86	*92	*98
23. When the letter <u>c</u> is followed by <u>o</u> or <u>a</u> , the sound of <u>k</u> is likely to be heard.	*100	*100	*100	*100	*100	*100
24. The letter <u>g</u> often has a sound similar to that of <u>j</u> in <u>jump</u> when it precedes the letter <u>i</u> or <u>e</u> .	64	*78	*87	*80	*75	55
25. When <u>ght</u> is seen in a word, <u>gh</u> is usually silent.	*100	*100	*100	*100	*100	*100
26. When a word begins <u>kn</u> the <u>k</u> is silent.	100	100	*100	*100	100	100
27. When a word begins <u>wr</u> , the <u>w</u> is silent.	100	100	*100	*100	100	100

*Per Cent of Applicability marked with an asterisk was found "useful" according to the criteria

TABLE 3--Continued

Generalizations	Per Cent of Applicability					
	Primary Readers (Clymer)	Primary and Intermediate Readers (Bailey)	Elementary School Science Textbooks (Jernigan)	Elementary School Spelling Programs (Davis)	Elementary School Mathematics Textbooks (Words)	Elementary School Mathematics Textbooks (Frequencies)
28. When two of the same consonants are side by side, only one is heard.	*99	*98	*96	*90	*98	*99
29. When a word ends in <u>ck</u> , it has the same last sound as in look.	*100	*100	*100	*100	*100	*100
30. In most two syllable words, the first syllable is accented.	*85	*81	*77	*82	*85	*85
31. If <u>a</u> , <u>in</u> , <u>re</u> , <u>ex</u> , <u>de</u> , or <u>be</u> is the first syllable in a word, it is usually unaccented.	*87	*84	*82	*81	*83	*79
32. In most two-syllable words that end in a consonant followed by <u>y</u> , the first syllable is accented and the last is unaccented.	*96	*97	*98	*98	*99	*99
33. One vowel letter in an accented syllable has its short sound.	61	65	63	68	62	68
34. When <u>y</u> or <u>ey</u> is seen in the last syllable that is not accented, the long sound of <u>e</u> is heard.	0	0	0	0	0	0
35. When <u>ture</u> is the final syllable in a word, it is unaccented.	100	*95	*100	*100	100	100

*Per Cent of Applicability marked with an asterisk was found "useful" according to the criteria

TABLE 3--Continued

Generalizations	Per Cent of Applicability					
	Primary Readers (Clymer)	Primary and Intermediate Readers (Bailey)	Elementary School Science Textbooks (Jernigan)	Elementary School Spelling Programs (Davis)	Elementary School Mathematics Textbooks (Words)	Elementary School Mathematics Textbooks (Frequencies)
36. When <u>tion</u> is the final syllable in a word, it is unaccented.	100	*100	*100	*100	*100	*100
37. In many two- and three-syllable words, the final <u>e</u> lengthens the vowel in the last syllable.	46	46	62	49	51	42
38. If the first vowel sound in a word is followed by two consonants, the first syllable usually ends with the first of the two consonants.	72	*78	*76	*80	*75	*83
39. If the first vowel sound in a word is followed by a single consonant, that consonant usually begins the second syllable.	44	50	53	49	50	46
40. If the last syllable of a word ends in <u>le</u> , the consonant preceding the <u>le</u> usually begins the last syllable.	*97	*93	*75	*96	*100	*100

*Per Cent of Applicability marked with an asterisk was found "useful" according to the criteria

TABLE 3--Continued

Generalizations	Per Cent of Applicability					
	Primary Readers (Clymer)	Primary and Intermediate Readers (Bailey)	Elementary School Science Textbooks (Jernigan)	Elementary School Spelling Programs (Davis)	Elementary School Mathematics Textbooks (Words)	Elementary School Mathematics Textbooks (Frequencies)
41. When the first vowel element in a word is followed by <u>th</u> , <u>ch</u> , or <u>sh</u> , these symbols are not broken when the word is divided into syllables and may go with either of the first or second syllable.	*100	*100	*100	*100	*100	*100
42. In a word of more than one syllable, the letter <u>v</u> usually goes with the preceding vowel to form a syllable.	73	65	61	68	67	54
43. When a word has only one vowel letter, the vowel sound is likely to be short.	57	69	69	67	66	52
44. When there is one <u>e</u> in a word that ends in a consonant, the <u>e</u> usually has a short sound.	*76	*92	*87	*91	*93	*94
45. When the last syllable is the sound <u>r</u> , it is unaccented.	*95	*79	*98	*82	*96	*99

*Per Cent of Applicability marked with an asterisk was found "useful" according to the criteria

^aThis table presents the composite findings for each of the forty-five recommended phonic generalizations in the various elementary programs. The number order of the generalizations in this table is identical with that in the tables shown in the Clymer and Bailey studies.

^bFigures in parentheses indicate specific application of the generalization

study; however, generalization 2⁴ did not meet the applicability for frequencies in the mathematics study.

The findings for each generalization as reported for each study are given in the following section:

1. Generalization one, which was concerned with the pronunciation of adjacent vowels, established an applicability of 45 per cent (Clymer), 34 per cent (Bailey), 54 per cent (Jernigan), 32 per cent (Davis), and 37 per cent (mathematics study). Frequencies, 33 per cent (mathematics).

2. Generalization two, which was concerned with the pronunciation of one vowel in the middle of a one syllable word, established an applicability of 62 per cent (Clymer), 71 per cent (Bailey), 64 per cent (Jernigan), 66 per cent (Davis) and 69 per cent (mathematics study). Frequencies, 64 per cent (mathematics).

(a) A subdivision of generalization two, which was concerned with the vowel placement as the middle letter, established an applicability of 69 per cent (Clymer), 78 per cent (Bailey), 76 per cent (Jernigan), 74 per cent (Davis), and 81 per cent (mathematics study). Frequencies, 68 per cent (mathematics).

(b) A subdivision of generalization two, which was concerned with the vowel as one of the middle two letters in a word of four letters, established an applicability of 59 per cent (Clymer), 68 per cent (Bailey), 61 per cent (Jernigan), 64 per cent (Davis), and 66 per cent

(mathematics study). Frequencies, 64 per cent, (mathematics).

(c) A subdivision of generalization two, which was concerned with the placement of a vowel within a word of more than four letters, established an applicability of 46 per cent (Clymer), 62 per cent (Bailey), 61 per cent (Jernigan), 61 per cent (Davis), and 58 per cent (mathematics study). Frequencies, 55 per cent (mathematics).

3. Generalization three, which is concerned with the pronunciation of an only vowel letter in a word when it occurs at the end of the word, established an applicability of 74 per cent (Clymer), 76 per cent (Bailey), 81 per cent (Jernigan), 77 per cent (Davis), and 72 per cent (mathematics study). Frequencies, 15 per cent (mathematics).

4. Generalization four, which was concerned with the pronunciation of two vowels in a word when one is a final e, established an applicability of 64 per cent (Clymer), 57 per cent (Bailey), 76 per cent (Jernigan), 63 per cent (Davis), 67 per cent (mathematics study). Frequencies, 58 per cent (mathematics).

5. Generalization five, which was concerned with the sound of a single vowel followed by an r, established an applicability of 78 per cent (Clymer), 86 per cent (Bailey), 89 per cent (Jernigan), 86 per cent (Davis), and 89 per cent (mathematics study). Frequencies, 94 per cent (mathematics).

6. Generalization six, which was concerned with the pronunciation of vowel digraphs, established an applicability of 66 per cent (Clymer), 60 per cent (Bailey), 64 per cent (Jernigan), 58 per cent (Davis), and 57 per cent (mathematics study). Frequencies, 64 per cent (mathematics).

(a) A subdivision of generalization six, which was concerned with the pronunciation of the vowel digraph ai, established an applicability of 64 per cent (Clymer), 72 per cent (Bailey), 74 per cent (Jernigan), 74 per cent (Davis), and 72 per cent (mathematics study). Frequencies, 61 per cent (mathematics).

(b) A subdivision of generalization six, which was concerned with the pronunciation of the vowel digraph ea, established an applicability of 66 per cent (Clymer), 55 per cent (Bailey), 57 per cent (Jernigan), 53 per cent (Davis), and 48 per cent (mathematics study). Frequencies, 65 per cent (mathematics).

(c) A subdivision of generalization six, which was concerned with the pronunciation of oa as a vowel digraph, established an applicability of 97 per cent (Clymer), 95 per cent (Bailey), 89 per cent (Jernigan), 95 per cent (Davis), and 96 per cent (mathematics study). Frequencies, 99 per cent (mathematics).

(d) A subdivision of generalization six, which was concerned with the pronunciation of ui as a vowel digraph, established an applicability of 6 per cent (Clymer), 10 per

cent (Bailey), 28 per cent (Jernigan), 5 per cent (Davis), 13 per cent (mathematics study). Frequencies, 7 per cent (mathematics).

7. Generalization seven, which was concerned with the phonogram ie, established an applicability of 17 per cent (Clymer), 31 per cent (Bailey), 20 per cent (Jernigan), 14 per cent (Davis), 9 per cent (mathematics study). Frequencies, 17 per cent (mathematics).

8. Generalization eight, which was concerned with the pronunciation of double e in words, established an applicability of 98 per cent (Clymer), 87 per cent (Bailey), 94 per cent (Jernigan), 86 per cent (Davis), 94 per cent (mathematics study). Frequencies, 92 per cent (mathematics).

9. Generalization nine, which was concerned with the pronunciation of a or i within words that end with a silent e, established an applicability of 60 per cent (Clymer), 50 per cent (Bailey), 74 per cent (Jernigan), 58 per cent (Davis), and 63 per cent (mathematics study). Frequencies, 59 per cent (mathematics).

10. Generalization ten, which was concerned with the combination of ay, established an applicability of 78 per cent (Clymer), 88 per cent (Bailey), 96 per cent (Jernigan), 83 per cent (Davis), and 95 per cent (mathematics study). Frequencies, 97 per cent (mathematics).

11. Generalization eleven, which was concerned with the pronunciation of i when followed by gh, established an

applicability of 71 per cent (Clymer), 71 per cent (Bailey), 81 per cent (Jernigan), 68 per cent (Davis), 59 per cent (mathematics study). Frequencies, 57 per cent (mathematics).

12. Generalization twelve, which was concerned with the sound of a when it followed w, established an applicability of 32 per cent (Clymer), 22 per cent (Bailey), 22 per cent (Jernigan), 22 per cent (Davis), and 25 per cent (mathematics study). Frequencies, 50 per cent (mathematics).

13. Generalization thirteen, which was concerned with the sound of e followed by w, established an applicability of 35 per cent (Clymer), 40 per cent (Bailey), 50 per cent (Jernigan), 42 per cent (Davis), 28 per cent (mathematics study). Frequencies, 9 per cent (mathematics).

14. Generalization fourteen, which was concerned with the sound of o when followed by w, established an applicability of 59 per cent (Clymer), 55 per cent (Bailey), 61 per cent (Jernigan), 54 per cent (Davis), and 63 per cent (mathematics study). Frequencies, 42 per cent (mathematics).

15. Generalization fifteen, which was concerned with w when used as a vowel, established an applicability of 40 per cent (Clymer), 33 per cent (Bailey), 55 per cent (Jernigan), 35 per cent (Davis), and 44 per cent (mathematics study). Frequencies, 37 per cent (mathematics).

16. Generalization sixteen, which was concerned with y as the final letter in a word, established an applicability of 84 per cent (Clymer), 89 per cent (Bailey), 91 per cent

(Jernigan), 86 per cent (Davis), and 82 per cent (mathematics study). Frequencies, 84 per cent (mathematics).

17. Generalization seventeen, which was concerned with y used as a vowel, established an applicability of 15 per cent (Clymer), 11 per cent (Bailey), 20 per cent (Jernigan), 10 per cent (Davis), and 10 per cent (mathematics study). Frequencies, 20 per cent (mathematics).

18. Generalization eighteen, which was concerned with the letter a when followed by w, l, or u, established an applicability of 48 per cent (Clymer), 34 per cent (Bailey), 32 per cent (Jernigan), 35 per cent (Davis), and 30 per cent (mathematics study). Frequencies, 40 per cent (mathematics).

19. Generalization nineteen, which was concerned with a followed by r and silent e, established an applicability of 90 per cent (Clymer), 96 per cent (Bailey), 91 per cent (Jernigan), 96 per cent (Davis), 90 per cent (mathematics study). Frequencies, 90 per cent (mathematics).

20. Generalization twenty, which was concerned with the pronunciation of c and h when used together, established an applicability of 100 per cent in each of the Clymer, Bailey, Jernigan, Davis, and mathematics studies.

21. Generalization twenty-one, which was concerned with the pronunciation of ch, established an applicability of 95 per cent (Clymer), 87 per cent (Bailey), 98 per cent (Jernigan), 85 per cent (Davis), and 98 per cent (mathematics study). Frequencies, 98 per cent (mathematics).

22. Generalization twenty-two, which was concerned with the sound of the letter c when followed by e or i, established an applicability of 96 per cent (Clymer), 92 per cent (Bailey), 97 per cent (Jernigan), 86 per cent (Davis), and 92 per cent (mathematics study). Frequencies, 98 per cent (mathematics).

23. Generalization twenty-three, which was concerned with the sound of the letter c when followed by o or a, established an applicability of 100 per cent in each of the Clymer, Bailey, Jernigan, Davis, and mathematics studies.

24. Generalization twenty-four, which was concerned with the sound of the letter g when followed by e or i, established an applicability of 64 per cent (Clymer), 78 per cent (Bailey), 87 per cent (Jernigan), 80 per cent (Davis), and 75 per cent (mathematics study). Frequencies, 55 per cent (mathematics).

25. Generalization twenty-five, which was concerned with the combined letters ght in words, established an applicability of 100 per cent in each of the Clymer, Bailey, Jernigan, Davis, and mathematics studies.

26. Generalization twenty-six, which was concerned with the letters kn as the beginning of a word, established an applicability of 100 per cent in each of the Clymer, Bailey, Jernigan, Davis, and mathematics studies.

27. Generalization twenty-seven, which was concerned with the combined letters wr as the beginning of a

word, established an applicability of 100 per cent in each of the Clymer, Bailey, Jernigan, Davis, and mathematics studies.

28. Generalization twenty-eight, which was concerned with two of the same consonants occurring side by side in a word, established an applicability of 99 per cent (Clymer), 98 per cent (Bailey), 96 per cent (Jernigan), 90 per cent (Davis), and 98 per cent (mathematics study). Frequencies, 99 per cent (mathematics).

29. Generalization twenty-nine, which was concerned with the letters ck as the ending of a word, established 100 per cent for each of the Clymer, Bailey, Jernigan, Davis, and mathematics studies.

30. Generalization thirty, which was concerned with the accentuation of two syllable words, established 85 per cent (Clymer), 81 per cent (Bailey), 77 per cent (Jernigan), 82 per cent (Davis), and 85 per cent (mathematics study). Frequencies, 85 per cent (mathematics).

31. Generalization thirty-one, which was concerned with the accentuation of the first syllable when that syllable was formed by a, in, re, ex, de, or be, established an applicability of 87 per cent (Clymer), 84 per cent (Bailey), 82 per cent (Jernigan), 81 per cent (Davis), and 83 per cent (mathematics study). Frequencies, 79 per cent (mathematics).

32. Generalization thirty-two, which was concerned

with the accentuation of two-syllable words ending in a consonant followed by y, established an applicability of 96 per cent (Clymer), 97 per cent (Bailey), 98 per cent (Jernigan), 98 per cent (Davis), and 99 per cent (mathematics study). Frequencies, 99 per cent (mathematics).

33. Generalization thirty-three, which was concerned with one vowel letter in an accented syllable, established an applicability of 61 per cent (Clymer), 65 per cent (Bailey), 63 per cent (Jernigan), 68 per cent (Davis), and 62 per cent (mathematics study). Frequencies, 68 per cent (mathematics).

34. Generalization thirty-four, which was concerned with y or ey occurring in an unaccented last syllable, established an applicability of zero in each of the Clymer, Bailey, Jernigan, Davis, and mathematics studies.

35. Generalization thirty-five, which was concerned with ture as the final syllable in a word, established an applicability of 100 per cent (Clymer), 95 per cent (Bailey), 100 per cent (Jernigan), 100 per cent (Davis), and 100 per cent (mathematics study).

36. Generalization thirty-six, which was concerned with tion as the final syllable in a word, established an applicability of 100 per cent in each of the Clymer, Bailey, Jernigan, Davis, and mathematics studies.

37. Generalization thirty-seven, which was concerned with the final e lengthening the vowel in the last

syllable of a two- or three-syllable word, established an applicability of 46 per cent (Clymer), 46 per cent (Bailey), 62 per cent (Jernigan), 49 per cent (Davis), and 51 per cent (mathematics study). Frequencies, 42 per cent (mathematics).

38. Generalization thirty-eight, which was concerned with the syllabication of words having two consonants following the first vowel sound, established an applicability of 72 per cent (Clymer), 78 per cent (Bailey), 76 per cent (Jernigan), 80 per cent (Davis), 75 per cent (mathematics study). Frequencies, 83 per cent (mathematics).

39. Generalization thirty-nine, which is concerned with the syllabication of words in which the first vowel sound was followed by a single consonant, established an applicability of 44 per cent (Clymer), 50 per cent (Bailey), 53 per cent (Jernigan), 49 per cent (Davis), and 50 per cent (mathematics study). Frequencies, 46 per cent (mathematics).

40. Generalization forty, which was concerned with the syllabication of words ending with le preceded by a consonant, established an applicability of 97 per cent (Clymer), 93 per cent (Bailey), 75 per cent (Jernigan), 96 per cent (Davis), and 100 per cent (mathematics study).

41. Generalization forty-one, which was concerned with th, ch, or sh, following the first vowel element in words, established an applicability of 100 per cent for each of the Clymer, Bailey, Jernigan, Davis, and mathematics studies.

42. Generalization forty-two, which was concerned with syllabication of words having the letter y following a vowel, established an applicability of 73 per cent (Clymer), 65 per cent (Bailey), 61 per cent (Jernigan), 68 per cent (Davis), and 67 per cent (mathematics study). Frequencies, 54 per cent (mathematics).

43. Generalization forty-three, which was concerned with words having only one vowel letter, established an applicability of 57 per cent (Clymer), 69 per cent (Bailey), 69 per cent (Jernigan), 67 per cent (Davis), and 66 per cent (mathematics study). Frequencies, 52 per cent (mathematics).

44. Generalization forty-four, which was concerned with words having one e and ending in a consonant, established an applicability of 76 per cent (Clymer), 92 per cent (Bailey), 87 per cent (Jernigan), 91 per cent (Davis), and 93 per cent (mathematics study). Frequencies, 94 per cent (mathematics).

45. Generalization forty-five, which was concerned with words that have the sound r for the last syllable, established an applicability of 95 per cent (Clymer), 79 per cent (Bailey), 98 per cent (Jernigan), 82 per cent (Davis), and 96 per cent (mathematics study). Frequencies, 99 per cent (mathematics).

Summary

An analysis of the data from the Clymer, Bailey, Jernigan, Davis, and mathematics studies indicated that, in

accordance with the established criteria, there were eighteen generalizations (5, 8, 10, 16, 20, 21, 22, 23, 25, 28, 29, 30, 31, 32, 40, 41, 44, 45) useful and common to all five studies. Further analysis indicated generalizations 24, 36, and 38 were useful and common to the Bailey, Jernigan, Davis, and mathematics studies for the composite word lists. Generalization 24 did not meet applicability for frequencies in the mathematics study. There were three additional generalizations (3, 19, 35) found useful in the Bailey, Jernigan, and Davis studies. Jernigan and Davis found generalizations 26 and 27 useful and common in the science and spelling studies. There were two additional generalizations (11, 18) found useful in the Jernigan study.

There was very high correlation in the applicability as related to "frequency of occurrences" of words in the mathematics textbooks and the applicability as related to words for the five studies. Only three generalizations (3, 19, and 24) showed noticeable range in the applicability as related to words and frequencies. These generalizations included words commonly taught as sight words, such as: do, to, the, a, get, and give. These words had very high frequencies and were exceptions in regard to the applicability of these generalizations.

In reviewing the findings of the five studies there was a range from eighteen to twenty-eight for generalizations found useful. Clymer found eighteen useful. The mathematics

study found twenty-one useful for words and twenty for frequencies. Bailey found twenty-four useful. Davis found twenty-six useful. Jernigan found twenty-eight useful.

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study extended the Clymer¹ and Bailey² studies on the utility of phonic generalizations in reading programs to the vocabularies of mathematics textbooks. The study included the following sub-problems: (a) the applicability of phonic generalizations to the vocabularies and "frequency of occurrences" of the words for each grade level, one through six, of the combined programs; (b) the applicability of phonic generalizations to the composite vocabularies and "frequency of occurrences" of these words for the combined levels of all the mathematics series; (c) a comparison of the findings on the applicability of phonic generalizations of the composite vocabularies of the mathematics textbooks with the Clymer, Bailey, Jernigan,³ and Davis⁴ studies.

¹Clymer, "Utility of Phonic Generalizations," pp. 252-58.

²Bailey, "Utility of Phonic Generalizations," pp. 413-18.

³Jernigan, "Utility of Phonic Generalizations to Science Series."

⁴Davis, "Applicability of Phonic Generalizations to Spelling Programs."

The phonic generalizations, procedure, and criteria for this study were the same as those used by Clymer in his recent study in reading. The mathematics textbooks used for the study were selected from those on the adopted list of the State of Oklahoma. The lists of words and frequencies used for sub-problems (a) and (b) were compiled from the mathematics series. The composite list was comprised of 5,314 words and 541,747 frequencies. The applicability of the generalizations was tested against each word according to the phonetic respelling, accentuation, and syllabic division of Webster's New Collegiate Dictionary, 1961 edition. The per cent of applicability for each generalization as it related to words and frequencies was determined by dividing the total number of words or frequencies (depending upon which is being sought) to which the generalization would be expected to apply, by the number of conforming words or frequencies. A minimum count of twenty words to which the generalization would be expected to apply and an applicability of 75 per cent as established by the criteria were accepted as the bases for determining the advisability of instruction of the generalization.

An investigation of the data (Table 1) indicated there was a range of five to twenty generalizations useful for one or more of the grade levels. There were only five of the generalizations (5, 23, 28, 30, 44) useful and common for all of the six grade levels. There were six additional

generalizations (10, 16, 20, 21, 31, 45) found useful and common for both frequencies and words at levels two through six. There were six of the remaining generalizations (8, 22, 25, 32, 40, 41) found useful and common for both, words and frequencies, for four of the grade levels, three through six. There was one generalization (36) found useful and common for the three upper grade levels (fourth, fifth, sixth) in both situations. Generalization 38 was found useful and common to second, fifth, and sixth grades. Generalization 9 was found applicable for words and frequencies for grade two. There were only three generalizations with irregularities in per cent of utility as related to both situations, words and frequencies. Generalization 9 met established criteria for the per cent of utility for words at grade levels one and three but not frequencies. Generalization 38 was found useful only for frequencies at grade levels 3 and 4. Generalization 42 was found useful as it related only to words at the second and third grade levels.

The composite list, for the combined series of the mathematics programs, consisted of 5,314 words with a frequency count of 541,747. An investigation of the data, (Table 2), in accordance with the established criteria, indicated there were twenty generalizations (5, 8, 10, 16, 20, 21, 22, 23, 25, 28, 29, 30, 31, 32, 36, 38, 40, 41, 44, 45) applicable for both, words and frequencies. Generalization 24 was applicable for words but not for

frequencies. The total word count (words to which the principle would be expected to apply) for these twenty-one generalizations ranged from 33 to 1,940. The frequencies ranged from 1,546 to 98,395. There were six of the twenty-one generalizations (20, 25, 29, 36, 40, 41) which had an applicability of 100 per cent. There were only two of the twenty-one generalizations (24, 38) which had an applicability below 80 per cent for words. All of the twenty-one generalizations, except 24 and 31, had an applicability above 80 per cent in the situation of frequencies. Four of the forty-five generalizations (19, 26, 27, 35) did not meet the first requirement of a minimum word count of twenty. Generalization thirty-three, which was concerned with one vowel letter in an accented syllable, had the highest number of words involved (2,795). Generalization forty-three had the highest number of frequencies involved (275,385). The subdivision 2-a, of generalization two, which was concerned with one vowel as the middle letter of a one-syllable word, was found applicable for words but not for frequencies. The subdivision 6-c, of generalization six, which was concerned with oa as a vowel digraph, was found to have applicability of a high percentage for both, words and frequencies. The twenty-one generalizations which were applicable were assigned to the following types: generalizations 5, 16, 22, 23, and 24 were concerned with vowel and consonant sounds; generalizations 8 and 10 were related to long vowels; generalization 44 was related

to short vowels; generalizations 30, 31, 32, 36, and 45 were related to accentuations; generalizations 38 and 40 were related to syllabication; generalizations 20, 21, 29, and 41 were related to consonant digraphs; generalizations 25 and 28 were related to silent consonants.

A comparison of the per cent of applicability of forty-five phonic generalizations to reading, spelling, science and mathematics programs was made (Table 3). There were eighteen generalizations (5, 8, 10, 16, 20, 21, 22, 23, 25, 28, 29, 30, 31, 32, 40, 41, 44, 45) applicable and common to all five studies. Further investigation indicated there were three additional generalizations (24, 36, 38) applicable and common to the Bailey, the Jernigan, the Davis and the mathematics studies. There were still three additional generalizations (3, 19, 35) applicable and common to the Bailey, the Jernigan, and the Davis studies. Jernigan and Davis found generalizations 26 and 27 applicable to the science and spelling studies. The Jernigan study indicated generalizations 4 and 11 were applicable to the science programs. In reviewing the total count of words for the composite lists of each study, we note the following: the Clymer study had 2,600 words, the Bailey study had 5,773 words, the Davis study had 5,426 words, the Jernigan study had 12,000 words, and the mathematics study had 5,314 words. There was a range of difference in applicability of zero to eighteen percentage points for the mathematics study

and the Clymer study. There was a range of zero to twenty-two percentage points in the applicability of the generalizations for the Bailey study and the mathematics study.

There was a difference of zero to twenty-five in the per cent of applicability for the science programs and the mathematics study. There was a difference of zero to fourteen per cent in the applicability of the generalizations to the spelling programs and the mathematics study. There were four generalizations (11, 26, 27, 35) which did not meet the first criterion of a minimum word count of twenty for the mathematics study or the Clymer study. The Bailey study failed to meet the first criterion on two of these same generalizations (26, 27). The Clymer study had one additional generalization (36) which did not have a minimum count of twenty words. The science and spelling studies met the first criterion in all generalizations. Five generalizations (20, 23, 25, 29, 41) had an applicability of 100 per cent for the five studies. Three additional generalizations (26, 27, 36) had an application of 100 per cent as related to the second criterion but failed to meet the first criterion for all five studies.

Conclusions

The following conclusions were reached after the investigation upon the applicability of specific phonic generalizations to mathematics textbooks was completed:

1. The number of generalizations found applicable and common to reading and mathematics indicate that phonic skills taught for reading would be applicable for mathematics.

2. The number of generalizations found applicable and common to reading, science, spelling, and mathematics indicated that phonic skills regarded useful for reading would also be useful for content areas.

3. The data for grade-level-one of the mathematics programs, showed only fourteen of the forty-five generalizations had a minimum word count of twenty. This suggested that careful study and caution should be given in regard to the practicality of approach used and "phonic dosage" given for first grade reading situations in terms of frequency of usage.

4. There was increasingly stronger correlation between grade level findings and composite findings as one moved upward from grade one through grade six. Eighty-one per cent of the generalizations found applicable for the composite list were found useful from third grade through sixth grade. Eighty-six per cent of the ones applicable for the composite list were applicable for fourth grade. Ninety per cent were applicable for fifth and sixth grades. This suggested a need for study in regard to the introduction of skills and use made of skills for the mathematics program.

5. There were very few instances in the collected data which did not show positive correlation in word and frequency situations where applicability was determined, in accordance with established criteria. This indicates high frequency of application for the skills found useful.

6. There were three generalizations (19, 26, 27) which had a very low word count; however, because of the high per cent of applicability it seems advisable to include these generalizations for the instructional program.

7. Generalizations 3 and 35 had low word count throughout all the five studies (Clymer, Bailey, science, spelling, mathematics) investigated. The teaching of these generalizations would be of questionable value.

8. Seven generalizations (1, 7, 12, 13, 15, 17, 18) were found to have low applicability and should be given thoughtful consideration by teachers in regard to instruction.

9. Three generalizations (5, 30, 38) had a very high count in both words and frequencies. The word count ranged between 1,400 and 2,000. The frequencies ranged between 59,000 and 99,000. The high count in both situations indicated a need for instruction of these generalizations.

10. Five generalizations (20, 23, 25, 29, 41) had an applicability of 100 per cent for the five studies (Clymer, Bailey, science, spelling, mathematics) investigated. This indicated these generalizations should be included in the instructional program.

11. Generalization 3⁴, in accordance with the established criteria, had an applicability of zero. This was an indication for caution and study toward the instruction of this generalization. Midwestern pronunciation has made this generalization useful. Whereas Webster, in 1961, rejected it.

12. The applicability of generalization one which is related to adjacent vowels results in the conclusion that instruction of this "much stressed" generalization should be challenged.

13. Because of the applicability of the 2-a division of generalization two and the very high applicability of the 6-c division of generalization six, it is suggested these sub-generalizations be studied by teachers and given more consideration for instruction.

14. Phonic generalizations related to consonant sounds, syllabication, and accentuation showed an applicability of substantial percentage. Conclusions were drawn that the teaching of consonant related generalizations are more reliable than vowel related generalizations.

15. Conclusions are that instruction in many phonic generalizations which are commonly taught is of limited value. Careful study should be directed toward the applicability of the skills and the frequencies of use as the instructional program is planned.

Recommendations

The conclusions, based on the findings of the research for this study, emphasize the need for further study and research toward determining the value of the phonic generalizations in the elementary grades. The following recommendations are made:

1. The established criterion used for determining applicability of the phonic generalizations should be scientifically researched. The 75 per cent utility level may be too high or too low.

2. Research, similar to Clymer's, is recommended on phonic generalizations from revised editions of reading textbooks. It is also suggested that a recent edition of a dictionary be used as authority.

3. Study needs to be directed toward the forty-five generalizations for purpose of rewording, combining certain ones, eliminating some (based on previous studies), and then, research texts in regard to applicability of generalizations.

4. Research needs to be extended beyond printed textbooks in terms of the applicability of phonic generalizations for both words and frequencies. Vocabularies from children's trade books, magazines, and newspapers should be used in compiling a composite list for such study.

5. Further research is needed in the area of applicability of phonic generalizations and frequency of occurrences of words to which the generalization would be expected to apply for the elementary reading textbooks.

6. Research is recommended for the study of vocabularies of various texts in an effort to establish an "up-to-date" elementary vocabulary consisting of the most used words.

7. Research is needed in terms of textbooks and classroom activities to determine whether sufficient practice (immediate and spaced) is provided to lead to mastery of phonic skills after initial introduction is made.

8. It is recommended there be research in the prospective teacher-training program in an effort to gain needed information for establishing pre-service training programs. The value of the phonic generalizations will depend largely on the teacher's knowledge for instructional purposes.

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APPENDIX A
LIST OF THE FORTY-FIVE GENERALIZATIONS
UTILIZED IN THE STUDY

LIST OF THE FORTY-FIVE GENERALIZATIONS
UTILIZED IN THE STUDY

1. When there are two vowels side by side, the long sound of the first one is heard and the second one is usually silent.
2. When a vowel is in the middle of a one-syllable word, the vowel is short.
Middle letter.
One of the middle two letters in a word of four letters.
One vowel within a word of more than four letters.
3. If the only vowel letter is at the end of a word, the letter usually stands for a long sound.
4. When there are two vowels, one of which is final e, the first vowel is long and the e is silent.
5. The r gives the preceding vowel a sound that is neither long nor short.
6. The first vowel is usually long and the second silent in the digraphs, ai, ea, oa, and ui.

ai

ea

oa

ui

7. In the phonogram ie, i is silent and the e has a long sound.
8. Words having double e usually have the long e sound.
9. When words end with silent e, the preceding a or i is long.
10. In ay the y is silent and gives a its long sound.
11. When the letter i is followed by the letters gh, the i usually stands for its long sound and the gh is silent.
12. When a follows w in a word, it usually has the sound a as in was.
13. When e is followed by w, the vowel sound is the same as represented by oo.
14. The two letters of ow make the long o sound.
15. W is sometimes a vowel and follows the digraph rule.
16. When y is the final letter in a word, it usually has a vowel sound.
17. When y is used as a vowel, it sometimes has the sound of long i.
18. The letter a has the same sound (æ) when followed by l, w, and u.
19. When a is followed by r and final e, we expect to hear the sound heard in care.
20. When c and h are next to each other, they make only one sound.

21. Ch is usually pronounced as it is in kitchen, catch, and chair, not like sh.
22. When c is followed by e or i, the sound of s is likely to be heard.
23. When the letter c is followed by o or a, the sound of k is likely to be heard.
24. The letter g often has a sound similar to that of j in jump when it precedes the letter i or e.
25. When ght is seen in a word, gh is silent.
26. When a word begins kn, the k is silent.
27. When a word begins with wr, the w is silent.
28. When two of the same consonants are side by side only one is heard.
29. When a word ends in ck, it has the same last sound as in look.
30. In most two-syllable words, the first syllable is accented.
31. If a, in, re, ex, de or be is the first syllable in a word, it is usually unaccented.
32. In most two-syllable words that end in a consonant followed by y, the first syllable is accented and the last is unaccented.
33. One vowel letter in an accented syllable has its short sound.
34. When y or ey is seen in the last syllable that is not accented, the long sound of e is heard.

35. When ture is the final syllable in a word, it is unaccented.
36. When tion is the final syllable in a word, it is unaccented.
37. In many two- and three-syllable words, the final e lengthens the vowel in the last syllable.
38. If the first vowel sound in a word is followed by two consonants, the first syllable usually ends with the first of two consonants.
39. If the first vowel sound in a word is followed by a single consonant, that consonant usually begins the second syllable.
40. If the last syllable of a word ends in le, the consonant preceding the le usually begins the last syllable.
41. When the first vowel element in a word is followed by th, ch, or sh, these symbols are not broken when the word is divided into syllables and may go with either the first or second syllable.
42. In a word of more than one syllable, the letter y usually goes with the preceding vowel to form a syllable.
43. When a word has only one vowel letter, the vowel sound is likely to be short.
44. When there is one e in a word that ends in a consonant, the e usually has a short sound.
45. When the last syllable is the sound r, it is unaccented.

APPENDIX B
THE COMPOSITE VOCABULARY

THE COMPOSITE VOCABULARY

COMBINED LIST OF WORDS AND FREQUENCIES

IN ALL GRADES

a	12,154	acre	23
abacus	95	acreage	2
abbreviation	1	acres	27
abbreviations	1	across	35
able	30	act	3
about	1,779	action	1
above	706	activities	18
abruptly	1	activity	152
absent	20	acts	3
absorb	1	actual	48
absorbed	1	actually	7
accept	2	acute	21
accepted	3	add	1,016
accepts	1	added	111
accession	1	addend	258
accident	1	addends	302
accidents	8	adding	347
according	13	addition	738
account	35	additional	14
accounts	1	additions	16
accuracy	2	additive	7
accurate	9	address	1
accurately	3	addressing	1
acid	5	adds	5

adjacent	23	airliner	7
admission	2	airmail	4
admitted	2	airplane	33
adopted	4	airplanes	13
adoption	1	airport	8
adult	16	airship	1
adults	19	albatross	1
advance	2	album	17
advantages	1	alcohol	3
advertise	1	alfalfa	1
advertised	2	alike	36
advertisements	4	alive	1
advertising	1	all	1,378
affect	9	allow	4
affecting	3	allowance	9
after	678	allowances	1
afternoon	45	allowed	6
afternoons	1	alloy	11
afterward	3	almost	18
afterwards	1	alone	6
again	155	along	103
against	3	alongside	1
age	38	aloud	2
ages	13	alphabet	3
ago	33	alphabetized	1
agree	33	already	28
agreed	11	also	284
agreement	2	although	14
agrees	1	altitude	15
ahead	6	altitudes	3
aid	2	altogether	44
air	25	alumina	4
aircraft	9	aluminum	21
airline	11	always	96

am	84	anvil	1
amateur	1	any	537
among	24	anyone	3
amount	211	anything	7
amounted	2	apart	48
amounts	67	apiece	5
an	1,496	appear	120
analyses	1	appeared	5
analyze	2	appearing	2
analyzing	3	appears	37
anchor	1	apple	51
ancient	9	apples	187
and	13,750	appliance	4
angle	662	application	1
angles	536	applications	2
animal	10	applies	3
animals	55	applying	2
ankle	1	appropriate	3
annex	4	approximate	19
annexed	2	approximately	22
annexing	1	approximation	3
announced	3	apricot	2
announcer	51	apricots	1
annual	3	apron	7
another	604	aprons	2
answer	1,440	aquarium	2
answered	19	arc	78
answering	8	arc-degree	4
answers	614	arcs	23
ant	7	arctic	1
ants	3	are	5,176
antelope	1	area	611
antelopes	2	areas	41
antique	2	argon	1

arithmetic	82	assignments	1
arm	11	associate	28
armadillo	2	associated	31
arms	7	associating	2
around	179	associative	91
arrange	38	assume	3
arranged	21	assuming	5
arrangement	14	assures	1
arranging	2	aster	3
array	131	astonishment	1
arrays	8	astray	1
arrival	3	astronaut	8
arrive	10	astronauts	7
arrived	13	astronomers	1
arrives	3	astronomical	1
arriving	1	astronomy	2
arrow	49	at	2,638
arrowhead	9	ate	49
arrowheads	16	athlete	1
arrows	93	atmosphere	1
art	4	atomic	4
article	3	attached	4
artificial	1	attain	2
as	3,958	attained	1
ask	10	attempt	1
asked	85	attempted	4
asking	3	attempting	1
asks	6	attend	3
asleep	2	attendance	18
asphalt	2	attendances	3
assembly	2	attendant	3
assigned	6	attended	6
assigning	1	attending	5
assignment	1	attention	1

attic	1	bag	83
auditorium	4	baggage	3
aunt	6	bags	133
auto	10	bait	1
automobile	11	bake	6
automobiles	6	baked	39
autos	1	baker	22
available	2	baking	1
avenue	1	bakery	4
avenues	3	bakes	1
average	406	balance	12
averaged	5	balanced	1
averages	28	bales	2
avoid	2	ball	62
awake	2	ballgame	2
away	215	balloon	7
aways	1	balloons	61
aware	1	bales	59
awhile	2	balsa	7
axe	2	banana	8
axes	23	bananas	14
axis	34	band	29
		bandage	1
babies	4	bands	9
baby	32	bank	64
back	113	banks	1
backward	5	banquet	1
backwards	1	bar	272
backyard	1	bargains	1
bacon	10	bark	1
bad	2	barnyard	3
badge	1	barn	7
badges	6	barns	1
badminton	3	barleycorn	3

barometer	2	bear	1
barrel	9	beanbags	1
bars	101	beans	8
base	542	bear	9
baseball	71	bears	9
baseballs	20	beat	4
based	14	beats	5
basement	3	beautiful	2
bases	51	beautify	2
basic	43	became	8
basis	1	because	139
basket	21	become	6
basketball	25	becomes	14
baskets	19	becoming	1
bass	6	bed	18
bat	26	bedroom	9
batch	1	bedtime	1
batches	1	bee	3
bath	2	beefsteak	1
bathyscope	4	been	373
bathyscopes	1	beer	3
bathymograph	1	beetle	6
bats	4	beetles	1
batter	4	before	232
batteries	3	began	18
battery	5	begin	81
batting	8	beginners	1
bauxite	6	beginning	37
bazaar	3	begins	6
be	1,819	behind	2
beach	22	being	52
bead	16	believe	2
beads	131	believed	1
beam	5	bell	19

bells	7	bills	48
belong	62	binary	2
belonged	9	bind	1
belonging	25	binder	1
belongs	29	binding	3
below	915	birch	2
belt	12	bird	35
bench	7	birdbath	7
benches	4	birds	102
bend	3	birth	6
benefit	1	birthday	23
bent	2	birthstone	4
berries	17	bisect	4
berry	2	bisecting	5
beside	45	bisector	12
best	58	bisectors	3
bet	1	bisects	2
better	37	black	165
between	417	blackbirds	1
betweenness	4	blade	4
beverage	3	blades	5
beverages	1	blank	54
beyond	15	blanket	3
bicycle	56	blanks	2
bicycled	2	blast	6
bicycles	6	blast-off	6
bicycling	15	blew	5
big	65	blink	1
bigger	1	blinks	7
bike	5	blip	4
bikes	13	blips	1
bill	70	block	67
billion	43	blocks	97
billions	11	blond	1

blonds	2	boots	5
blood	7	border	14
blossoms	4	borders	1
blotter	5	bordering	1
blouse	1	born	18
blouses	4	borrowed	10
blow	1	both	479
blue	189	bottle	16
bluebirds	1	bottles	37
board	719	bottom	46
boards	32	bought	414
boasted	1	bounce	9
boat	64	bounces	1
boathouse	4	bound	1
boats	58	boundaries	2
bobsled	3	boundary	9
bodies	2	bounded	2
body	29	bounding	2
boil	4	bounds	1
boiled	3	bouquet	8
boiling	22	bouquets	16
boils	10	bow	2
bolt	4	bowl	11
bond	13	bowled	2
bonds	16	bowling	4
bones	12	bowls	27
book	187	box	1,300
bookcase	8	boxcar	2
booklet	1	boxcars	2
bookmark	1	boxed	1
books	169	boxes	345
bookshelf	1	boy	128
bookstore	3	boys	511
booster	3	brace	11

bracelets	7	bronze	1
braces	146	brother	36
brain	5	brothers	4
brake	2	brought	55
brackets	1	brown	134
branch	2	brownies	2
branches	3	brushes	2
brand	11	bubble	2
brass	4	bubbles	3
bread	34	bucket	3
breads	4	budget	2
break	9	buffalo	4
breakfast	7	buffalos	9
breakfasts	2	bug	4
breaking	5	bugs	9
breastbone	1	build	13
breathes	4	builder	1
brick	9	building	44
bricks	21	buildings	5
bridge	5	built	25
bridges	2	bulb	2
briefly	1	bulbs	47
bright	1	bulk	1
brightest	1	bullet	2
bring	30	bulletin	5
bringing	2	bullfrog	1
brings	3	bullseye	1
bristles	1	bunch	4
brittle	1	bundle	9
broad	7	buns	4
broadest	1	bureau	2
broke	9	buried	4
broken	19	burn	1
brokenline	1	burning	2

bus	106	call	108
buses	25	called	596
bush	6	calls	11
bushel	71	calorie	4
bushels	69	calories	12
bushes	20	calves	5
business	8	camel	4
but	278	camera	21
butter	32	camp	43
butterfat	4	campers	7
butterflies	8	campground	2
butterfly	6	camping	12
button	3	camps	2
buttons	47	campsites	1
buy	234	can	2,679
buyer	3	candies	11
buying	27	candle	18
buys	12	candles	3
by	2,816	candy	206
		candycane	1
cabbage	5	canes	2
cabin	32	canned	8
cabins	2	canning	1
cable	3	cannot	45
cage	9	canoe	27
cages	7	canoes	7
cake	109	cans	91
cakes	45	canteen	10
calculate	1	canvas	8
calculated	1	canvasback	1
calculates	1	cap	6
calculating	1	capacity	5
calculations	1	capitol	9
calendar	33	caps	8

capstone	1	cases	16
capsule	2	cash	5
capsules	1	cashier	2
captain	2	cast	3
car	179	casting	1
carbon	1	cat	22
card	43	catch	15
cardboard	54	catfish	1
cardinal	23	cats	33
cardinals	3	cattle	1
cards	90	caught	80
care	7	cause	2
careful	22	caused	1
carefully	75	causes	2
carnival	3	causing	2
carpenter	5	cave	10
carpentry	6	ceiling	5
carpet	1	cellophane	2
carpeting	2	cells	1
carriages	1	cement	4
carried	53	census	4
carries	5	cent	316
carrot	4	center	110
carrots	6	centers	1
carry	47	centigrade	16
carrying	19	centimeter	177
cars	163	centimeters	75
cart	2	centipedes	1
carton	35	central	4
cartons	43	cents	689
cartridges	1	centuries	9
carts	2	century	22
carved	3	cereal	9
case	60	certain	93

chain	17	cherries	20
chains	1	cherry	9
chair	10	chicken	11
chairs	92	chickens	27
chalk	9	chicks	14
chalkboard	23	chief	2
champion	1	child	52
chance	16	children	573
chances	16	chili	1
change	266	chipmunks	6
changed	19	chips	11
changes	26	chocolate	20
changing	25	chocolates	1
chapter	95	choice	3
chapters	2	choices	10
charge	5	choir	2
charged	2	choose	184
charges	7	chooses	4
charitable	1	choosing	11
chart	237	chopped	5
charts	16	chops	4
chasing	1	chord	23
cheaper	4	chords	8
check	746	chorus	3
checked	20	chose	23
checkers	42	chosen	34
checking	61	chromium	3
checks	5	church	2
cheerleaders	2	churches	1
cheese	7	cider	3
cheetah	3	circle	626
chemical	1	circles	99
chemicals	1	circular	52
chemistry	2	circulars	4

circumference	29	clip	7
circumferences	1	clippings	1
circumscribed	6	clock	162
circumscribes	2	clockface	37
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cities	47	clocks	18
city	65	clockwise	2
civil	2	close	45
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claims	3	closer	99
clam	2	closest	34
class	195	closets	1
classes	27	closing	1
classify	1	closure	3
classifying	1	cloth	20
classroom	41	clothes	9
classrooms	2	clothing	10
clay	3	cloud	5
clean	4	clouds	2
cleaned	2	clover	2
cleaning	7	clovers	7
clear	4	clown	4
clearance	3	clowns	16
clearer	1	club	52
clearest	1	clubhouse	2
clearly	5	clubs	7
clerk	34	clue	11
clerks	1	clues	3
cliff	2	cluttered	1
climb	7	coach	4
climbed	4	coaches	3
climbing	2	coal	7
climbs	2	coaster	1

coat	15	comb	5
coating	2	combinations	1
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cocoa	3	combined	11
cocoon	2	combing	1
code	4	combining	4
coded	36	come	52
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coffeepot	2	comfort	1
coil	2	comic	3
coin	35	coming	5
coins	102	comma	5
cold	14	commas	8
colder	8	commercial	2
coldest	5	commercials	2
collar	2	committee	28
collars	4	committees	2
collect	12	committing	3
collected	60	common	557
collecting	3	commonly	2
collection	50	commulative	48
collections	8	communications	2
collectors	2	commutative	50
collects	3	commute	1
college	1	commuting	3
colon	1	company	5
color	124	compare	138
colored	106	compared	14
colorful	1	compares	17
coloring	2	comparing	34
colors	19	comparison	21
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complicated	1	connecting	4
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composite	44	connects	3
composites	1	consecutive	4
compound	7	consider	12
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computations	9	considered	9
compute	46	considering	13
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computer	1	consists	17
computers	5	consonant	4
computes	3	construct	39
computing	22	constructed	4
concept	1	constructing	4
concerned	6	construction	6
concerning	1	contain	55
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conclusion	2	containers	35
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convenient	19	correspondence	11
converse	1	corresponding	24
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cooked	3	costing	39
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cooking	8	costumes	4
cookout	5	cottage	10
cool	3	cotton	1
cooled	1	cottonwood	1
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cools	3	council	1
coordinate	23	count	238
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copied	1	counted	84
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copper	26	counterclockwise	2
copy	2,588	counting	215
copying	33	countries	10
cord	7	country	11
cork	1	course	2
corks	3	court	25
corn	16	cousin	4
corner	57	cousins	2
corners	35	cover	178
cornerstone	1	covered	42
cornflakes	1	covering	4
cornflowers	3	covers	16
correct	489	cough	2
corrected	2	cow	14

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cowboys	6	cruising	2
cows	32	crushed	2
crab	1	crystal	2
crabmeat	1	crystals	1
cracked	3	cube	143
cracker	3	cubed	5
crackers	7	cubes	49
cranes	1	cubic	66
cranium	1	cubical	3
crate	2	cubit	2
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crawls	1	cucumbers	1
crayfish	1	cup	112
crayon	14	cupboard	4
crayons	27	cupcake	7
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cricket	1	curve	132
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cross	53	custodian	1
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crow	1	cutting	5
crowd	2	cyclometer	6
crude	1	cylinder	12
cruise	1	cylindrical	7
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		death	1
dad	1	decade	5
daffodil	1	decades	8
daily	10	deceased	1
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dam	1	deciding	24
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darkness	3	decimeters	10
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dash	11	decorated	6
dashed	7	decoration	7
dashes	21	decorations	4
data	47	decrease	30
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dated	1	deduct	1
dates	15	deep	15
daughter	15	deeper	5
daughters	2	deepest	10
day	541	deer	17
daylight	6	defeats	1
days	353	define	2
daytime	1	defined	1
dead	1	defines	1
deal	16	definite	2
dealer	2	definition	8
dealing	1	definitions	1
deals	1	degree	70

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deliver	10	dessert	5
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demonstration	1	determined	3
den	1	develop	8
denominator	473	developed	8
denominators	53	developing	2
denote	5	device	4
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density	6	diagonal	26
dental	1	diagonals	34
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dime	43	disk	6
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dimensions	3	displayed	1
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dinner	32	disregarding	1
dinners	1	dissolved	2
dinosaur	3	distance	330
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directed	74	distribute	4
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discarded	1	divides	7
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doctor	1	dowel	1
dodecahedron	2	down	80
dodge	1	downward	18
does	1,593	dozen	171
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doghouse	1	draft	2
dogs	73	draftsman	3
doing	31	dragonfly	1
doll	36	drama	1
dollar	277	drank	6
dolls	57	draw	761
dome	1	drawer	2
domino	1	drawing	570
donate	1	drawings	82
donation	1	drawn	56
done	98	dress	19
donkey	7	dressed	3
donor	2	dresses	29
door	10	dressings	1
doorway	2	drew	32
dot	119	dried	2
dotted	30	drilling	1
dots	446	drink	14
double	22	drinking	5
doubled	4	drinks	16
doubleheader	3	drive	60
doubles	11	driven	15
doubling	2	driver	16
doubloon	1	drives	8
doubloons	3	driving	13
doughnut	1	drop	5
doughnuts	23	dropped	20
dove	6	drops	8

drove	59	easy	34
drug	1	eat	31
druggist	2	eaten	24
drum	5	eating	18
drums	7	eats	2
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dry	45	edging	3
duck	2	editors	1
ducks	20	effect	2
due	3	efficient	1
dues	3	egg	17
dug	1	eggs	177
duplicate	1	eight	146
during	140	eighteen	12
		eighteenth	2
each	6,626	eithteenth	2
eagle	4	eighth	20
earlier	13	eighths	82
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earned	74	either	68
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earns	11	electrical	10
ears	13	electricity	7
earth	119	electromagnet	1
easier	46	electronic	1
easiest	5	electroplate	3
easily	27	element	35
east	10	elementary	1
eastbound	1	elements	5
eastern	1	elephant	20
eastward	1	elephants	9

elevation	1	entered	2
elevator	19	entire	15
eleven	21	entirely	4
eleventh	1	entries	10
elk	4	entry	1
elm	10	equal	463
else	4	equality	4
emphathize	2	equally	85
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encircle	1	equator	18
enclose	4	equatorial	1
enclosed	4	equiangular	6
enclosing	2	equilateral	26
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end	308	equivalence	2
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endings	2	erase	3
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engine	8	error	47
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enjoyed	1	erupt	1
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enough	60	erupts	2
enrichment	20	escaping	1
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evaporated	2	expand	1
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evaporation	1	expands	1
even	270	expansion	2
evening	17	expect	4
evenly	8	expected	7
event	2	expects	1
events	4	expenses	18
ever	25	expensive	9
evergreen	3	experience	1
every	99	experiment	16
everyday	2	experimentation	1
everyone	9	experimented	5
everything	2	experimenting	12
everywhere	2	experiments	2
evident	1	explain	1,062
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exactly	77	explaining	1
examine	7	explanation	5
example	1,627	explore	3
examples	775	explored	2
excellent	3	exploring	11
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excess	3	exponent	55
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excluding	1	express	585

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expressing	40	falling	3
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extend	13	family	71
extended	7	famous	4
extending	11	fancy	1
extends	2	fans	1
extension	12	far	252
extent	1	fare	5
exterior	44	fares	1
exteriors	38	farm	25
extra	590	farmer	10
extras	1	farther	64
extremes	11	farthest	10
eye	2	fast	56
eyes	11	fasten	6
		fastener	4
face	86	faster	25
faces	99	fastest	4
facing	2	fat	6
fact	324	fate	1
factor	819	father	156
factorization	30	fathers	9
factorizations	1	fathom	4
factors	884	fathoms	8
factory	7	favor	1
facts	896	favours	6
fahrenheit	4	feathers	7
fail	1	feats	2
fair	22	fed	6
fairly	3	fee	1

feed	12	fifty-two	2
feeder	5	fight	1
feeders	3	fighter	1
feeding	1	figure	500
feeds	2	figured	4
feel	1	figures	128
fees	2	file	2
feet	662	filings	1
fell	16	fill	115
fence	39	filled	41
fenced	4	filling	5
fences	1	fills	5
fencing	36	film	21
ferris	2	final	12
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fertilizer	5	finally	10
festival	2	find	4,589
few	26	finding	342
fewer	86	findings	12
fewest	16	finds	1
field	44	fine	3
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fifteenth	6	finish	439
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fifth	73	finishing	5
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fifties	1	fire	11
fifty	46	fires	2
fifty-five	2	fireplace	3
fifty-four	2	firetruck	1
fifty-nine	1	first	797
fifty-one	1	firsts	1

fish	176	flock	2
fisherman	4	floor	69
fishhook	4	floors	12
fishing	18	flour	12
fishpole	1	flower	36
fit	37	flowerpots	2
fits	2	flowers	48
fitted	3	flown	2
five	775	flu	1
fives	170	fluid	18
fix	1	fly	38
fixed	14	flying	14
flag	12	fold	62
flagpole	7	folder	6
flags	5	folding	9
flaps	4	folds	3
flash	1	follow	29
flashlight	5	followed	11
flask	3	follower	1
flasks	4	following	948
flat	28	follows	104
flatcar	3	food	62
flatcars	2	foods	1
flats	7	fool	1
flavor	1	foot	233
flavored	4	football	26
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flea	3	force	4
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flier	2	forest	3
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formulating	1	framing	2
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forties	7	frankfurter	3
fortieths	1	frankfurters	1
forty	41	free	6
forty-eight	1	freely	1
forty-nine	1	freeze	5
forty-nines	1	freezer	6
forty-seven	2	freezers	1
forty-six	1	freezes	9
forty-three	1	freezing	28
forty-two	1	freight	4
forward	9	freighter	1
foul	1	freighters	1
fouls	3	frequently	1
found	385	fresh	9
founded	2	fried	2
fountain	4	friend	28
fountains	1	friendly	1
four	644	friends	38
fours	96	frightened	1
fourteen	13	fringe	2
fourteenth	1	frog	10
fourth	143	frogs	1
fourth-grade	1	from	1,729
fourth-inch	1	front	27
fourths	125	frontage	4
fox	2	frosting	3
foxes	1	frozen	6

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fruits	4	gardener	7
fry	2	gardens	2
fudge	29	gas	45
fuel	5	gases	1
full	38	gasoline	93
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fun	6	gate	8
function	419	gather	6
functions	19	gathered	8
fund	1	gauge	11
funny	1	gave	144
furlong	2	geese	2
furlongs	4	general	1
furnishes	3	generally	1
furniture	2	generated	1
further	7	gently	1
fuss	1	geography	2
		geometric	66
gadget	1	geometry	71
gadgets	1	get	511
gain	9	gets	12
gained	8	getting	15
gaining	1	geyser	1
gains	1	giant	5
galaxies	1	gift	14
gallon	203	gifts	10
gallons	219	gingersnaps	1
galore	1	giraffe	1
game	141	girl	43
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gantry	2	girl-scout	1
garage	8	girth	1
garages	1	give	1,697

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giving	30	gram	15
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glance	5	grand	1
glancing	2	grandfather	6
gland	1	grandmother	5
glass	36	grandmothers	3
glasses	50	grandparents	1
globe	23	granulated	1
gloug	10	grape	2
glove	3	grapefruit	11
gloves	5	grapes	8
glued	2	graph	349
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goal	7	graphing	22
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gold	50	grasshopper	5
golden	2	grasshoppers	2
goldfish	8	grate	1
golf	3	gravel	1
gone	35	gravity	6
good	54	gray	173
goods	5	grease	1
googal	2	greased	1
goose	8	great	50
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gotten	3	greatest	436
government	2	greatly	1
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grade	87	green	59
graders	5	greeting	2
grades	10	grew	9

grid	18	gym	8
grids	2	gyroscope	1
grill	2		
grinder	2	had	790
grocer	2	hair	15
groceries	14	hairs	3
grocery	6	half	301
ground	36	half-inch	1
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grouping	59	halved	1
groupings	17	halves	84
groups	68	ham	9
grove	2	hamburger	17
grow	6	hamburgers	8
growing	5	hammered	1
grown	1	hammers	1
grows	3	hammock	3
grub	1	hamster	2
guards	1	hamsters	5
guess	28	hand	114
guessed	2	handed	8
guesses	7	handkerchief	3
guessing	4	hands	3
guests	10	hang	3
guide	14	hangers	3
guides	2	hanging	1
gulls	3	happen	6
gum	2	happened	1
gumdrops	1	happens	6
gun	1	hard	9
guppies	2	harder	5
guy	1	hardest	1

hardness	1	heavy	20
hardware	3	hectometer	2
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hatch	2	helicopter	6
hatched	10	helmet	1
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haul	6	helped	22
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headed	2	henhouse	1
headdress	1	hens	34
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headless	1	here	197
headlights	2	herself	1
heads	11	hexagon	27
health	1	hexagonal	5
hear	4	hickory	7
heard	6	hidden	32
heart	4	hide	1
hearts	12	hides	1
heat	1	hiding	4
heated	3	high	94
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heavens	1	highest	51
heavier	20	high-powered	1
heaviest	7	high-school	2

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highways	1	homing	3
hike	17	honey	6
hiked	7	hook	5
hikes	5	hooked	1
hiking	8	hooks	6
hill	6	hookup	1
him	57	hoop	1
himself	7	hope	2
hinges	7	hoped	1
hint	8	hopes	1
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hired	3	horn	10
his	618	horns	8
historic	1	horse	31
history	6	horseback	1
hit	9	horseless	1
hits	12	horseman	1
hitting	2	horsepower	1
hobbies	1	horses	48
hobby	7	horseshoe	1
hockey	1	horseshoes	1
hoe	3	hose	6
hoes	1	hospital	4
hogs	1	hot	11
hold	63	hotel	4
holder	10	hotter	4
holding	22	hottest	1
holds	59	hour	405
hole	9	hourly	2
holiday	4	hours	391
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homes	8	housefly	1

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hummingbird	5	illustrating	1
hundred	570	illustration	31
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hundredth	47	imagination	4
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hungry	3	immersed	1
hunt	1	imperial	1
hunter	3	important	21
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hydrogen	5	impurities	2
hyoid	1	in	14,546
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		inches	844
I	201	incline	1
ice	69	inclined	3
iceberg	2	include	4
icecream	5	included	4
icing	3	includes	3
icosahedron	3	including	6
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ideas	33	incomes	2
identified	1	incomplete	1
identify	44	incorrect	14
identifying	1	incorrectly	4
if	2,116	increase	55
ill	3	increased	5
illusion	1	increases	7
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index	3	interchange	1
indicate	61	interest	33
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infield	2	intersect	103
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injured	1	intestine	2
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instance	12	inversed	1
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instruction	2	invite	10
instrument	7	invited	5
instrumental	2	involve	3
instruments	4	involved	14
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jacket	9	keeping	64
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jacks	16	kept	30
jam	3	kerosene	4
jar	7	key	6
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jays	3	kids	1
jelly	4	kill	8
jet	60	killing	1
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jewelry	1	kilowatt	16
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join	23	kit	3
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labor	4	launched	1
laboratories	1	launching	2
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ladders	1	lawn	18
laid	9	lawns	17
lake	54	laws	3
lakes	4	lay	27
lamb	3	layer	20
lambs	5	layers	28
lamp	4	laying	2
land	37	lays	2
landed	10	lead	6
landing	19	leads	1

leader	2	lettuce	7
leading	1	level	31
leaf	5	levels	2
league	3	librarian	1
leak	5	library	27
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leap	5	lie	37
learn	33	lies	13
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leash	1	lifetime	2
least	369	lift	7
leather	2	lifted	4
leave	63	lifting	5
leaves	88	liftoff	2
leaving	29	lifts	2
left	949	light	38
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legendary	1	lightest	5
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lemon	13	lightning	1
lemonade	9	lights	24
lemons	3	light-year	5
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length	878	like	400
lengths	75	liked	4
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lesser	12	likely	31
lesson	57	likes	2
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letter	135	lime	3
lettered	1	limit	9
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linen	2	lobed	9
liner	3	lobster	6
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link	2	locate	36
linoleum	1	located	19
lion	1	locates	13
lions	1	locating	4
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listen	8	log	28
listing	21	logs	22
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loaded	10	lose	5
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loud	2	major	3
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luncheon	1	manned	1
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lunchroom	12	manufacturer	1
lying	1	many	5,764
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machines	11	maps	6
machinists	1	marble	8
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magazines	14	marching	3
magic	30	margarine	1
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magnifying	1	marking	9
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mast	1	medium	1
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matched	25	meets	4
matches	13	melon	18
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matchings	1	melt	1
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metallurgy	1	mind	2
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meter	61	mined	4
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meterstick	2	mini	1
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mill	1	modern	11
millennium	3	module	7
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millionths	6	monorail	5

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months	49	muffins	3
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moons	6	multiplication	657
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more	1,513	multiplied	65
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mornings	3	multipliers	5
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moths	1	musket	1
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mount	3	must	210
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move	218	nail	22
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national	1	nevertheless	1
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nearest	774	nickname	1
nearly	5	nifty	1
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necessary	36	nights	1
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necklace	8	nine	122
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needed	166	nineteen	9
needle	4	nineties	1
needles	1	ninth	11
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neighbor	3	ninety-three	2
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nervous	1	non-stop	1
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non-zeros	1	not	5
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normal	28	oak	7
normally	1	oats	17
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northern	2	object	111
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nothing	5	occupied	1
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oldest	5	ordering	1
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outer	3	packaged	1
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outline	3	packets	2
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outstretched	3	paddled	2
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overexposed	3	paint	42
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own	35	pairings	1
owned	2	pairs	284
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paraffin	2	past	77
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partitions	6	peach	5
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peat	4	performed	4
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penguin	6	peso	1
penguins	8	pesos	7
penholders	4	pet	13
pennants	10	petal	9
pennies	133	petals	9
penny	28	petroleum	4
pens	17	petunia	2
pentagon	37	phonograph	7
pentagonal	2	photographs	6
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people	229	physical	5
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peppermints	2	pick	17
per	628	picked	26

picket	4	pink	52
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pickles	2	pint	89
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pictographs	2	pipeline	1
picture	795	pirate	1
pictured	107	pitched	9
pictures	205	pitcher	8
picturing	4	pitchers	11
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piece	205	place	1,322
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pig	1	placing	8
pigeon	4	plain	1
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piggy	5	plane	305
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pilot	1	plant	28
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pinch	1	planting	2
pine	14	plants	82
pineapple	3	plastic	14
pineapples	2	plat	2
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players	30	poodle	1
playground	6	pool	23
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plentiful	1	popular	2
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pockets	1	portion	1
poem	1	position	34
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policeman	1	postcards	2
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polish	2	poster	5
polishing	1	posters	3
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pot	1	prepared	3
potato	9	preparing	2
potatoes	43	present	13
pots	3	presented	1
potted	3	presenting	3
pottery	1	president	5
poultry	1	presidents	10
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pounds	517	pressed	1
pour	5	presses	1
poured	5	pressure	17
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practiced	7	price	83
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probably	17	proved	2
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procedure	33	puff	1
proceed	1	puffs	6
proceeds	2	pull	7
process	6	pulled	2
produce	9	pulling	1
produced	9	pulls	1
produces	2	pulse	4
product	1,104	pump	1
production	3	pumped	4
products	599	pumpkin	1
profit	10	pumpkins	1
profits	1	pumps	1
program	6	punch	4
programs	2	pup	1
progress	1	pupil	22
project	11	pupils	88
projector	2	puppet	1
projects	4	puppets	14
pronounced	1	puppies	18
propeller	1	puppy	5
proper	19	purchase	8
properly	1	purchased	7
properties	37	purchases	3
property	64	pure	7
proportion	47	purple	2
proportions	14	purse	1

push	4	quintillions	3
pushed	5	quire	2
pushing	2	quires	1
put	789	quite	10
puts	14	quotient	414
putting	110	quotients	312
puzzle	6		
puzzled	1	rabbit	7
puzzles	1	rabbits	34
pyramid	24	race	24
pyramids	4	raced	1
python	1	races	6
		racetrack	1
quadrangular	23	racing	15
quadrilateral	7	rack	4
quadrilaterals	21	racket	3
quadrillion	1	racks	4
quadrillions	5	radar	1
quality	2	radian	4
quantity	3	radians	1
quart	162	radii	16
quarter	73	radio	10
quarterback	1	radios	3
quarters	42	radishes	1
quarts	125	radius	69
queen	13	rag	1
question	217	rail	1
questionnaire	1	railroad	15
questions	129	railroads	1
quick	16	rails	3
quicker	22	rain	26
quickly	30	rained	2
quinch	1	rainfall	14
quinces	2	rains	2

rainstorm	1	react	1
rainy	4	reaction	1
raise	17	reactor	1
raised	10	rēad	369
raises	2	rěad	147
raising	5	readers	7
raisins	2	readiness	1
rake	1	reading	91
ran	23	readings	9
ranch	2	reads	4
random	1	ready	15
range	3	real	13
ranged	1	realize	2
ranger	2	realized	1
ranking	7	really	21
rare	1	rearrange	6
rarely	1	rearranged	1
raspberries	2	rearranging	3
rate	47	reason	11
rated	1	reasonable	5
rates	20	reasonably	1
rather	5	reasoning	21
rating	3	reasons	6
ratio	261	recall	3
rational	253	receive	39
rational-number	2	received	42
ratios	50	receiver	2
rattlesnake	1	receives	5
raven	1	receiving	1
ray	95	recent	12
rays	82	recess	1
reach	18	recipe	20
reached	7	recipes	1
reaches	3	reciprocal	64

reciprocals	16	refuel	1
recognize	2	regarding	1
recommended	1	region	431
recopied	1	regions	205
rēcord	116	register	7
rĕcord	22	registered	8
recorded	17	registers	2
recording	7	registration	2
rĕcords	49	regrouping	7
rēcords	6	regular	51
recreation	13	rehearsing	1
rectangle	221	reindeer	1
rectangles	70	relate	2
rectangular	210	related	111
red	507	relates	1
reduce	7	relating	5
reducing	6	relation	3
reduction	10	relations	1
redwood	2	relationship	41
redwoods	1	relationships	81
reel	1	relative	14
re-equip	1	relatively	5
re-express	1	relay	3
refer	60	relayed	1
reference	4	remain	13
references	1	remainder	409
referred	4	remainders	88
referring	4	remained	2
refers	4	remaining	17
refill	1	remains	4
refined	1	remember	208
reflection	4	remembered	12
refreshments	1	remembering	26
refrigerator	4	remind	24

reminds	13	requiring	1
remodeling	1	resemble	1
remove	12	resembled	1
removed	31	resembles	1
removing	10	reserve	3
rename	300	residence	1
renamed	105	residing	1
renaming	179	resistance	1
rent	5	resources	1
rental	1	respectively	1
rented	2	rest	40
repainted	1	restated	1
repair	1	restating	1
repairman	1	restaurant	1
repairs	3	resting	3
repeat	11	result	37
repeated	9	resulting	2
repeating	6	results	36
replace	270	resurface	1
replaced	16	resurvey	1
replacement	64	reteaching	125
replacements	10	retrace	1
replacing	8	retracing	1
replied	1	retracting	1
report	6	return	10
reported	8	returning	1
reports	2	returns	2
represent	358	reverse	8
representation	3	review	71
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representing	19	reviewing	12
represents	172	reviews	2
required	5	revolution	1
requires	6	revolutions	9

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rewriting	12	rise	12
rewritten	3	risen	8
rewrote	1	rises	8
rhinoceros	1	rising	1
rhombe	1	river	1
rhombus	9	riverboat	1
rhombuses	1	rivers	1
rib	1	road	34
ribbon	41	roads	6
ribbons	21	roadside	5
ribs	3	roar	1
rice	38	roast	16
richer	4	robins	2
ridden	1	rock	10
riddle	2	rocket	14
riddles	5	rockets	13
ride	68	rocks	37
rider	2	rocky	1
riders	2	rod	36
rides	25	rode	29
riding	2	rods	24
ridge	1	role	2
rifle	1	roll	23
rifles	1	rolled	2
rig	1	roller	3
right	918	rolling	1
rigs	10	rolls	32
ring	139	roof	5
ringbolt	6	room	117
ringer	1	rooms	12
ringers	7	root	1
rings	21	rope	36
ringtoss	5	rose	9

rosebush	3	sack	11
rosebushes	4	sacks	7
roses	38	sad	1
rotate	2	safer	1
rotates	1	safety	5
rotations	2	said	165
rotten	4	sail	19
roughly	1	sailboat	8
round	243	sailboats	7
rounded	166	sailed	5
rounding	59	sailing	3
route	14	sailor	1
routes	1	sailors	2
row	466	sails	3
rowboats	2	salad	2
rowed	2	salary	7
rows	409	sale	67
rubber	19	sales	11
rug	16	salesman	4
rugs	9	salmon	16
rule	357	salt	8
ruled	5	same	1,681
ruler	228	sample	1
rulers	5	samples	1
rules	6	sand	17
rummage	1	sandpaper	1
run	52	sandwich	25
runner	7	sandwiches	20
running	11	sassafras	2
runs	16	sat	4
rupee	1	satellite	34
rupees	1	satellites	5
rye	2	saucepan	1
		sausage	1

save	44	scorekeeper	1
saved	59	scores	54
saves	4	scorpion	2
saving	12	scout	3
savings	36	scoutmaster	2
saw	85	scouts	15
sawed	9	scrap	3
sawmill	2	screen	16
saws	5	screens	12
say	533	screw	3
saying	5	scroll	1
says	21	sea	38
scale	261	seafood	2
scaled	1	seal	2
scalene	25	sealed	4
scales	98	seals	6
scarf	4	searching	1
scarves	2	searchlight	1
scenes	2	seashells	3
schedule	1	seashore	6
school	313	season	15
schoolhouse	1	seat	12
schools	9	seated	6
science	28	seater	2
scientific	16	seating	1
scientist	8	seats	44
scientists	6	second	524
scissors	2	secondhand	1
scooter	1	seconds	93
scoots	1	section	29
score	142	sectioned	1
scoreboard	4	sections	24
scorecard	2	see	567
scored	33	seed	11

seeded	1	serious	3
seeing	1	seriousness	2
seedling	2	serve	15
seedlings	2	served	10
seeds	18	serves	28
seem	28	service	2
seems	15	serving	1
seen	26	session	2
sees	4	set	3,169
segment	584	sets	1,023
segments	307	setting	2
seldom	1	settle	1
select	10	settled	1
selected	8	settlement	1
sell	99	seven	203
selling	19	sevens	47
semicircle	5	seventeen	9
send	3	seventeenth	1
sending	1	seventh	12
senior	1	sevenths	3
sense	1	seventies	5
sensible	14	seventy	35
sent	5	seventy-eight	1
sentence	2,080	seventy-five	1
sentences	673	seventy-six	1
separate	24	several	20
separated	13	severe	1
separately	38	sew	1
separates	9	sewed	2
separating	2	sewing	5
septillion	1	sews	3
sequence	27	sextant	1
sequences	9	sextillion	4
series	1	sextillions	2

shade	27	shipped	8
shaded	174	ships	7
shading	7	shirt	1
shadow	3	shirts	2
shake	2	shoe	9
shall	11	shoes	23
shallow	1	shoot	2
shape	95	shooting	2
shaped	18	shop	21
shapes	13	shopkeepers	1
share	37	shopped	1
shared	32	shopping	16
sharp	2	shore	4
sharply	1	short	243
she	776	shortage	2
sheaf	2	shortcut	8
shear	1	shorten	11
sheared	1	shortened	2
sheep	14	shortening	6
sheet	91	shorter	79
sheets	72	shortest	34
shelf	50	short-story	1
shell	7	shot	9
shells	81	shots	8
shelter	5	should	456
shelves	25	shoulder	6
shelving	1	shovel	3
shift	2	shoveled	3
shilling	2	shoveling	4
shillings	1	shovels	1
shin	1	show	1,933
shiny	1	showed	35
ship	26	shower	1
shipment	5	showers	2

showing	189	sirloin	1
shown	1,527	sister	25
shows	689	sisters	2
shrink	2	sit	12
shrubs	8	site	1
shuffled	1	sits	2
sick	1	sitting	5
side	281	situation	36
sided	32	situations	4
sides	383	six	511
sidewalk	4	sixes	112
sidewall	2	sixteen	23
sight	3	sixteenth	6
sign	270	sixteenths	24
signal	7	sixth	36
signaled	9	sixth-grade	4
signals	5	sixths	56
signed	4	sixties	1
signs	33	sixty	41
silver	5	sixty-four	1
silverplating	1	sixty-fourths	1
similar	55	sixty-two	3
similarly	3	size	306
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simpler	10	sizes	12
simplest	151	skate	5
simplify	7	skated	2
simply	13	skates	7
since	721	skating	23
sing	1	skeleton	2
singing	2	sketch	3
single	60	sketches	2
singles	1	ski	3
sinkers	1	skies	2

skiing	1	slow	7
skill	9	slowly	2
skillful	4	small	173
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skin	2	smallest	90
skins	9	smallmouth	1
skip	5	smart	1
skipped	3	smell	1
skirt	8	snack	5
skirts	10	snail	6
skis	1	snails	10
sky	2	snake	4
slant	1	snakes	2
slanting	2	snapshots	6
slash	1	snow	13
slate	1	snowballs	8
slaves	1	snowfall	6
sled	2	snowman	4
sleep	5	snowmen	2
sleeping	6	snowy	2
sleeps	1	so	637
sleet	1	soaked	1
slept	5	soap	2
slice	1	social	4
sliced	2	socks	11
slices	8	sod	32
slicing	1	soda	19
slid	2	soft	2
slide	4	softball	13
slides	9	softballs	1
slightly	9	soil	3
slippers	1	solar	3
slips	4	sold	249
slit	4	soldier	1

soldiers	15	sparrow	1
solid	67	sparrows	1
solid-line	1	speak	20
solids	25	speaks	1
solution	53	special	77
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solve	892	specials	3
solved	17	specific	14
solving	90	speck	4
some	490	speed	144
someone	14	speeded	1
something	33	speedometer	5
sometimes	84	speeds	14
somewhat	1	speedway	1
somewhere	1	spell	2
son	3	spelled	2
sons	1	speller	1
soon	4	spelling	36
sought	1	spend	126
sound	31	spending	2
soup	10	spends	26
soups	1	spent	194
south	9	sperm	1
southern	1	sphere	62
souvenir	4	spheres	8
sow	1	spherical	5
sowed	2	spices	1
space	228	spill	1
spacecraft	1	spin	3
spaces	237	spinal	3
spacing	1	spindle	3
span	11	spinning	9
spans	3	spins	2
spare	3	splits	10

spoiled	2	stainless	2
spoke	2	stair	4
sponge	4	stairs	1
sponsors	1	stake	2
spool	2	stalactites	1
spoon	1	stalagmites	1
spoons	12	stall	2
sport	1	stamp	32
sports	7	stamps	137
spot	1	standard	138
spots	4	standing	7
spotted	1	stands	105
spray	11	star	26
spring	44	starfish	3
springs	5	stars	165
spy	1	start	155
spyglass	1	started	63
squad	1	starters	1
square	569	starting	58
squared	14	starts	14
square-ruled	5	state	28
squares	99	stated	4
squash	3	statement	41
squashes	1	statements	17
squeezed	3	states	40
squirrels	4	station	11
stables	4	stationary	2
stack	31	stationmasters	2
stacked	5	stations	1
stacks	26	statistician	1
stadium	2	statistics	1
staff	1	statue	11
stage	43	stay	4
stages	1	stayed	15

stays	2	stores	3
steak	12	stories	97
steaks	1	storm	1
steam	3	stormy	1
steamboat	2	story	61
steamship	2	storybooks	2
steel	14	stove	2
steers	1	straight	37
step	304	straightedge	4
stepped	1	strange	4
stepping	1	stranger	1
steps	165	straw	9
stew	3	strawberries	12
stick	25	strawberry	7
sticks	100	straws	14
stiff	1	stream	5
still	86	street	9
stilts	3	streets	17
stock	5	stretch	14
stockings	3	stretched	18
stone	5	stretchers	1
stones	4	stretching	1
stood	3	strike	7
stool	1	strikeouts	1
stop	52	string	3
stopped	24	strings	6
stoppers	1	strip	46
stopping	6	stripe	5
stops	4	stripes	15
store	124	stripping	4
storekeeper	7	strips	9
storeman	1	strong	5
stored	4	strongest	3
storeroom	5	struck	1

structure	1	successful	1
structures	2	successive	1
stubbed	1	such	261
stubborn	2	sucks	3
stucco	3	suddenly	1
student	11	suffer	1
students	4	sugar	50
studied	17	sugars	3
studies	2	suggest	26
study	657	suggested	63
studying	14	suggesting	2
style	1	suggestion	1
subdivided	3	suggestions	1
subdivision	2	suggests	40
subject	2	suit	6
subjects	5	suitable	1
submarine	5	suitcase	3
submerged	4	suits	2
subscribers	1	sum	1.413
subscript	1	summarize	8
subscripts	1	summarizing	1
subset	88	summary	1
subsets	266	summer	36
substance	6	summers	1
substitute	13	sums	477
substituted	45	sun	94
subtracts	777	sundaes	3
subtracted	94	sundial	3
subtracting	199	sunlight	1
subtraction	532	sunny	4
subtractions	14	sunrise	2
subtractive	2	sunshine	2
subtracts	1	supermarket	6
suburbs	2	supersonic	1

supper	4	symbol	64
supplementary	2	symbolizes	1
supplied	2	symbols	42
supplies	8	syrup	21
supply	11	system	132
supplying	1	systems	11
support	3		
supported	1	tab	3
suppose	235	table	685
supposed	1	tablecloth	2
sure	40	tables	95
surely	1	tablespoon	4
surface	87	tablespoons	11
surfaces	6	tablet	2
surprised	2	tablets	2
surrounded	1	tabs	6
surrounding	3	tabulate	3
surrounds	1	tack	1
survey	1	tackle	3
surveyor	1	tadpoles	1
surveyors	1	taffy	1
swam	8	tail	13
swan	2	tails	10
sweater	2	take	292
sweaters	4	taken	26
sweepers	2	take-off	15
sweeping	1	taker	7
sweet	11	takes	34
swim	8	taking	14
swimming	13	tales	32
swing	2	talk	5
swings	2	talked	2
sword	2	talking	2
swordfish	4	tall	108

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tallest	37	telephone	14
tally	2	telephones	1
tame	1	telescope	1
tan	5	telescopes	1
tangent	5	televised	1
tank	61	television	34
tanks	1	tell	1,091
tap	2	telling	26
tape	6	tells	190
tapes	1	temperature	226
target	4	temperatures	39
targets	3	ten	850
tarts	3	ten-millions	1
task	1	tennis	12
taste	1	tenpin	1
tax	1	tenpins	1
taxes	1	tens	2,754
taxi	1	tense	1
tea	8	tent	10
teacher	31	tentacles	1
teachers	8	tenth	62
teaching	1	ten-thousand	3
team	97	ten-thousands	2
teams	48	ten-thousandths	1
teapot	3	tenths	364
tear	3	tents	8
tearing	1	tepee	3
teaspoon	2	tepees	3
teaspoons	4	term	25
teddy	2	terminating	7
teen	1	termite	2
teen-age	2	terms	437
teenager	1	tern	2

terrace	1	things	284
terraces	1	think	1,548
territory	3	thinkers	3
test	221	thinking	172
tested	1	thinks	2
testing	9	thinner	2
tests	21	thinnest	1
tetrahedron	4	thins	1
textbook	1	third	183
textbooks	2	thirds	113
than	1,974	thirteen	15
that	4,814	thirteenth	1
the	39,916	thirtieth	1
theater	5	thirties	3
their	313	thirty	73
them	511	thirty-eights	1
themselves	4	thirty-five	1
then	2,587	thirty-ones	3
theorems	2	thirty-seconds	2
theory	14	thirty-seven	2
there	1,893	thirty-six	5
therefore	4	thirty-sixes	5
thermometer	58	thirty-two	2
thermometers	9	this	3,126
these	1,458	those	97
they	782	though	25
thick	29	thought	127
thicker	3	thousand	265
thickest	1	thousands	339
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thicknesses	2	thousandths	117
thimble	12	three	1,028
thin	20	three-month	1
thing	34	three-place	1

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three-wheeler	1	toad	2
threw	24	today	25
through	324	toe	2
throughout	1	toes	3
throw	15	together	238
throwing	2	told	41
thrown	1	toll	4
throws	1	tomato	38
thrust	12	tomatoes	19
thumb	1	tomb	1
thunder	1	tombs	1
thus	5	tomorrow	2
ticket	17	ton	31
tickets	153	ton-miles	3
tie	6	tons	49
tied	5	too	54
ties	2	took	164
tiger	1	tools	7
tigers	4	toothbrush	3
tightrope	1	toothpaste	5
tile	13	toothpick	1
tiles	23	toothpicks	1
tilt	1	top	127
time	466	topic	1
timed	2	topics	2
times	543	tops	22
tin	4	torn	2
tiny	4	toss	17
tip	45	tossed	4
tips	2	tosses	21
tire	5	tossing	13
tires	19	total	438
title	11	totalled	1

totals	11	transcontinental	1
touch	77	transistor	8
touchdown	2	transit	1
touchdowns	2	transport	4
touches	3	transportation	7
touching	1	transported	4
tour	1	trapezoid	1
touring	1	trapezoidal	1
tournament	6	trapezoids	3
toward	12	travel	112
towel	1	traveled	75
towels	2	traveling	17
tower	16	travels	36
town	26	tray	5
towns	8	treasure	11
toy	50	treasurers	2
toys	22	treasury	2
trace	37	treat	1
traced	1	treated	1
traces	6	treats	1
tracing	34	tree	136
tracings	5	trees	95
track	30	trial	8
tracks	12	triangle	488
tractors	5	triangles	134
trade	2	triangular	81
traded	4	trick	4
trading	9	tricked	1
traffic	5	trickery	2
trail	19	tricky	3
trails	1	tricycle	2
train	81	tricycles	2
trains	13	tried	4
transactions	2	tries	1

trillion	5	turbojet	2
trillions	6	turkey	4
trim	2	turkeys	11
trimmed	2	turn	59
trio	1	turned	8
trip	219	turning	3
triple	9	turnips	1
tripled	3	turnpike	2
triples	1	turntable	1
triplets	7	turntables	15
trips	25	turpentine	5
troop	12	turtle	10
troops	2	turtles	13
trouble	11	tusk	1
trout	1	tusks	2
truck	66	twelfths	28
trucked	2	twelve	44
truckload	1	twelve-oclock	4
trucks	33	twelves	8
true	880	twenties	3
trunk	4	twentieth	6
trunks	1	twentieths	2
try	272	twenty	133
trying	8	twenty-five	2
tryout	2	twenty-four	1
tube	12	twenty-fours	2
tuft	1	twenty-seven	3
tulip	5	twenty-six	1
tulips	2	twenty-three	1
tuna	4	twenty-two	2
tune	1	twice	78
tungsten	1	twin	7
tunnel	3	twinch	3
tupee	3	twins	2

two	2,315	union	125
two-day	2	unit	451
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twostep	6	universe	2
two-thirds	1	unknown	124
type	25	unlabeled	1
typed	3	unless	8
types	12	unlike	16
typical	2	unlimited	15
typing	3	unload	2
		unloading	1
umbrellas	4	unnecessary	6
unchanged	2	unpopular	1
uncle	20	unshaded	2
uncover	1	unsold	1
uncut	1	untapped	1
under	70	until	41
underline	3	unwraps	1
underlined	6	up	174
underneath	1	upon	17
underpass	2	upper	6
understand	79	upside	3
understanding	42	upward	31
understood	4	us	131
underwater	2	use	2,116
underweight	2	used	706
undo	33	useful	22
undoes	18	uses	64
undoing	12	using	1,190
undone	2	usual	27
unequal	3	usually	50
unfold	2	utensils	1
uniform	2	utilities	1
uniforms	1		

vacation	27	vice	1
vaccination	1	view	3
vaccinations	1	village	5
vaccine	1	vinegar	4
valentines	3	visit	14
valuable	2	visited	10
value	311	visiting	1
values	27	visitors	8
valve	21	visual	1
vanilla	2	vital	1
vapor	1	vitamins	1
vaporize	1	volcano	2
vaporized	2	vollyball	1
vaporizing	2	volume	106
various	6	volumes	4
varnish	7	voted	1
varnished	1	voters	2
vary	2	votes	1
vase	4	voyage	5
vases	4	vulture	3
vault	10		
vegetable	11	wading	2
vegetables	25	waffle	3
vehicle	4	waffles	1
vehicles	4	wagon	8
verify	2	wagons	9
verily	1	wait	3
vernier	1	waiter	4
vertex	77	waiting	2
vertical	127	waiters	2
vertically	2	walk	57
vertices	31	walked	41
very	42	walker	1
vessels	3	walking	3

walks	14	wavy	1
wall	18	waxing	1
walls	11	way	620
walnut	4	ways	293
walnuts	10	we	3,029
wander	3	wear	9
wanderer	1	wearing	12
want	50	wears	1
wanted	89	weather	7
wants	50	weatherman	1
war	4	weathervane	2
warehouse	4	wedding	4
warm	6	weed	1
warmer	7	weeds	1
warmest	2	week	283
warming	1	weekday	2
warp	8	weekdays	1
was	1,501	weekend	3
wash	5	weekly	11
washed	11	weeks	100
washers	3	weigh	190
washing	5	weighed	113
watch	34	weighing	44
watched	13	weighs	159
watches	4	weight	331
watching	10	weighted	12
water	260	weights	39
waterfall	3	welded	1
waterfalls	1	well	93
watermelon	6	went	165
waterway	1	were	1,259
watt	15	west	17
wave	4	westward	1
waves	3	wettest	1

whale	10	wind	23
whales	1	window	27
what	5,524	windows	11
whatever	1	winds	1
wheat	9	windshield	1
wheel	16	wing	7
wheelbarrow	3	wingspread	2
wheels	14	winner	4
when	1,256	winners	3
whenever	17	winning	12
where	266	wins	3
whether	159	winter	14
which	1,344	wipe	3
whichever	4	wiped	3
while	35	wipers	2
whistle	4	wire	98
whistles	5	wires	15
white	120	wish	76
who	178	wished	3
whole	810	wishes	5
whole-number	3	with	446
wholes	14	withdrawals	1
whose	106	withdraws	5
why	789	within	76
wide	88	without	217
wider	3	wolves	5
widest	3	woman	2
width	147	women	12
widths	7	won	29
wife	2	wondered	3
wild	5	wonders	3
will	1,180	wood	33
willow	13	woodchuck	5
win	6	wooden	7

woodpile	2	wrong	74
word	72	wrote	81
words	115		
work	1,539	yard	189
workbench	1	yards	151
worked	85	yardstick	8
worker	2	year	239
workers	6	yearly	8
working	192	years	205
works	32	yellow	53
world	44	yen	2
worm	6	yes	99
worms	3	yesterday	4
worse	2	yet	10
worth	63	yields	2
worthless	1	you	6,383
would	810	young	4
wound	1	younger	8
wrap	8	youngest	1
wrapped	4	your	1,749
wrapper	1	yours	1
wrappers	1	yourself	12
wrapping	3		
wraps	1	zero	197
wrenches	3	zeros	39
wrist	2	zinc	3
write	3,524	zinnias	3
writes	1	zone	6
writing	252	zones	5
written	122	zoo	37

APPENDIX C

CORRESPONDENCE

920 Hoover
Norman, Oklahoma
July 24, 1969

International Reading Association
P. O. Box 119
Newark, Delaware

Dear Sir:

During the coming months I plan to study the topic, The Applicability of Phonic Generalizations in Selected Elementary Mathematics Textbooks, for a doctoral dissertation. This study will be developed with the approval and advice of my program committee, with Dr. Robert Curry of the Graduate College of Education, University of Oklahoma, as chairman.

I am writing to ask permission to quote from Dr. Clymer's article, "The Utility of Phonic Generalizations In The Primary Grades," in the January, 1963 issue of The Reading Teacher and also Dr. Bailey's article, "The Utility of Phonic Generalizations In Grades One Through Six," in the February, 1967 issue of The Reading Teacher.

I realize, of course, it will be necessary to contact Dr. Clymer and Dr. Bailey to get their permission to quote from their articles. If your permission is given proper credit will be given your publication.

Your cooperation will be greatly appreciated.

Sincerely,

Loree Ferguson

INTERNATIONAL READING ASSOCIATION
An Incorporated Non-Profit Professional Organization

Tyre Avenue at Main Street
Newark, Delaware 19711
July 29, 1969

To:

Mrs. Loree Ferguson
920 Hoover
Norman, Oklahoma 73069

Permission is hereby granted by the Association to reprint the material below which is copyrighted by the International Reading Association:

"The Utility of the Phonic Generalizations in the Primary Grades," by Dr. Theodore Clymer from THE READING TEACHER, January 1963, pp. 252-258.

In the following publication:

For inclusion in a doctoral dissertation entitled "The Applicability of Phonic Generalizations in Selected Elementary Mathematics Programs."

A royalty fee of \$ NONE is payable to the International Reading Association upon publication.

Author desires a complimentary copy of the publication containing his article. ____ yes ____ no: Summary

Name: Dr. Theodore W. Clymer

Mailing Address: 105 Burton Hall, University of Minnesota
Minneapolis, Minnesota

Suggested credit line: "Reprinted with permission of (the author) and the International Reading Association."

Theodore W. Clymer
Author

Ralph C. Staiger
Executive Secretary-Treasurer

INTERNATIONAL READING ASSOCIATION
An Incorporated Non-Profit Professional Organization

Tyre Avenue at Main Street
Newark, Delaware 19711
July 29, 1969

To:

Mrs. Loree Ferguson
920 Hoover
Norman, Oklahoma 73069

Permission is hereby granted by the Association to
reprint the material below which is copyrighted by the
International Reading Association:

"The Utility of Phonic Generalizations in Grades
One Through Six," by Dr. Mildred H. Bailey from
THE READING TEACHER, February 1967, pp. 413-418.

In the following publication:

For inclusion in a doctoral dissertation entitled
"The Applicability of Phonic Generalizations in
Selected Elementary Mathematics Programs."

A royalty fee of \$ NONE is payable to the International
Reading Association upon publication.

Author wishes to charge an additional royalty ____ yes
 x no: Amount \$ ____.

Author desires a complimentary copy of the publication
containing his article. x yes ____ no:

Name: Dr. Mildred H. Bailey

Mailing Address: 619 Whitfield Dr.
Natchitaches, Louisiana 71457

Suggested credit line: "Reprinted with permission of (the
author) and the International Reading Association."

Mildred H. Bailey
Author

Ralph C. Staiger
Executive Secretary-Treasurer

920 Hoover
Norman, Oklahoma
July 24, 1969

Dr. Theodore W. Clymer
Professor, College of Education
University of Minnesota
Minneapolis, Minnesota

Dear Dr. Clymer:

During the coming months I plan to study the topic, The Applicability of Phonic Generalizations in Selected Elementary Mathematics Textbooks, for a doctoral dissertation. This study will be developed with the approval and advice of my program committee, with Dr. Robert Curry of the Graduate College of Education, University of Oklahoma, as chairman.

Your study on The Utility of Phonic Generalizations in the Primary Grades would be very significant to my study. I am writing to ask permission to use your list of forty-five phonic generalizations, to utilize your technique for determining "per cent of utility" of the generalizations, and to quote from your published article, "The Utility of Phonic Generalizations in the Primary Grades," in the January 1963, Reading Teacher. I realize it will be necessary for me to obtain permission from the International Reading Association to quote from the latter. If your permission is granted, all your materials and quotes will be properly documented and credited to you. An abstract of the prospectus for my study or the final report will be forwarded to you upon request.

Your cooperation will be greatly appreciated.

Sincerely,

Loree Ferguson

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UNIVERSITY OF MINNESOTA
College of Education • Burton Hall • Minneapolis, Minnesota 55455

July 29, 1969

Mrs. Loree Ferguson
920 Hoover
Norman, Oklahoma

Dear Mrs. Ferguson:

I have your letter of July 24 in which you request my permission to utilize in a variety of ways in your thesis the study which I published in January 1963 in The Reading Teacher.

I am, of course, pleased to grant you permission to make further research use of this material. You are correct in your statement that you will need additional permission from the International Reading Association. I suggest you address your letter to the association to Mrs. Faye Branca.

Good luck to you in your venture. I will look forward to receiving an abstract of your final report.

Sincerely,

Theodore Clymer
Professor, Elementary Education
and Educational Psychology

TC:at

920 Hoover
Norman, Oklahoma
July 24, 1969

Dr. Mildred Hart Bailey, Director
The Reading Clinic
Northwestern State College
Natchitaches, Louisiana

Dear Dr. Bailey:

During the coming months I plan to study the topic, The Applicability of Phonic Generalizations in Selected Elementary Mathematics Textbooks, for a doctoral dissertation. This study will be developed with the approval and advice of my program committee, with Dr. Robert Curry of the Graduate College of Education, University of Oklahoma, as chairman.

I am writing to ask permission to quote from your doctoral dissertation entitled An Analytical Study of the Utility of Selected Phonic Generalizations for Children in Grades One Through Six, and from your article entitled, "The Utility of Phonic Generalizations in Grades One Through Six," published in the February 1967, Reading Teacher. I realize, of course, that it will be necessary to obtain permission from the International Reading Association to quote from the latter. If your permission is granted, all of your materials will be properly documented and credited to you. An abstract of the prospectus for my study or of the final report will be furnished you upon your request.

Your cooperation will be greatly appreciated.

Sincerely,

Loree Ferguson

8-1-1969

Permission granted. Good luck!

Mildred H. Bailey

920 Hoover
Norman, Oklahoma

Rights and Permission
Publishing Company

Dear Sir:

I plan to develop a doctoral dissertation on The Applicability of Phonic Generalizations in Selected Mathematics Programs. I would like to include your mathematics series in this study.

This letter is to ask your permission to utilize the vocabulary words in the textbooks for grades one through six to test phonic generalizations.

I will use the same generalizations Bailey and Clymer utilized in their studies of reading programs. Permission has been granted to use any material from their studies that I may need for the mathematics study.

In using your material proper credit to title, authors, publishers, and copyright date will be given on the page where used. An abstract of the prospectus or final report will be furnished you upon your request. Thank you for your cooperation.

Sincerely,

Loree Ferguson

GINN AND COMPANY STATLER BUILDING, BOSTON, MASSACHUSETTS 02117

August 7, 1969

Mrs. Loree Ferguson
920 Hoover
Norman, Oklahoma

Dear Mrs. Ferguson,

Your letter requesting permission to use MATHEMATICS WE NEED in connection with work on your doctorate has been forwarded to the Elementary Mathematics Department.

We are pleased to grant you permission to use this series.

Enclosed is all the material we have available relative to the vocabulary control exercised in the first three grades of MATHEMATICS WE NEED. We trust this material will be of some use to you.

We would be pleased to receive either the final report or an abstract of the prospectus for your study when it is available.

Very truly yours,

(Mrs.) Marianna P. Burke
Elementary Mathematics Department

b

Enc:

ADDISON-WESLEY PUBLISHING COMPANY
Sand Hill Road, Menlo Park, California 94025
(415) 854-0300

November 10, 1969

Mrs. Loree Ferguson
920 Hoover
Norman, Oklahoma

Dear Mrs. Ferguson:

Somehow your letter requesting permission to use our series of elementary school textbooks in your study got misplaced and finally found its way to my desk. I must apologize for the lateness of this response.

We would like to know more about how you plan to use the materials. Due to copyright protection, we should know about the copying, xeroxing, etc., that takes place in terms of quantity.

Consider this letter as your authorization to use our materials in your study with the understanding that you will keep us notified of any copies made of the materials. This does not authorize you to publish or copyright any of our materials in connection with your study.

I am sorry that we do not have a compilation of words used at each grade level and the frequencies of occurrence. If we had them, you certainly would be welcome to them.

We would very definitely be interested in the outcome of your study. Any information you could furnish us would be greatly appreciated.

Sincerely,

Royce S. Hargrove, Executive Editor
Elementary Mathematics Department

CENTRAL STATE COLLEGE
Edmond, Oklahoma 73034

Division of Education
and Psychology

February 5, 1970

Mr. Royce Hargrove
Addison-Wesley Publishing Co.
Sand Hill Road
Menlo Park, California 94025

Dear Mr. Hargrove:

I wish to thank you for your letter granting permission for the use of the Addison-Wesley Elementary Mathematics Series for my dissertation study in completing my doctoral program.

The study is titled The Applicability of Phonic Generalizations to the Elementary Mathematics Programs, and is extending Clymer's study of phonic generalizations published in The Reading Teacher, January 1963.

The procedure I am using involves the compiling of the vocabulary, and frequency of occurrences of each word used in three state adopted elementary mathematics programs.

The applicability of the phonic generalizations to the vocabulary is determined by computing the per cent of words conforming to each generalization in comparison to the total number of words which should apply according to the way the generalization reads.

I do not plan to reproduce any of the textbook material.

If you would like an abstract or a summary of the findings upon completion of the study I shall be glad to accommodate in that respect.

Thank you for your cooperation in regard to the study.

Sincerely,

Loree Ferguson
Assistant Professor of Education

SILVER BURDETT COMPANY A Division of General Learning Corporation
Morristown, New Jersey 07960, 201-538-0400

March 18, 1970

Mrs. Loree Ferguson
920 Hoover
Norman, Oklahoma 73069

Dear Mrs. Ferguson:

Please accept my apology for not replying to your letter of February 20 before now - which has been due to the extreme volume of incoming mail.

In response to your request, we are pleased to grant you permission to utilize the vocabulary words in the textbooks of our Modern Mathematics Through Discovery, Grades 1 through 6, in your doctoral dissertation on The Applicability of Phonic Generalizations in Selected Mathematics Programs. We would appreciate on page credit to each title, authors, copyright date, and ourselves as publishers, as well as a copy of the final report for our permissions file. Please mail the copy to the attention of the Rights and Permissions Department.

We very much appreciate your interest in our publications and if we can be of further assistance, please do not hesitate to contact me.

Sincerely yours,

(Mrs.) Harriet F. King
Rights and Permissions

hfk

920 Hoover
Norman, Oklahoma
October 15, 1969

Dr. Lillie Davis
Florida A & M
Tallahassee, Florida

Dear Dr. Davis:

I am doing a study on The Applicability of Phonic Generalizations to Selected Mathematics Programs, for a doctoral dissertation. The study will be developed under the direction and approval of Dr. Robert Curry and Dr. Mary Clare Petty of the Graduate College of Education, University of Oklahoma.

Your recent study on The Applicability of Phonic Generalizations to Selected Spelling Programs would be very helpful to me. I wish to compare the findings of the mathematics study with those of Clymer, Bailey and Davis. This letter is to ask permission to use your findings. If granted, all your material used will be properly documented and credited to you. An abstract of the prospectus or the final report will be furnished upon your request.

Your cooperation will be greatly appreciated.

Sincerely,

Loree Ferguson

FLORIDA AGRICULTURAL AND MECHANICAL UNIVERSITY
Tallahassee, Florida
32307

School of Education

October 20, 1969

Mrs. Loree Ferguson
920 Hoover
Norman, Oklahoma

Dear Mrs. Ferguson:

You have my permission to compare the findings of your
dissertation study with those of mine. Good luck to you and
I hope that you will soon have your work completed.

Yours truly,

Lillie S. Davis

/lsd

--

920 Hoover
Norman, Oklahoma
February 19, 1970

Dr. Mary Jernigan
East Texas State University
Commerce, Texas 76428

Dear Dr. Jernigan:

I am doing a study on The Applicability of Phonic Generalizations to Selected Mathematics Programs, for a doctoral dissertation. The study will be developed under the direction and approval of Dr. Robert Curry and Dr. Mary Clare Petty of the Graduate College of Education, University of Oklahoma.

Your recent study on The Utility of Phonic Generalizations to Selected Science Series would be very helpful to me. I wish to compare the findings of the mathematics study with those of Clymer, Bailey, Davis and Jernigan. This letter is to ask permission to use your findings. If granted, all your material used will be properly documented and credited to you. An abstract of the prospectus or the final report will be furnished upon your request.

Your cooperation will be greatly appreciated.

Sincerely,

Loree Ferguson

EAST TEXAS STATE UNIVERSITY
East Texas Station
Commerce, Texas 75428

Department of
Elementary Education

Mary L. Jernigan
East Texas State
University
Commerce, Texas 75428

March 9, 1970

Mrs. Loree Ferguson
920 Hoover
Norman, Oklahoma

Dear Mrs. Ferguson:

I was pleased to learn that you were continuing the studies pertaining to the utility of phonic generalizations. It is with pleasure that I grant permission for the use of the findings from my study. A comparison of the findings from all four studies, with those from your own, will give added substance to them all. I will be looking forward to reading the final report.

Sincerely,

Mary L. Jernigan

MJ/ms