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Quantitative concepts in third grade reading and content-subject textbooks

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Thesis

QUANTITATIVE CONCEPTS IN THIRD GRADE READING AND CONTENT-SUBJECT TEXTBOOKS

Submitted by

Louise P. Wade

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First Reader: Dr. Robert L. Burch, Associate Professor of Education

Second Reader: Dr. Helen B. Sullivan, Professor of Education

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CHAPTER I.

THE PROBLEM

A. Statement of the Problem

It is the purpose of this study to list the quantitative concepts that occur in selected reading and content-subject third-grade textbooks and to determine the frequency of their occurrence.

B. Source and Justification of the Problem

There were several reasons for the selection of the above topic:- 1. the continuing trend in education toward closer correlation (cf. such terms as unit, fusion, integration, etc.); 2. the increasing emphasis upon the importance of meanings, understandings, and concepts (cf. such phrases, especially, as concept of number, concept of words, concept of processes, concept of skills, etc.); and 3. the suggestions in articles (especially those in research periodicals) that indicate the need for new research concerning quantitative concepts and the teaching of such concepts.

It seems reasonable to think that a knowledge of <u>which quantitative concepts</u> are actually of frequent occurrence in reading and subject-matter textbooks should be of value to the teacher of arithmetic. Such knowledge will help once more to point up the need for careful development and checking of these concepts during arithmetic lessons.

On the other hand, if children are really helped to the extent that they are able to meet quantitative concepts intelligently when they occur in the vocabulary of studies other than arithmetic, this should help to motivate them toward a greater interest in all arithmetic that is "sensible and obviously useful to the learner."[1]

C. Scope of the Problem

Because the following third-grade level reading and content-subject textbooks (all copyrighted between 1945 and 1949) are typical of those now in use in many third grades, they have been selected for the study of the problem previously stated on page one: -

Reading -

Beyond Treasure Valley,[2] a basal third reader (level one)

Along Friendly Roads,[3] a basal third reader (level two)

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[1]W. A. Brownell, "Frontiers in Educational Research in Arithmetic," _Journal of Educational Research_, 40 : 374, Jan., 1947.

[2]E. A. Betts & C. M. Welch, _Beyond Treasure Valley_, Boston; American Book Co., 1949.

[3]E. A. Betts & C. M. Welch, _Along Friendly Roads_, Boston; American Book Co., 1948.

Science -

How Do We Know?[1]

Social Studies -

Your Town and Mine[2]

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[1] W. L. Beauchamp, G. Crampton, and W. S. Gray, *How Do We Know?* New York: Scott, Foresman and Co., 1945.

[2] E. Thomas, W. E. Tiegs, and F. Adams, *Your Town and Mine*, Boston: Ginn and Co., 1949.

CHAPTER II.

REVIEW OF LITERATURE AND RESEARCH

A study made and reported by Buswell and John[1] is among the earlier ones that indicated a desire to determine just what arithmetic concepts are necessary in order that children may read intelligently textbooks other than arithmetic books. They report results of a vocabulary test (administered to grades 4, 5, and 6) designed to measure arithmetic understandings necessary for reading texts at fourth-grade level. Quantitative terms are included in their list of five hundred terms commonly used.

Taking a similar standpoint concerning the importance of developing understanding, Morton[2] discusses a more limited vocabulary, - measures of length, time, capacity and weight.

In a later article, he again appears to be pointing out the need for teaching clear concepts of arithmetic terms that appear in various "instructional materials." He says, "The progress of pupils in arithmetic should not be blocked

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[1] G. T. Buswell and Lenore John, "Vocabulary of Arithmetic," Supplementary Educational Monograph No. 38: 3 and 107-116, Chicago, Univ. of Chicago Press, 1931.

[2] Robert L. Morton, Teaching Arithmetic in the Elementary School, Vol. I., 330-335, N. Y.: Silver, Burdett Co., 1937.

by difficult language structure or untaught terms appearing in instructional materials."[1]

In 1936, three separate reports were made by Gunderson, Russell, and Reid, to present their findings when they studied quantitative concepts needed by very young children.

Gunderson[2] found a "list of 416 different items having to do with arithmetic or quantitative concepts." Her items were related to size, quantity, time, location, numbers expressed in words, Arabic numerals, money, etc. She suggests that "perhaps the amount of integration between reading and arithmetic should be increased." This study was confined to reading books designed for first and second grades.

Russell[3] reports upon certain quantitative concepts that are, or are not, comprehended by children under seven.

Reid[4] checked during a period of one month the quantitative terms that first grade pupils use. She reports the relative usage of such words as all, little, big, more,

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[1]Robert L. Morton, "Arithmetic in the Changing Curriculum," N.E.A. Journal, 38: 430-1, Sept., 1949.

[2]Agnes G. Gunderson, "Nature and Amount of Arithmetic in Readers for Grades I and II," Elementary School Journal, 36: 527-40, March, 1936.

[3]Ned M. Russell, "Arithmetical Concepts of Children," Journal of Educational Research, 29: 645-63, May, 1936.

[4]Florence E. Reid, "Incidental Number Situations in First Grade," Journal of Educational Research, 30: 36-43, Sept., 1936.

whole, etc.

More recent reports of studies conducted with young children are those by Rosenquist in 1949 and by Stains in 1950.

Rosenquist[1] suggests a minimum word list for grades I and II. This vocabulary contains many quantitative concepts, but is not limited to them. The list is given in connection with a discussion of "developing an adequate vocabulary for expressing arithmetical ideas" used by young children. The book as a whole is "about children and arithmetic, and how children learn to use quantitative ideas exactly."

Stains[2] says that "children's number concepts are concerned with quantity, size, time, distance, location, direction, shape and space." She lists forty-five terms that the four-year old can usually understand, and nineteen more that the five-year-old adds to his vocabulary, using them with understanding.

Professional magazines contain articles illustrating natural schoolroom situations which should be capitalized as

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[1] Lucy Lynde Rosenquist, Young Children Learn to Use Arithmetic, 1-174, Boston: Ginn and Co., 1949.

[2] Katherine B. Stains, "Number in the Everyday Living of Young Children," American Childhood, 36:22, Nov., 1950.

a means of developing concepts. For example, Adams[1] describes children's voting on a name for their rabbit; then remarks,- "Thus more, less, the same, equal, are terms that accumulate meaning and come into the vocabulary of children as they go through many such experiences both in and out of school."

Cooke[2] also "presents concrete ways to use living-learning situations in developing number concepts." Illustrations given are "getting a concept of the fraction idea," and "possibilities for teaching a concept concerning quantity."

The slow learner is not overlooked in the studies concerning quantitative concepts. Sullivan[3] comments that one of the "basic skills that the slow-learning child should be taught" is "to handle number concepts accurately. Quantitative concepts are the most difficult for the slow-learning child."

Certain studies to determine what arithmetic concepts are needed for success in understanding books or articles written for use in fields other than arithmetic are confined to a single type of subject-matter. The following excerpts con-

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[1] Olga Adams, "Arithmetic Readiness in the Primary Grades," Elementary School Journal, 48:91, Oct., 1947.

[2] Ralph J. Cooke, "Develop Arithmetic Readiness," Instructor, 57:17, Jan., 1948.

[3] Helen B. Sullivan, "Teaching the Slow Learner," N.E.A. Journal, 40:116, Feb., 1951.

cern studies in the special fields of social studies, geography, or reading.

Horn[1] draws especially upon the field of social studies for his illustrations. The author has "long been interested in the quantitative aspects of texts and references in the social studies and in the adequacy with which children deal with them. This emphasis upon arithmetic in the social studies should not, however, obscure its importance in other fields, including even music and art."

His conclusions, even though he considers the data from his investigations "fragmentary," are: "First, there is a very heavy demand upon arithmetical concepts and abilities in other school work. Second, there is a large number of mathematical concepts and abilities which are required in most other fields of study. Third, the ability of pupils to deal with quantitative statements in other fields is very limited."

The whole article is worthy of intensive study and consideration, especially the sections Ability of Pupils to Manage Mathematical Concepts; Contributions of Arithmetic to Other Fields; and Contributions of Other Fields to

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[1] Ernest Horn, "Arithmetic in the Elementary School Curriculum," National Society for the Study of Education 50th. Yearbook, Pt. II., 9-21.

Arithmetic.

Kyle, Marentz, and Southwick[1] "compile, tabulate, and classify time words and expressions in reading material for grades I, II, and III which are used to form time concepts," thus making it possible to provide "objective evidence of the variety and frequency of time concepts presented to children of the primary grades." In the findings, the following tables should prove to be interesting and useful to the primary teacher: Table VIII. Twenty-five most Frequently Used Time Concepts of Grades I, II, III; Table IX. Relative Rank of the 25 most Frequently Used Time Concepts Taken from Table VIII; Table X. Grade Placement of Days of the Week in Reading Material of Grades I, II, and III; Table XI. Grade Placement of Months of the Year in Reading Material of Grades I, II, and III.

Pascoe, Carr, and Angelakis[2] determined "what per cent the words which constitute the quantitative vocabulary are of the total running words of the different (geography) books." In their findings, Tables X to XVI inclusive provide the

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[1] H. F. Kyle, I. Marentz, A. McCourt, and R. Southwick, A Study of Time Concepts Found in Primary Reading Materials, Unpublished Master's Thesis, Boston University, 1949.

[2] L. J. Pascoe, A. M. Carr, and S. T. Angelakis, Analysis of the Quantitative Terms in the Discussion of the United States in three Fifth Grade Geography Textbooks, Unpublished Master's Thesis, Boston University, 1951.

above information in great detail. Definite and indefinite quantitative vocabularies are considered; not only words, but also phrases and figures are included in the study.

CHAPTER III.

PROCEDURE

A. Specific Objectives Determined

The quantitative concepts to be sought through careful investigation of the previously mentioned textbooks will pertain to 1. comparisons (longer, heavier, most, etc.); 2. measures (of length, distance, capacity, etc.); 3. whole numbers and easy fractions that are expressed in words; 4. special collective terms (pair, dozen, etc.); 5. money; and 6. several miscellaneous quantitative concepts.

Time concepts have not been included as a regular part of this study, but a list of the time concepts is provided in Appendix B., page 33.

B. Definition of Terms

The <u>Dictionary of Education</u>[1] is the authority for the following definitions of two significant terms used in this study: <u>Quantitative</u>,- "differing in amount rather than in kind"; and <u>Concept</u>,- "a generalized idea including all that

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[1] Carter V. Good, editor, <u>Dictionary of Education</u>, New York: McGraw Hill Book Co., 1945.

is suggested to the individual by an object, symbol, or situation."

C. Data for Study

The following data are reported in this study:- 1. a separate vocabulary list for each of the four textbooks used, to include all of the quantitative concepts which conform to the objectives previously stated on page eleven; 2. a count of the frequency of occurrence of each concept; 3. a composite list of all findings in the four texts, for use in making comparison; 4. a list of the highest-frequency concepts from all sources used; and 5. a bibliography suggesting further readings related to this study.

D. Procurement of Data

As each of the selected textbooks was read, the needed data were secured by listing on separate small index cards each concept as it occurred. The cards were alphabetized, after which the frequency of each concept was determined. When these data had been recorded, the same cards were "keyed" according to the book studied, then used again to facilitate the construction of a cumulative list of the highest-frequency concepts.

CHAPTER IV.

FINDINGS RECORDED AND ORGANIZED

The first four tables constitute a report of the exact data found in each of the four third-grade textbooks selected. For details concerning each of these textbooks, see footnotes on pages two and three.

TABLE I. is a report of the quantitative concepts selected from the basal third reader Beyond Treasure Valley, together with the frequency of occurrence of each concept.

TABLE II. is a report of similar data from the second level third reader Along Friendly Roads.

TABLE III. is a similar report of data secured from the science textbook How Do We Know?

TABLE IV. is the last of the four reports of data secured from a single textbook, data all from the third grade level social studies textbook entitled Your Town and Mine.

TABLE V. is a composite list of all the quantitative concepts obtained from the four textbooks studied. Such a table is significant in making comparisons as to which quantitative concepts are common to all four texts.

TABLE VI. is a list of the fifty concepts which occurred most frequently in the four textbooks studied. These concepts are listed in the order of their frequency, which ranges from a high of 531 to a low of 21.

TABLE I.

Frequencies of Quantitative Concepts Found in
Third Reader (Level One) - Betts and Welch

Quantitative Concepts	Frequency
again	19
all	103
alone	8
another	12
any	40
big	35
biggest	5
both	2
cent	2
cents	9
dollar	5
dollars	3
each	23
empty	4
enough	30
every	62
feet	2
few	22
fewer	5
fifteen	13
fifty	6
fill	2
filled	11
fills	1
final	1
first	33
five	9
foot	1
four	11
fourth	5
great	13
half	8
handful	1
hundred	10
hundreds	4
large	12
larger	1
largest	2
last	12
little	75
long	43
longer	10
lot	5
lots	8
many	26
mile	5
miles	11
more	29
most	13
much	17
narrow	7
nine	11
no (not any)	58
nothing	24
once	17
one	163
ones	2
only	21
pair	7
pennies	1
penny	1
piece	6
pieces	2
quarter	9
quarters	1

TABLE I. Continued

Quantitative Concepts	Frequency
second (ordinal)	10
seven	5
short	7
six	6
small	15
smaller	3
some	76
tall	6
tallest	3
ten	11
thick	10
thickly	1
third	5
thirty	12
three	11
tiny	20
twin	4
twins	6
two	25
wide	10
Total	1365

The above total is 3.5% of the 38,515 running words in this reader.

TABLE II.

Frequencies of Quantitative Concepts Found in Third Reader (Level Two) - Betts and Welch

Quantitative Concepts	Frequency
again	28
all	222
alone	13
another	31
any	23
anybody	1
anyone	5
anything	15
anywhere	3
big	68
bigger	4
biggest	4
both	13
cent	1
cents	10
deep	11
deeper	2
dollar	6
dollars	9
each	52
either	8
empty	1
enough	23
every	36
everybody	3
everyone	14
everyone's	1
everything	9
everywhere	6
feet	5
few	28
fifteen	10
fifty	9
fill	1
filled	2
first	29
five	11
foot	3
four	16
fourth	4
full	11
great	29
greatest	3
half	18
hundred	9
hundreds	4
inch	5
inches	6
large	15
largest	2
last (the last)	14
little	75
lone (a lone pine)	1
long	50
longer	9
lot (a lot)	5
lots (lots of)	6
many	43
mile	1
miles	10
more	39
most	16
much	22
narrow	8
nickel (money)	7
nine	7
no (not any)	74
nobody	3
nothing	17

TABLE II. Continued

Quantitative Concepts	Frequency	Quantitative Concepts	Frequency
once	21	tall	12
one	196	taller	2
ones	7	tallest	2
only	41	ten	16
		thick	9
pair	5	thicker	6
pairs	3	thickest	1
pennies	3	thin	10
penny	1	third (ordinal)	4
piece	13	one-third	2
pieces	6	two-thirds	1
pound	6	thirty	10
pounds	3	thousand	6
		thousands	4
quarter	10	three	34
quarters	1	tiny	14
		twelve	10
second (ordinal)	11	twenty	10
seven	6	twin	4
several	11	twins	12
short	7	two	65
shorter	1		
six	10	whole	9
small	29	wide	6
smaller	3		
some	78	Total	2015
somebody	3		
someone	11		
something	41		

The above total is 4.2% of the 47,453 running words in this reader.

TABLE III.

Frequencies of Quantitative Concepts Found in Science Text (Book C) - Beauchamp, Crampton and Gray

Quantitative Concepts	Frequency
all	20
any	3
anything	1
big	9
both	2
each	14
every	1
few	2
first	2
four	3
large	1
last	1
little	1
long	1
many	5
more	3
most	4
much	3
no (not any)	3
one	13
ones	3
only	5
short	1
small	1
smaller	1
some	9
three	5
two	8
wide	2
Total	127

This total is 3.6% of the 3488 running words.

TABLE IV.

Frequencies of Quantitative Concepts Found in
Social Studies Text (Third Book) - Thomas, Tiegs and Adams

Quantitative Concepts	Frequency
again	25
all	90
alone	3
another	35
any	36
anyone	4
anything	6
anywhere	1
big	132
bigger	2
both	9
cents	11
dollar	4
dollars	8
each	25
eight	2
empty	5
enough	9
every	14
everyone	23
everything	2
few	11
fifty	6
first	23
five	12
four	9
full	14
giant (huge)	4
great	10
hundred	1
hundreds	6
large	12
last	8

Quantitative Concepts	Frequency
less	1
little	88
long	41
longer	1
many	73
miles	6
more	36
most	12
much	27
nine	7
no (not any)	19
nothing	1
once	8
one	159
ones	5
only	12
pair	9
pence	1
penny	4
piece	11
pieces	8
pound	3
seven	2
short	1
six	7
small	14
some	120
someone	7
something	20
tall	10
taller	2
ten	8
thousand	6
thousands	2
three	28

TABLE IV. Continued

Quantitative Concepts	Frequency
tiny	1
two	65
wee	4
whole	1
yard	2
Total	1394

The above total is 3.1% of the 44,649 running words in this social studies textbook.

TABLE V.

Cumulative Frequency of Each Quantitative Concept Found in the Four Textbooks Examined

Quantitative Concepts Alphabetical List	Frequencies				
	Reader One	Reader Two	Science	Social Studies	Total Frequencies
again	19	28	0	25	72
all	103	222	20	90	435
alone	8	13	0	3	24
another	12	31	0	35	78
any	40	23	3	36	102
anybody	0	1	0	0	1
anyone	0	5	0	4	9
anything	0	15	1	6	22
anywhere	0	3	0	1	4
big	35	68	9	132	244
bigger	0	4	0	2	6
biggest	5	4	0	0	9
both	2	13	2	9	26
cent	2	1	0	0	3
cents	9	10	0	11	30
deep	0	11	0	0	11
deeper	0	2	0	0	2
dollar	5	6	0	4	15
dollars	3	9	0	8	20
each	23	52	14	25	114
eight	0	0	0	2	2
either	0	8	0	0	8
empty	4	1	0	5	10
enough	30	23	0	9	62
every	62	36	1	14	113
everybody	0	3	0	0	3
everyone	0	14	0	23	37
everyone's	0	1	0	0	1
everything	0	9	0	3	12
everywhere	0	6	0	0	6
feet	2	5	0	0	7
few	22	28	2	11	63

TABLE V. Continued

Quantitative Concepts Alphabetical List	Frequencies				Total Frequencies
	Reader One	Reader Two	Science	Social Studies	
fewer	5	0	0	0	5
fifteen	13	10	0	0	23
fifty	6	9	0	6	21
fill	2	1	0	0	3
filled	11	2	0	0	13
fills	1	0	0	0	1
final	1	0	0	0	1
first	33	29	2	23	87
five	9	11	0	12	32
foot	1	3	0	0	4
four	11	16	3	9	39
fourth	5	4	0	0	9
full	0	11	0	14	25
giant (huge)	0	0	0	4	4
great	13	29	0	10	52
greatest	0	3	0	0	3
half	8	18	0	0	26
handful	1	0	0	0	1
hundred	10	9	0	1	20
hundreds	4	4	0	6	14
inch	0	5	0	0	5
inches	0	6	0	0	6
large	12	15	1	12	40
larger	1	0	0	0	1
largest	2	2	0	0	4
last (the last)	12	14	1	8	35
less	0	0	0	1	1
little	75	75	1	88	239
lone (a lone pine)	0	1	0	0	1
long	43	50	1	41	135
longer	10	9	0	1	20
lot (a lot of)	5	5	0	0	10
lots (lots of)	8	6	0	0	14

TABLE V. Continued

Quantitative Concepts Alphabetical List	Frequencies				Total Frequencies
	Reader One	Reader Two	Science	Social Studies	
many	26	43	5	73	147
mile	5	1	0	0	6
miles	11	10	0	6	27
more	29	39	3	36	107
most	13	16	4	12	45
much	17	22	3	27	69
narrow	7	8	0	0	15
nickel (money)	0	7	0	0	7
nine	11	7	0	7	25
no (not any)	58	74	3	19	154
nobody	0	3	0	0	3
nothing	24	17	0	1	42
once	17	21	0	8	46
one	163	196	13	159	531
ones	2	7	3	5	17
only	21	41	5	12	79
pair	7	5	0	9	21
pairs	0	3	0	0	3
pence	0	0	0	1	1
pennies	1	3	0	0	4
penny	1	1	0	4	6
piece	6	13	0	11	30
pieces	2	6	0	8	16
pound	0	6	0	3	9
pounds	0	3	0	0	3
quarter	9	10	0	0	19
quarters	1	1	0	0	2
second (ordinal)	10	11	0	0	21
seven	5	6	0	2	13
several	0	11	0	0	11
short	7	7	1	1	16
shorter	0	1	0	0	1
six	6	10	0	7	23
small	15	29	1	14	59
smaller	3	3	1	0	7

TABLE V. Continued

Quantitative Concepts Alphabetical List	Frequencies Reader One	Reader Two	Science	Social Studies	Total Frequencies
some	76	78	9	120	283
somebody	0	3	0	0	3
someone	0	11	0	7	18
something	0	41	0	20	61
tall	6	13	0	10	29
taller	0	2	0	2	4
tallest	3	2	0	0	5
ten	11	16	0	8	35
thick	10	9	0	0	19
thicker	0	6	0	0	6
thickest	0	1	0	0	1
thickly	1	0	0	0	1
thin	0	10	0	0	10
third (ordinal)	5	4	0	0	9
third (fraction)	0	3	0	0	3
thirty	12	10	0	0	22
thousand	0	6	0	6	12
thousands	0	4	0	2	6
three	11	34	5	28	78
tiny	20	14	0	1	35
twelve	0	10	0	0	10
twenty	0	10	0	0	10
twin	4	4	0	0	8
twins	6	12	0	0	18
two	25	55	8	65	153
wee	0	0	0	4	4
whole	0	9	0	1	10
wide	10	6	2	0	18
yard	0	0	0	2	2

TABLE VI.

Fifty Quantitative Concepts Occurring Most Frequently in the Four Textbooks Studied (Listed in Order of Frequency)

Quantitative Concepts	Frequency	Quantitative Concepts	Frequency
one	531	most	45
all	435	nothing	42
some	283	large	40
big	244	four	39
little	239	everyone	37
no (not any)	154	last (the last)	35
two	153	ten	35
many	147	tiny	35
long	135	five	32
each	114	cents	30
every	113	piece	30
more	107	tall	29
any	102	miles	27
first	87	half	26
only	79	both	26
another	78	full	25
three	78	nine	25
again	72	alone	24
much	69	fifteen	23
few	63	six	23
enough	62	anything	22
something	61	thirty	22
small	59	second (ord.)	21
great	52	pair	21
once	46	fifty	21

CHAPTER V.

CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The four reading and content-subject textbooks analyzed for the purposes of this study yielded a total of one hundred twenty-nine different quantitative concepts. Table V. gives the complete list, at the same time indicating the book (or books) in which each word occurs, and the frequency with which it occurs. That there was a wide range in frequencies may be illustrated by noting that in Reader Two the concept "all" occurs 222 times, while the concept "mile" occurs but once. No concept had a frequency greater than 222 within a single text.

The following twenty-six quantitative concepts were found to be common to all the four texts studied:- all, any, big, both, each, every, few, first, four, large, last, little, long, many, more, most, much, no (not any), one, ones, only, short, small, some, three, and two.

Time concepts are not included in this study since the original purpose of the present study was to determine the frequency of quantitative concepts other than time concepts. However, those time concepts which occurred in the four textbooks examined are listed in Appendix B. For information concerning previous studies made to determine the frequencies of time concepts, see Chapter II.

Table VI. should be especially significant to the primary teacher. It lists the fifty quantitative concepts occurring most frequently in the four textbooks studied. It is reasonable to expect that these terms are also common to many other textbooks of third-grade level. This points out the necessity for carefully checking the various units, activities, etc., to see whether these units make provision for using quantitative terms to the extent that they may be truly learned,- that the children may obtain thorough understanding,- true concepts,- of quantity.

In line with the above remarks are two quotations from the Mass. Curriculum Guide,[1] as follows:- "The development of adequate mathematical concepts depends upon (1) the careful selection of materials and (2) provision for continuous growth from year to year. The development of the feeling that arithmetic is useful depends upon the interpretation of arithmetic and the relating of arithmetic to the curriculum as a whole."

"Growth in understandings does not occur over night. Every teacher is responsible for finding out what stage of

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[1] Massachusetts Dept. of Education, A Curriculum Guide for Primary Grade Teachers, Arithmetic Section, pp. 266, 271, 1949.

concept development has been reached by the children in her grade and for providing for continued growth. The teaching in the lower grades should anticipate the development of meanings which will follow in later grades."

Out of a total of 134,105 running words in the four reading and content-subject third grade textbooks examined, this study has determined that 4901 words, or 3.7% of the total, are terms that express quantitative concepts as defined in Chapter III., page eleven. The term having the highest total frequency is the word "one" which occurs 531 times.

. . . .

Further research to determine the frequency of quantitative concepts of all types should be helpful. To quote from Chapter I., "Such knowledge will help once more to point up the need for careful development and checking of these concepts during arithmetic lessons. On the other hand, if children are really helped to the extent that they are able to meet quantitative concepts intelligently when they occur in the vocabulary of studies other than arithmetic, this should help to motivate them toward a greater interest in all arithmetic that is sensible and obviously useful to the learner."

Specific suggestions for further research along the lines of this study are as follows:-

1. Examine reading and content-subject textbooks of any grade level other than third grade to determine the frequency of quantitative concepts.

2. Select third grade textbooks not listed herein, make a similar study and compare findings with those determined by this study.

3. Study the frequency of some specific group of quantitative terms, such as -

a. Words that refer to a particular kind of measurement; e.g., linear measure.

b. Words that stand for cardinal or ordinal numerals.

c. Words that refer to time. (See Bibliography, Appendix A., no. 12, for a previous study.)

4. Confine a study of quantitative terms to a series of science or social studies textbooks in grade sequence. Compare findings from grade to grade.

If research helps to produce even a small amount of progress towards a greater interest in and understanding of arithmetic and other studies, the time spent and effort expended will be well worth while.

APPENDIX A.

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APPENDIX B.

Alphabetical List of Time Concepts Contained in the Four Textbooks Used in this Study

about (about to)
after
afternoon
ages
almost
already
always
as
autumn

before

dawn
day
days
during

early
evening
ever

fall
fast
faster
fastest
finally
flash (in a flash)
following
Friday

hour
hours
just (just as)

last (at last)
late
lately
later

long (long ago)
longer (time)

meanwhile
minute
moment
Monday
month
months
morning

never
new
next (time)
night
noon
now

often
old
older
oldest
once (at once)

present
(for the present)

quick
quickly

ready
right (right away)

Saturday
seasons
second (a second)
seconds
shortly

since
slow
slower
slowly
sometime
sometimes
soon
sooner
spring
still (yet)
sudden
suddenly
summer
swift
swiftly

then
today
tomorrow
tonight

until
used (used to)

week
weeks
when
while
winter

year
yearly
years
year's
yesterday
young
younger
youngest