A READABILITY STUDY OF SOCIAL STUDIES AND SCIENCE TEXTBOOKS

IDA PERPETUA MARRIE ENGLISH

A READABILITY STUDY OF SOCIAL STUDIES AND SCIENCE TEXTBOOKS

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Ida Perpetua Marrie English

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The undersigned certify that they have read, and recommend to the Committee on Graduate Studies for acceptance, a thesis entitled A Readability Study of Social Studies and Science Textbooks submitted by Ida Perpetua Marrie English in partial fulfillment of the requirements for the Degree of Master of Education.

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Supervisor

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Date_____

ABSTRACT

The purpose of this study is to determine by using the Dale-Chall Readability Formula: (1) the readability level of the social studies and science textbooks recommended by the Newfoundland Department of Education for use in grades four, five, six, seven and eight; (2) the readability level of two series of science textbooks which are at present under consideration for further use in grades four, five, and six; (3) whether the reading difficulty of the social studies and science textbooks increases at a uniform rate from the beginning to the end of the book.

The results of this study show that at grade five and grade seven a majority of the textbooks sampled conforms to their publishers designated grade-level; at grade four and grade six none of the textbooks sampled conform to their publisher's designated grade-level since all scored above, and at grade eight the majority of textbooks sampled do not conform to their publisher's designated grade-level but scored above it.

To the question concerning the extent to which the sampled textbooks at each grade-level exhibit a desirable internal progression from less difficult to more difficult reading material, the results show that at grades four and eight, one of the textbooks at each grade-level exhibited the desired internal progression; at grades five and seven, two of the textbooks at each grade-level exhibited the desired internal progression; and at grade six, three of the textbooks at this grade-level exhibited the desired internal progression.

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INTRODUCTION

Reading is still the most important means whereby persons gain information, skills, and entertainment. The effectiveness with which books, newspapers, and magazines convey this information remains an important problem. Newspaper and magazine editors are becoming increasingly aware of the deficiencies in their instruments for communicating ideas. They are becoming more and more interested in developing material that is readable to the public. Early methods or attempts to improve readability were usually subjective. In recent years these methods have been made more objective in nature.

An accumulation of research during the last twenty years has developed better methods of measuring readability. Dale says that most of this research has come from educators who needed a method of selecting books for the different grades.[1] That first grade textbooks should be easier than those of the second grade is obvious, but selecting the proper gradient is much more difficult.

At the present time, reading texts in the elementary grades are being carefully written. The modern reading program makes provisions for reading material that is on the reading level of the child. No expense

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[1]Edgar Dale, Readability A Publication of the National Convention on Research in English (Chicago: University of Chicago Press, 1952).

is spared in providing basic readers and supplementary readers that are needed to meet the interests and abilities of the child. The teacher of reading no longer puts a textbook labelled grade four or grade five into the hands of a pupil who is in grade four or grade five simply because he is in that grade. We know that success is important to the child, and that he cannot succeed if the textbook put into his hands is beyond his capacity to read. Therefore, the problem of fitting the reading textbook to the reading ability of the child should be given equal consideration in the fields of social studies and science.

The tremendous improvements that have been made in the reading programs of our elementary school have been achieved through the work of investigators in the field of reading who have done so much in their study of the mechanics and the psychological aspects of reading. Publishers have appreciated the importance of these efforts and have endeavored to control the various aspects of reading difficulty. Numerous studies of the vocabularies of children have resulted in basic vocabulary lists which are being used in the reading texts. Other studies have been made which are concerned with determining when and how rapidly the vocabulary should be introduced in the textbooks. Just as it is true that skillfully prepared textbooks are needed in reading to increase the pupil's chance of success, only limited success can be achieved in building a social studies or science program that fits the needs of the children without skillfully prepared social studies and science textbooks.

The specialist in social studies and science materials must be acquainted with the fact that the need for readable books is especially

great when the child begins to use reading as a tool in learning subject matter. Those specialists must have an understanding of the reading interests, habits and reading levels of the children who are to use the textbooks they construct.

Teachers are ultimately responsible for matching the book with the reader. They depend on authors, publishers, researchers and curriculum supervisors to provide them with accurately graded textbooks. In short, teachers need some degree of certainty that the textbooks they are using match the reading level of the students and that those textbooks will communicate the content of instruction effectively.

PURPOSE OF THE STUDY

It is the purpose of this study to determine by using the Dale-Chall Formula: (1) the readability level of the social studies and science textbooks recommended by the Newfoundland Department of Education for use in grades four, five, six, seven, and eight; (2) the readability level of two series of science textbooks which are at present under consideration for further use in grades four, five, and six; (3) whether the reading difficulty of the social studies and science textbooks increases at a uniform rate from the beginning to the end of the books.

IMPORTANCE OF THE STUDY

This investigation and its conclusion will be of direct value to elementary and junior high school teachers in Newfoundland, in that it will provide them with information concerning the readability of the recommended social studies and science textbooks for use in grades four, five, six, seven, and eight, as computed by the use of the Dale-Chall formula. The teachers in the elementary and junior high grades will be able to assign those books with a much higher degree of accuracy to a particular student or group of students with a given reading capability.

ASSUMPTIONS

Certain assumptions underlying this study are the following:

(1) that vocabulary load and sentence length are significant determinants of reading difficulty.

(2) that the reading level of a social studies and science textbook may interfere with or contribute to a successful learning of basic

concepts in social studies or science.

(3) that the level of reading difficulty of reading material in a given social studies and science textbook should correspond to the publisher's designated grade-level.

LIMITATIONS OF THE STUDY

(1) The social studies and science texbooks sampled in this study are limited to the recommended texts for use in grades four, five, six, seven, and eight in Newfoundland schools, and the two series of science textbooks which are at present under consideration and testing for further use in grades four, five, and six in Newfoundland schools.

(2) The readability formula that will be used is the Dale-Chall Readability Formula, which measures vocabulary load and sentence length. The formula does not reflect any conceptual difficulties caused by varied contextual meanings of words, idiomatic expressions, or the ratio of abstract and concrete terms. As a matter of fact no formula in current use is capable of measuring all aspects of reading difficulty.

DEFINITION OF TERMS USED

Since the following terms have technical meanings in relation to this study, they are defined to ensure accuracy of understanding.

Readability as applied in the Dale-Chall Readability Formula refers to the level of difficulty of printed materials, based upon average sentence length and percentage of unfamiliar words.

Reading Level has two meanings: on the one hand it refers to the publisher's designation of a textbook's readability for a specific grade-level; on the other hand it is, within the Dale-Chall Readability Formula,

a prediction of the range of grade-levels within which readers will probably have success in undertaking a textbook.[2]

Dale-Chall Raw Score is the score calculated from the proportion of unfamiliar words and the average sentence length for each sample passage taken for the readability analysis for each textbook.

Unfamiliar Words are words which do not appear on the Dale List of 3000 Familiar Words.

Vocabulary Load is the proportion of unfamiliar words in written material.

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[2]George Klare, The Measurement of Readability (Iowa: Iowa State University Press, 1963), p. 34.

CHAPTER II

RELATED ISSUES IN READING, READABILITY, AND READING MATERIALS

This chapter is concerned with explaining the larger context of reading issues to which the concept of readability is related. Readability formulas aid in the description and selection of reading materials and thus have something to say about some of the problems which arise from the nature of reading and the composition of reading materials. An understanding of these issues is a necessary prequisite for intelligent use of readability formulas in assessing reading materials.

THE NATURE OF READING

Reading has been variously defined by different writers and at different periods in history. At one time a narrow conception of reading prevailed. Not infrequently it was defined as the process of recognizing printed or written symbols.[1] The proponents of this view maintained that the comprehension and interpretation of meaning were not part of the reading act but involved supplementary thought process.

This writer does not view reading as a process of rapid recognition of one word after another. Rather, this writer views reading as a process of fusing the meaning of single words into a sequence of meaning. However, decoding the printed word is still a fundamental skill because you must be

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[1]Leonard Bloomfield and Clarence Barnhart, Let's Read (Detroit: Wayne University Press, 1961).

able to decode words before you can get meaning from them So, the more carefully and accurately the mechanical skill of decoding the print into sound is mastered, the sooner it can be forgotten in favor of greater concentration on reading for meaning. The mature reader, then, is seen as examining all available cues, reflecting about them in terms of his experiences and knowledge, and then setting his purposes according to his informed judgement. The total act of reading is, therefore, a combination of the visual recognition of words and central thought processes that are stimulated by them.

Therefore to communicate via the written word, the writer must encode precepts, concepts, images, and sensations into a signal system that will be meaningful. The reader must decode these signals into a meaningful pattern. The greater the degree of congruency between those two signal systems, the more effective will be the communication. However, such a relationship is premised upon a commonality of experience. Perfect comprehension of reading material is practically unattainable, because the author and reader will differ in emotional maturity, experiential background, language facility, efficiency in thinking, and skill in perceiving concepts, ideas and relationships.

The major implication of this definition of reading is that not all readers comprehend the same reading material at the same rate and to the same extent. The task is always one of matching book to reader; this task becomes more difficult when the audience for whom one must choose a book is made up of individuals at different levels of reading ability. Then one must investigate and analyze the available materials so as to select the most suitable.

PROBLEMS INHERENT IN COMPOSITION AND NATURE OF READING MATERIALS

The above definition, then, contains factors which raise a problem for every teacher whether he be teaching science, social studies, or reading: that is, the wide range of reading abilities found in the average classroom. According to Dale and Chall the reading abilities within a sixth grade class may range from third grade to over eleventh grade.[2] The range of reading ability can be complicated by gaps that arise between what the author presumes the reader to be able to do and what the reader can actually do. For example, an author of a textbook may feel that a student in a given grade-level will be able to cope with a certain density of ideas; it is very easy, however, for the author to overestimate the efficiency of thought and comprehension in a student.

Materials for Reading Instruction

This type of gap will not so easily occur in the composition of basic reading materials. In these basic reading materials, there are not the problems of concept development and concept progression that restrict the author of social studies and science. The author of reading materials has relatively greater flexibility in composing contexts that are not beyond the reading ability of a student. In other words, the author is not burdened with the considerations of a code of ideas it imparts to the student. His primary concern is with providing materials that will develop skills associated with the reading process itself, as well as the development of the vocabulary of a student.

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[2] Edgar Dale and Jeanne S. Chall, "The Concept of Readability," Elementary English, XXVI (January, 1949), p. 24.

The author of materials to teach reading is free, then, to deliberately avoid the possibility of gaps in the areas mentioned above. He can select contexts which do not go beyond the level of the emotional maturity of the student and he can use situations which are likely to correspond with the experiential background of most students. Furthermore, since concepts are not of prime importance or consideration, he can load the material as sparsely as he wishes with ideas, and he can develop the student's skill in perceiving concepts by using basic, common relationships, such as familial relationships. And finally, he can introduce new vocabulary at as slow a pace as he wishes since there is no given technical vocabulary for him to include.

Because of these types of flexibility, the author of reading materials is better able to counteract the inevitable wide range of reading ability among students at any grade-level. For the author of content area materials, however, there are certain restrictions which relate to the nature and composition of the subject matter. For him a compromise must always be struck between satisfying the demands of the subject area and satisfying the demands of a wide range of reading ability in students.

Materials for Social Studies and Science

Social studies and science materials involve this type of compromise. In terms of the signal system theory of reading, the necessity for compromise arises out of the presence of a third system of meaning, namely, that of the subject area itself. This third factor must be given consideration in the process of composing teaching materials, and it will play an important role, along with the author's concern for the student's needs and the student's abilities, in determining the ease or difficulty of the reading process and the usefulness of the material.

The author of materials for social studies and science has less freedom than his counterpart in providing materials for reading. The former is especially hard-pressed in trying to accommodate the range in students' ability to think efficiently, to perceive relationships with skill and to handle the language with facility. This difficulty stems from the fact that each subject area has its own specialized vocabulary which is often inseparable from the concepts peculiar to that area. Any discussion of these concepts, especially in science, must involve use of this vocabulary, often to the detriment of the average student. The subject area also carries with it an order and a set of relationships among facts and concepts. This order is usually imposed on explanatory material in the subject area. The student must perceive these relationships as they are presented, even though they may relate to nothing in his experience outside the subject area itself. Similarly, each concept reduces itself to a set of facts which are essential to an explanation of the concept. The necessity of including a large number of facts in a relatively brief consideration of a concept can often lead to an overload of facts for the average student. As a result, textbooks in the content areas are usually more difficult than basal readers because of greater concept load.

The author of social studies and science materials can extract from the probable experiential background of his students certain situations and contexts which will help to explain and relate certain parts of the subject matter. While it is difficult to do this, he can also adjust the focus of his material to the level of maturity and interest of his students. In both these areas his flexibility is only as great as his sympathy for and knowledge of the students for whom he is writing.

CONCLUSION

The problems which arise from the nature of reading are the problems of matching the symbols used to convey concepts with those which the reader is either ready or able to grasp. The task of composition of materials should be less complex for the author of materials to teach reading skills than it is for the author of social studies and science materials because the latter must meet the demands of a subject matter without going beyond his readers. These factors compel those responsible for selection of instructional materials to assess them critically and with the aid of measuring devices such as readability formulas.

CHAPTER III

REVIEW OF RELATED LITERATURE

This chapter reviews research on specific aspects of reading and readability as it relates to social studies and science textbooks. It also considers the role of the textbook in social studies and science teaching and the wide range of reading abilities in a classroom. There is included discussion of the research in readability itself, with concentration on the factors affecting readability and the choice of a readability formula. The bulk of the review of research relates to readability formulas per se, their composition, and their application in studies of social studies and science textbooks.

THE ROLE OF THE TEXTBOOK IN SOCIAL STUDIES AND SCIENCE TEACHING

In the early schools, the textbook was considered to be an indispensable tool because it provided ready made answers to such questions as what to teach and how to teach it.[1] Despite the fact that our century seems to have faced a revolution in communication, " the textbook remains the basic instructional tool".[2] Books are always available; unlike the

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[1]Ernest Hillow, "Textbooks," Encyclopedia of Educational Research, ed. Robert L. Ebel (4th ed.; Toronto, Ontario: Macmillan Co., 1959), p.1471

[2]Jack Allen, "Corporate Expansion and Social Studies Textbooks," Social Education (March, 1969), p. 289.

teaching film, or a television program, they can be returned to, reread and studied.

Relying on the textbook to the exclusion of virtually all other learning sources is not a satisfactory solution in teaching social studies and science. But in addition to a wide range of other materials, the textbook has several major values. Textbooks still maintain a central role in curriculum practice because their essential function is to make the knowledge which does exist available to the student in a selective and orderly way.

Textbooks in social studies and science have changed in retent years in response to research towards a new curriculum, new concepts of social learning and research dealing directly with the textbooks themselves. Social studies and science textbooks have incorporated new subject matter and new methodological emphasis. These textbooks are increasingly organized on unit bases and tend to place more stress on functional materials and less on detailed facts. They provide an overview of topics or problems to be studied and make available to the children in the class a common background of information, a starting point which provides basic information for all. They also tend to include more concrete content, better maps, graphs, pictures, illustrations, accurate renditions and sophisticated cartographic techniques.[3]

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[3]Malcolm Douglass, Social Studies: from theory to practice in elementary education (Philadelphia: J.B. Lippincott Co., 1967), p. 380-389.

Thus, the textbook, while maintaining its central position in the classroom, no longer is composed as it was in the past. Nevertheless, problems relating to reading persist.

ACCOMMODATING CLASSROOM DIFFERENCES

Despite these improvements in textbooks, research has demonstrated that most books are still too difficult for the majority of pupils in the grades for which the books are intended. In a review of textbook readability findings, Smith and Dechant concluded that the textbooks in the content area may run one or two grades above their placement.[4] If one accepts the rationale that students at or above the grade-level should be able to comprehend the material, while those below the grade placement of the textbook would experience difficulty in comprehending the material,[5] it is little wonder that average and above average pupils in addition to less endowed pupils experience difficulty with the printed word in science and social studies.

This lack of congruency between textbooks and their designated grade-levels, coupled with the fact that "most classes ... range in reading ability as much as six grades or more"[6] requires teachers to resort to devices like grouping in a classroom in the effort to provide

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[4]H.P. Smith and B.U. Dechant, Psychology in Teaching Reading (Englewood Cliffs, New Jersey: Prentice Hall, 1951), p. 245.

[5]Terry A. Cline, "Readability of Community College Textbooks," Journal of Reading, XVI (October, 1972), 35.

[6]W.S. Gray and B.F. Leary, What Makes a Book Readable (Chicago: University of Chicago Press), p. 1.

the right child with the right book at the right time. As a result the readability of content area textbooks is highly important to the concerned teacher. Much of the research on readability has in fact been geared to studying this set of problems.

A DEFINITION OF READABILITY

A definition of the word "readability", like that of the word "intelligence", presents problems to educators. There is no firm theoretical understanding of the concept of readability, but there are practical and empirical understandings. Practically speaking, we use the word "readability" to describe the ease or difficulty involved in a given reading task. Yet, this task always involves two sets of factors, and when we try to measure the effect of these factors on the ease or difficulty of reading, we introduce a third set of factors involved in the measurement itself.

These complexities of defining readability in printed material were noted and summarized by Edgar Dale and Jeanne Chall as follows:

> We have discussed the three chief interacting variables which affect the readability of a particular piece of material. First, the book or article itself - its format and organization; its subject matter and themes; its expressional elements such as vocabulary, sentence structure, etc. Second, the reader - his general experience and specific experience along the lines of the book he is reading. Third, the criterion used to estimate readability - whether we use a measure of interest, comprehension or speed of reading; and the methods used to estimate these criteria.[7]

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[7] Edgar Dale and Jeanne Chall, "The Concept of Readability," Elementary English, XXVI (January, 1949), 23.

In the quest for a totally objective concept of readability all of these factors must be considered, but greatest significance will usually be placed on those which are most easily measured.

FACTORS AFFECTING READABILITY

In the event that certain factors prove insignificant for measurement, the choice of measurable factors will depend largely on one's understanding of reading in general, as well as the human and non-human factors involved. There are potentially, therefore, as many ways of measuring readability in reading material as there are factors influencing the difficulty of reading that material. This makes for greater flexibility in the way measuring instruments are composed by researchers for readability studies, but their selection of criteria for measurement cannot be totally arbitrary.

In a brief survey of readability, W.S. Gray[8] listed several authors who have given importance to vocabulary load as a factor contributing to reading difficulty in textbooks. Among these authors were Lively and Pressey[9], Lewerenz[10], Johnson[11], and Gray and Leary[12].

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[8] William S. Gray, "Progress in the Study of Readability," The Elementary School Journal, XLVII (May, 1947), 491-499.

[9] Bertha A. Lively and S.L. Pressey, "A Method for Measuring the Vocabulary Burden of Textbooks," Educational Administration and Supervision, IX (October, 1923), 389-390.

[10] Alfred S. Lewerenz, "Measurement of the Difficulty of Reading Materials," Los Angeles Educational Research Bulletin, VIII, (March, 1929), 11-16.

[11] George R. Johnson, "An Objective Method of Determining Reading Difficulty," Journal of Educational Research, XXI (April, 1930), 283-287.

[12] William S. Gray and Bernice E. Leary, What Makes a Book Readable (Chicago: University of Chicago Press, 1935).

Yoakam[13] gave attention solely to this factor. On the other hand, Gray[14] cites human interest as a factor given importance in the studies of Gray and Leary[15], and Flesch[16]. A third factor mentioned by Gray as crucial in some studies of readability is sentence structure[17]; this factor has been used by Vogel and Washburne[18], Gray and Leary[19], Lorge[20], Flesch[21], and Dale and Tyler[22].

A fourth factor which has been used to predict the level of readability of textbooks is the reading ability of the reader, and this

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[13]Gerald Alan Yoakam, "A Technique for Determining the Difficulty of Reading Materials," (unpublished study, University of Pittsburgh, 1930).

[14]Gray, loc. cit.

[15]Gray and Leary, loc. cit.

[16]Rudolf Flesch, "Estimating the Comprehension Difficulty of Magazine Articles," Journal of General Psychology, XXVIII (January, 1942), 63-80.

[17]Gray, loc. cit.

[18]Mabel Vogel and Carleton Washburne, "An Objective Method of Determining Grade Placement of Children's Reading Material," Elementary School Journal, XXVIII (January, 1928), 373-381.

[19]Gray and Leary, loc. cit.

[20]Irving Lorge, "Predicting Readability," Teacher's College Record, XLV (March, 1944), 404-419.

[21]Flesch, loc. cit.

[22]Edgar Dale and Ralph Tyler, "A Study of the Factors Influencing the Difficulty of Reading for Adults of Limited Reading Ability," Library Quarterly, IV (July, 1934), 384-412.

factor constitutes the basic input for the cloze procedure for predicting readability. The use of the cloze procedure involves the deletion of a number of words randomly determined or at fixed intervals, commonly every fifth word. Subjects are then asked to complete the passages and the number of correct responses is scored. In contrasting passages, those on which higher scores were obtained will be regarded as more readable than those on which lower scores were obtained.[23]

READABILITY FORMULAS

In accordance with the importance they attach to various factors, the researchers listed above have constructed formulas to measure readability. Lewerenz's "The Vocabulary Grade-Placement Formula" includes measures of vocabulary difficulty based on the ratio of simple Anglo-Saxon words to difficult technical and special meaning words of Greek and Roman derivation; vocabulary diversity based on the ratio between words appearing in "Clarke's first 500" and the total number of different words used; and interest rating based on the proportion of colorful descriptive adjectives and adverbs.[24] Flesch's "Marks of a Readable Style" uses three factors or elements; the average sentence length in words, the number of affixed morphemes, and the number of personal references.[25] Yoakam's "A Technique of Grading Books"

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[23]John Gilliland, Readability (London: University of London Press Ltd., 1972), p. 102.

[24]Alfred S. Lewerenz, "The Vocabulary Grade-Placement Formula," Journal of Experimental Education, IV (1935), p. 236.

[25]Rudolph Flesch, Marks of a Readable Style Contributions to Education, No. 897, (New York: Teacher's College, Columbia University, 1934), p. 3-6.

is based soley on the factor of vocabulary and the determining criterion of word difficulty is the Thorndike Teacher's Wordbook of 30,000 Words.[26] Lorge's "Predicting Readability" uses the factors of vocabulary, average sentence length, and the relative number of prepositional phrases. The vocabulary difficulty is determined by the Dale List of 769 easy words which is made up of those words common to the first thousand in the Thorndike List and the first thousand most frequently known by children on entering first grade.[27] Dale-Chall's "A Formula for Predicting Readability" bases the prediction of readability on the average sentence length and the percentage of unfamiliar words (that is, words that are outside of the Dale List of 3,000 words.)[28]

Each of these instruments will only be useful in a given researcher's work if it facilitates fulfillment of his research. Most researchers will want a formula which does not take too long a time to apply to the usually large amount of material for study. In this factor there is large variation between formulas, as Smith showed in her research: the Lorge formula took almost twice as long to administer per book as did the Dale-Chall formula, while the Yoakam formula took only half as long as the Dale-Chall

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[26]Gerald A. Yoakam, "Revised Directions for Using the Yoakam Technique for Grading Books," (Pittsburgh: University of Pittsburgh Press, 1948).

[27]Irving Lorge, "Predicting Readability," Teacher's College Record, XLV (March, 1944), p. 405.

[28]Edgar Dale and Jeanne Chall, "Formula for Predicting Readability: Instructions," Educational Research Bulletin, XXVII (February 17, 1948), p. 37-54.

formula to administer.[29]

PRACTICAL CONSIDERATIONS INFLUENCING THE CHOICE OF A READABILITY FORMULA

What remain, then, as the central considerations in selecting a readability formula for use in research are the objectives of the research and the nature of the reading material to be studied. If, for example, one wishes to know whether previously unused or new textbooks would be suitable for a given group of students, the student-centered approach of the cloze procedure would be quite suitable. If, on the other hand, one desires to establish the readability level of a wide range of textbooks currently in use in schools and to see how closely their level of difficulty matches the publisher's designated grade-level, then the type of formula which determined their readability in terms of grade-levels would be most useful.

Among the formulas for predicting readability which will satisfy the latter set of requirements above are the Lewerenz, the Dale-Chall, the Flesch, the Yoakam, and the Lorge formulas. These like all formulas are descriptive instruments and all concentrate on measuring the vocabulary load of written material. Except for the Flesch formula, all use word lists, which serve as their basic index of vocabulary load. These word lists also serve to link the results of these formulas to a known minimum standard of familiarity with the language.

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[29] Ruth I. Smith, "An Investigation of the Readability of Recently Published History and Geography Textbooks and Related Materials for the Fourth Grade" (unpublished doctoral dissertation, University of Pittsburgh, 1952).

Of these formulas using word lists - the Dale-Chall, the Yoakam, the Lewerenz, and the Lorge - two seem to be more frequently used than the others in research on readability in social studies and science. The Dale-Chall formula and the Yoakam formula have gained popular use in these areas. Of the studies in social studies and science textbook readability examined by this writer, the Dale-Chall formula was used twelve times[30] and the Yoakam formula was used five times.[31] The Lorge

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[30] W. Selikson, "A Critical Study of the Grade Placement of Textbooks in a Sixth Grade by the Use of Two Readability Prediction Formulas" (unpublished Master's thesis, Ohio State University, 1951); Smith loc. cit.; Le Roy Wood, "Readability of Certain Textbooks," Elementary English, XXXI (April, 1954), 214-216.; Nita M. Wyatt and Robert W. Ridgeway, "A Study of the Readability of Selected Social Studies Materials," University of Kansas Bulletin of Education, XII (1958), 100-105.; William T. Walker, "Measured Readability of Intermediate Grade Programmed Textbooks," The Teacher's College Journal, XXXVII (March, 1966), 179-181.; Fred A. Sloan, "Readability of Social Studies Textbooks for Grades Four, Five, and Six, as measured by the Dale-Chall Formula" (unpublished Ph.D. disseration, George Peabody College for Teachers, 1959).; Wilbur R. Miller, "Readability versus Reading ability," Journal of Educational Research, LVI(December, 1962), 205-209.; Val E. Arnsdorf, "Readability of Basal Social Studies Materials," Reading Teacher, XVI(January, 1963), 243-246.; Robert E. Mills and Jean R. Richardson, "What Do Publishers Mean by 'Grade-Level'?" The Reading Teacher, XVI (March 1963), 359-362.; W.R. Brown, "Science Textbook Selection and the Dale-Chall Formula," School Science and Mathematics, LXV (February,1965), 164-167.; W.J. Gallaway, "A Readability Study of Selected Textbooks Used in Grades Four, Five, and Six" (unpublished Master's thesis, Sacramento College, California, 1968).; W.Cramer and D. Dorsey, "Science Textbooks: How Readable are They?" Elementary School Journal, LXX (October,1969), 28-33.

[31] Smith, loc. cit.; Le Roy Wood, "Readability of Certain Textbooks," Elementary English, XXXI (April,1954), 214-216.; Jacob Eugene Burkey, "The Readability Levels of Recently Published Elementary Science Textbooks" (unpublished Ph.D. disseratation, University of Pittsburgh, 1954).; Hyman Hafner, "A Study of Vocabulary Load and Social-Concept Burden of Fifth and Sixth Grade Social Studies, History, and Geography Textbooks" (unpublished Ph.D. dissertation, University of Pittsburgh,1959).; John F. Newport, The Elementary School Journal,LXVI (October, 1965), 40-43.

formula was used three times[32], and the Lewerenz formula was not used at all. The Flesch formula was used four times[33]. Thus, the popularity of the Dale-Chall formula as a tool of research was a factor in selection of it for use in this study.

The results of two independent studies[34] in readability were additional factors in the selection of the Dale-Chall formula for use in the present study of readability in social studies and science textbooks. Klare pointed out that the Dale Chall formula is one of the "most frequently used,"[35] "more highly predictive than any of the other popular formulas available today,"[36] and "consistently more accurate than others."[37]

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[32]Avis Kilgore Porch, "Reading Difficulty of Adopted Textbooks" (unpublished Master's thesis, Alabama Polytechnic Institute, 1946).; Smith, loc. cit.; Le Roy Ottley, "Readability of Science Textbooks for Grades Four, Five, and Six," School Science and Mathematics, LXV (April, 1965), 363-366.

[33]W. Selikson, "A Critical Study of the Grade Placement of Textbooks in a Sixth Grade by the Use of Two Readability Predictfon Formulas" (unpublished Master's thesis, Ohio State University, 1951).; Edmund W.J. Faison, "Readability of Children's Textbooks," The Journal of Educational Psyschology, XLII (January 1951), 43-51.; George Mallinson, Harold E. Sturm, and Lois M. Mallinson, "The Reading Difficulty of Some Recent Textbooks for Science," School Science and Mathematics, LVII (1957), 364-366.; Wilbur R. Miller, "Readability versus Reading ability," Journal of Educational Research, LVI (December, 1962), 205-209.

[34]George R. Klare, The Measurement of Readability (Iowa: Iowa State University Press, 1963); W.J. Gallaway, "Readability Study of Selected Textbooks in Grades Four, Five, and Six" (unpublished Master's thesis, Sacramento College, California, 1968).

[35]George R. Klare, The Measurement of Readability (Iowa: Iowa State University Press, 1963), p. 59.

[36]Ibid., p. 60.

[37]Ibid., p. 22.

Gallaway in an unpublished master's thesis stated that "the wide use of the (Dale-Chall) formula in other readability studies concerning textbooks in specific areas, such as science and social studies, gave preference to the Dale-Chall formula over others."[38]

READABILITY OF TEXTBOOKS

The research in the readability of textbooks of various kinds reveals a difference in the levels of difficulty between basal readers and non-reading textbooks. Roe concludes from her study of the readability of elementary school textbooks that "in general, basal readers have become decreasingly difficult over the years," but that "such control has not been evident in all other subjects."[39] She implies that readers received major attention concerning appropriate readability, while subject matter textbooks have been neglected.[40]

Readability of Social Studies Textbooks

In their study of sixth-grade texts in history, Bedillon and Brown, quoted in Seeger, found great difficulty for the average reader.[41] Zacur, quoted in Yoakam, studied ten history textbooks and found in them an average

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[38]W.J. Gallaway, "Readability Study of Selected Textbooks Used in Grades Four, Five, and Six" (unpublished Master's thesis, Sacramento College, California, 1968), p. 21.

[39]Betty Daniel Roe, "Readability of Elementary School Textbooks," Journal of the Reading Specialist, IX (May, 1970), 168.

[40]Ibid., p. 163-168.

[41]J.C. Seegers, "Vocabulary Problems in the Elementary School - A Digest of Current Research," The Elementary English Review, XVI (December, 1939), 322.

over-difficulty of 1.4 grades.[42] Hill reported that, although use of words lists had lessened the difficulty in social studies textbooks, there was still a major problem of difficulty in the intermediate grades.[43]

Brown found that the vocabularies of sixth-grade textbooks in history were more difficult than those of sixth-grade basal readers. The difficulty arose because a pupil had to know from 800 to 850 more words to use in the history textbooks effectively than he did to use the basal readers.[44] Similar results, and results confirming the extent to which social studies textbooks were too difficult for the grade using them, were reported by Porch[45] and Smith[46]. Sloan reported that of the twenty-one fourth, fifth, and sixth-grade social studies textbooks he analyzed, only eleven coincided in readability with the publisher's designated grade level.[47] Haffner demonstrated in his study of fifth and sixth-grade social

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[42]Gerald Yoakam, "The Reading Difficulty of School Textbooks," The Elementary English Review, XXII (December, 1945), 308.

[43]Wilhemina Hill, "Social Studies Textbooks for Children," Social Education, XVIII (February, 1954), 74.

[44]Robert Brown, "Vocabularies in History and Reading Textbooks," Bulletin of the Department of Elementary Principals, X (1931), 408-411.

[45]Avis Kilgore Porch, "Reading Difficulty of Adopted Textbooks" (unpublished Master's thesis, Alabama Polytechnic Institute, 1946).

[46]Ruth I. Smith, "An Investigation of the Readability of Recently Published History and Geography Textbooks and Related Materials for the Fourth Grade: (Unpublished ED.D., dissertation, University of Pittsburgh, 1952).

[47]Fred A. Sloan, "Readability of Social Studies Textbooks for Grades Four, Five, and Six, as measured by the Dale-Chall Formula: (unpublished Ph.D. dissertation, George Peabody College for Teachers, 1959).

studies textbooks that they contain excessive vocabulary loads and concept burdens.[48]

Another aspect of the difficulty of social studies in the intermediate grades is the lack of progression from reading ease to reading difficulty at various points in many texts. Porch noted both of these types of reading difficulty in fourth, fifth, and sixth-grade social studies textbooks.[49] Wyatt and Ridgway, writing of a study by Ridgway, reported extremes of difficulty in fourth, fifth, and sixth-grade textbooks; the same authors wrote of the same problem arising in a study by Walker of fifth-grade social studies textbooks.[50] Sloan found that there was a wide range of readability scores in most of the fourth, fifth, and sixth-grade social studies textbooks he studied.[51] In his 1963 study Arnsdorf found, in an analysis of four basal social studies series, that the publisher's recommended progression from reading ease to reading difficulty was marred by irregularities both within and between the texts.[52] Gallaway,

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[48]Hyman Haffner, "A Study of Vocabulary Load and Social-Concept Burden of Fifth and Sixth Grade Social Studies, History, and Geography Textbooks" (unpublished Ph.D. dissertation, University of Pittsburgh, 1959).

[49]Porch, loc. cit.

[50]Nita M. Myatt and Robert W. Ridgway, "A Study of the Readability of Selected Social Studies Materials," University of Kansas Bulletin of Education, XII (1958), 100-105.

[51]Fred A. Sloan, "Readability of Social Studies Textbooks for Grades Four, Five, and Six, as measured by the Dale-Chall Formula" (unpublished Ph.D. dissertation, George Peabody College for Teachers, 1959).

[52]Val E. Arnsford, "Readability of Basal Social Studies Materials" Reading Teacher, XVI (January, 1963), 243-246.

in his study of readability levels in selected basal readers, language, science and social studies textbooks, found that the reading difficulty did not always increase from beginning to end of the book, nor did the reading difficulty increase at a uniform rate from grade to grade.[53]

Readability of Science Textbooks

Recent studies in the readability of science textbooks have revealed similar kinds of difficulty. Mallinson and others in 1950 concluded that fourth, fifth, and sixth-grade science textbooks were too difficult for the children who would have to use them. They also discovered that transition from reading ease to reading difficulty in each book was not gradual, and in many cases the reverse transition was present.[54] Ottley found similar problems in intermediate science texts;[55] and Mallinson and others found in a study of unit-type science texts that they were too difficult for the publisher's suggested grade-level.[56] Burkey's study revealed that only eighteen of forty-one elementary science textbooks were at the designated reading level, and that in the texts which were too difficult, only thirty-five of all the difficult words were technical in nature.

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[53]W.J. Gallaway, "Readability Study of Selected Textbooks Used in Grades Four, Five, and Six" (unpublished Master's thesis, Sacramento College, California, 1968).

[54]George Mallinson, Harold E. Sturm, and Robert E. Patton, "The Reading Difficulty of Textbooks in Elementary Science," The Elementary School Journal, L (April, 1950), 460-463.

[55]Le Roy Ottley, "Readability of Science Textbooks for Grades Four, Five, and Six," School Science and Mathematics, LXV (April, 1965), 363-366.

[56]George Mallinson, Harold E. Sturm, and Lois M. Mallinson, "The Reading Difficulty of Unit-Type Textbooks for Elementary Science," Science Education, XXXIX (December, 1955), 410.

Burkey's study indicated the presence of extremes of reading ease and reading difficulty within each textbook and even from page to page.[57] Newport did a study to determine the readability level of nine continuous series of science texts for use in grades one through six. The primary level texts were appropriate for their readers, except for the overly difficult first-grade texts, but the intermediate level books varied widely in their levels of readability.[58] Mallinson and his associates continued to keep check on the readability of science textbooks after 1950. Nine studies published in educational journals since 1950 have pointed out that the levels of reading difficulty of many science texts were too advanced for the students for whom they were written. Mallinson reported that many textbooks which had average readability scores appropriate for the grade for which they were assigned contained many passages on the college level of reading difficulty. He also found that very often reading difficulty was due to non-technical words than to scientific terms.[59] Mallinson, in

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[57]Jacob Eugene Burkey, "The Readability Levels of Recently Published Elementary Science Textbooks" (unpublished Ph.D. dissertation, University of Pittsburgh, 1954).

[58]John E. Newport, "The Readability of Science Textbooks for Elementary School," The Elementary School Journal, LXVI (October, 1965).

[59]George Mallinson, H. Sturm, and Lois M. Mallinson, "The Reading Difficulty of Textbooks in Junior High School Science," School Review, LVIII (December, 1950), 526-540.; George Mallinson, H. Sturm, and R.E. Patton, "The Reading Difficulty of Textbooks in Elementary Science," Elementary School Journal, L (April, 1950), 460-463.; George Mallinson, "The Readability of High School Texts," The Science Teacher, XVIII (November, 1951), 253-256.; George Mallinson, H. Sturm, and L.M. Mallinson, "The Reading Difficulty of Textbooks for High-School Physics," Science Education, XXXVI (February, 1952), 19-23.; George Mallinson, H. Sturm, and L.M. Mallinson, "The Reading Difficulty of Textbooks for High-School Chemistry," Journal of Chemical Education, XXIX (1952), 629-631.;

continued study of readability in science textbooks, reported that recent science textbooks had not improved in readability; in fact, he said, if we presume that the level of reading difficulty of a textbook should be one grade below the reading level of the student for whom it was intended, only a few textbooks could be considered under that criterion.[60]

SUMMARY

The evidence cited above of the problem of reading difficulty in social studies and science textbooks demonstrates the need for continual study of such textbooks to determine what demands they are making on their readers. As the studies show, there is more of a problem with content area textbooks, especially, social studies and science textbooks, than there is with the scrupulously controlled basal readers.

Besides the implication of the evidence which research has provided, there are other reasons for concern over extremes of difficulty in social studies and science textbooks. One of these reasons stems from the basic difference between the nature of such content area textbooks and the

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George Mallinson, H. Sturm, and L.M. Mallinson, "The Reading Difficulty of Textbooks for General Physical Science and Earth Science," School Science and Mathematics, LIV (November, 1954), 612-616.; "The Reading Difficulty of Unit-Type Textbooks for Elementary Science," Science Education, XXXIX (December, 1955), 406-410.; "The Reading Difficulty of Some Recent Textbooks for Science," School Science and Mathematics, LVII (May, 1957), 364-366.; George Mallinson, "Textbook and Reading Difficulty in Science Teaching," The Science Teacher, XXV (December, 1958), 474-475.

[60] George Mallinson, Harold E. Sturm, Lois M. Mallinson, "The Reading Difficulty of Some Recent Textbooks for Science," School Science and Mathematics, LVII (May, 1957), 364-366.

nature of basal readers. In other words, in basal readers the focus is continually on the expression of events and ideas that are in themselves not to be learned, whereas in social studies and science textbooks the focus is continually on the concepts and facts which comprise part of the content of the subject area. Eventually, therefore, the textbook used to teach reading leads to the recognition and use of the very expression within that textbook; the textbook used to teach social studies and science aims at the recognition and use of concepts and facts expressed in those textbooks. When a reader fails to grasp the expression of a basal reader, i.e. the vocabulary and sentence structure, the reader's problem can be corrected by paying greater attention to the expression itself. But when the reader of a content area textbook fails to grasp the expression of certain ideas, he is two steps behind the pace, and his problem is a doubly complex one. For this reason it is crucial to the success of the student of social studies and science textbooks that his textbooks be at a level of reading ease that will allow him to progress beyond the expression to the important concepts themselves.

CHAPTER IV

THE DESIGN OF THE STUDY

This chapter includes a description of the Dale-Chall Readability Formula and a discussion of the reasons why it was selected for this study. This discussion will emphasize the limitations of the Dale-Chall Readability Formula, and how the formula was applied in this study. The chapter also contains a list of the textbooks which were sampled in this study.

THE DALE-CHALL READABILITY FORMULA

The Dale-Chall Readability Formula is a simple and easily applied formula because it includes only two straight-forward factors. These factors are percentage of unfamiliar words (words outside the Dale List of 3000 Words) and average sentence length. The formula has had wide application since its appearance in 1948; educators have used it to determine the reading level of school textbooks and various types of literature and publications with difficulty ranging from as low as fourth-grade. Many experiments conducted by Dale-Chall confirm that there is a high correlation between the formula's predictions and the judgements of experts on readability; the formula's predictions also correlate well with the reading grades of children and adults who were able to answer at least fifty to seventy-five per cent of the questions asked on the material used

in the experiment.[1]

Selection

As was mentioned earlier, one of the central considerations in selecting a readability formula for use in research are the objectives of the research; another primary consideration is the nature of the material to be studied. In this study the proposal is to establish the readability level of social studies and science textbooks currently in use or under active consideration for use in Newfoundland schools. This study hopes specifically to discover how closely the level of difficulty in each textbook matches the publisher's designated grade-level for that same textbook.

Three factors were of importance in selecting the Dale-Chall formula for use in this study: (1) its high popularity; the formula was applied twelve times by different researchers in social studies and science textbook readability studies; (2) Gallaway's comment in an unpublished master's thesis that "the wide use of the (Dale-Chall) formula in other readability studies concerning textbooks in specific areas, such as science and social studies, gave preference to the Dale-Chall formula over others"; (3) Klare, having examined all existing readability formulas in his book Measurement of Readability points out that the Dale-Chall

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[1]Edgar Dale and Jeanne Chall, "A Formula for Predicting Readability," Educational Research Bulletin, XXVI (January, 1948), 18-19.

[2]W.J. Gallaway, "A Readability Study of Selected Textbooks Used in Grades Four, Five, and Six" (unpublished Master's thesis, Sacramento College, California, 1968), p. 21.

formula is one of the "most frequently used,"[3] "more highly predictive than the other popular formulas available today,"[4] and "consistently more accurate than others."[5]

Limitations

As we use the Dale-Chall formula in determining the readability level of social studies and science textbooks, it must be remembered that the results obtained are not precise in nature. The Dale-Chall formula does not: (1) adequately measure any concepts involved in the textbooks; (2) make provision for words defined in context; (3) measure indiomatic expressions or the ratio of abstract and concrete terms; (4) evaluate the organizational character of materials, the manner of presentation or the degree of explanation of terms and principles; and (5) measure the reader's interest.

Despite its limitations, however, the Dale-Chall formula is valid for measuring the vocabulary element in reading materials in terms of 'hard', 'rare', or 'long' words and for measuring sentence length.[6] As

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[3]George Klare, The Measurement of Readability (Iowa: Iowa State University, 1963), p. 59.

[4]Ibid., p. 60.

[5]Ibid., p. 22.

[6]Edgar Dale and Jeanne Chall, "Reply" Elementary English, XXXIII (December, 1956), 520-522.

readability formulas go, it is one of the best devices available to procure a prediction of the difficulty of social studies and science textbooks.

THE APPLICATION OF THE DALE-CHALL FORMULA

In this study the Dale-Chall Formula will be applied to all twenty-one social studies and science textbooks in grades four, five, six, seven, and eight. The formula will be applied in exactly the same way to each of the twenty-one textbooks. No attempt will be made to select pages or passages which might affect the outcome of the study. The difference between the number of samples taken from each textbook will be controlled simply by the total number of pages within a textbook.

The following is a brief, step-by-step explanation of the normal application of the Dale-Chall Readability Formula.[7]

(1) Every tenth page in each book is selected mechanically as a sample page as specified by the formula. When the tenth page contains insufficient words for a sample, i.e., less than 100 words, recourse is made to the preceeding page and, failing that, to the succeeding page; this pattern is followed until a page of at least 100 words is found and used as a sample.

(2) One sample of 100 words from each of these pages is selected, counted, and recorded.

(3) Completed sentences in the sample are counted and recorded.

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[7] Edgar Dale and Jeanne Chall. "A Formula for Predicting Readability: Instructions," Educational Research Bulletin, XXVII (February, 1948), 37-54.

(4) Each word in each passage is then compared to the Dale List of 3000 Words to determine if it is on that list. If it is not, the word is considered unfamiliar, and the total number of unfamiliar words in each sample is counted and recorded. All special rules outlined by Dale-Chall regarding certain parts of speech are followed.

(5) The average sentence length in a sample is computed by dividing the number of words in the sample by the number of sentences in the sample.

(6) The Dale Score, or percentage of unfamiliar words (words outside the Dale List), is computed by dividing the number of words not on the Dale List by the number of words in the sample, and multiplying by 100.

(7) The Formula Raw Score is determined by use of the Dale-Chall Formula:

Sample Readability Raw Score = .1579 (proportion of unfamiliar words) + .0496 (average sentence length) + 3.6365

(8) The Average Formula Raw Score for all samples in each textbook is then converted to a corrected grade-level, by reference to Dale-Chall Correction Table. The corrected grade-level indicates the grade at which a book or article can be read with understanding. These corrected grade-levels correspond to raw scores obtained by the use of the Dale-Chall Readability Formula and serve to determine the grade-level of materials being appraised by use of the Dale List. The Dale-Chall Correction Table[8] is reproduced in Table 1 below.

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[8] Edgar Dale and Jeanne Chall, "A Formula for Predicting Readability: Instructions," Educational Research Bulletin, XXVII (February, 1948), 42.

TABLE 1

DALE-CHALL

CORRECTION TABLE

Formula Raw Score	Correction Grade-Levels
4.9 and below	4th grade and below
5.0 to 5.9	5-6th grade
6.0 to 6.9	7-8th grade
7.0 to 7.9	9-10th grade
8.0 to 8.9	11-12th grade
9.0 to 9.9	13-15th grade (college)
10.0 and above	16-(college graduate)

Because I have used in this study a table devised by Goltz[9] for the quick computation of readability scores using the basic steps of the Dale-Chall Readability, there are certain changes, additions, and omissions in comparison with the normal procedure outlined above. These changes, additions, and omissions are as follows:

(1) Step 1 remains as in the normal application of the Dale-Chall formula;

(2) The word count for each sample must be exactly 100 words, excluding for the purposes of this study all headings and captions;

(3) The sentence count must include only the number of whole sentences in each sample passage;

(4) Step 4 remains as in the normal application of the Dale-Chall formula;

(5) What would normally be steps 5,6, and 7 are not necessary when use is made of Goltz's tables. Instead the Dale-Chall Raw Score must be read directly from Goltz's Table 1, using the two measures of sentence count and unfamiliar word count.

(6) What would normally be Step 8 is changed slightly to read that the average Dale-Chall Raw Score for all samples in each textbook can be converted to a corrected grade-level for each textbook, by reference to Dale-Chall Correction Table.

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[9] Charles R. Goltz, "A Table for the Quick Computation of Readability Scores Using the Dale-Chall Formula," Journal of Developmental Reading, VII (Spring, 1964), 184-186.

TEXTBOOKS SELECTED FOR THE STUDY

The textbooks selected for the study were those textbooks recommended for grades four, five, six, seven, and eight by the Newfoundland Department of Education for social studies and science. The textbooks selected, the names of the publishers, and the years in which they were published are given in Table II. Although other textbooks and materials are used by some teachers in each of the subject areas, the selection of these books for this study was thought to be of more significance to the majority of teachers because these are the textbooks which are recommended by the Newfoundland Department of Education for use in the appropriate grades.

TABLE II

SELECTED TEXTBOOKS, PUBLISHERS AND YEAR PUBLISHED

Textbook & Publisher	Year Published
Fourth-Grade	
Health Science - Book Four Doubleday Canada Ltd.	1968
Modern Science - Level Four Laidlaw Brothers	1970
Elementary School Science (6204) Addison-Wesley Publishing Company	1972
Around Our World Ginn and Company	1965
Fifth-Grade	
Health Science - Book Five Doubleday Canada Ltd.	1968
Modern Science - Level Five Laidlaw Brothers	1970
Elementary School Science (6205) Addison-Wesley Publishing Company	1972
Newfoundland and Labrador - A Brief History J.M. Dent and Sons (Canada) Ltd.	1968
Geography of Newfoundland Copp-Clarke Publishing Company	1972

TABLE II (continued)

Textbook & Publisher	Year Published
Sixth-Grade	
Health Science - Book Six Doubleday Canada Ltd.	1968
Modern Science Level Six Laidlaw Brothers	1970
Elementary School Science (6206) Addison-Wesley Publishing Company	1972
Land of Promise The House of Grant (Canada) Ltd.	1960
Canada - This Land of Ours Ginn and Company	1970
Seventh-Grade	
Exploring Science - Stage One- MacMillan of Canada	1971
Exploring World History Globe Book Company	1969
Canada and Her Neighbours Ginn and Company	1966
Ginn Studies in Canadian History Ginn and Company	
-Includes: The Voyageurs	1969
Colonists at Port Royal	1970
Nomads of the Shield	1970
The Fur Fort	1970

TABLE II (continued)

Textbook & Publisher	Year Published
Eighth-Grade	
Exploring Science - Stage Two	
MacMillan of Canada	1967
Britain - The Growth of Freedom	
J.M. Dent and Sons (Canada) Ltd.	1960
Southern Lands	
Ginn and Company	1965

CHAPTER V

FINDINGS

This chapter contains the results of the application of the Dale-Chall Readability Formula to twenty-one selected textbooks. Grade-level readability results are presented in tabular form in terms of the corrected grade-levels, the percentage of unfamiliar words, and the average sentence length for each textbook. The tables present additional data on the readability of textbooks at each grade-level. These data include the overall mean raw score for each textbook, the range of raw scores for each textbook, the mean raw scores for successive thirds of each textbook, and the standard deviation for each textbook. The mean raw scores for successive thirds of each textbook were derived by dividing the total number of samples into thirds and averaging the raw score of the samples in each third.

RESULTS BY GRADE-LEVEL

In analyzing the results of the application of the Dale-Chall Readability Formula in this study two questions were considered: first, to what extent do the results for each textbook sampled conform to or deviate from the publisher's designated grade-level for that textbook; and second, to what extent do the results for each textbook demonstrate success or failure in the attempt to build into that textbook a gradual progression from material that is less difficult to material that is more difficult for the average reader at the grade-level for which the book is designed?

Readability Results of Selected Fourth-Grade Textbooks

The results of the application of the Dale-Chall Readability Formula to four fourth-grade textbooks are shown in Table III. Around Our World, a social studies textbook, Health Science - Book Four, Elementary School Science (6204), all scored within a range that put them at least one grade above their designated grade-level. Modern Science - Level Four scored within a range that put it at least three grades above its designated grade-level.

Of the four textbooks sampled at the fourth-grade level, only Health Science - Book Four demonstrates an internal progression from less difficult to more difficult material; Around Our World and Modern Science - Level Four are both erratic in this factor.

Readability Results of Selected Fifth-Grade Textbooks

The results of the application of the Dale-Chall Readability Formula to five fifth-grade textbooks are shown in Table IV. Newfoundland and Labrador - A Brief History, Geography of Newfoundland, and Elementary School Science (6205), all scored within a range that includes their appropriate grade-level. Health Science - Book Five and Modern Science - Level Five scored within a range that put them at least two grades above their designated grade-level.

Of the five textbooks sampled at the fifth-grade level, Health Science - Book Five and Elementary School Science (6205) demonstrate an internal progression from less difficult to more difficult material.

Readability Results of Selected Sixth-Grade Textbooks

The results of the application of the Dale-Chall Readability

TABLE III

READABILITY RESULTS FOR FOURTH-GRADE TEXTBOOKS

Title	Raw Score Means 1st 3rd.	Mid. 3rd.	Last 3rd.	Overall Mean Raw Score	Raw Score Range	S.D.	% of Unfam. Words	Av. Sent. Length	Corrected Grade Level
Around Our World	5.36	4.95	5.20	5.18	4.09-7.46	.73	5.35	14.20	5-6th
Health Science Book Four	5.13	5.63	5.96	5.57	4.13-7.98	.99	8.25	12.55	5-6th
Modern Science Level Four	6.01	5.87	6.37	6.08	5.05-8.18	.80	11.66	12.25	7-8th
Elementary School Science (6204)	4.91	5.82	5.34	5.36	4.19-7.08	.81	7.66	10.48	5-6th

TABLE IV

READABILITY RESULTS FOR FIFTH-GRADE TEXTBOOKS

Title	Raw Score 1st 3rd.	Mid. 3rd.	Means Last 3rd.	Overall Mean Raw Score	Raw Score Range	S.D.	% of Unfam. Words	Av. Sent. Length	Corrected Grade Level
Newfoundland and Labrador - A Brief History	5.48	6.12	5.95	5.83	4.82-6.56	.37	8.35	17.94	5-6th
Geography of Newfoundland	5.62	5.86	5.62	5.70	4.62-7.10	.74	6.38	20.05	5-6th
Health Science Book Five	5.85	6.54	7.66	6.76	4.57-8.88	.54	15.40	13.81	7-8th
Modern Science Level Five	6.13	6.58	6.20	6.31	4.57-8.10	.95	12.85	13.12	7-8th
Elementary School Science (6205)	5.49	5.80	5.81	5.70	4.50-7.61	.77	11.41	12.16	5-6th

Formula to five sixth-grade textbooks are shown in Table V. Land of Promise and Canada - This Land of Ours, two social studies textbooks, and Elementary School Science (6206) scored within a range that put them at least one grade above their designated grade-level. Health Science - Book Six and Modern Science - Level Six scored within a range that put them at least three grades above their designated grade-level.

Of these, however, Modern Science - Level Six may actually be lower: the high standard deviation for that textbook (1.13) indicates some variability in the sampling from that text. The range of raw scores indicates some very high raw scores and reference to the raw data for Modern Science - Level Six shows that there are many samples from that textbook which have extremely high raw scores.

Of the five textbooks sampled at the sixth-grade level, Land of Promise, a social studies textbook, Health Science - Book Six and Modern Science - Level Six demonstrate an internal progression from less difficult to more difficult material; Canada - This Land of Ours, a social studies textbook, and Elementary School Science (6206) do not demonstrate this internal progression.

Readability Results of Selected Seventh-Grade Textbooks

The results of the application of the Dale-Chall Readability Formula to four seventh-grade textbooks are shown in Table VI. Ginn Studies in Canadian History, Exploring World History, and Exploring Science - Stage One, all scored within a range which includes their appropriate grade-level. Canada and Her Neighbours, a social studies textbook, scored within a range that put it at least two grades below its designated grade-level.

TABLE V

READABILITY RESULTS FOR SIXTH-GRADE TEXTBOOKS

Title	Raw Score Means 1st 3rd.	Mid. 3rd.	Last 3rd.	Overall Mean Raw Score	Raw Score Range	S.D.	% of Unfam. Words	Av. Sent. Length	Corrected Grade Level
Land of Promise	6.08	6.35	6.51	6.31	4.94-8.10	.71	11.44	17.61	7-8th
Canada-This Land of Ours	6.45	6.23	6.61	6.42	5.42-7.76	.71	12.50	16.72	7-8th
Health Science Book Six	6.75	6.97	7.37	7.02	5.57-8.45	.89	16.72	16.13	9-10th
Modern Science Level Six	6.61	7.49	8.03	7.38	5.40-9.62	1.13	19.18	14.44	9-10th
Elementary School Science (6206)	5.76	6.47	6.21	6.14	4.92-8.05	.89	11.41	12.09	7-8th

TABLE VI-

READABILITY RESULTS FOR SEVENTH-GRADE TEXTBOOKS

Title	Raw Score Means 1st 3rd.	Mid. 3rd.	Last 3rd.	Overall Mean Raw Score	Raw Score Range	S.D.	% of Unfam. Words	Av. Sent. length	Corrected Grade Level
Ginn Studies In Canadian History	6.52	6.60	6.78	6.64	5.88-7.78	.67	12.62	21.12	7-8th
Canada and Her Neighbours	5.32	5.36	5.56	5.42	4.35-6.52	.56	5.52	18.47	5-6th
Exploring World History	6.46	6.26	6.22	6.31	4.66-8.20	.86	19.49	14.60	7-8th
Exploring Science Stage One	6.67	7.17	6.92	6.88	5.42-9.71	1.30	15.76	15.37	7-8th

However, the results for Exploring Science - Stage One may be unreliable for the same reasons as given in relation to Modern Science - Level Six.

Of the four textbooks sampled at the seventh-grade level, Ginn Studies in Canadian History and Canada and Her Neighbours demonstrate an internal progression from less difficult to more difficult material; Exploring World History and Exploring Science - Stage One are both erratic in this feature

Readability Results of Selected Eight-Grade Textbooks

The results of the application of the Dale-Chall Readability Formula to three eighth-grade textbooks are shown in Table VII. Britain - The Growth of Freedom, a social studies textbook, and Exploring Science - Stage Two scored within a range that put it at least one grade belwo its designated grade-level.

Of the three textbooks sampled at the eighth-grade level, only Britain - The Growth of Freedom, a social studies textbook, demonstrates an internal progression from less difficult to more difficult material; Southern Lands and Exploring Science - Stage Two are both erratic in this feature

SUMMARY OF FINDINGS

In the preceding presentation of data on the results of the application of the Dale-Chall Readability Formula to selected textbooks in grades four, five, six, seven and eight, two questions were consistently asked and answered. (For a summary of the grade-level results see Table VIII.) To the first question, concerning the extent to which the sampled textbooks at each grade-level are shown by the results of this

TABLE VII

READABILITY RESULTS FOR EIGHTH-GRADE TEXTBOOKS

Title	Raw Score Means 1st 3rd.	Mid. 3rd.	Last 3rd.	Overall Mean Raw Score	Raw Score Range	S.D.	% of Unfam. Words	Av. Sent. Length	Corrected Grade Level
Britian - The Growth of Freedom	6.98	7.00	7.88	7.49	6.04-9.04	.81	17.19	22.85	9-10th
Southern Lands	6.29	5.72	5.87	6.00	5.05-7.94	.71	9.17	18.07	7-8th
Exploring Science Stage Two	7.17	6.99	6.87	7.02	5.29-9.36	.77	16.78	14.43	9-10th

TABLE VIII

READABILITY RESULTS OF TEXTBOOKS

BY GRADE-LEVEL

Grade	Title	Overall Mean Raw Score	Corrected Grade Level
4	Around Our World	5.18	5-6th
4	Health Science - Book Four	5.57	5-6th
4	Modern Science - Level Four	6.08	7-8th
4	Elementary School Science (6204)	5.36	5-6th
5	Newfoundland and Labrador - A Brief History	5.83	5-6th
5	Geography of Newfoundland	5.70	5-6th
5	Health Science - Book Five	6.76	7-8th
5	Modern Science - Level Five	6.31	7-8th
5	Elementary School Science (6205)	5.70	5-6th
6	Land of Promise	6.31	7-8th
6	Canada - This Land of Ours	6.42	7-8th
6	Health Science - Book Six	7.02	9-10th
6	Modern Science - Level Six	7.38	9-10th
6	Elementary School Science (6206)	6.14	7-8th
7	Ginn Studies in Canadian History	6.64	7-8th
7	Canada and Her Neighbours	5.42	5-6th
7	Exploring World History	6.31	7-8th
7	Exploring Science - Stage One	6.88	7-8th
8	Britain - The Growth of Freedom	7.49	9-10th
8	Southern Lands	6.00	7-8th
8	Exploring Science - Stage Two	7.02	9-10th

study to conform to or deviate from their respective designated grade-levels, the responses generally show the following: at two grade-levels, grade five and grade seven, a majority of the textbooks sampled conform to their publishers' designated grade-level but at grade five the two remaining textbooks are beyond their designated grade-level and at grade seven the one remaining textbook is below its designated grade-level; second, at two grade-levels, grade four and grade six, none of the textbooks sampled conforms to its designated grade-level since all scored above; third, at the one remaining grade-level - grade eight - two of the three textbooks sampled do not conform to their publishers' designated grade-level but scored above it.

To the second question, concerning the extent to which the sampled textbooks at each grade-level are shown by the results of this study to exhibit a desirable internal progression from less difficult to more difficult reading material, the results show the following: at grades four and eight, one of the textbooks at each grade-level (Health Science-Book Four and Britain - The Growth of Freedom Gr.8) exhibited the desired internal progression from less difficult to more difficult reading material; at grades five and seven, two of the textbooks at each grade-level (Health Science - Book Five, Elementary School Science (6205) and Ginn Studies in Canadian History Gr. 7, Canada and Her Neighbours Gr. 7) exhibited the desired internal progression from less difficult to more difficult reading material; and at grade six, three of the textbooks at this grade-level (Land of Promise, Health Science - Book Six and Modern Science - Level Six) exhibited the desired internal progression from less difficult to more difficult reading material.

CHAPTER VI

CONCLUSIONS AND IMPLICATIONS

This study was designed to determine the reading difficulty of selected social studies and science textbooks in grades four, five, six, seven and eight by applying the Dale-Chall Readability Formula to each textbook. Twenty-one social studies and science textbooks, each either in use or under consideration for use in grades four to eight in Newfoundland schools, were considered in this study.

It was hoped that this study would indicate whether the textbooks analyzed were written at the appropriate reading level for the average reader in the fourth, fifth, sixth, seventh and eighth grades. The average of the readability levels for all the sample passages were computed to yield an average readability level for each textbook.

In general, the results of this study of the readability of selected social studies and science textbooks confirm the results of earlier research in these areas, despite the fact that most of that earlier research was conducted in the 1950's or before. That earlier research showed that most social studies and science textbooks sampled were not at a level of difficulty suitable for the grades for which they were assigned, that there was no orderly progression of difficulty in those textbooks, and that there were marked irregularities in the level of difficulty in a given textbook. This study found such results in the majority of the textbooks analyzed. According to the corrected grade-level scores, only eight of the twenty-one textbooks sampled were at a level of reading difficulty either equal to or lower than their

designated grade-level. The reading difficulty within the sampled textbooks does not generally progress from the beginning to the end of the textbook; only within the sixth-grade textbooks was there evidence of a consistently successful attempt to ensure internal progression from less difficult to more difficult reading material. Most of the textbooks sampled were subject to high extremes of reading difficulty in some passages. Control of extremes of reading difficulty in textbooks appears to be a problem at all grade-levels. It seems, however, to be more of a problem in the textbooks for grades four, five, six, than it is in the textbooks for grades seven and eight.

Research has generally shown that there is a difference in the level of difficulty of science textbooks as compared to social studies textbooks. The results in this study have been analyzed to see if such a difference exists here. It was found that five out of ten (50 per cent) social studies textbooks scored at their publisher's designated grade-level; and that two out of eleven (18 per cent) science textbooks scored at their publisher's designated grade-level. Also, in this study, it was found that five out of eleven (45 per cent) science textbooks exhibited the desired internal progression from less difficult to more difficult reading material; and that four out of ten (40 per cent) social studies textbooks exhibited the desired internal progression from less difficult to more difficult reading material.

There seems to be more control over the social studies textbooks sampled in this study compared to the science textbooks, in that more of the social studies textbooks conform to their publishers' designated grade-level. Yet the science textbooks exhibited a slightly greater concern

for an internal progression from less difficult to more difficult reading material.

Not only are a large majority (82 per cent) of the science textbooks above their designated grade-level but in the case of these science textbooks there is generally a larger gap between their measured readability level and their designated level of difficulty than there is in the case of the few social studies textbooks which exceeded their designated grade-level.

Thus in this study no evidence was discovered of any marked improvement in the readability of social studies and science textbooks from the situation described by researchers almost two decades ago. It is likely, therefore, that the problem of matching textbook to reader has not been simplified, and also that the difficulties of composing a textbook persist.

If we accept the ideal of normal systematic growth in reading development and comprehension of subject matter, the majority of textbooks sampled in this study will be seen generally to hinder such growth as a result of the wide range of reading levels and extremes in reading difficulty within the textbooks. In fact the wide range of reading levels in the textbooks make the learning task more difficult for students using those textbooks.

These results raise doubts about the methods that publishers have used and are using to grade their textbooks. Who do they rely on for an assessment of the worth of their textbooks? If the assessors are, as often happens, experts in a specific content area it may be that their only criterion for a successful textbook is that material in the textbook

cover the relevant area of knowledge comprehensively and accurately. Where this is the case, the expert would probably fail to assess the readability of the textbook. We do not know how a given publisher makes an assessment of his textbooks. Does he rely on professional's judgment based on experience and intuition, and does he seek to have judgment validated by scientific instruments such as readability formulas? Whatever answers publishers can provide to these questions they should make known to educators, who will then be in a better position to evaluate the accuracy of the grade-level designation of their textbooks.

The root of the problem may be the author. It is probable that authors of overly difficult and uncontrolled textbooks are unaware of reading problems that arise in the classroom. It seems that the authors are not writing to communicate to a wide range of readers but rather they are writing simply to present content material. This raises another question about the composition of textbooks: is there an opportunity for the reading specialist to contribute to the creation of a given textbook? Even where a textbook is the result of the collaboration of several authors - experts in the content area and educators together - it is possible that there is no critical examination made from the reading perspective.

When we compare the readability results for social studies and science textbooks in this study we find that the science textbooks are comparatively more difficult than the social studies textbooks. Why is this so? It is likely that the author of science textbooks is concerned with presenting a mass of facts of a technical nature in a technical form, whereas the author of social studies is working with humanistic material which can be presented in a variety of forms, es-

pecially in an easily-understood narrative manner. Therefore, the author of science materials is more prone than the author of social studies to forgetting his audience in concentrating on the presentation of his material.

IMPLICATIONS FOR AUTHORS AND PUBLISHERS

From the above discussion and the results of this study certain implications arise for authors and publishers. The most important of these is that authors and publishers of social studies and science textbooks in grades four to eight should grade their material more carefully. Being the experts they are in their content areas, authors should be aware of the heterogenous audience for whom they are writing and the interests and reading capacities of that audience. Toward this end a collaborative authorship would be preferable to a single author so long as the reading specialist contributes to the final composition of the textbook. Publishers can use more systematic and scientific devices, such as readability formulas, in conjunction with the expert opinion of professionals, to grade their material more carefully.

Another implication of this study is that the range of difficulty in all textbooks should be more carefully controlled. This calls for a readability check on textbooks after the initial stage of composition. If some portions of the textbook are overly difficult, then the author or publisher should rewrite the text using all devices that minimize difficulty such as pictures, captions, diagrams and context clues.

A third implication for authors and publishers is that more attention must be given to building into textbooks a systematic pro-

gression of reading difficulty from less difficult to more difficult reading material. The overall average grade-level of a textbook does not tell the whole story about the readability level of a textbook. While it is not necessary that every part of a textbook be at exactly the same reading level, it is perhaps desirable to commence at a lower level of reading difficulty and increase it gradually as the textbook proceeds. Such a strategy would not solve the problem of the backward reader, but it should help a wide range of readers to accommodate themselves to the material in a textbook. Authors and publishers should check the textbooks they produce according to this criterion of a gradual progression of reading difficulty; they should be willing to rewrite parts of the textbooks if necessary to meet this criterion.

IMPLICATIONS FOR TEACHERS

In general the results of the present study show that the sampled textbooks, which are all selected for use in the Newfoundland schools, are too difficult for the grades to which they are assigned. How is the classroom teacher to cope with this difficulty?

The results of the present study imply several options for the teacher. Of course, the teacher could avoid using such overly-difficult textbooks altogether, but this is not possible where such textbooks are prescribed. Furthermore, where textbooks are used as models for a curriculum outline, it is not feasible for the teacher to refuse to use those textbooks, even if he is aware that they may cause reading problems in his classroom.

A more practical option for classroom teachers is to use alter-

native materials to supplement the more difficult textbook. Such alternative material written at several levels of reading difficulty should be made available in the classroom in order to counteract the extreme difficulty of some textbooks. Supplementary materials can be used in addition to or in place of parts or the whole of an unsuitable textbook. This method is most effective in the teaching of social studies and science when chapters or sections of a textbook present problems, because graded materials which cover specific topics in essay form are readily available, e.g. The Reader's Digest Science Series.

The use of alternative materials calls for good judgment on the part of the teacher. He must select from more difficult textbooks only those portions which will actually aid the students in developing clear concepts and which it is necessary for the student to master. If the teacher chooses to use another textbook or other material, he must select from the mass of available writings in his content area that material which is most appropriately readable for the students he is teaching. In a sense the teacher will need to do his own readability study, with the help of all available resources.

Where the teacher does find suitable supplementary materials, he may combine the use of more than one textbook with a grouping technique in the classroom. This calls for some planning, but when properly organized it has the greatest practical potential for matching the right student with the right reading material in the content area.

Usually, however, the classroom teacher lacks access to a pool of alternative materials; he then must use the difficult textbook alone. In such a case he should adopt various teaching strategies so as to

minimize the actual difficulty of the textbook. His choice of strategy will depend on what element of the difficulty he wishes to mitigate.

As the Dale-Chall Readability Formula shows, the main factor in the difficulty of the textbooks sampled in this study is the large number of unfamiliar words they present. As explained above, this is probably due to the new and specialized terms necessary and peculiar to social studies and science as teaching areas.

One of the ways of reducing the sting of unfamiliar words is to pre-teach them to students. This can be done by attacking the words themselves, breaking them down into manageable and perhaps more familiar parts. This is especially necessary where the new word is part of a technical vocabulary but resembles words of a more general application.

Another strategy in the face of a textbook's heavy vocabulary load is to explain the word in context, thereby de-mystifying it. This approach will reveal what the word is - person, place or thing - by stressing its verbal context, and also what the word refers to, by describing how it fits in with other perhaps familiar facts or concepts.

A by-product of the above approaches to difficult vocabulary is the preparation of the student to cope independently with unfamiliar words. Once the student understands and accepts the use of word attack skills, he can handle the worst of any textbook.

Another method of reducing the effect of heavily-loaded technical sections of a textbook is a simple one, but one which works well with science textbooks in particular. That is simply to present content material to be read by students in the smallest possible portions, so

as to facilitate comprehension. One of the series of science textbooks sampled in this study lends itself to this approach: the Elementary School Science series uses only very brief textual explanations and supplements them with groups of exercises in the nature of experimental illustrations of a given concept. Thus the reader is spared the technical vocabulary until the experimental stage, when he has the advantage of seeing before him concrete representations of the words. This new series of elementary science textbooks demonstrates the value of smaller doses of reading in the content areas.

Another aspect of the reading difficulty in the sampled textbooks was a lack of gradual progression from less difficult to more difficult material. This symptom means that the child who is new to a given textbook and to a given grade-level cannot expect any easy transition from his previous reading tasks. Again it is the teacher's place to provide such a transition, even when he must do so with an erratically constructed textbook.

The teacher should try to compensate for the erratic textbook by pre-teaching vocabulary, as described above, even more intensively in the earliest stages of the use of a new textbook: this will hopefully ease the impact of the textbook's difficulty at the crucial early stages.

Another strategy towards this same end is to teach the textbook itself, that is, to familiarize the child with all the aids to reading which are built into the textbook. These include glossaries, indexes, study guides and visual aids which explain textual material. A further refinement of this teaching technique is for the teacher to provide his own study guide to the students, one which could specifically compensate

for the textbook's shortcomings. To prepare these study guides the teacher would have to identify the skills needed to read the particular textbook with understanding; he would then design a guide which could be used by students during their reading of the textbook.

As for the third aspect of the difficulty of the sampled textbooks - the chronically high extremes in reading levels from page to page - again the most effective strategy is pre-teaching on a day-to-day basis to prepare the student to cope with the inordinately demanding passages. Also it may be more possible to avoid or replace the most difficult of these passages since they cover only small amount of content material.

IMPLICATIONS FOR FURTHER RESEARCH

This study raises many questions which we cannot yet answer. Why, for example, are textbooks not composed so as to meet the demands of the average classroom? There is a need for further research into the composition of textbooks that are in use in our schools, and there is also a need for innovative research into the theory and practice of textbook composition. Furthermore, we need to improve the few reliable readability formulas that we have at present so as to make them better tools for assessing and selecting reading materials for instructional purposes.

Yet newer creative textbooks are available for use in the classroom. Unfortunately they often rely on media other than the printed word to communicate information. The conventional readability formula is not suitable for use as tools for evaluating such textbooks. Researchers should carry out wide-ranging readability studies on such new intermediate-grade textbooks in social studies and science. For this they may need to devise new readability formulas that can classify and give

a comprehensive rating for non-verbal media. Where, as in the Elementary School Science series, there is less emphasis on expository text and more emphasis on exercises and experiments, a suitable readability formula would have to measure the level of reading difficulty of these different types of reading material.

The readability formulas that are available at present need to be updated, especially those formulas which rely on word lists. Word lists used with readability formulas to determine the difficulty of the vocabulary of content material should be revised to account for new words that are now part of every child's vocabulary and also to include colloquialisms that are becoming acceptable in instructional materials. Such revisions must keep pace with the impact of television on children's experience and language.

New research on such revisions should also investigate how to keep word lists abreast of advances in the social studies and in science. The idea that one word list represents the basic familiarity with the language necessary for reading in a variety of disciplines may be questioned. Researchers should consider the compilation of specialized word lists for each content area taught in the intermediate grades. These could be compiled on the basis of investigation into the familiarity with the terminology of a discipline that a child brings with him to a given instructional level. With such specialized word lists it would be possible to make more precise readability studies of social studies and science textbooks than the present general word lists allow.

In general, then, there is much research to be done into textbooks, readability formulas, and word lists. This research is necessary both

because of the changing nature of the instructional process, and because of the swift pace of advancement in the social studies and science. In so far as a textbook is intended to be representative of the terms and concepts of these disciplines, it is necessary that there be continuing study into the best methods of creating accurate textbooks which children can read with understanding.

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	rade-Level orrected	5-6	5-6	5-6	5-6

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APPENDIX

TABLE IX

READABILITY DATA DERIVED FROM FOURTH GRADE SCIENCE TEXTBOOK, ELEMENTARY SCHOOL SCIENCE (6204), PUBLISHED BY ADDISON-WESLEY PUBLISHING COMPANY

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	9	100	9	0	11	0	4.19	-4
2	20	100	8	9	13	9	5.68	5-6
3	31	100	12	2	8	2	4.37	-4
4	43	100	11	15	9	15	6.48	7-8
5	50	100	9	2	11	2	4.50	-4
6	60	100	10	2	10	2	4.45	-4
7	71	100	10	3	10	3	4.61	-4
8	80	100	8	8	13	8	5.52	5-6
9	90	100	11	3	9	3	4.40	-4
10	100	100	12	16	8	16	6.58	7-8
11	110	100	8	9	13	9	5.68	5-6
12	120	100	11	6	9	6	5.03	5-6
13	131	100	12	7	8	7	5.15	5-6
14	140	100	10	4	10	4	4.76	-4
15	151	100	11	19	9	19	7.08	9-10

TABLE IX (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	13	11	8	11	5.76	5-6
17	170	100	10	9	10	9	5.55	5-6
18	179	100	8	16	13	16	6.78	7-8
19	190	100	8	7	13	7	5.36	5-6
20	200	100	10	7	10	7	5.24	5-6
21	208	100	8	5	13	5	5.05	5-6
22	220	100	9	9	11	9	5.61	5-6
23	230	100	11	9	9	9	5.50	5-6
24	240	100	11	2	9	2	4.40	-4
25	250	100	11	11	9	11	5.81	5-6
26	260	100	8	3	13	3	4.73	-4
27	270	100	7	13	14	13	6.40	7-8
Total		2700	266	207	283			
Average		100	10	8	10.48	7.66	5.36	5-6

TABLE X

READABILITY DATA DERIVED FROM FOURTH-GRADE SCIENCE TEXTBOOK, HEALTH SCIENCE - BOOK FOUR. PUBLISHED BY DOUBLEDAY CANADA LTD.

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	10	0	10	0	4.13	-4
2	20	100	7	5	14	5	5.14	5-6
3	30	100	9	4	11	4	4.82	-4
4	40	100	9	5	11	5	4.98	5-6
5	49	100	7	11	14	11	6.08	7-8
6	60	100	7	11	14	11	6.08	7-8
7	70	100	9	3	11	3	4.66	-4
8	80	100	7	9	14	9	5.77	5-6
9	90	100	7	9	14	9	5.77	5-6
10	100	100	9	14	11	14	6.40	7-8
11	110	100	7	4	14	4	4.98	5-6
12	120	100	9	11	11	11	5.93	5-6
13	130	100	6	3	17	3	4.94	-4
14	140	100	7	10	14	10	5.92	5-6
15	150	100	9	1	11	1	4.35	-4

TABLE X (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	7	2	14	2	4.66	-4
17	170	100	9	24	11	24	7.98	11-12
18	180	100	8	17	13	17	6.94	7-8
19	190	100	9	4	11	4	4.82	-4
20	200	100	9	18	11	18	7.03	9-10
Total		2000	161	165	251			
Average		100	8	8	12.55	3.25	5.57	5-6

TABLE XI

READABILITY DATA DERIVED FROM FOURTH-GRADE SOCIAL STUDIES TEXTBOOK, AROUND OUR WORLD, PUBLISHED BY GINN AND COMPANY

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	8	7	13	7	5.36	5-6
2	20	100	8	5	13	5	5.05	5-6
3	29	100	6	19	17	19	7.46	9-10
4	40	100	11	0	9	0	4.09	-4
5	50	100	8	3	13	3	4.73	-4
6	60	100	6	7	17	7	5.57	5-6
7	70	100	7	6	14	6	5.29	5-6
8	80	100	7	6	14	6	5.29	5-6
9	90	100	5	3	20	3	5.10	5-6
10	100	100	9	2	11	2	4.50	-4
11	110	100	9	1	11	1	4.35	-4
12	120	100	8	1	13	1	4.41	-4
13	130	100	6	10	17	10	6.04	7-8
14	140	100	7	6	14	6	5.29	5-6
15	150	100	5	4	20	4	5.26	5-6

TABLE XI (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	5	6	20	6	5.58	5-6
17	170	100	8	6	13	6	5.20	5-6
18	180	100	7	3	14	3	4.82	4-6
19	190	100	10	3	10	3	4.61	4-6
20	200	100	9	9	11	9	5.61	5-6
Total		2000	149	107	284			
Average		100	7	5	14.20	5.35	5.18	5-6

TABLE XII

READABILITY DATA DERIVED FROM FOURTH-GRADE SCIENCE TEXTBOOK, MODERN SCIENCE - LEVEL FOUR, PUBLISHED BY LAIDLAW BROTHERS

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	8	11	13	11	5.99	7-8
2	20	100	9	22	11	22	7.66	9-10
3	30	100	8	10	13	10	5.84	5-6
4	40	100	9	13	11	13	6.24	7-8
5	50	100	9	7	11	7	5.29	5-6
6	60	100	7	6	14	6	5.29	5-6
7	70	100	8	6	13	6	5.20	5-6
8	80	100	8	18	13	18	7.10	9-10
9	90	100	7	7	14	7	5.45	5-6
10	100	100	9	17	11	17	6.87	7-8
11	110	100	8	5	13	5	5.05	5-6
12	120	100	8	9	13	9	5.68	5-6
13	129	100	8	9	13	9	5.68	5-6
14	140	100	6	6	17	6	5.41	5-6
15	150	100	9	12	11	12	6.08	7-8

TABLE XII (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	9	14	11	14	6.40	7-8
17	170	100	8	7	13	7	5.36	5-6
18	179	100	8	13	13	13	6.31	7-8
19	190	100	9	13	11	13	6.24	7-8
20	200	100	11	26	9	26	8.18	11-12
21	210	100	9	12	11	12	6.08	7-8
22	220	100	7	14	14	14	6.56	7-8
23	230	100	9	8	11	8	5.45	5-6
24	240	100	9	12	11	12	6.08	7-8
25	250	100	8	16	13	16	6.87	7-8
26	260	100	10	8	10	8	5.40	5-6
27	270	100	8	14	13	14	6.49	7-8
Total		2700	226	315	331			
Average		100	8	12	12.25	11.66	6.08	7-8

TABLE XIII

READABILITY DATA DERIVED FROM FIFTH-GRADE SOCIAL STUDIES TEXTBOOK, NEWFOUNDLAND AND LABRADOR - A BRIEF HISTORY, PUBLISHED BY J.M. DENT & SONS (CANADA) LTD.

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	5	2	20	2	4.94	-4
2	20	100	6	10	17	10	6.04	7-8
3	30	100	7	3	14	3	4.82	-4
4	40	100	7	9	14	9	5.77	5-6
5	50	100	5	8	20	8	5.89	5-6
6	60	100	6	6	17	6	5.41	5-6
7	70	100	7	14	14	14	6.56	7-8
8	80	100	6	11	17	11	6.20	7-8
9	89	100	6	8	17	8	5.73	5-6
10	100	100	5	10	20	10	6.21	7-8
11	110	100	7	10	14	10	5.92	5-6
12	120	100	5	8	20	8	5.89	5-6
13	130	100	4	9	25	9	6.20	7-8
14	140	100	5	6	20	6	5.58	5-6
15	150	100	7	11	14	14	6.08	7-8

TABLE XIII (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	4	8	25	8	6.04	7-8
17	170	100	6	9	17	9	5.88	5-6
Total		1700	98	142	305			
Average		100	6	8	17.94	8.35	5.83	5-6

TABLE XIV

READABILITY DATA DERIVED FROM FIFTH-GRADE SOCIAL STUDIES TEXTBOOK, GEOGRAPHY OF NEWFOUNDLAND, PUBLISHED BY THE COPP-CLARK PUBLISHING COMPANY

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	9	100	6	9	17	9	5.88	5-6
2	19	100	4	7	25	7	5.88	5-6
3	30	100	5	12	20	12	6.52	7-8
4	40	100	4	2	25	2	5.09	5-6
5	51	100	6	1	17	1	4.62	-4
6	60	100	5	7	20	7	5.73	5-6
7	70	100	5	7	20	7	5.73	5-6
8	80	100	8	18	13	18	7.10	9-10
9	90	100	5	4	20	4	5.26	5-6
10	99	100	4	6	25	6	5.72	5-6
11	110	100	4	5	25	5	5.57	5-6
12	118	100	3	3	33	3	5.76	5-6
13	130	100	6	3	17	3	4.94	-4
14	140	100	7	11	14	11	6.08	7-8
15	150	100	6	13	17	13	6.52	7-8

TABLE XIV (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	8	6	13	6	5.20	5-6
17	171	100	5	5	20	5	5.42	5-6
18	180	100	5	6	20	6	5.58	5-6
Total		1800	96	115	361			
Average		100	5	6	20.05	6.38	5.70	5-6

TABLE XV

READABILITY DATA DERIVED FROM FIFTH-GRADE SCIENCE TEXTBOOK, HEALTH SCIENCE - BOOK FIVE, PUBLISHED BY DOUBLEDAY CANADA LTD.

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	8	2	13	2	4.57	-4
2	20	100	6	18	17	18	7.31	9-10
3	30	100	10	15	10	15	6.50	7-8
4	40	100	9	11	11	11	5.93	5-6
5	50	100	6	5	17	5	5.25	5-6
6	60	100	8	9	13	9	5.68	5-6
7	70	100	8	9	13	9	5.68	5-6
8	80	100	8	7	13	7	5.36	5-6
9	90	100	9	9	11	9	5.61	5-6
10	100	100	9	7	11	7	5.29	5-6
11	110	100	7	17	14	17	7.03	9-10
12	120	100	6	23	17	23	8.10	11-12
13	130	100	6	20	17	20	7.62	9-10
14	140	100	7	19	14	19	7.46	9-10
15	150	100	6	9	17	9	5.88	5-6

TABLE XV (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentences Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	8	23	13	23	7.88	9-10
17	170	100	10	22	10	22	7.61	9-10
18	180	100	6	20	17	20	7.62	9-10
19	190	100	11	20	9	20	7.24	9-10
20	200	100	6	28	17	28	8.88	11-12
21	210	100	8	19	13	19	7.26	9-10
22	220	100	6	17	17	17	7.15	9-10
Total		2200	168	339	304			
Average		100	8	15	13.81	15.40	6.76	7-8

TABLE XVI

READABILITY DATA DERIVED FROM FIFTH-GRADE SCIENCE TEXTBOOK, MODERN SCIENCE - LEVEL FIVE, PUBLISHED BY LAIDLAW BROTHERS

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	8	4	13	4	4.89	-4
2	20	100	5	19	20	19	7.63	9-10
3	30	100	9	20	11	20	7.35	9-10
4	40	100	11	10	9	10	5.66	5-6
5	50	100	8	2	13	2	4.57	-4
6	60	100	9	5	11	5	4.98	5-6
7	70	100	9	17	11	17	6.87	7-8
8	80	100	8	11	13	11	5.99	7-8
9	90	100	8	19	13	19	7.26	9-10
10	100	100	7	9	14	9	5.77	5-6
11	110	100	8	15	13	15	6.62	7-8
12	120	100	6	23	17	23	8.10	11-12
13	131	100	8	10	13	10	5.84	5-6
14	140	100	9	18	11	18	7.03	9-10
15	150	100	8	8	13	8	5.52	5-6

TABLE XVI (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	9	20	11	20	7.35	9-10
17	170	100	4	18	25	18	7.62	9-10
18	180	100	14	9	7	9	5.41	5-6
19	190	100	6	18	17	18	7.31	9-10
20	200	100	8	18	13	18	7.10	9-10
21	210	100	11	13	9	13	6.13	7-8
22	220	100	6	6	17	6	5.41	5-6
23	230	100	9	10	11	10	5.77	5-6
24	240	100	9	9	11	9	5.61	5-6
25	250	100	7	9	14	9	5.77	5-6
26	260	100	9	14	11	14	6.40	7-8
27	270	100	8	13	13	13	6.31	7-8
Total		2700	221	347	354			
Average		100	8	13	13.11	12.85	6.31	7-8

TABLE XVII

READABILITY DATA DERIVED FROM FIFTH-GRADE SCIENCE TEXTBOOK, ELEMENTARY SCHOOL SCIENCE (6205), PUBLISHED BY ADDISON-WESLEY PUBLISHING COMPANY

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	9	5	11	5	4.98	5-6
2	20	100	10	8	10	8	5.40	5-6
3	30	100	10	7	10	7	5.24	5-6
4	40	100	7	5	14	5	5.14	5-6
5	50	100	12	4	8	4	4.68	-4
6	61	100	10	10	10	10	5.71	5-6
7	70	100	10	10	10	10	5.71	5-6
8	80	100	9	7	11	7	5.29	5-6
9	90	100	9	12	11	12	6.08	7-8
10	100	100	9	16	11	16	6.71	7-8
11	110	100	8	7	13	7	5.36	5-6
12	120	100	8	10	13	10	5.84	5-6
13	129	100	8	6	13	6	5.20	5-6
14	139	100	8	4	13	4	4.89	-4
15	150	100	9	6	11	6	5.14	5-6
16	160	100	8	8	13	8	5.52	5-6
17	170	100	6	10	17	10	6.04	7-8

TABLE XVII (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
18	180	100	9	17	11	17	6.87	7-8
19	188	100	6	16	17	16	6.99	9-10
20	200	100	7	11	14	11	6.08	7-8
21	211	100	8	11	13	11	5.84	5-6
22	220	100	8	14	13	14	6.49	7-8
23	230	100	10	22	10	22	7.61	9-10
24	239	100	7	17	14	17	7.03	9-10
25	250	100	7	3	14	3	4.82	-4
26	260	100	9	2	11	2	4.50	-4
27	270	100	7	4	14	4	4.98	5-6
28	280	100	11	6	10	6	5.03	5-6
29	289	100	9	8	11	8	5.45	5-6
30	298	100	8	11	13	11	5.99	7-8
31	310	100	8	12	13	12	6.15	7-8
Total		3100	264	288	377			
Average		100	9	9	12.16	9.29	5.70	5-6

TABLE XVIII

READABILITY DATA DERIVED FROM SIXTH-GRADE SCIENCE TEXTBOOK, ELEMENTARY SCHOOL SCIENCE (6206), PUBLISHED BY ADDISON-WESLEY PUBLISHING COMPANY

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	9	8	11	8	5.45	5-6
2	20	100	6	11	17	11	6.20	7-8
3	29	100	9	11	11	11	5.93	5-6
4	40	100	7	9	14	9	5.77	5-6
5	50	100	10	5	10	5	4.92	-4
6	61	100	9	7	11	7	5.29	5-6
7	70	100	11	10	9	10	5.66	5-6
8	80	100	6	14	17	14	6.67	7-8
9	90	100	8	15	13	15	6.62	7-8
10	100	100	10	6	10	6	5.08	5-6
11	110	100	8	17	13	17	6.94	7-8
12	120	100	8	5	13	5	5.05	5-6
13	129	100	9	9	11	9	5.61	5-6
14	139	100	6	14	17	14	6.67	7-8
15	150	100	7	22	14	22	7.82	9-10
16	160	100	11	15	9	15	6.45	7-8
17	170	100	9	21	11	21	7.50	9-10

TABLE XVIII (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
18	180	100	8	24	13	24	8.05	11-12
19	190	100	8	14	13	14	6.49	7-8
20	200	100	10	5	10	5	4.92	4
21	210	100	8	9	13	9	5.68	5-6
22	220	100	11	14	9	14	6.29	7-8
23	229	100	7	8	14	8	5.61	5-6
24	240	100	9	9	11	9	5.61	5-6
25	251	100	8	16	13	16	6.78	7-8
26	260	100	9	8	11	8	5.45	5-6
27	270	100	11	10	9	10	5.66	5-6
28	280	100	7	7	14	7	5.45	5-6
29	290	100	10	22	10	22	7.61	9-10
30	300	100	9	11	11	11	5.93	5-6
31	308	100	8	22	13	22	7.73	9-10
Total		3100	266	354	375			
Average		100	9	11	12.09	11.41	6.14	7-8

TABLE XIX

READABILITY DATA DERIVED FROM SIXTH-GRADE SCIENCE TEXTBOOK

MODERN SCIENCE - LEVEL SIX, PUBLISHED BY

LAIDLAW BROTHERS

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	10	8	10	8	5.40	5-6
2	20	100	6	25	17	25	8.41	11-12
3	30	100	13	8	8	8	5.29	5-6
4	40	100	6	17	17	17	7.15	9-10
5	50	100	5	16	20	16	7.15	9-10
6	60	100	7	13	14	13	6.40	7-8
7	70	100	7	17	14	17	7.03	9-10
8	80	100	8	11	13	11	5.99	7-8
9	90	100	5	13	20	13	6.68	7-8
10	100	100	6	16	17	16	6.99	9-10
11	110	100	6	15	17	15	6.83	7-8
12	120	100	6	19	17	19	7.46	9-10
13	130	100	9	13	11	13	6.24	7-8
14	140	100	10	18	10	18	6.98	9-10
15	150	100	5	23	20	23	8.26	11-12

TABLE XIX (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	6	21	17	21	7.78	9-10
17	170	100	7	28	14	28	8.77	11-12
18	180	100	6	23	17	23	8.10	11-12
19	190	100	8	20	13	20	7.41	9-10
20	200	100	10	24	10	24	7.92	9-10
21	210	100	7	17	14	17	7.03	9-10
22	220	100	6	26	17	26	8.57	11-12
23	230	100	7	26	14	26	8.45	11-12
24	240	100	7	15	14	15	6.71	7-8
25	250	100	9	18	11	18	7.03	9-10
26	260	100	9	34	11	34	9.56	13-15
27	270	100	8	34	13	34	9.62	13-15
Total		2700	199	518	390			
Average		100	7	19	14.44	19.18	7.38	9-10

TABLE XX

READABILITY DATA DERIVED FROM SIXTH-GRADE SCIENCE TEXTBOOK, HEALTH SCIENCE - BOOK SIX, PUBLISHED BY DOUBLEDAY CANADA LTD.

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	10	16	10	16	6.66	7-8
2	20	100	6	18	17	18	7.31	9-10
3	30	100	6	9	17	9	5.88	5-6
4	40	100	6	9	20	9	5.88	5-6
5	50	100	5	8	20	8	5.89	5-6
6	60	100	6	17	17	17	7.15	9-10
7	70	100	7	26	14	26	8.45	11-12
8	80	100	7	20	14	20	7.50	9-10
9	90	100	6	7	17	7	5.57	5-6
10	100	100	6	22	17	22	7.94	9-10
11	110	100	8	9	13	9	5.68	5-6
12	120	100	6	18	17	18	7.31	9-10
13	130	100	6	18	17	18	7.31	9-10
14	140	100	8	19	13	19	7.26	9-10
15	150	100	6	17	17	17	7.15	9-10

TABLE XX (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	6	23	17	23	8.10	11-12
17	170	100	7	16	14	16	6.87	7-8
18	180	100	5	21	20	21	7.94	9-10
19	190	100	6	14	17	14	6.67	7-8
20	200	100	8	21	13	21	7.57	9-10
21	210	100	5	9	20	9	6.05	7-8
22	220	100	6	31	17	31	8.36	11-12
Total		2200	142	368	355			
Average		100	7	17	16.13	16.72	7.02	9-10

TABLE XXI

READABILITY DATA DERIVED FROM SIXTH-GRADE SOCIAL STUDIES TEXTBOOK, CANADA - THIS LAND OF OURS, PUBLISHED BY GINN AND COMPANY

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	11	100	6	14	17	14	6.67	7-8
2	20	100	6	12	17	12	6.36	7-8
3	30	100	4	9	25	9	6.20	7-8
4	40	100	9	15	11	15	6.56	7-8
5	50	100	3	4	33	4	5.92	5-6
6	60	100	7	9	14	9	5.77	5-6
7	70	100	9	22	11	22	7.66	9-10
8	80	100	9	11	11	11	5.93	5-6
9	90	100	4	11	25	11	6.51	7-8
10	99	100	6	7	17	7	5.57	5-6
11	110	100	7	13	14	13	6.40	7-8
12	119	100	4	18	25	18	7.62	9-10
13	130	100	6	10	17	10	6.04	7-8
14	140	100	7	12	14	12	6.24	7-8
15	150	100	6	7	17	7	5.57	5-6

TABLE XXI (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	158	100	12	20	8	20	7.21	9-10
17	169	100	5	5	20	5	5.42	5-6
18	179	100	8	14	13	14	6.49	7-8
19	190	100	10	23	10	23	7.76	9-10
20	200	100	9	15	11	15	6.56	7-8
21	209	100	8	8	13	8	5.52	5-6
22	218	100	4	16	25	16	7.30	9-10
Total		2200	149	275	368			
Average		100	7	13	16.72	12.50	6.42	7-8

TABLE XXII

READABILITY DATA DERIVED FROM SIXTH-GRADE SOCIAL STUDIES TEXTBOOK.

LAND OF PROMISE, PUBLISHED BY

THE HOUSE OF GRANT (CANADA) LTD.

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	6	9	17	9	5.88	5-6
2	20	100	8	9	13	9	5.68	5-6
3	30	100	6	8	17	8	5.73	5-6
4	40	100	6	4	17	4	5.10	5-6
5	50	100	5	6	20	6	5.58	5-6
6	60	100	5	10	20	10	6.21	7-8
7	70	100	6	12	17	12	6.36	7-8
8	80	100	6	9	17	9	5.88	5-6
9	91	100	6	6	17	6	5.41	5-6
10	100	100	5	22	20	22	8.10	11-12
11	110	100	5	9	20	9	6.05	7-8
12	119	100	5	15	20	15	7.00	9-10
13	129	100	7	14	14	14	6.56	7-8
14	140	100	5	2	20	2	4.94	-4.
15	150	100	7	8	14	8	5.61	5-6

TABLE XXII (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	6	16	17	16	6.99	9-10
17	170	100	7	9	14	9	5.77	5-6
18	180	100	7	6	14	6	5.29	5-6
19	190	100	5	17	20	17	7.31	9-10
20	200	100	8	14	13	14	6.49	7-8
21	210	100	6	11	17	11	6.20	7-8
22	220	100	6	13	17	13	6.52	7-8
23	230	100	5	18	20	18	7.47	9-10
24	240	100	5	15	20	15	7.00	9-10
25	250	100	5	19	20	19	7.63	9-10
26	260	100	7	9	14	9	5.77	5-6
27	270	100	5	16	20	16	7.15	9-10
28	280	100	7	14	14	14	6.56	7-8
29	288	100	8	19	13	19	7.26	9-10
30	300	100	7	15	14	15	6.71	7-8

TABLE XXII (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
31	310	100	3	13	33	13	7.34	9-10
32	320	100	6	11	17	11	6.20	7-8
33	330	100	6	14	17	14	6.67	7-8
34	340	100	5	7	20	7	5.73	5-6
35	350	100	5	6	20	6	5.58	5-6
36	360	100	6	7	17	7	5.57	5-6
Total		3600	213	412	634			
Average		100	6	11	17.61	11.44	6.31	7-8

TABLE XXIII

READABILITY DATA DERIVED FROM SEVENTH-GRADE SOCIAL STUDIES TEXTBOOKS, GINN STUDIES IN CANADIAN HISTORY, PUBLISHED BY GINN AND COMPANY

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
THE VOYAGEURS								
1	10	100	4	19	25	19	7.78	9-10
2	20	100	6	9	17	9	5.88	5-6
THE FUR FORT								
1	10	100	5	8	20	8	5.89	5-6
2	20	100	6	11	17	11	6.20	7-8
NOMADS OF THE SHIELD								
1	10	100	4	14	25	14	6.99	9-10
2	20	100	4	10	25	10	6.36	7-8
COLONISTS AT PORT ROYAL								
1	9	100	5	16	20	16	7.15	9-10
2	20	100	5	14	20	14	6.84	7-8
Total		800	39	101	169			
Average		100	5	13	21.12	12.62	6.64	7-8

TABLE XXIV

READABILITY DATA DERIVED FROM SEVENTH-GRADE SOCIAL STUDIES TEXTBOOK, CANADA AND HER NEIGHBOURS, PUBLISHED BY GINN AND COMPANY

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	9	100	9	1	11	1	4.35	-4
2	20	100	6	5	17	5	5.25	5-6
3	30	100	5	12	20	12	6.52	7-8
4	40	100	6	3	17	3	4.94	-4
5	50	100	5	8	20	8	5.89	5-6
6	60	100	5	5	20	5	5.42	5-6
7	70	100	5	1	20	1	4.79	-4
8	80	100	4	4	25	4	5.41	5-6
9	90	100	7	4	14	4	4.98	5-6
10	100	100	5	4	20	4	5.26	5-6
11	110	100	7	10	14	10	5.92	5-6
12	120	100	6	2	17	2	4.78	-4
13	130	100	5	4	20	4	5.26	5-6
14	140	100	5	8	20	8	5.89	5-6
15	150	100	5	5	20	5	5.42	5-6

TABLE XXIV (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentneces	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	4	8	25	8	6.04	7-8
17	170	100	6	9	17	9	5.88	5-6
18	180	100	7	0	14	0	4.35	-4.
19	190	100	5	6	20	6	5.58	5-6
20	200	100	5	9	20	9	6.05	7-8
21	210	100	7	5	14	5	5.14	5-6
22	220	100	5	5	20	5	5.42	5-6
23	230	100	6	9	20	9	6.05	7-8
Total		2300	129	127	425			
Average		100	6	6	18.47	5.52	5.42	5-6

TABLE XXV

READABILITY DATA DERIVED FROM SEVENTH-GRADE SOCIAL STUDIES TEXTBOOK, EXPLORING WORLD HISTORY, PUBLISHED BY GLOBE AND COMPANY

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	6	3	17	3	4.94	-4
2	19	100	7	8	14	8	5.61	5-6
3	30	100	8	16	13	16	6.78	7-8
4	40	100	5	5	20	5	5.42	5-6
5	50	100	7	19	14	19	7.35	9-10
6	60	100	5	16	20	16	7.15	9-10
7	70	100	6	16	17	16	6.99	9-10
8	80	100	5	3	20	4	5.10	5-6
9	90	100	7	18	14	18	7.19	9-10
10	101	100	7	13	14	13	6.40	7-8
11	110	100	8	18	13	18	7.10	9-10
12	119	100	7	21	14	21	7.66	9-10
13	130	100	8	24	14	24	8.05	11-12
14	140	100	6	13	17	13	6.52	7-8
15	150	100	6	8	17	8	5.73	5-6
16	160	100	7	14	14	14	6.56	7-8
17	170	100	8	15	13	15	6.62	7-8

TABLE XXV (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
18	179	100	5	12	20	12	6.52	7-8
19	190	100	9	18	11	18	7.03	9-10
20	200	100	9	6	11	6	5.14	5-6
21	210	100	7	9	14	9	5.77	5-6
22	219	100	7	5	14	5	5.14	5-6
23	231	100	9	18	11	18	7.03	9-10
24	240	100	6	9	17	9	5.88	5-6
25	250	100	7	14	14	14	6.56	7-8
26	260	100	8	8	13	8	5.52	5-6
27	270	100	11	9	11	9	5.50	5-6
28	280	100	7	3	14	3	4.82	-4
29	290	100	7	7	14	7	5.45	5-6
30	298	100	7	13	14	13	6.40	7-8
31	310	100	9	15	11	15	6.56	7-8
32	320	100	8	12	13	12	6.15	7-8
33	329	100	9	17	11	17	6.87	7-8
34	339	100	8	25	13	25	8.20	11-12

TABLE XXV (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
35	350	100	7	15	14	15	6.71	7-8
36	359	100	6	18	17	18	7.31	9-10
37	370	100	7	16	14	16	6.87	7-8
38	381	100	9	11	11	11	5.93	5-6
39	389	100	10	11	10	11	5.87	5-6
40	400	100	7	2	14	2	4.66	-4
41	409	100	7	22	14	22	7.82	9-10
42	419	100	6	11	17	11	6.20	7-8
43	430	100	5	11	20	11	6.37	7-8
44	440	100	6	13	17	13	6.52	7-8
45	449	100	7	15	14	15	6.71	7-8
46	460	100	9	5	13	5	4.98	5-6
47	469	100	6	11	17	11	6.20	7-8
48	480	100	7	10	14	10	5.92	5-6
49	489	100	7	2	14	2	4.66	-4
50	500	100	8	10	13	10	5.84	5-6
51	509	100	7	12	14	12	6.24	7-8

TABLE XXV (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
52	520	100	7	12	14	12	6.24	7-8
53	530	100	7	9	14	9	5.77	5-6
54	541	100	7	12	14	12	6.24	7-8
55	550	100	5	12	20	12	6.52	7-8
56	562	100	6	5	17	5	5.25	5-6
57	570	100	8	12	13	12	6.15	7-8
58	578	100	8	18	13	18	7.10	9-10
59	589	100	8	15	13	15	6.62	7-8
60	600	100	6	19	17	19	7.46	9-10
61	609	100	6	15	17	15	6.83	7-8
62	620	100	6	16	17	16	6.99	9-10
63	630	100	7	10	14	10	5.92	5-6
Total		6300	448	1228	920			
Average		100	7	19	14.60	19.49	6.31	7-8

TABLE XXVI

READABILITY DATAT DERIVED FROM SEVENTH-GRADE SCIENCE TEXTBOOK EXPLORING SCIENCE-STAGE ONE, PUBLISHED BY MACMILLAN OF CANADA

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	8	19	13	19	7.26	9-10
2	20	100	5	5	20	5	5.42	5-6
3	30	100	7	22	14	22	7.82	9-10
4	40	100	6	15	17	15	6.83	7-8
5	50	100	5	10	20	10	6.21	7-8
6	60	100	7	10	14	10	5.92	5-6
7	70	100	6	16	17	16	6.99	7-8
8	80	100	11	13	9	13	6.13	7-8
9	90	100	7	13	14	13	6.40	7-8
10	100	100	5	15	20	15	7.00	9-10
11	110	100	8	14	13	14	6.49	7-8
12	120	100	7	11	14	11	6.08	7-8
13	130	100	7	15	14	15	6.71	7-8
14	140	100	8	24	13	24	8.05	11-12
15	150	100	5	17	20	17	7.31	9-10

TABLE XXVI (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	11	9	9	9	5.50	5-6
17	170	100	7	13	14	14	6.40	7-8
18	180	100	8	13	14	13	6.40	7-8
19	189	100	7	29	14	29	8.92	11-12
20	200	100	9	35	11	35	9.71	13-15
21	211	100	9	14	11	14	6.40	7-8
22	220	100	7	19	14	19	7.35	9-10
23	230	100	5	18	20	18	7.47	9-10
24	239	100	9	13	11	13	6.24	7-8
25	250	100	6	7	17	7	5.57	5-6
26	260	100	4	20	25	20	7.93	9-10
27	270	100	8	18	13	18	7.10	9-10
28	280	100	5	19	20	19	7.63	9-10
29	290	100	5	8	20	8	7.63	9-10
30	300	100	7	27	14	27	8.61	11-12
31	310	100	8	22	13	22	7.73	9-10
32	320	100	7	11	14	11	6.08	7-8

TABLE XXVI (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
33	330	100	9	12	11	12	6.08	7-8
34	340	100	7	11	14	11	6.08	7-8
35	350	100	6	7	17	7	5.57	5-6
36	360	100	6	21	17	21	7.78	9-10
37	370	100	9	23	11	23	7.82	9-10
38	380	100	8	11	13	11	5.99	5-6
39	390	100	8	8	13	8	5.52	5-6
40	400	100	5	13	20	13	6.68	7-8
41	410	100	4	24	25	24	8.57	11-12
42	420	100	7	13	14	13	6.40	7-8
43	430	100	5	21	20	21	7.94	9-10
Total		4300	297	678	661			
Average		100	7	16	15.37	15.76	6.88	7-8

TABLE XXVII

READABILITY DATA DERIVED FROM EIGHTH-GRADE SOCIAL STUDIES TEXTBOOK, BRITAIN - THE GROWTH OF FREEDOM, PUBLISHED BY J.M. DENT AND SONS (CANADA) LTD.

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	4	10	25	10	6.36	7-8
2	20	100	3	14	33	14	7.59	9-10
3	30	100	4	8	25	8	6.04	7-8
4	40	100	4	20	25	20	7.93	9-10
5	49	100	8	14	13	14	6.49	7-8
6	60	100	5	10	20	10	6.21	7-8
7	70	100	6	21	17	21	7.78	9-10
8	80	100	4	13	25	13	6.83	7-8
9	90	100	3	19	33	19	8.29	11-12
10	100	100	5	14	20	14	6.84	7-8
11	110	100	5	20	20	20	7.79	9-10
12	120	100	6	19	17	19	7.46	9-10
13	130	100	4	8	25	8	6.04	7-8
14	140	100	3	7	33	7	6.40	7-8
15	149	100	5	26	20	26	8.73	11-12

TABLE XXVII (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
31	310	100	5	18	20	18	7.47	9-10
32	320	100	5	25	20	25	8.58	11-12
33	330	100	4	19	25	19	7.78	9-10
34	340	100	4	27	25	27	9.04	13-15
35	350	100	6	16	17	16	6.99	9-10
36	360	100	4	23	25	23	8.41	11-12
37	370	100	3	23	33	23	8.92	11-12
38	380	100	4	23	25	23	8.41	11-12
39	390	100	7	15	14	15	6.71	7-8
40	400	100	4	16	25	16	7.30	9-10
41	410	100	6	22	17	22	7.94	9-10
Total		4100	193	705	963			
Average		100	5	17	23.49	17.19	7.49	9-10

TABLE XXVII (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	6	19	17	19	7.46	9-10
17	170	100	5	19	20	19	7.63	9-10
18	180	100	6	17	17	17	7.15	9-10
19	190	100	3	8	33	8	6.55	7-8
20	200	100	8	18	13	18	7.10	9-10
21	210	100	2	8	50	8	7.38	9-10
22	219	100	8	15	13	15	6.62	7-8
23	230	100	3	14	33	14	7.50	9-10
24	240	100	4	21	25	21	8.09	11-12
25	250	100	4	16	25	16	7.30	9-10
26	260	100	7	28	14	28	8.77	11-12
27	270	100	3	20	33	20	8.45	11-12
28	280	100	5	18	20	18	7.47	9-10
29	290	100	3	16	33	16	7.82	9-10
30	300	100	5	18	20	18	7.47	9-10

TABLE XXVIII (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	8	5	13	5	5.05	5-6
17	170	100	6	6	17	6	5.41	5-6
18	180	100	8	8	13	8	5.52	5-6
19	190	100	6	9	17	9	5.88	5-6
20	200	100	5	6	20	6	5.58	5-6
21	210	100	6	12	17	12	6.36	7-8
22	220	100	5	3	20	3	5.10	5-6
23	230	100	6	4	17	4	5.10	5-6
24	240	100	6	7	17	7	5.57	5-6
25	250	100	8	6	13	6	5.20	5-6
26	260	100	4	14	25	14	6.99	9-10
27	270	100	7	11	14	11	6.08	7-8
28	280	100	4	13	25	13	6.83	7-8
Total		2800	165	257	506			
Average		100	6	10	18.07	9.17	6.00	7-8

TABLE XXVIII

READABILITY DATA DERIVED FROM EIGHTH-GRADE SOCIAL STUDIES TEXTBOOK, SOUTHERN LANDS, PUBLISHED BY GINN AND COMPANY

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	5	21	20	21	7.94	9-10
2	20	100	6	14	17	14	6.67	7-8
3	30	100	6	9	17	9	5.88	5-6
4	40	100	4	12	25	12	6.67	7-8
5	50	100	7	7	14	7	5.45	5-6
6	60	100	6	9	17	9	5.88	5-6
7	70	100	6	16	17	16	6.99	7-8
8	80	100	9	7	11	7	5.29	5-6
9	89	100	4	7	25	7	5.88	6-7
10	100	100	6	12	17	12	6.36	7-8
11	110	100	4	12	25	12	6.67	7-8
12	120	100	7	8	14	8	5.61	5-6
13	130	100	6	7	17	7	5.57	5-6
14	140	100	4	6	25	6	5.72	5-6
15	150	100	6	6	17	6	5.41	5-6

TABLE XXIX

READABILITY DATA DERIVED FROM EIGHTH-GRADE SCIENCE TEXTBOOK, EXPLORING SCIENCE - STAGE TWO, PUBLISHED BY MACMILLAN OF CANADA

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
1	10	100	5	25	20	25	8.58	11-12
2	20	100	7	16	14	16	6.87	7-8
3	30	100	10	20	10	20	7.29	9-10
4	40	100	8	18	13	18	7.10	9-10
5	50	100	9	18	11	18	7.03	9-10
6	60	100	8	13	13	13	6.31	7-8
7	70	100	7	17	14	17	7.03	9-10
8	80	100	11	20	9	20	7.24	9-10
9	90	100	7	17	14	17	7.03	9-10
10	100	100	7	23	14	23	7.98	11-12
11	110	100	7	23	14	23	7.98	11-12
12	120	100	11	16	9	16	6.60	7-8
13	130	100	8	13	13	13	6.31	7-8
14	140	100	8	19	13	19	7.26	9-10
15	150	100	9	24	11	24	7.98	11-12

TABLE XXIX (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
31	310	100	13	14	8	14	6.23	7-8
32	320	100	7	6	14	6	5.29	5-6
33	330	100	11	10	9	10	5.66	5-6
34	340	100	7	15	14	15	6.71	7-8
35	350	100	6	16	17	16	6.99	9-10
36	360	100	7	16	14	16	6.87	7-8
37	370	100	5	22	20	22	8.10	11-12
38	380	100	7	17	14	17	7.03	9-10
39	390	100	4	10	25	10	6.36	7-8
40	400	100	9	19	11	19	7.19	9-10
41	410	100	4	29	25	29	9.36	13-15
Total		4100	304	692	592			
Average		100	7	17	14.43	16.87	7.02	9-10

TABLE XXIX (cont'd)

Sample Number	Page No.	No. of Words	No. of Sentences	No. of Unfam. Words	Average Sentence Length	% of Unfam. Words	Raw Score	Grade-Level Corrected
16	160	100	7	19	14	19	7.35	9-10
17	170	100	7	21	14	21	7.66	9-10
18	180	100	5	10	20	10	6.21	7-8
19	190	100	6	19	17	19	7.46	9-10
20	200	100	9	17	11	17	6.87	7-8
21	210	100	6	20	17	20	7.62	9-10
22	220	100	6	13	17	13	6.52	7-8
23	230	100	10	9	10	9	5.61	5-6
24	240	100	8	14	13	14	6.49	7-8
25	250	100	7	16	14	16	6.87	7-8
26	260	100	7	16	14	16	6.87	7-8
27	270	100	7	19	14	19	7.35	9-10
28	280	100	6	15	17	15	6.83	7-8
29	290	100	5	14	20	14	6.84	7-8
30	300	100	6	14	17	14	6.67	7-8