THE FEASIBILITY OF REWRITTEN SUBJECT MATERIAL AT A LOWER READING LEVEL IN GEOGRAPHY FOR LESS CAPABLE READERS

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THE FEASIBILITY OF REWRITTEN SUBJECT MATERIAL AT A LOWER READING LEVEL IN GEOGRAPHY FOR LESS CAPABLE READERS

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ABSTRACT

Many students at St. Patrick's Hall Central High School in St. John's were experiencing reading difficulties with the new geography textbook, Introducing Earth Part II by L. F. Hobley. This internship was concerned with overcoming this reading difficulty by rewriting the textbook material at a lower reading level.

A formal reading test was given to the students to further assess the nature and the extent of the reading problem. It was found that most of the students were reading at least three years or more below their grade placement level. Due to their severe reading problem students were unable to read and comprehend the content of the geography textbook.

Objectives selected for this internship were the application of a readability formula to the grade eight textbook to determine its level of readability, the use of a rewritten textbook unit as a learning resource and the evaluation of its effectiveness for less capable grade eight students, and the formation of a set of guidelines for rewriting geography materials at a lowdr reading level.

One unit of the eighth-grade geography textbook was analyzed using the Dale-Chall Readability Formula and rewritten at a fourth grade or lower level of readability. Three classes, one control group and two experimental groups, for a total of forty-nine students were the subjects in the study. One experimental class and the control class were

taught by the intern and the remaining experimental class was taught by a cohort teacher. The control class read the original textbook material while the two experimental classes were tested on teacher-made tests. Observation by the teachers of the students' attitudes and behavior were also recorded and used to evaluate the effectiveness of the internship.

Students using the rewritten textbook materials showed an improvement in attitudes and behavior and in the achievement scores on teacher-made tests. Greater self-confidence appeared to be enhanced through the use of the rewritten material.

The guidelines outlined in the study show the steps to follow in rewriting materials. Recommendations were made for authors, publishers, the Newfoundland Department of Education, and the local school boards across the province.

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CHAPTER I

PURPOSE OF INTERNSHIP

INTRODUCTION

School systems have developed curricula both for the elementary and high school which have appeared on the surface to work relatively well for the school population. In reality, however, a large proportion of the student body is unable to cope with existing curricula. According to Buckingham[1] perhaps as many as one-half of the entering students are unable to complete these programs successfully. In Newfoundland slightly more than 40 percent of the grade two students of 1952-53 reached grade eleven in 1961-62.[2] The percentage has increased dramatically within the last decade. Research for the period 1960-61 to 1970-71 has shown that the percentage of grade eleven students related to grade two enrollment nine years earlier was 46 percent for 1965-66, 64 percent for 1969-70, and 66 percent for 1970-71.[3]

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[1]W. Buckingham, "The Impending Educational Revolution," Automation and the Challenge to Education: Symposium on the Educational Implications of Automation, eds. L. H. Evans and G. E. Arnstein (Washington: National Education Association, 1962), p. 165; see also Benjamin S. Bloom, Allison Davis, and Robert Hess, Compensatory Education for Cultural Deprivation (New York: Holt, Rinehart and Winston, 1965), p. 1.

[2]Philip J. Warren (ed.) Report of the Royal Commission on Education and Youth, I (St. John's: Queen's Printer, 1967), pp. 31-32.

[3]Statistics Canada, Statistical Research of Education for the Period 1960-1961 to 1970-1971, (Ottawa: Queen's Printer, 1973), pp. 346-358.

Encouraging as these figures are, schools are still falling short of the stated objective of "enabling each human being to achieve his fullest and best development both as a private individual and as a member of human society."[4] According to Mr. C. Roebothan, Deputy Minister of Education for Newfoundland and Labrador, there were over 18 percent fewer grade eleven students in 1975 than in 1962. In 1962 there were 9600 grade eleven students as compared with 8500 grade eleven students in 1975.[5] Taking into consideration the decline in total student enrollment that has occurred in Newfoundland during the past few years there are still over 10 percent fewer grade eleven students today than in 1962.

The best interest of the province is not being fostered when approximately one-third of its human resources remain underdeveloped. Educators must do everything humanly possible to provide for this segment of the school population. The provision of curriculum programs to help all students should be the most important objective of educational personnel.

The magnitude of the reading problem and why it is essential that efforts should continue to be made to improve the methods of adapting school materials to individual

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[4] Warren, op. cit., p. 38.

[5] The Evening Telegram [St. John's], March 26, 1975, p. 3, col. 7-8.

abilities has been shown in a nationwide study by Harris.[6] The Stanford Reading Test Form J was used on approximately forty thousand students in grades five, six, and seven throughout the United States. The grade equivalent scores for the test ranged from below 2.0 to 12.9. The results showed 21 percent of the fifth graders were reading at fifth grade level, 22.5 percent of the sixth graders were at sixth grade level, and 16 percent of the seventh graders were at seventh grade level. It was also found that the number of students two or more years below the respective grade placement was high: 15 percent for grade five, 21.5 percent for grade six, and 21 percent for grade seven. Students three or more years below grade placement were 3 percent for grade five, 8 percent for six, and 13 percent for grade seven. This study shows that in a given population there may be found a wide range of reading ability.

Research has shown that social studies textbooks are generally written at a reading level above the designated grade level. The selection of textual materials in this subject has presented problems especially with respect to their readability levels. Sloan,[7] Mills and

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[6] A. J. Harris, How to Increase Reading Ability (New York: David McKay, 1961), pp. 100-101.

[7] Fred A. Sloan, "Readability of Social Studies Textbooks for Grades Four, Five, and Six, as measured by the Dale-Chall Formula" (unpublished Doctor's dissertation, George Peabody College for Teachers, 1959), pp. 282-306.

Richardson,[8] Arnsdorf,[9] Janz and Smith,[10] Johnson and Vardian,[11] and English[12] found in their studies that reading levels of most social studies textbooks were higher than the average reading ability of the students for whom the books were intended.

If all students are to achieve their capacity they must be presented material adapted to their ability. Reading specialists have advocated for many years that individual students in social studies classes should somehow have materials in keeping with their reading achievement.[13] They have urged that the gifted readers be challenged and the poor readers have material they can read so they can reach their full potential. This would require a number of

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[8]Robert E. Mills and Jean R. Richardson, "What Do Publishers Mean by Grade Level?", The Reading Teacher, XVI (March, 1963), 359-362.

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

[10]Margaret L. Janz and Edwin H. Smith, "Students' Reading Ability and the Readability of Secondary School Subjects," Elementary English, XLIX (April, 1972), 622-624.

[11]Roger E. Johnson and Ellen B. Vardian, "Reading, Readability and Social Studies," The Reading Teacher, XXVI (February, 1973), 483-488.

[12]Ida English, "A Readability Study of Social Studies and Science Textbooks" (unpublished Master's thesis, Memorial University of Newfoundland, 1974), p. 51.

[13]Ellen L. Thomas and Philip Montag, "A Social Studies Department Talks Back," Journal of Reading (October, 1966), 22-28.

different textbooks at various reading levels to meet the needs of all the students in any particular class. This can create many problems for it is extremely difficult to find two or more textbooks of different levels of reading difficulty which treat social studies topics even similarly. Some teachers find it difficult to handle a class using a number of different textbooks; not only is it time consuming, but many teachers feel insecure in such a situation. Both of these problems can be eliminated by the use of social studies materials of identical content, but written at more than one level of reading difficulty. In this way all students are using the same textbooks and the same material at the same time.

STATEMENT OF THE PROBLEM

The low level of reading ability of Newfoundland students has been a concern of local educators for many years. The provincial department of education has conducted a number of surveys and studies of reading achievement in Newfoundland schools.[14] In 1964 the Metropolitan Achievement Tests in reading and arithmetic were given to the students who wrote grade nine public examinations in 1963. Results showed that 56 percent were below the level of reading expected for the average grade eight student. These results indicated that there was a low standard of reading throughout

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[14] Philip J. Warren (ed.), Report of the Royal Commission on Education and Youth, I (St. John's: Queen's Printer, 1967), p. 43.

Newfoundland schools.

The department of education also administered in June 1965 the Dominion Achievement Tests in vocabulary and comprehension to 10 percent of the grade six students enrolled in Newfoundland schools.[15] The norms Newfoundland students were to be compared to were those established for rural schools in Ontario. Any student who reached a norm of 6.9 was to be ranked on a par with the average grade six student from rural Ontario at the end of the ninth month of the sixth year. The median for the sample was 6.1 for vocabulary and 6.0 for comprehension. This meant that more than half of the Newfoundland students on entering grade seven were eight months behind the average rural Ontario student in vocabulary and nine months behind the average rural Ontario student in comprehension.

Another reading survey was conducted by Jones[16] on all the students enrolled in grade three in Newfoundland and Labrador in 1971. The Gates MacGinitie Reading Tests: Primary C, Form I for vocabulary and comprehension were administered to the students. The expected grade score for the average child taking the test in May or June was 3.9 for both vocabulary and comprehension. For the Newfoundland sample the grade score equivalent of the average raw score

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[15] Ibid., p. 44.

[16] Newfoundland Department of Education Newsletter [St. John's], April, 1971, pp. 5-6.

for vocabulary was 3.2 and for comprehension 3.1. The grade equivalent scores ranged from 1.3 to 7.1 for vocabulary and from 1.3 to 7.0 for comprehension. This indicated there were students in the sample that were anywhere from grade one to grade seven level in vocabulary and comprehension.

A more recent study conducted in 1973 by Penny[17] reported no significant difference between the means for 1970 and 1973. His study of grade three students reported a grade score equivalent of the average raw score for vocabulary and comprehension at 3.2 on the Gates MacGinitie Reading Tests: Primary C, Form 2 which was 0.6 below the test manual grade norms based on a 1964 nationwide United States sample yielding 3.8 for the average grade three student.

This internship project demonstrates that a low reading level may be common among pupils in Newfoundland schools. The SRA Reading Record Test which tests the rate of reading, reading comprehension, everyday reading skills, and reading vocabulary was given to the students who comprised the sample in this study. The lowest Reading Record Test Score given for the test was 37 which had a grade equivalent score of 5.9. No grade equivalent score could be given for these students tested because all students had a Reading Record Total Score below 37. Estimated levels

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[17] School World [St. John's], October-November, 1973, pp. 11-13.

of reading indicated that they were reading at least three years or more below grade placement level. This low reading level was not indicative of the total student body. The group selected for the internship was homogenous; its common element was academic failure. A vast majority of the group had experienced failure and had repeated at least one grade, and some had repeated two and even three grades. Obtained intelligence quotients on the Otis Quick Scoring Mental Ability Test Beta Form A ranged from 55 to 112. The mean, however, for the students was 90.

It was felt by the teachers and administrators that the dislike for school and the lack of interest in academic work shown by these students were the result of continuous academic failure throughout their years in school. Because of this they frequently displayed behavior that was not conducive to learning.

From the research presented it is evident that there exists in Newfoundland schools a wide range of reading ability. Programs which accommodate this wide range of reading ability should be the prime concern of educators in Newfoundland.

PURPOSE OF INTERNSHIP

The purpose of this internship was threefold.

1. Determine by the use of the Dale-Chall Readability Formula the reading level of the grade eight geography textbook, Introducing Earth Part II by L. F. Hobley. Readability studies in social studies use the Dale-Chall

Readability Formula more frequently than any other formula (See Chapter II-Related Research). Since the textbook is the basic tool of instruction in Newfoundland schools, it was important to know the level of reading necessary to fully comprehend the content of the book. Before the subject material could be rewritten at a lower level of reading, it was necessary to establish the level of reading difficulty of the material which was to be rewritten.

2. Use as a learning resource and evaluate its usefulness in grade eight geography a unit of subject material from Introducing Earth Part II rewritten at a grade four reading level as determined by the Dale-Chall Readability Formula. If the students were three or more years behind in reading (as determined in the statement of the problem) then it would be necessary to rewrite the existing subject material at a grade four reading level. For the purpose of this internship only Unit III — "Deserts and Savannahs of the World" of Introducing Earth Part II was rewritten at the grade four reading level.

3. Provide school personnel with a guide for rewriting textbook material at different levels of reading. As a result of this internship report, it is hoped that many teachers will become involved in rewriting at different levels of reading difficulty textbooks that are used in their classrooms. In this way it will be possible to meet the needs of a larger number of students than are now being reached in Newfoundland schools.

SIGNIFICANCE OF STUDY

This internship will be of value to grade eight geography teachers in that it will provide direct information as to the readability level of the grade eight geography textbook that is currently being used in Newfoundland schools. It will make it possible for teachers to be more accurate when assigning the textbook to students with a given reading capability.

The study will also provide teachers with a possible solution to the problem of teaching social studies to students who are less capable readers. If it is feasible to put into the hands of the pupils material at a reading level which allows them to successfully learn, more teachers may be encouraged to become involved in rewriting textual materials.

PROCEDURE

A brief overview of the procedure is given here. For a more detailed description see Chapter III - Implementation of the Internship.

The Dale-Chall Readability Formula was applied to twenty-five samples (one sample every ten pages) of the textbook Introducing Earth Part II. Each sample contained approximately one hundred words of the text. All words which were not on the Dale List of 3000 words were considered unfamiliar and were recorded. The average score of the twenty-five samples was recorded and compared to the Dale-Chall Correction Table to determine the readability level of

the textbook.

When the readability level of the textbook was established, Unit III - "Deserts and Savannahs of the World" of Introducing Earth Part II was rewritten. Again the Dale-Chall Readability Formula was applied to the rewritten work (twelve samples of approximately one hundred words each, one sample every five pages). The average score for the twelve samples was recorded and compared to the Dale-Chall Correction Table to determine the readability level of the rewritten material.

The rewritten material was bound in booklet form and used in two homogenously grouped grade eight classes (one with thirteen students and the other with seventeen students). It was used as the geography textbook in these two classes for the period January 15, 1975, to March 20, 1975. One class was taught by a member of the staff and the other class by the intern.

The evaluation consisted of teacher-made tests given at the end of the term. The results were compared to the results obtained by a third class which used the original material. The evaluation was very subjective. The obtained scores may not have been the result of the rewritten work, but rather the result of the teachers' frame of mind, disposition, or the work of the second term may have been more familiar than the work of the previous term. The students' sense of achievement, attitudes, confidence, and involvement were important as well for evaluating the

effectiveness of the internship. These characteristics were measured through teacher observation of group activities, projects, and discussions.

DESIGN OF REPORT

Chapter II of this report reviews the research on the readability of social studies textbooks, readability and the variables which contribute to reading difficulty, readability formulas and their application, and the research in rewritten subject materials for less capable readers. Chapter III relates the procedures followed in implementation of the internship. Chapter IV presents the findings of the internship and lists as well the limitations of such a program. Included also is a set of guidelines for rewriting social studies material and a list of recommendations for further research.

CHAPTER II

REVIEW OF RELATED RESEARCH

INTRODUCTION

Factors which determine how much and what a child reads pertain not only to the reader's proficiency in reading, his motives for reading, and his reading interests and tastes, but, as well, to the reading materials, their accessibility and readability.[1] The co-ordination of these two sets of factors for the purpose of getting the right book into the hands of the right reader should go far toward extending and improving reading habits. This internship was concerned with rewriting a social studies textbook at a lower level of reading difficulty as one means of providing the right material for less capable readers.

In order to fully explore this problem it was necessary to review the research in the readability of social studies textbooks, the research in readability factors which contribute to reading difficulty, readability formulas and their application, and research in rewritten subject materials for less capable readers.

RESEARCH IN READABILITY OF SOCIAL STUDIES TEXTBOOKS

"The most common and the earliest methods of

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[1]William S. Gray and Bernice E. Leary, What Makes a Book Readable (Chicago: University of Chicago Press, 1935), p.1.

estimating readability were those based on trained opinion on experienced judgment."[2] Writers, editors, teachers, and librarians often depended upon their previous experiences in assigning books to readers of various ages. Their predictions of readability of books were generally false. School textbooks were often above the grade levels for which they were designated.[3]

One of the earliest studies to investigate the reading difficulty of social studies textbooks was conducted over forty years ago. Brown[4] showed that the vocabularies of sixth grade textbooks written in the field of history were more difficult than those of basal readers. Students had to know from 800 to 850 more words to use the history textbooks effectively than they did to use the basal readers.

Sloan[5] analyzed the readability of three sections in twenty-one social studies textbooks used in American schools for grades four, five, and six. These sections

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[2]George D. Spache, Good Reading For Poor Readers (Champaign, Ill: Garrard Publishing Co., 1962), p.21.

[3]Ibid., pp. 21-22.

[4]Robert Brown, "Vocabularies in History and Reading Textbooks", Bulletin of the Department of Elementary School Principals, X, 3 (1931), 408-11.

[5]Fred A. Sloan, "Readability of Social Studies Textbooks for Grades Four, Five, and Six, as measured by the Dale-Chall Formula" (unpublished Doctor's dissertation, George Peabody College for Teachers, 1959), pp. 282-309.

were the introduction to each textbook, the content of each textbook, and the questions, activities, and projects in each textbook. The readability level of the introduction corresponded to the publishers' assigned grade level for eleven of the twenty-one textbooks. Generally the textbooks were no more than one grade level above the publishers' designated grade level. Readability of content was appropriate for slightly less than one-half of the textbooks, two in grade four, three in grade five, and four in grade six. The readability of the questions, activities, and projects in most textbooks presented a reading problem as most of the material tended to have a general grade placement above the designated grade level. The study also showed that average sentence length and proportion of uncommon words tended to increase from grade to grade with the sharpest increase between the fourth and fifth grades.

Other researchers have found that not only do uncommon words increase from grade to grade in some social studies textbooks, but also some grades tend to have more difficult vocabulary than the succeeding grade. Haffner[6] found that fifth grade social studies textbooks presented more difficult vocabulary than sixth grade books and

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[6]Hyman Haffner, "A Study of Vocabulary Load and Social Concept Burden of 5th and 6th Grade Social Studies, History and Geography Textbooks" (unpublished Doctor's dissertation, University of Pittsburg, 1959); see also O.L. Davis, "Textbooks and Other Printed Materials", Review of Educational Research, XXXII, 2 (1962), 131.

concluded that social studies textbooks at both grade levels contained excessive vocabulary loads and concept burdens.

Studies on readability of social studies materials intended for elementary grades in general reported findings which showed that the reading level of most textbooks was higher than the average reading ability of the students for whom the books were intended.[7] Twenty-five textbooks which comprised four basal social studies series were analyzed to determine the readability levels within and between the books of a series. The Spache Readability Formula and the Dale-Chall Formula for Predicting Readability were applied to the books in the primary and elementary grades respectively. Results of the study showed that the readability level of these social studies series progressed generally according to the publisher's recommended sequence. However, the general progression was marked by irregularities both within and between the series. Within each book the reader was confronted with printed materials at various levels of difficulty; the range for some books was four years.[8]

Johnson and Vardian[9] evaluated sixty-eight social

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

[8]Ibid., p. 245.

[9]Roger E. Johnson and Ellen B. Vardian, "Reading, Readability, and Social Studies", The Reading Teacher, XXVI (February, 1973), 483-488.

studies textbooks for grades one through six used in American schools. They ignored methods of instruction, interest level of materials, concepts that were to be taught, and motivation provided by a teacher. They used the Spache Readability Formula and Fry Readability Graph for the primary books and three readability scales, Dale-Chall Formula, Flesch Formula, and Fry Readability Graph for the elementary grades. Of the seventy-four reading levels listed for the thirty-seven books recommended for grades one, two, and three only two were below the designated grade level. Forty-one reading levels were at least one grade level above that recommended by the publishers. Of the thirty-one textbooks recommended for grades four, five, and six, seventy-two of the ninety-three obtained reading levels were above the intended grade level. Only one of the ninety-three reading levels was below the publisher's designated grade level.[10] They concluded that if the readability levels were accurate only some of the textbooks were appropriate to the average reader. None of the books was for the slow or less capable reader.

English[11] investigated the readability level of social studies and science textbooks used in Newfoundland

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[10] Ibid., p. 485.

[11] Ida English, "A Readability Study of Social Studies and Science Textbooks", (unpublished Master's thesis, Memorial University of Newfoundland, 1974), p.51.

schools. The Dale-Chall Readability Formula was applied to twenty-one social studies and science textbooks used in grades four to eight. Results showed only eight of the twenty-one textbooks were at a level of difficulty equal to or below the intended grade level. All of the books used in grades four and six were above the designated grade level. Thirteen of the textbooks had a level of difficulty from one to four years above the intended grade level.

It would appear from these studies that many social studies textbooks are written at a level too difficult for the reader for whom they are intended. A student reading on a grade four level cannot be expected to read and comprehend a book written on an eighth grade level because he lacks the requisite conceptual vocabulary. To give a student who is reading on a fourth grade level an eighth grade book is unwarranted, unfair, unrealistic, and damaging. A young reader's mind can be stretched only so far before he becomes frustrated and quits. Therefore, rewriting subject material that is compatible with the student's reading level would logically seem to be both beneficial and rewarding to that student.

FACTORS WHICH CONTRIBUTE TO READING DIFFICULTY

Over the years hundreds of language variables have been found that predict readability. In order to understand and control readability, it was necessary to make sense of this profusion of variables. Although there is a number of

variables which are related to readability, this internship was concerned only with the two most common variables, some aspect of word difficulty, usually frequency, and some aspect of sentence difficulty, usually length. The amount of predictive accuracy added by the use of more than these two variables becomes small compared with the amount of additional work. "Of the 31 formulas published up to 1960, 17 of them used a word count factor directly and most others used a related factor (for example, word length). Similarly, 12 other formulas used a sentence length factor directly and many used it indirectly such as the proportion of simple sentences in the sample sentences [sic]."[12] A study by Stolurow and Newman[13] showed that the relative difficulty of words and the relative sentence difficulty accounted for 34 percent and 20 percent respectively of the forty-four objective structural elements of expression in reading passages listed by Gray and Leary.

Word Frequency factor in readability

People have a tendency to repeat familiar words both in writing and speech much more frequently than unfamiliar words. Research has shown that ten words may

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[12]George R. Klare, "The Role of Word Frequency in Readability", Elementary English, XLV (January, 1968), 12.

[13]Lawrence Stolurow and James R. Newman, "A Factorial Analysis of Objective Features of Printed Language Presumably Related to Reading Difficulty", Journal of Educational Research, LII (March, 1959), 243-251.

make up as much as 25 percent of college freshman writing; one hundred words may make up as much as 95 percent of adult telephone conversations.[14]

Perhaps the earliest recorded evidence that frequency is related to readability came from the Talmudists, a group of religious writers, over a thousand years ago. "They made word and idea counts of their manuscripts so that they could use frequency of occurrence to distinguish usual from unusual meanings".[15] In 1889 and 1898 Rubakin and Keading respectively published word lists which provided the scientific base for the relation of vocabulary to reading difficulty and established a basic vocabulary foundation. As a result of these studies E.L. Thorndike published in 1921 The Teachers' Word Book. This book was important for the teaching of vocabulary in schools and out of it grew the first measure of readability that could be considered a formula, which was devised by Lively and Pressey.[16]

In concluding his article on word frequency Klare stated, "not only do humans tend to use some words much more often than others, they recognize more frequent words more rapidly than less frequent, prefer them and understand

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[14]George R. Klare, "Assessing Readability", Reading Research Quarterly, X, 1 (1974-75), 97.

[15]George R. Klare, "The Role of Word Frequency in Readability, Elementary English, XLV (January, 1968), 14.

[16]Ibid.

and learn them more readily."[17]

Word difficulty is the most important component in the study of readability. It is the most often used of all factors in readability prediction, and it accounts for the greatest amount of variance in available factor analyses of readability elements. Word frequency gives a slightly more predictive index than counting word length, probably because length is a secondary reflection of familiarity.[18]

Sentence factor in readability

The second most important factor which contributes to readability is the sentence variable. Although it has not played such a dominant role in the prediction of difficulty as the word variable, it has made an important contribution. Evidence for this has been in the widespread use of the sentence variable in readability formulas. "Sentence complexity is probably the real causal factor in reading difficulty, but length correlates very highly with complexity and is much easier to count."[19] Seventy-three books (forty textbooks and thirty-three workbooks) analyzed by Glazer[20]

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[17]Ibid., p.20.

[18]George R. Klare, "Assessing Readability", Reading Research Quarterly, X, 1 (1974-75), 97.

[19]Ibid.

[20]Susan M. Glazer, "A Comparative Analysis of Syntax in Some Elementary Grade Reading Materials" (unpublished Doctor's dissertation, University of Pennsylvania, 1973); see also S.M. Glazer, "Is Sentence Length a Valid Measure of Difficulty in Readability Formulas?", The Reading Teacher, XXVII (February, 1974), 465.

for the BDG complexity counts (Botel, Dawkins, Granowsky Syntactic Complexity Formula) gave correlations of .480 for the lower level materials to .981 at the more advanced levels. In another study complexity of sentence was analyzed by comparing the percentage or number of simple sentences with the percentage or number of compound sentences. Compound or complex sentences were found to be generally longer than simple sentences. Therefore, structure and length were presumed to be related.[21]

Sentence length as a readability factor has been the one linguistic variable included in many of the more widely used formulas (Dale and Chall, 1948, Spache, 1953) for predicting the reading difficulty of a passage. Bormuth has referred to sentence length as "the best single measure of grammatical complexity of sentences."[22] Educators have assumed for a long time that younger, less mature students spoke and wrote shorter sentences while more mature language has been marked by longer structure. Younger students have a much shorter meaning span than older, more mature students. Comprehension of written material depends upon the length of sentence used, probably because of human limits in memory span. Sentence length as a measure of difficulty has virtually always involved counting the number

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[21]George R. Klare, The Measurement of Readability (Ames, Iowa: Iowa State University Press, 1963), p. 170.

[22]John R. Bormuth, "Readability: A New Approach", Reading Research Quarterly, I, 3 (Spring, 1966), 92.

of words in a sentence.[23]

Other variables such as redundancy and linguistic variables have also been found to influence readability. The most highly predictive formula available, the Dale and Chall, has relied on the two factors, word similarity and sentence length. The more variables measured, the more complicated computations become and complicated formulas are not practical for classroom teachers to use.

READABILITY FORMULAS AND THEIR APPLICATION

"Readability formulas indicate the average reading ability needed for adequate comprehension of a certain book. They do not prove that all readers of this level of ability will necessarily enjoy the book or be able to read it with profit or consider the book easy reading."[24]

Interest in readability formulas has grown because of their multitude of possible uses. Educators have used readability formulas in hundreds of applications for which no other method of estimating readability was quite appropriate. Some of these applications included school readers, teacher tests, and the school material offered by government.[25]

Of all the formulas that have been used over the years for predicting readability, those that gained widespread recognition were the Dale-Chall, the Flesch, and the Spache.

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[23]Klare, op. cit., p. 171.

[24]George D. Spache, Good Reading For Poor Readers (Champaign, Ill: Garrard Publishing Co., 1962), p. 27.

[25]Ibid., p. 25.

They have concentrated on measuring vocabulary load (proportion of difficult words) and the sentence length of written materials. Word lists served as their basic determinant of vocabulary load in all formulas except the Flesch.

Research in readability in social studies used the Dale-Chall formula more frequently than any of the others. Klare pointed out that the Dale-Chall formula "is one of the most frequently used," "more highly predictive than any of the popular formulas available today," and "consistently more accurate than others."[26] Other researchers including Sloan,[27] Arnsdorf,[28] and English[29] used the Dale-Chall formula over others in determining the readability level of textbooks in a specific area such as social studies. Pauk stated "the Dale-Chall formula is widely accepted as being both valid and reliable. It contains a word list which is absolutely essential for using the modification technique."[30]

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[26]George R. Klare, The Measurement of Readability (Ames, Iowa: Iowa State University Press, 1963), pp. 59, 60, 22.

[27]Fred A. Sloan, "Readability of Social Studies Textbooks for Grades Four, Five and Six, as measured by the Dale-Chall Formula" (unpublished Doctor's thesis, George Peabody College for Teachers, 1959), pp. 282-306.

[28]Val E. Arnsdorf, "Readability of Basal Social Studies Materials," The Reading Teacher, XVII (January, 1963), 243-246.

[29]Ida English, "A Readability Study of Social Studies and Science Textbooks" (unpublished Master's thesis, Memorial University of Newfoundland, 1974), p. 51.

[30]Walter Pauk, "The Interest Level - That's the Thing", Journal of Reading, XVII (March, 1973), 459-461.

The modification technique is the rewriting of existing materials at a lower reading level by replacing unfamiliar words with familiar ones and converting long sentences into shorter ones.

The Dale-Chall formula was used for this internship because it could be applied with little difficulty to both the original and the rewritten material to determine the readability level. Although only two variables were used (unfamiliar words and sentence length) the formula was still felt to be valid and reliable. Also, it includes a word list which was essential for rewriting the original material at a lower reading level. A step-by-step explanation of the formula and its application to both the original and rewritten material is given in Chapter III.

RESEARCH IN REWRITTEN SUBJECT MATERIALS FOR LESS CAPABLE READERS

Most investigations into the rewriting of existing subject materials for less capable readers have been done by professional editors. Zintz reported an attempt made by Treadwell and Free who in 1910 selected stories in literature and rewrote them at a lower level so that they could be taught to students of lower reading ability.[31] Other editors who have rewritten reading series at a lower level of reading for

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[31] Mary H. Zintz, Corrective Reading (Dubuque: William C. Brown Company, 1966), p. 332.

less capable students include Bond, et.al.,[32] Thomas,[33] and McIntosh.[34]

Some suggestions for improving the situation have been to find published articles with low readability and high interest level. Articles with high interest have generally been written at a high reading level. Pauk suggested that educators write the needed materials themselves.[35] This would be very difficult because all educators are not authors, and many of them do not have the time for such a task.

Roe[36] suggested that teachers rewrite the existing materials available in their schools at lower readability levels for students who were reading below grade level. In her study she used nine graduate students who were also public school teachers. Their assignment was to take a chapter of a textbook being used in secondary school, assess the readability of the chapter by the Dale-Chall readability formula, and rewrite the existing material

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[32] G.L. Bond, et.al., Developmental Reading Series (Chicago: Lyons and Carnahan, 1957).

[33] Mary E. Thomas, Developing Comprehension in Reading (Toronto: J. M. Dent Publishers, 1972).

[34] J.R. McIntosh (ed.), The Canadian Reading Development Series (Toronto: Copp Clark, 1962).

[35] Walter Pauk, "The Interest Level - That's the Thing", Journal of Reading, XVII (March, 1973), 459-461.

[36] Betty D. Roe, "Teacher Prepared Materials for Slow Learners", Journal of Reading, XV (January, 1972), 277-279.

simplifying the vocabulary and sentence structure, then assess the rewritten version by applying the Dale-Chall formula again. Selections came from history, English, literature, and science textbooks. Results showed that all teachers were able to lower the reading level by at least two grade levels while some even managed to lower the readability level by four grade levels. The graduate students were very skilled at producing sentences containing simpler vocabulary than the original material and simplified sentence structure by producing shorter sentences. "Every teacher described the experience as enjoyable and expressed the desire to rewrite more material."[37]

Williams[38] studied the effects on sixth-grade pupils' reading abilities when sixth-grade science materials were rewritten at a lower level of readability. He analyzed and rewrote a unit of a sixth-grade science textbook at a third-grade level of readability. He used four hundred sixth-grade students and randomly assigned them to either the control group (original material) or the experimental group (rewritten material). He reported in his conclusions, "writing sixth-grade science textbook selections at a lower level of reading difficulty through simplification of style and vocabulary and amplification of technical vocabulary

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[37]Ibid., p. 279.

[38]David L. Williams, "Rewritten Science Materials and Reading Comprehension", Journal of Educational Research, LXI (January, 1968), 204-206.

helped sixth grade pupils increase their reading rate and comprehension."[39] He also found that sixth-grade pupils with low reading ability read with greater speed and understanding when they were provided science reading materials more closely written to their reading achievement level.

From the studies cited in the foregoing it is obvious social studies textbooks are generally written at a reading level above the students for whom the books are intended. Readability formulas have used a number of variables of which the most common are word frequency, and sentence length which contribute to this reading difficulty. The provision of rewritten subject materials for less capable readers is one way of eliminating the frustrations of students caused by material that is too difficult.

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[39] Ibid., p. 206.

CHAPTER III

IMPLEMENTATION OF THE INTERNSHIP

INTRODUCTION

The sample

The internship was conducted in St. Patrick's Hall Junior High School, St. John's. The school, constructed by the Irish Christian Brothers thirty years ago, is now under the jurisdiction of the Roman Catholic School Board for St. John's. The twenty-classroom wooden frame building has approximately four hundred students in grades seven to nine. Permission to do the internship in St. Patrick's Hall Junior High School was granted by the assistant superintendent for curriculum of the St. John's Roman Catholic School Board and by the principal of the school. Forty-nine grade eight students who were considered to be less proficient verbally (See Appendixes B and C) were used for the internship. The students ranged in age from 14 to 16 years (most were 15 and 16 years old). Most of these students had experienced academic failure and had repeated a grade while some had even repeated two or three grades. Their courses of study for mathematics and English Language were at a lower level than the regular grade eight program. Their program was also supplemented with remedial reading (McGraw Hill EDL Program for Underachievers), and workshop classes in carpentry, leather craft, and copper tooling. Results of

the SRA Reading Record Test which tested the rate of reading, reading comprehension, everyday reading skills, and reading vocabulary, showed that all students were below the lowest grade equivalent value for the Reading Record total score. Estimated levels of reading indicated that they were reading at least three to four years below grade placement level. Medical records, however, revealed that the majority of these students were free from any physical abnormalities.

The textbook

Introducing Earth Part II by L.F. Hobley was in its initial year as the geography textbook for grade eight students of Newfoundland and Labrador. It was introduced to the schools through a series of pilot programs by the department of education for the province of Newfoundland and Labrador during 1973-74 school year. It was recommended by the department of education as the geography textbook for all grade eight students in the province of Newfoundland and Labrador for the 1974-75 school year.

APPLICATION OF THE DALE-CHALL FORMULA

It was necessary to determine the readability level of Introducing Earth Part II before the content material could be rewritten. The Dale-Chall readability formula (1948) was used because it is the most widely used readability formula. It could also be applied with little difficulty to both the original and the rewritten

material and it included a word list which was essential for rewriting the existing material at a lower reading level. The formula was applied to the textbook exactly as stated by the authors and no attempt was made to select passages which would affect the outcome of the study. The Dale-Chall formula was applied in the following manner.

Approximately every tenth page, as specified by the formula, was selected as a sample page for a total of twenty-four samples for the textbook. (See Appendix D.) A passage of one hundred words was selected. However, if there were insufficient words for the sample the preceding page was used. If that page did not contain sufficient words the succeeding page was selected. This process continued until a page was found with more than one hundred words. Some samples contained more than one hundred words because each sample consisted only of complete sentences.

The sample was selected, words counted and recorded excluding all headings and captions. The information regarding the title, author, publisher, and date was entered with each sample. The number of sentences in each sample was also recorded.

Each word in each sample was compared to the Dale List of 3000 words to determine if it were on the list. If a word were not on the list, it was considered unfamiliar. All unfamiliar words were recorded for each sample. All special rules given by Dale-Chall (1948) were followed in determining the unfamiliar words. The Dale List of

Familiar Words was found by testing grade four students on their knowledge of some ten thousand words. A word was considered as known when on testing it was determined that at least 80 percent of the grade four students were familiar with the meaning of the word. It was maintained by Dale and Chall that when appraising the level of reading difficulty of a passage, the percentage of words that was not on the Dale-Chall List helped to provide an accurate index of the difficulty of that reading material.[1]

The average sentence length in each sample was found by counting the number of words in the sample and dividing by the number of sentences in the sample.

The Dale Score or percentage of words that were outside the Dale List of 3000 words was found by dividing the number of words not on the Dale-Chall List by the number of words in the sample and multiplying by 100.

The formula raw score was determined by:

$$XC50 = .1579X_1 + .0496X_2 + 3.6365$$

XC50 = the reading grade score of a pupil who could answer one-half the test questions on a passage correctly. The criterion used by Dale and Chall was the 1925 McCall-Crabbs Standard Test Lessons in Reading. These lessons consisted of a large number of

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[1] Leonard P. Stocker, "Increasing the Precision of the Dale-Chall Readability Formula", Reading Improvement, VIII (Winter, 1972-73), 87-89.

reading passages, covering a wide range of difficulty. The Dale-Chall formula correlated .70 with McCall-Crabbs criterion.

X_1 = the Dale Score or percentage of words outside the Dale List of 3000 familiar words

X_2 = average sentence length in words

3.6365 = constant.

The Formula Raw Score of each sample was totalled and divided by the number of samples. The average Formula Raw Score for the twenty-five samples was then converted to a Corrected Grade Level as determined by Dale-Chall (1948). The Corrected Grade Level indicated the grade at which the book could be read with understanding. It did not mean that all students with this level of ability would enjoy the book or find the book easy to read. The Formula Raw Score of 6.0 - 6.9 has a grade level of 7-8. The Average Formula Raw Score for the twenty-four samples was 6.7, which corresponds to a grade 7-8 level on the converted Grade Level Scale. Consequently the textbook was suitable for grade eight students as recommended by the department of education for Newfoundland and Labrador. A concomitant outcome of analyzing the textbook with the formula showed that there was no consistent systematic progression of difficulty of the content. Indeed, the samples showed many irregularities. Some were written at a grade 5-6 level whereas other samples were written at a 9-10 reading level.

REWRITING THE EXISTING MATERIAL

Although the textbook Introducing Earth Part II was found to be suitable for average and above average grade eight students, it was too advanced for the students used in this internship. Since the estimated reading levels of these students were three to four grades below the level of the textbook, the aim was to rewrite the textual material at a grade four reading level.

For the purpose of the internship, only one unit of Introducing Earth Part II was rewritten at the fourth grade reading level. This unit, "Deserts and Savannahs of the World", was rewritten using content material identical to the original textbook, but the factors which research has shown to be important in reading ease were considered when rewriting.

Word Frequency

When the readability formula was applied to Introducing Earth Part II it was found that approximately 15 percent of the words in each sample were unfamiliar according to the Dale-Chall List of 3000 words. To alleviate this problem, it was necessary to substitute phrases, short sentences, or synonyms for the unfamiliar words. It was impossible to provide a substitute for all words, especially geographical concepts like equator and tropics. It was felt that this did not pose too great a problem since most of these words should have been familiar to the student from his study of geography in previous

grades. However, provision was made in the daily lessons for developing unfamiliar concepts.

Sentence Length

The Dale-Chall formula (1948) used the sentence factor as an important contributor to reading difficulty. It was obvious from reading the textbook that the length of the sentences in Introducing Earth Part II helped to contribute to the difficulty of the material. Sentences of forty to sixty words were quite common in the textbook and some sentences contained over ninety words. It was relatively easy to break up these long sentences into shorter ones, since most of them consisted of multiple clauses.

The substitution of words and the shortening of sentences must not be done mechanically. A logical orderly structure of sentences must be maintained when rewriting material. Short, choppy, repetitive sentences could change the systematic arrangement of the material to the extent that the rewritten version would be more difficult to comprehend than the original one.[2]

After unfamiliar words were replaced with familiar ones and after long sentences were converted into shorter ones, it was necessary to apply the Dale-Chall formula to ascertain the grade level of the rewritten version. (See Appendix F.) The rewritten version consisted of fifty-six pages. Twelve samples of one hundred words

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[2]Walter Pauk, "The Interest Level - That's the Thing", Journal of Reading, XVI (March, 1973), 459-461.

each were taken from the modified product. In order to obtain the most accurate results, it was necessary to take a number of samples. Therefore, instead of taking one sample every ten pages as in the original book, in the rewritten version one sample was taken every five pages. A Formula Raw Score Mean of 4.7 indicated that the rewritten material was at a fourth grade or below reading level.

IMPLEMENTATION OF THE REWRITTEN MATERIAL

As stated earlier in this chapter (p. 33) the Corrected Grade Level indicated by the Formula Raw Score showed that Introducing Earth Part II was written at a grade 7-8 reading level. This indicated that in all probability the textbook was satisfactory for the average or above average grade eight classes. Since the grade eight pupils were grouped homogenously, it was considerably above the reading level of the three lower classes. Results of the first term examination showed that approximately 35 percent of the students in three grade eight classes was failing. Through teacher observation and teacher made tests, it became apparent that the majority of the students in the three classes were making little progress in geography.

The selection of one class over the others to act as a control group was based on the scores of teacher-made tests for the first term. (See Appendix H.) Control group X had less failures (25 percent as opposed to 50 percent

for experimental group Y and 31 percent for experimental group Z). It was felt by the intern that the students in group Y and group Z would benefit more from the use of the rewritten content material. Control group X was taught by the intern. The students in group X were taught the same subject material as the two experimental classes with the one exception, control group X used the original material rather than the rewritten version. All groups were exposed to approximately the same teaching strategies, materials, activities, tests, and other forms of evaluation.

The rewritten material, "Deserts and Savannahs of the World," contained fifty-six typed pages as well as five pages of maps and diagrams considered relevant to the rewritten material. The unit was bound in booklet form and a copy given to each student in the two experimental classes. The material was to be used in these two classes for approximately seven to eight weeks. Due to inclement weather and teacher workshops, the school was closed for two weeks during the program. However, it was still possible to finish the unit during the six weeks, which would have been highly improbable had the students been using the original textbook.

The involvement of another teacher in this project came about as the result of the difficulty experienced by students in a third class. This teacher expressed a desire to use the rewritten version of Unit III, "Deserts and Savannahs of the World", in his geography class as a

means of overcoming the reading difficulty experienced by these students. This class became the second experimental group (group Z) in the study.

Although the teaching procedures (researching, reading, writing, reporting, and discussing) for the unit were planned jointly by both the cohort teacher and the intern, the regular daily lessons were the sole responsibility of each individual teacher. Intermittent discussions with the cohort teacher were held on various aspects of the unit, for example, what methods of instruction would be used to teach a particular section of the unit, what was considered important for the students to know in a section, and to exchange thoughts and ideas that the students expressed in the classes. These discussions occurred generally in free periods during the teaching day.

Theoretically, the first step in planning a unit is the selection of a unit topic that reflects the nature and needs of the students, school, and community in which the unit is to be taught.[3] The resources (reading materials, audio-visual aids, excursions, and construction materials) available for teaching a unit also help to determine the topic that is selected. This process was not adhered to in selecting the unit, "Deserts and Savannahs of the World." Selection was based solely on the fact that this was the

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[3] Lavone A. Hanna, Gladys L. Potter and Neva Hagaman, Unit Teaching in the Elementary School (New York: Holt, Rinehart, and Winston, 1963), p. 144.

designated subject material that was to be taught during the second school term.

In preparation for teaching the unit the school librarian listed all resource materials (reference books, periodicals, filmstrips, study prints, resource kits, encyclopedias, and phonotapes) available in the school library that were relevant to the sub-topics in the unit. This material was kept in one specific area of the library for the duration of the term while the students were studying the unit. This helped to eliminate time that would likely have been spent by students in researching for specific materials when doing activities. Other instructional materials such as films and filmstrips from the division of instruction of the provincial department of education were used to supplement the school library materials.

Before introducing the unit topic to the students in the experimental groups Y and Z, one class period was devoted to the advantages of rewritten materials for students. It was explained to the students that because of the lower reading level of the material they would be able to read and understand much more quickly the content of the textbook unit. They would as a result of acquiring information more easily be able to take part in group discussions and projects. The purpose of this introductory class period then was to create in the students a favourable attitude toward using textual material.

Four class periods were devoted to introducing the

students (both the control group and the experimental groups) to the various groups dealt with in the unit. Each day the students viewed a film or filmstrip on a particular group and for the remainder of the class period visited the library and browsed through the reference materials associated with that group. The main purpose for this was to give the students an overview of the whole unit and to create a thirst in them for more knowledge of the various groups of people and the conditions under which they live and how they adjust to their surroundings. Therefore, developing the students' insights and understandings of other humans was the main objective of the unit.

Although reference materials were used to supplement the unit students in the two experimental groups derived the pertinent data primarily from the rewritten material and primarily from the original textbook in the control group. Teaching concentrated on the acquisition of subject matter through learning activities which tended to be verbal, with reading, discussions, writing, and testing comprising the main means of learning. Students in the experimental groups were required to read specific sections in the rewritten booklet to find answers to questions that were relevant to the assigned readings, for example, how the Bushmen make their bows and arrows, how the Aborigines collect water, or how the white man has changed the life of the Eskimoes. Disqussions were held on the advantages and disadvantages of such factors as the weapons and hunting

methods used by each group, the animals hunted by them, their methods of collecting water and food, the religious beliefs of the groups, the art of the Bushmen, and the influence of oil on the changing life styles of the Bedouins. Students were encouraged to compare one group with another and to compare the groups with themselves. Those discussions were held only after students had read and made notes on the relevant sections. After the discussions students were given an opportunity to add further to their notes points that were discussed which they had not included when they read the material. This helped individual students to share their points of view with others and to learn to respect viewpoints at variance with their own. Written activities also involved reporting to the class in more detail on sub-topics that were discussed in class. The original material was used by the control group in carrying out the same teaching strategies. Students were tested on the work covered in the readings, discussions, and writing activities. Test questions were based on the rewritten material. However, students were free to include any ideas found in the reference materials, films, or filmstrips. Students were also evaluated on written reports and notes, and participation in class discussions. (For a more detailed description of the results of class tests see Chapter IV - Evaluation of the Internship).

CHAPTER IV

EVALUATION OF THE INTERNSHIP

INTRODUCTION

Very little statistical analysis was necessary to evaluate the effects of the internship because it is descriptive research. There can be no generalizing to a wider population. The findings are applicable only to the pupils involved in the study investigated by the researcher. Subjective evaluation was made on the basis of the results attained by the students on teacher-made tests for the two semesters for both the original and rewritten subject material. The evaluation also included teacher appraisal of students' work attitudes and behavior during the internship.

EVALUATION OF APPROACH

To evaluate the effectiveness of this approach on the grade eight students of St. Patrick's Hall School evidence was gathered from two sources. The first source was a comparison of achievement scores on teacher-made tests for both the first and second semesters. The reader will find in the figures and the tables in Appendix H that each student has been assigned a number. The purpose for this is to maintain the anonymity of the students involved. The second source of evidence was informal

observation by both the cohort teacher and the intern.

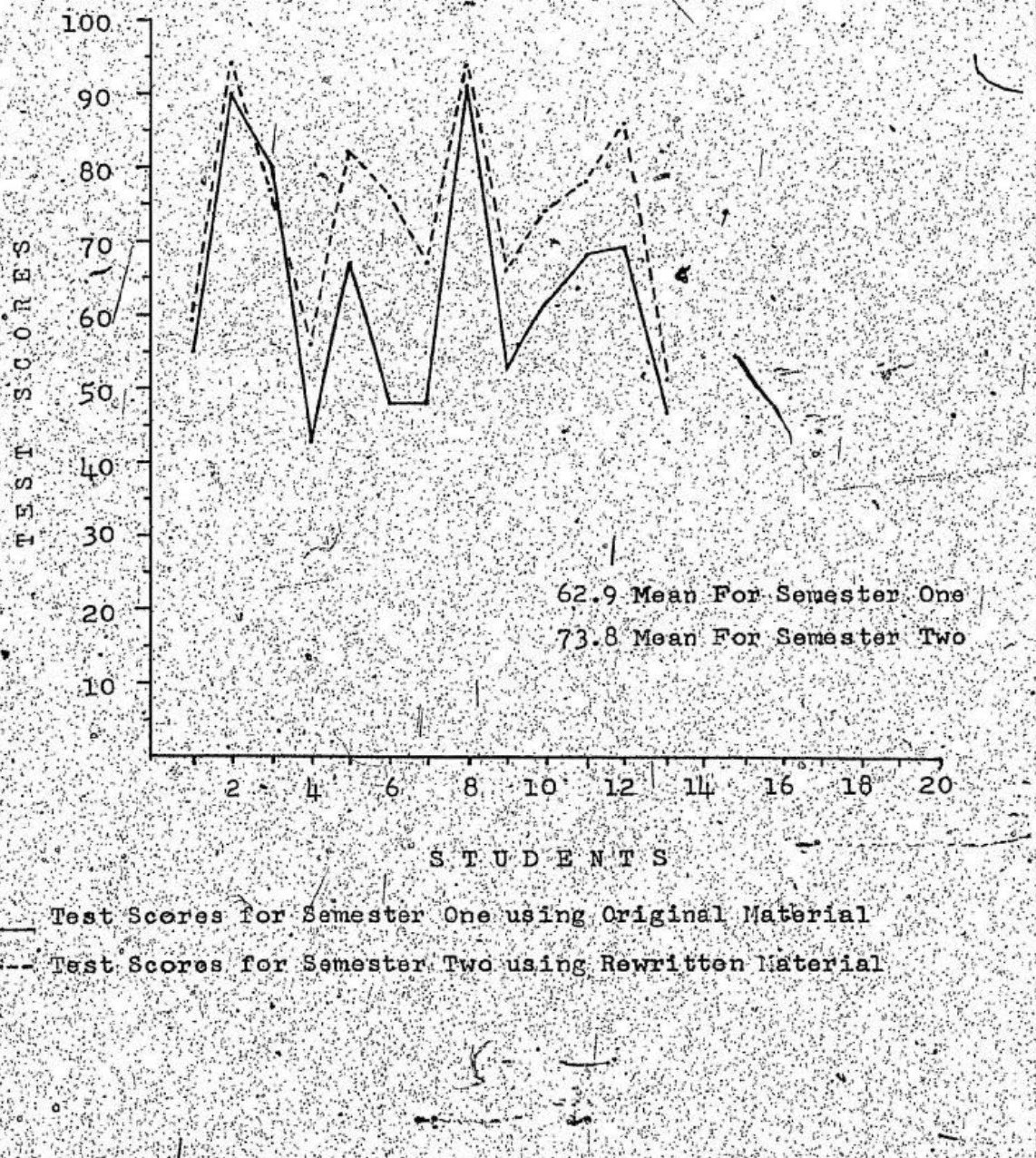
The control class (group X) used the original textbook material both semesters. The experimental Classes (groups Y and Z) used the original textbook material during the first semester and the rewritten version of the textbook unit for the second semester. Due to the subjective nature of the evaluation it was impossible to determine if the treatment was solely responsible for the increased mean scores experienced in the two experimental classes using the rewritten textbook material. There may be other variables envolving out of the interaction of pupils and materials that may have contributed to the results. The students in the experimental classes may have been better able to verbalize in the classroom due to their greater understanding through the use of the rewritten material than the control students using the original material. Students in the experimental classes may have had greater inspiration to learn as a result of the opening remarks made in the first class by both the cohort teacher and the intern as to the merits of using such a program. These variables may have exerted an influence on the achievement scores of the students in the experimental groups.

Results of treatment on teacher-made tests

Experimental group Z showed an increase of 11 points in the mean score (See Figure I and Appendix H - Table III) from the first to the second semester. This may be considered significant because during the first semester

FIGURE I

A Comparison of Test Scores for Experimental Group Z for the First and Second Semesters



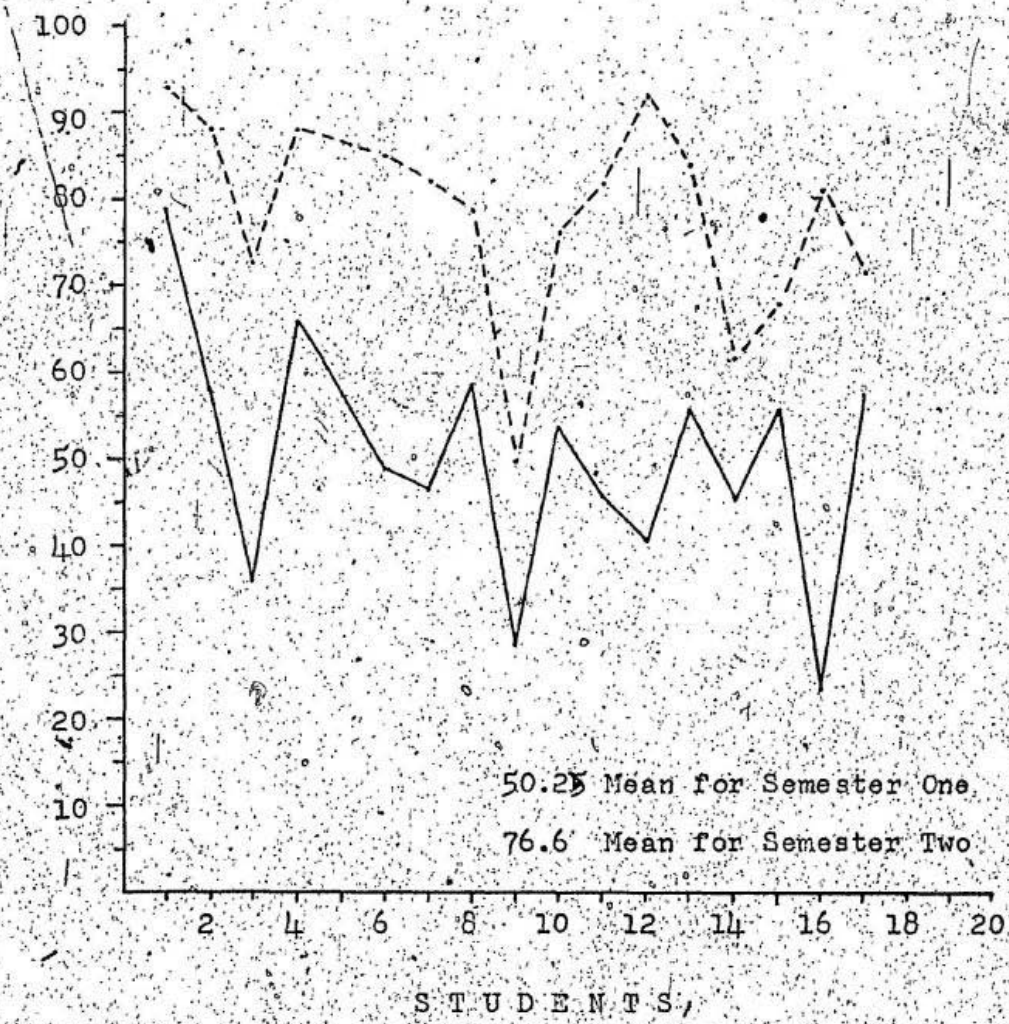
this class only covered one-half the assigned content material studied by groups X and Y. The high mean score (62.8) for the first semester may have been the result of little work studied or drill for the exam on the part of the teacher. During the second semester this class was able to complete the same work as the other two classes (X and Y) and still increase the mean score for the class by 11 points. It was felt by the cohort teacher that their progress would perhaps have been less had these students not been given the rewritten subject material.

The largest increase in mean score was found for experimental group Y which also had the original material the first semester and the rewritten version for the second semester. The mean scores for the class were 50.25 and 76.6 for the first and second semesters respectively, an increase of 26 points. (See Figure 2 and Appendix H - Table II.) Approximately the same amount of work was covered both semesters and the work was felt to be as unfamiliar the second semester as it was the first semester. Therefore, it is felt by this intern that the increased mean score for the second semester may be attributable to the easier-to-read rewritten subject material.

The achievement scores for control group X which used the original material for both semesters showed an increase of 9 points in the mean score from 54.7 to 63.9 from the first to the second semester. (See Figure 3 and Appendix H - Table I.) The increased mean score for

FIGURE 2

A Comparison of Test Scores for Experimental Group Y for the First and Second Semesters



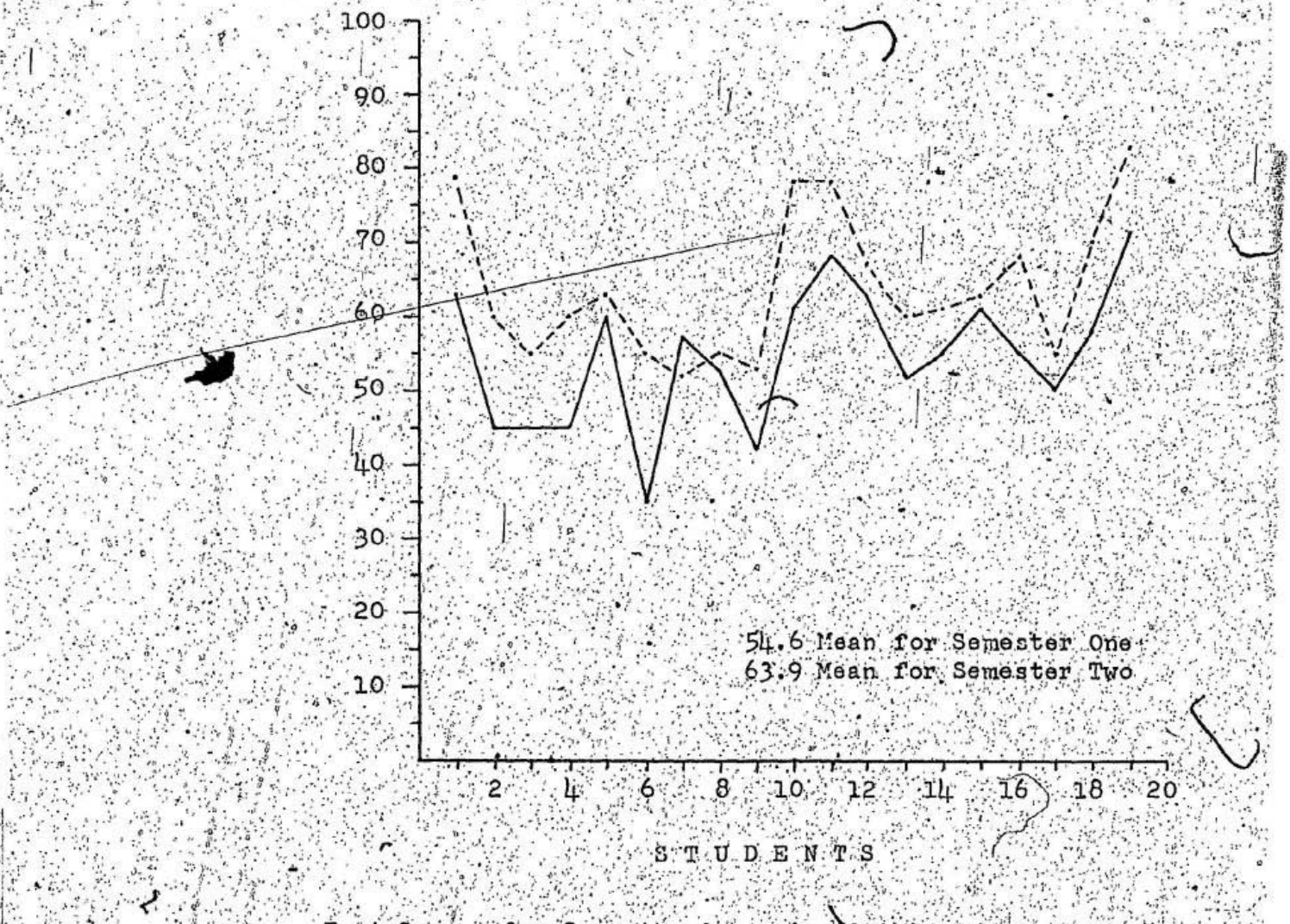
____ Test Scores for Semester One using Original Material

----- Test Scores for Semester Two using Rewritten Material

No Comparison made for Pupil Number 5; only one Test Score Available.

FIGURE 3

A Comparison of Test Scores for Control Group X for the First and Second Semesters



control group X may have been the result of more conscientious teaching by the intern, his priming the pupils for the exam, or the work may have been inherently more interesting during the second semester creating a desire for more study by these students.

Although it cannot be determined definitely if the treatment influenced the achievement scores of the experimental groups Y and Z to the extent stated in this internship, it was, however, encouraging to see a decrease in the number of failures in these two classes. For the first semester the failure rate for classes Y and Z was 50 and 30 percent respectively. For the second semester there was only one failure in both classes. That student had missed a great deal of time from school both semesters including the first semester exam.

Results of treatment on attitudes and behavior

The second source of evaluation was informal observation by the cohort teacher and the intern. Through direct observation of student activities, class discussions, relationships with other students, and interest displayed in geography the cohort teacher and the intern noticed changes in students' attitudes and behaviors in the classroom. There seemed to be an increase in student participation and contribution to classroom activities (group discussions and written assignments) in the experimental classes. This participation was inconspicuous in these two classes during the first semester. In the control group

there was little apparent noticeable change in behavior and attitude from the first semester to the second semester.

1. Students enjoyed working on their own and were eager to assist any classmates who were experiencing difficulty. In the second week of the program on January 23-24 some students were having difficulty understanding why desert lands were cool at night and tropical forest lands were warm. These students (numbers II and XIII in group Y and number XI in group Z) who easily understood the answer went around to the desks of their classmates and helped to explain why the temperature drops at night in the desert lands.

2. Students were able to extract from the rewritten material the essential facts and understandings. This was evident in their note-books. Many students (numbers II, IV, VII, VIII, XI, XII, XIII and XVII in group Y and II, IV, VII, XI and XII in group Z) had made outlines and summaries on the important ideas involving each of the groups studied in the unit. Most of this work was completed outside of school hours or during any free time in geography classes.

3. Students were able to read a passage, select the main idea or ideas, and identify the related facts that were relevant to the topic under consideration. This often meant that students had to read more than one page to find the pertinent facts. For example, on January 28 students had to read the section on the Bushmen of the

Kalahari to find the major problems faced by this group of people. Most students were able to do this (especially students II, VI, VIII, XI and XII in group Z and students I, II, III, VI, VII, XII and XVI in group Y). On February 6 students were studying the effect of oil on the Arab desert dwellers. They were required to read the section "Oil from the Desert" and explain how oil is changing the life style of the desert people. The class discussion on February 18 involved not only the Arab desert dwellers but Canadians as well. Many of the students wanted to know why Canada imported oil from other countries when it was exporting oil to the United States. Students especially interested in this discussion were numbers II and VIII from group Z and students XI, XII, XIII from group Y. Students were required to read the final section of the unit to find samples of (a) how man is overcoming the desert and (b) how man's work in the desert seems to go against him. This assignment, although it took two class periods (March 11-12) and required the reading of seven pages of the textbook, was completed by most students with a fair degree of success, especially students II and XI in group Z and students I, II, XII, XVII in group Y.

4. Many students, particularly student XI in group Z and XII in group Y, made questions on the assigned readings to ask in class the following day. These questions were often answered by the students, especially numbers II and XI in group Z and I, II, and XVII in group Y.

These are only some of the activities and assignments conducted by the students during their study of the unit. Other samples of a similar nature could be stated with equivalent results. These students were able to do these assignments with a fair degree of success, something they had been unable to do in the first semester. It is felt by the cohort teacher and this intern that the general overall improvement shown by the students can be attributed at least in some measure to the use of the rewritten subject material. The cohort teacher also expressed a desire to have other school texts rewritten at a lower reading level for less capable readers.

In the control group many students were still experiencing difficulties with the original material as they had in the first semester. Most students were unable to complete the required activities and assignments and seldom could they be left to work alone. There was little recognized improvement in class participation by these students. Generally the students behaved and worked with similar results and in much the same manner as in the first semester.

SUMMARY AND FINDINGS

Summary

The nature of this internship was to determine the feasibility of rewriting geography textbook materials at a lower level of reading difficulty for less capable

grade eight students. To conduct this study it was necessary to find the reading levels of the students in the sample and the readability level of the grade eight textbook, Introducing Earth Part II. The S.R.A. Record Reading Test was used to find the reading level of the students and the Dale-Chall Readability Formula was used to find the reading difficulty of the textbook. Results showed that the students were reading at least four grades below their designated grade and according to the Corrected Grade Level Score for the formula the textbook was suitable for grade seven or eight students. The geography textbook was rewritten at a grade four or lower reading level which corresponded to the reading level of the students in the sample. Due to the subjective nature of the evaluation it can be stated only that the study indicates that the use of these rewritten materials for less capable students may have been beneficial to both the teacher and the student.

Findings

Generalizations are often made to a much wider population from the small sample used in a study. It is impossible to make any generalizations based on this study due to the subjective nature of the evaluation. However, this study may help both teachers and pupils to cope with the problems of low reading ability and materials with high levels of readability. The findings of this study were:

1. Students received higher achievement scores on teacher-made tests for the second semester than for the

first semester.

2. Students' work attitudes and behavior improved in the classes using the rewritten subject material.

3. The rewritten material proved beneficial for both the teacher and the student. It reduced teacher involvement in classroom activities by providing for more individual effort on the part of the students, consequently instilling in them greater self-confidence.

Providing for individual differences among students with some degree of success in achievement and self-confidence requires textual materials written at or near the reading level of individual students. The responsibility for providing this material rests with the school. The rewriting of textual materials by classroom teachers is one way of providing the right material for the right student.

LIMITATIONS OF THE STUDY

This internship had certain limitations. The following are considered to be the most important.

1. The reading formula that was used was the Dale-Chall Readability Formula which considered only vocabulary load and sentence length. Although these two variables exert the greatest influence on reading difficulty, they are not the only variables.

2. The formula does not consider words in terms of their content or their systematic arrangement nor does it predict the reader's interest.

3. This study has no generalizability. The findings are confined only to the pupils involved in the study.

4. The textbook, Introducing Earth Part II is the recommended text for use in geography classes in grade eight in Newfoundland schools. Any statements made with respect to geography were applicable only to one section of that textbook.

5. Due to the subjective nature of the evaluation it cannot be assumed that the treatment was the only factor contributing to student improvement.

GUIDELINES TO TEACHERS FOR REWRITING SOCIAL STUDIES TEXT BOOKS

This internship provided evidence that it is possible to rewrite existing social studies basic textbooks at a lower level of reading for less capable students. Evidence has also shown that there may be a measurable degree of success from the use of these materials. Teachers will find the following guide useful for rewriting social studies materials.

1. Determine the reading levels of the students. Students must be tested to determine their levels of reading. Unless the reading levels of the students are known it is impossible to know the most accommodating level at which the material has to be rewritten.

2. Determine the readability level of the material.

There are hundreds of variables which are related to readability. The two most common variables are word difficulty, usually frequency, and sentence difficulty, usually length. Most readability formulas use some aspect of these two variables. The selection of a readability formula depends on the individual teacher. However, the more variables measured the more complicated computations become and the longer it takes to apply the formula to the reading material. Most classroom teachers do not have the needed time for complicated computations. Therefore, any formula which uses word frequency and sentence length will probably produce valid and reliable results.

3. Rewrite the social studies material. With whatever formula is selected care should be taken to ensure that the application of the formula is conducted in the manner required by its author. The level at which the material has to be written depends on the readability level of the original material and the reading level of the students for whom the material is intended. Care should be taken to maintain a logical orderly structure of sentences when rewriting material. Otherwise, short, choppy, repetitive sentences change the systematic arrangement of the material to the extent that the rewritten material becomes more difficult than the original material.

4. Apply the readability formula again to the rewritten material. It should be noted that the estimates of difficulty found by readability formulas are not exactly

accurate, but in most instances they have a probable error of about one full year. Also, formulas indicate the average reading ability needed for adequate comprehension of the material. They do not predict the readers' interest nor do they prove that all readers will find the material easy reading.

RECOMMENDATIONS

On the basis of the findings of this study the following recommendations are made.

1. Authors and publishers of eighth-grade social studies textbooks might give serious consideration to writing the books at a lower level of reading difficulty. If they are unable to do this they may be able to write companion sets of eighth-grade social studies textbooks comprised of one textbook at a high reading level for the more capable student, one for the average student, and one at a lower reading level for the less capable reader.

2. The Newfoundland Department of Education in conjunction with Memorial University of Newfoundland and the various school boards throughout the province may encourage teachers to rewrite difficult social studies materials. Inservice education, university courses, and summer writing conferences may be given to aid teachers in rewriting difficult social studies materials. Teachers could be given time off from regular class teaching to rewrite social studies materials and may be remunerated

for this work.

3. It is finally recommended that the Roman Catholic School Board for St. John's undertake a project which would include the rewriting of not only social studies textbooks, but texts in other subjects for all the less capable readers under it jurisdiction.

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APPENDIXES

APPENDIX A

Letters of Approval

St. Patrick's Hall School
Merrymeeting Road
St. John's, Nfld.
March 3, 1975

Mr. Michael Byron Davis
Marketing Editor
Educational Division
The MacMillan Company of Canada

Dear Mr. Davis:

In replying to earlier correspondence* concerning the reading difficulty of Introducing Earth Part II by L.F. Hobley, I have completed the Dale-Chall Readability Test of the book and found that the reading level is mid-grade eight.

I am asking permission to rewrite Unit III "Deserts and Savannahs of the World" of Introducing Earth Part II by L.F. Hobley to a grade IV reading level as partial fulfillment for the M.ed degree. The rewritten content material will be given to two of our Grade VIII classes at St. Patrick's Hall School.

Thank you for your anticipated cooperation.

Sincerely yours,

Jeffery Arnold

JA/bd

*Verbal agreement to use a rewritten version of the textbook was given in November, 1974.

MACMILLAN
OF CANADA

The Macmillan Company of Canada Limited
Maclean-Hunter Learning Materials Company
70 Bond Street, Toronto, Ontario M5B 1X3
Telephone (416) 362-7651

March 14, 1975

Mr. Jeffery Arnold
St. Patrick's Hall School
Merrymeeting Road
St. John's, Newfoundland

Dear Mr. Arnold:

Thank you for your letter of March 3 regarding the reading level of INTRODUCING EARTH, Part Two. I am quite surprised that the Dale-Chall test would place the book at a mid grade eight level. Would it be possible to send some documented evidence of this readability score? I am curious to know if you have excluded geographical terms and place names when using the Dale-Chall formula.

One reason for my scepticism regarding the reading level of INTRODUCING EARTH, Part Two, is that the book being used at the grade six level, CANADA: THIS LAND OF OURS (published by Ginn), appears to be more sophisticated in terms of conceptual development and vocabulary than the Hobley material. However, I would be interested to see your actual scoring if that is possible.

We would have no objection to your rewriting of Unit 3 of INTRODUCING EARTH, Part Two, at a grade four reading level. However, we would ask to see a copy of this rewrite and our agreement is contingent upon a statement from you that you intend to use this material only for testing purposes at St. Patrick's Hall School. If you did intend to disseminate this material, we would have to take the matter up with the original publisher, Macmillan London, and the author. Also, the question of conceptual development would enter into consideration.

Please let me know if the conditions outlined above are satisfactory to you. If so, you would have our permission to undertake the rewriting as specified.

Yours sincerely,

Michael Byron Davis

Michael Byron Davis
Marketing Editor
Educational Division
THE MACMILLAN COMPANY OF CANADA LIMITED

MBD/lj

St. Patrick's Hall School
Merrymeeting Road
St. John's, Nfld.
March 26, 1975

Macmillan of Canada Ltd.
70 Bond Street
Toronto, Ontario

Mr. Michael Byron Davis
Marketing Editor
Educational Division

Dear Mr. Davis:

In reference to your letter of March 14th. I am enclosing a copy of the rewritten material, Unit III "Deserts and Savannahs of the World" which you requested. In determining the readability level of the textbook, the Dale-Chall Formula was strictly adhered to in its application. Content terminology, which did not appear on the Dale-Chall list of 3000 familiar words, was considered unfamiliar. Place names are considered familiar (see Section V, Subsection B of Dale-Chall Reading List). The big problem with the textbook is sentence length. Sentences of 40-60 words are common, with some having up to 90 words or more.

In applying the Dale-Chall Formula twenty-five (25) content samples were taken from the textbook approximately one (1) sample every ten (10) pages.

With respect to your reference of Canada: This Land of Ours many schools are experiencing difficulty with this book as well. I am a member of the school board social studies committee, and we have just completed tabulating the results of a questionnaire, which we sent to the elementary school teachers employed with the board. Over eighty (80) percent stated they were experiencing difficulties with the textbook. Recommendations from the committee are forth coming on this matter.

I trust that this information is satisfactory and fulfills the conditions outlined in your recent letter.

Let me reiterate, as in the letter of March 3rd. this material is for use in St. Patrick's Hall School only, and in no other school under the jurisdiction of the board.

Thank you for your anticipated cooperation.

Yours sincerely,

Jeffery Arnold

JA/bd

MACMILLAN
OF CANADA

The Macmillan Company of Canada Limited
Maclean-Hunter Learning Materials Company
70 Bond Street, Toronto, Ontario M5B 1X3
Telephone (416) 362-7651

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April 9, 1975

Mr. Jeffery K. Arnold
St. Patrick's Hall School
Merrymeeting Road
St. John's, Newfoundland

Dear Mr. Arnold:

Thank you for your letter of March 26 and the enclosed rewritten material from Hobley: INTRODUCING EARTH, Part Two. I appreciate receiving your explanation of the application of the Dale-Chall formula for determining reading level with the published material.

When preparing this edition for Newfoundland schools, we tried to simplify the vocabulary when possible and did break up a number of longer sentences. However, from checking your rewritten work as compared to the published material, it does appear that the length of the sentences could lead to a fairly high Dale-Chall score.

You have our permission to use the material for testing purposes at St. Patrick's Hall School.

Thank you for providing all of the information that we requested. We will keep your rewritten version of DESERTS AND SAVANNAHS OF THE WORLD on file for future reference.

Yours sincerely,

Michael Byron Davis

Michael Byron Davis
Marketing Editor
Educational Division
THE MACMILLAN COMPANY OF CANADA LIMITED

MBD/lj

St. Patrick's Hall School
Merrymeeting Rd.
St. John's, Nfld.
March 3, 1975

Mrs. Geraldine Roe
Director of Curriculum
R.C. School Board
St. John's, Nfld.

Dear Mrs. Roe:

As you are aware there exists a very serious reading problem in our school. I have, as partial fulfillment for the M.ed degree, rewritten Unit III, "Deserts and Savannahs of the World" of the Grade VIII Geography textbook Introducing Earth Part II by L.F. Hobley from its present Grade VIII reading level to a Grade IV reading level.

I am asking permission* to include this unit as part of the course of study for two Grade VIII classes in our school during the second semester.

Thank you for anticipated cooperation.

Sincerely yours,

Jeffery Arnold

JA/bd

*Verbal agreement to use a rewritten version of the textbook, Introducing Earth Part II, was given by Mrs. Roe in November, 1974.

TELEPHONE 726-9450

Roman Catholic School Board for St. John's

BELVEDERE
BONAVENTURE AVENUE
ST. JOHN'S, NEWFOUNDLAND

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March 13, 1975

Mr. Jeffery Arnold
St. Patrick's Hall School
Merrymeeting Rd.
St. John's

Dear Jeff,

Permission is granted for you to pilot the Social Studies material referred to in your letter of March 3, providing that this is agreeable to your principal.

Best of luck in your work.

Sincerely,

Geraldine Roe
Assistant Superintendent
Curriculum & Instruction

GR/gfp

St. Patrick's Hall School
Merrymeeting Rd.
St. John's, Nfld.
March 3, 1975

Br. G.L. Dwyer
Principal
St. Patrick's Hall School
Merrymeeting Rd.
St. John's, Nfld.

Dear Br. Dwyer:

As you are aware there exists a very serious reading problem in our school. I have, as partial fulfillment for the M.Ed degree, rewritten Unit III, "Deserts and Savannahs of the World" of the Grade VIII Geography textbook Introducing Earth Part II by L.F. Hobley from its present Grade VIII reading level to a Grade IV reading level.

I am asking permission* to include this unit as part of the course of study for two Grade VIII classes in our school during the second semester.

Thank you for anticipated cooperation.

Sincerely yours,

Jeffery Arnold

JA/bd

*Verbal agreement was given by Brother Dwyer to use a rewritten version of the textbook, Introducing Earth Part II in November, 1974.

St. Patrick's Hall Central High School
Merrymeeting Road
St. John's - - Newfoundland

March 5, 1975

Mr. Jeffery Arnold
Teacher
St. Patrick's Hall Jr. High School
Merrymeeting Road
St. John's, Nfld.

Dear Mr. Arnold:

Permission is granted to you for the use of the rewritten Unit 111 of Introducing Earth Part 11 by L.F. Hobley as part of the course of study for two grade V111 classes in this school during the second semester.

Respectfully yours,

Br. G.M. Dwyer
Principal

GMD/mk

APPENDIX B

SRA Reading Record Test Scores

SRA READING RECORD TEST SCORES
FOR
CONTROL GROUP X (PERCENTILES)

PUPIL NUMBER	RATE	COMPREHENSION	SKILLS	VOCABULARY	TOTAL*
I	18	12	18	20	19
II	21	10	7	18	7
III	4	15	16	15	14
IV	10	30	2	2	3
V	6	8	2	9	4
VI	82	30	27	20	25
VII	18	21	11	10	15
VIII	25	41	25	18	22
IX	20	75	20	25	25
X	8	20	12	12	15
XI	18	46	18	12	19
XII	10	20	22	15	18
XIII	2	60	20	5	17
XIV	50	46	35	30	31
XV	28	60	28	13	23
XVI	84	59	31	18	27
XVII	72	77	13	27	22
XVIII	60	85	25	21	26
XIX	8	8	10	9	10

* All raw scores for the Record Reading Test are converted to percentiles. Only the raw score for Comprehension, Skills and Vocabulary are included in Total Scores which are also converted to percentiles.

SRA READING RECORD TEST SCORES
FOR
EXPERIMENTAL GROUP Z (PERCENTILES)

PUPIL NUMBER	RATE	COMPREHENSION	SKILLS	VOCABULARY	TOTAL*
I	18	15	4	1	1
II	3	45	1	1	2
III	5	30	39	45	30
IV	1	3	1	1	1
V	10	20	1	10	4
VI	5	6	13	12	11
VII	2	21	5	1	4
VIII	18	30	13	15	12
IX	28	30	5	5	6
X	10	25	7	7	8
XI	45	20	25	10	18
XII	2	15	7	11	9
XIII	4	20	3	1	3

* All raw scores for the Record Reading Test are converted to percentiles. Only the raw score for Comprehension, Skills and Vocabulary are included in the Total Scores which are also converted to percentiles.

SRA READING RECORD TEST SCORES
FOR
EXPERIMENTAL GROUP Y (PERCENTILES)

PUPIL NUMBER	RATE	COMPREHENSION SKILLS	VOCABULARY	TOTAL*
I	1	30	3	35	25
II	40	15	17	12	13
III	13	55	16	6	15
IV	76	30	25	31	27
V	10	20	11	7	8
VI	10	43	18	25	23
VII	3	22	8	7	9
VIII	73	20	12	5	9
IX	25	25	1	8	3
X	15	15	5	7	4
XI	2	45	10	6	10
XII	11	20	13	6	12
XIII	50	6	25	22	19
XIV	2	30	10	14	15
XV	15	45	15	3	14
XVI	4	3	12	3	5
XVII	15	30	23	13	20

* All raw scores for the Record Reading Test are converted to percentiles. Only the raw scores for Comprehension, Skills, and Vocabulary are included in the Total Scores which are also converted to percentiles.

APPENDIX C

Otis Quick Scoring Mental Ability Test Scores

OTIS QUICK SCORING MENTAL ABILITY TEST SCORES

PUPIL NUMBER	CONTROL GROUP X TEST SCORES	EXPERIMENTAL GROUP Y TEST SCORES	EXPERIMENTAL GROUP Z TEST SCORES
I	106	107	66
II	93	83	68
III	79	95	96
IV	94	98	80
V	82	95	91
VI	103	104	84
VII	89	95	100
VIII	92	91	97
IX	117	81	88
X	96	85	92
XI	94	104	85
XII	90	94	84
XIII	85	92	66
XIV	97	98	
XV	97	112	
XVI	93	112	
XVII	101	90	
XVIII	91		
XIX	97		

APPENDIX C

Readability Samples for Original Material

Sample 1

No part of the United States of America lies within the tropics, but all the southern half of the country is far enough south to be hot in summer, and much of it is quite warm in winter. There are several types of climate, depending upon the amount of rainfall, the distance from the sea, and the height of the land.

The south east is hot in summer and warm in winter, and has plenty of rain: Sub-tropical forest once covered most of the land.

Farther west is drier, and the forests were more open and composed mainly of deciduous trees.

Book: Introducing Earth Part II Page No. 2

Author: L. F. Hobley From: No part ...

Publisher: MacMillan of Canada Date: 1974 To: ... trees.

1. Number of words in the sample	101
2. Number of sentences in the sample	5
3. Number of words not on the Dale List	8
4. Average sentence length (divide 1 by 2)	20
5. Dale Score (divide 3 by 1, multiply by 100)	8
6. Multiply average sentence length (4) by .0496 ..	.9920
7. Multiply Dale Score (5) by .1579	1.2632
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	5.8917

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 2

Then another disaster hit the southern farmers. In 1891 the cotton boll weevil appeared in Texas. This is a brownish beetle about one-fifth of an inch long that lays its eggs in the cotton flower. When the grubs hatch out they feed on the flowers and prevent them from making proper fibres. The crop was ruined, but the weevils flourished. Vast hordes of them spread eastwards, carrying destruction and ruin. By 1920 they were over the Texas border and into Arkansas. No chemicals could stop them, and in 1906 they crossed the Mississippi. By 1914 they were in Georgia, and in 1921 they reached the Atlantic.

Book: Introducing Earth Part II Page No. 11

Author: L. F. Hobley From: Then another ...

Publisher: MacMillan of Canada Date: 1974 To: ... the Atlantic.

1. Number of words in the sample	106
2. Number of sentences in the sample	9
3. Number of words not on the Dale List	17
4. Average sentence length (divide 1 by 2)	12
5. Dale Score (divide 3 by 1, multiply by 100)	16
6. Multiply average sentence length (4) by .0496 ..	.5952
7. Multiply Dale Score (5) by .1579	2.5264
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.7581

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 3

The shallow water off the coast is one of the world's most important regions of shellfish, particularly oysters. Towards the end of the last century, fishermen did to the seabed what the farmers were doing to the land; just as the farmers overcropped and ruined the soil, the fishermen overfished the oyster beds and nearly destroyed them. Now the oysters are 'farmed,' and large stretches of the sea bottom are 'sown' with oysters. Each female oyster produces some hundreds of millions of eggs during the summer. When hatched, the baby oysters swim freely for some days. Then they fix themselves onto a rock, stone, old tin can, or broken bottle, and begin to develop their shells.

Book: Introducing Earth Part II Page No. 22

Author: L. F. Hobley From: The shallow ...

Publisher: MacMillan of Canada To: .... shells.

1. Number of words in the sample	116
2. Number of sentences in the sample	6
3. Number of words not on the Dale List	16
4. Average sentence length (divide 1 by 2)	19
5. Dale Score (divide 3 by 1, multiply by 100)	14
6. Multiply average sentence length (4) by .0496 ..	.9424
7. Multiply Dale Score (5) by .1579	2.2106
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.7895

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 4

In the early 1930's the whole of America was passing through a difficult time; there were more than 12 million people out of work, many people had lost all their money, and trade throughout the world was very bad. It hardly seemed the time to undertake vast schemes, but the President of the U.S.A., Franklin D. Roosevelt, decided that this problem could be solved only by using the resources of the whole country. He guided the planning that led to the setting up of the Tennessee Valley Authority (T.V.A.) in 1933, to try to solve the problems of the whole river basin.

Book: Introducing Earth Part II Page No. 32

Author: L. F. Hobley From: In the ....

Publisher: MacMillan of Canada Date: 1974 To: ... basin.

1. Number of words in the sample	101
2. Number of sentences in the sample	3
3. Number of words not on the Dale List	12
4. Average sentence length (divide 1 by 2)	34
5. Dale Score (divide 3 by 1, multiply by 100)	12
6. Multiply average sentence length (4) by .0496 ..	1.6864
7. Multiply Dale Score (5) by .1579	1.8948
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	7.2177

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 5

Just north of the cotton belt in the Mississippi basin is one of the two main wheat growing areas of the U.S.A. It is part of the Mississippi lowlands and the gently sloping Great Plains which stretch westwards to the foot of the Rocky Mountains, and consists mainly of Kansas, Western Oklahoma, North Western Texas, and Southern Nebraska. It is the area of winter wheat, where if the crop is not ruined by severe frost, withered by drought, battered by hail or violent rainstorms, burnt up by blistering heat too early in the season, eaten by plagues of insects, or killed by disease, a harvest is reaped in early summer; in early June in Texas, in late June in Kansas, and in July in Nebraska..

Book: Introducing Earth Part II Page No. 42.

Author: L. F. Hobley From: Just North ...

Publisher: MacMillan of Canada Date: 1974 To: ... in Nebraska.

1. Number of words in the sample	121
2. Number of sentences in the sample	3
3. Number of words not on the Dale List	14
4. Average sentence length (divide 1 by 2)	40
5. Dale Score (divide 3 by 1, multiply by 100)	11
6. Multiply average sentence length (4) by .0496 ..	1.9840
7. Multiply Dale Score (5) by .1579	1.7369
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	7.3574

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 6

A cool current off the coast keeps the summer temperature near the sea much lower than one would expect in a region only 1,000 miles from the tropics. Although much nearer than Winnipeg to the equator, San Francisco is kept several degrees cooler in summer by cold winds and fogs that drift in from the sea (San Francisco's warmest month is 60°F, Winnipeg's is 66°F). The winter is milder than is Winnipeg, having a temperature of 48°F in the coldest month, compared with -2°F for Winnipeg. The great Central Valley, however, sheltered by the mountains, has less cloud, and quickly warms up in the summer.

Book: Introducing Earth Part II Page No. 52

Author: L. F. Hobley From: A cool ...

Publisher: MacMillan of Canada Date: 1974 To: ... in summer.

1. Number of words in the sample	101
2. Number of sentences in the sample	4
3. Number of words not on the Dale List	9
4. Average sentence length (divide 1 by 2)	25
5. Dale Score (divide 3 by 1, multiply by 100) ...	9
6. Multiply average sentence length (4) by .0496 ..	1.2400
7. Multiply Dale Score (5) by .1579	1.4211
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.2976

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 7

Queensland and New South Wales have a narrow coastal plain, behind which is the long and almost unbroken stretch of high land called the Great Dividing Range. It is not so much a range of mountains as a plateau with a steep edge which makes it difficult to cross. If you look at the map you will see that in some places the railways keep to the top of the high land once they reach it, instead of following the valleys, as is usually the case in mountainous country. Many rivers flow from the mountains across the plain. They are not navigable for very far inland, but they can be used to generate hydro-electric power.

Book: Introducing Earth Part II Page No. 62

Author: L. F. Hobley From: Queensland and ...

Publisher: MacMillan of Canada Date: 1974 To: .... power.

1. Number of words in the sample	111
2. Number of sentences in the sample	5
3. Number of words not on the Dale List	9
4. Average sentence length (divide 1 by 2)	22
5. Dale Score (divide 3 by 1, multiply by 100)	9
6. Multiply average sentence length (4) by .0496 ..	1.0912
7. Multiply Dale Score (5) by .1579	1.4211
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.1488

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 8

After the wheat crop, oats may be grown to provide fodder for sheep, or barley for grain for malting, or peas. The next year grass and clover are sown and grazed by sheep, and the land is then left fallow until the next wheat crop.

At the end of the nineteenth century the wheat growers pressed farther and farther into the interior, but the rainfall proved so unreliable and the harvest was ruined so frequently by drought that wheat growing on these driest lands has been given up. Australia produces rather less wheat today than she did thirty years ago.

Book: Introducing Earth Part II Page No. 72

Author: L. F. Hobley From: After the ...

Publisher: MacMillan of Canada Date: 1974 To: ... years ago.

1. Number of words in the sample	100
2. Number of sentences in the sample	4
3. Number of words not on the Dale List	14
4. Average sentence length (divide 1 by 2)	25
5. Dale Score (divide 3 by 1, multiply by 100)	14
6. Multiply average sentence length (4) by .0496 ..	1.2400
7. Multiply Dale Score (5) by .1579	2.2106
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8).....	7.0871

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 9

Almost all farms are supplied with electricity, milking and many other farm processes use electrical equipment. The farms are not as a rule divided into small fields by hedges or stone walls, but by electric fences or "paddock breaks." The whole farm, or large areas of it, is enclosed by boxthorn or barbed wire.

There are no great cities in New Zealand, which has a total population of less than three million. The largest urban area is the Auckland area, with about half a million people. It is on North Island and is the country's largest port with two harbours, one on each side of the narrow neck of land on which it is built.

Book: Introducing Earth Part II Page No. 80-81

Author: L. F. Hobley From: "Almost all ..."

Publisher: MacMillan of Canada Date: 1974 To: ... is built."

1. Number of words in the sample	113
2. Number of sentences in the sample	6
3. Number of words not on the Dale List	15
4. Average sentence length (divide 1 by 2)	19
5. Dale Score (divide 3 by 1, multiply by 100)	13
6. Multiply average sentence length (4) by .0496 ..	.9424
7. Multiply Dale Score (5) by .1579	2.0527
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.6316

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 10

Where the land has not been cleared, there are thickets of sub-tropical woodland, with various kinds of palms, aloes, and wild bananas. On the slopes farther inland, the ground is mainly covered with grass, with thorn bushes (acacias) and tall aloes here and there. The aloes are bright with flowers of various shades of red, and among the grasses grow many beautiful flowers, often 6 feet high; the red bush lily, the fire lily, and gladioli. There are still many wild animals, but the larger ones such as the elephant, rhinoceros, and eland now need protection. There are also many jackals, which often destroy numbers of lambs.

Book: Introducing Earth Part II Page No. 92

Author: L. F. Hobley From: "Where the ...

Publisher: MacMillan of Canada Date: 1974 To: ... of lands."

1. Number of words in the sample	107
2. Number of sentences in the sample	5
3. Number of words not on the Dale List	17
4. Average sentence length (divide 1 by 2)	21
5. Dale Score (divide 3 by 1, multiply by 100)	16
6. Multiply average sentence length (4) by .0496 ..	1.0416
7. Multiply Dale Score (5) by .1579	2.5264
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	7.2045

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 11

The gold mines themselves are as different from the gold washings of the early gold rush as the great modern city of Johannesburg is from the shacks and tents of those early days. The gold bearing rock is very hard, and as it is deep down in the earth it is a very expensive business to start and operate a gold mine, which is a huge complicated construction, with many buildings on the surface as well as the underground workings. Tall chimneys, electricity pylons, tall narrow tanks and big squat ones, mazes of pipes and machinery, and linss of clattering trucks and engines stretch in all directions.

Book: Introducing Earth/Part II Page No. 102

Author: L. F. Hobley From: The gold ...

Publisher: MacMillan of Canada Date: 1974 To: ... all directions

1. Number of words in the sample	106
2. Number of sentences in the sample	3
3. Number of words not on the Dale List	12
4. Average sentence length (divide 1 by 2)	35
5. Dale Score (divide 3 by 1, multiply by 100)	11
6. Multiply average sentence length (4) by .0496 ..	1.7360
7. Multiply Dale Score (5) by .1579	1.7369
8. Constant	3.6365
9. Formula raw score (6, 7, and 8)	7.1094

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 12

To the south, in Patagonia, the pampas become drier and colder, the soil stony, and the vegetation more scanty. There is very little cultivation, but about 15 million sheep are raised on some of the largest sheep farms in the world. The sheep are raised mainly for wool, but increasing quantities of frozen mutton are exported. In the valley of the Chubut River there is some dairy farming and fruit growing. Almost all the 2,000 people living there are descended from some Welsh colonists who settled the valley.

The hub of Argentina's rail and airway systems, and the center of her trade, industry, and government, is Buenos Aires.

Book: Introducing Earth Part II Page No. 112-113

Author: L. F. Hobley From: To the South ...

Publisher: MacMillan of Canada Date: 1974 To: ... to Buenos Aires.

1. Number of words in the sample	111
2. Number of sentences in the sample	6
3. Number of words not on the Dale List	14
4. Average sentence length (divide 1 by 2)	18
5. Dale Score (divide 3 by 1, multiply by 100)	13
6. Multiply average sentence length (4) by .0496	.8928
7. Multiply Dale Score (5) by .1579	2.0527
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.5820

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 13

The men make small bows and arrows. These, though small, are skillfully made and deadly in effect. The arrows are often made of a reed into which is fitted a head of bone made from the leg bone of an ostrich or giraffe. The ends of the reed are neatly bound with thin strips of sinew to prevent them from splitting. A small piece of hard, sharpened stone is fitted to the end of the bone and fixed with gum. Poison, obtained from the juices of various plants, is painted on the arrow-head.

Book: Introducing Earth Part II Page No. 122

Author: L. F. Hobley From: The men ...

Publisher: MacMillan of Canada Date: 1974 To: ... arrow-head.

1. Number of words in the sample	93
2. Number of sentences in the sample	6
3. Number of words not on the Dale List	13
4. Average sentence length (divide 1 by 2)	16
5. Dale Score (divide 3 by 1, multiply by 100)	14
6. Multiply average sentence length (4) by .0496 ..	.7936
7. Multiply Dale Score (5) by .1579	2.2106
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.6407

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 14

The life of the aborigines in their natural state is very different from that of white Australians and of Canadians. They have scarcely any of the things that we regard as necessities and none of our luxuries, but are they less happy? When Captain Cook first discovered the eastern coast of Australia he did not think so. He wrote: 'They appear to be some of the most wretched people upon earth; but in reality they are far happier than we Europeans.' He said they were content with what they had; they did not want fine houses, furniture, and other things and they did not struggle to be richer or more powerful than others, but shared everything with one another, without trace of envy or jealousy.

Book: Introducing Earth Part II Page No. 132

Author: L. F. Hobley From: The life ...

Publisher: MacMillan of Canada Date: 1974 To: ... or jealousy

1. Number of words in the sample	125
2. Number of sentences in the sample	5
3. Number of words not on the Dale List	13
4. Average sentence length (divide 1 by 2)	25
5. Dale Score (divide 3 by 1, multiply by 100)	10
6. Multiply average sentence length (4) by .0496 ..	1.2400
7. Multiply Dale Score (5) by .1579	1.5790
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.4555

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 15

The local chiefs receive part of the profit from the oil production and, besides providing a luxurious life for themselves, are building hospitals, schools, and better houses for their people, and modernizing their countries with irrigation works, new roads, railways, and factories. The oil in Algeria under the Sahara was largely owned by the French and the Americans, but the Algerian government has now taken over much of the ownership.

Oil is thus changing the life of the people of the Middle East. The wages that can be obtained by working in the oil fields, refineries, docks, and factories have led many of the people, who once wandered with their flocks over the semi-desert, to live a settled life in houses instead of tents, and to ride in automobiles instead of on camels.

Book: Introducing Earth Part II Page No. 141-142

Author: L. F. Hobley From: The local ....

Publisher: MacMillan of Canada Date: 1974 To: .... on camels.

1. Number of words in the sample	132
2. Number of sentences in the sample	4
3. Number of words not on the Dale List	12
4. Average sentence length (divide 1 by 2)	35
5. Dale Score (divide 3 by 1, multiply by 100)	9
6. Multiply average sentence length (4) by .0496 ...	1.7360
7. Multiply Dale Score (5) by .1579	1.4211
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.7936

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 16

This type of irrigation not only brings a larger area of land into cultivation, but makes it possible to grow a wider variety of crops, for water is available throughout the year, and sowing can be done at any time. Wheat, barley, clover, and beans can still be sown in autumn and harvested in spring, as has been done for thousands of years, but instead of leaving most of the land dry and barren until the next flood, cotton, rice, corn, and sugar cane can be planted as soon as the spring crops have been harvested. These can be watered from the canals during the hot, dry summer.

Book: Introducing Earth Part II Page No. 151

Author: L. F. Hobley From: This type ....

Publisher: MacMillan of Canada Date: 1974 To: .... dry summer.

1. Number of words in the sample	108
2. Number of sentences in the sample	3
3. Number of words not on the Dale List	10
4. Average sentence length (divide 1 by 2)	36
5. Dale Score (divide 3 by 1, multiply by 100)	9
6. Multiply average sentence length (4) by .0496 ..	1.7856
7. Multiply Dale Score (5) by .1579	1.4211
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.8432

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 17

Many savannah dwellers are hunters and herdsmen. Except near rivers that can be used for irrigation, much savannah land has too long a dry season to make it possible to raise crops in large quantities.

In regions free from tsetse fly, cattle are raised in large numbers, but they are not usually of very good quality, and in some parts, such as the campos of Brazil, where they are a long way from the coast and where transportation is bad, they are often slaughtered for their hides and for the hoofs from which glue is made. The carcasses are left to rot.

Book: Introducing Earth Part II Page No. 162

Author: L. F. Hobley From: Many savannah ...

Publisher: MacMillan of Canada Date: 1974 To: ... to rot.

1. Number of words in the sample	102
2. Number of sentences in the sample	4
3. Number of words not on the Dale List	13
4. Average sentence length (divide 1 by 2)	25
5. Dale Score (divide 3 by 1, multiply by 100) ...	12
6. Multiply average sentence length (4) by .0496 ..	1.2400
7. Multiply Dale Score (5) by .1579	1.8948
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.7713

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 18

Where crops are grown on sloping land, the furrows should be ploughed along the contours (contour ploughing) and not up and down the slope. This prevents heavy rain from rushing down the hillside and carrying the soil with it. These measures are particularly important with large scale farming, where very big fields are needed. On smaller farms fence rows and hedges usually divide the land into fields and give protection against the force of the wind.

To lessen the damage by high winds, long narrow belts of trees (windbreaks) are planted to direct the wind currents upwards and to break their force.

Book: Introducing Earth Part II Page No. 172

Author: L. F. Hobley From: Where crops ....

Publisher: MacMillan of Canada Date: 1974 To: .... their force.

1. Number of words in the sample	101
2. Number of sentences in the sample	5
3. Number of words not on the Dale List	16
4. Average sentence length (divide 1 by 2)	20
5. Dale Score (divide 3 by 1, multiply by 100)	16
6. Multiply average sentence length (4) by .0496 ..	.9920
7. Multiply Dale Score (5) by .1579	2.5264
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	7.1549

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 19

The monsoon brings very different weather to different parts of India, but almost everywhere it brings the life giving rain. The prosperity, the food, the very lives of most of the people depend upon the monsoon rains; if the monsoon is late in bursting, or if it brings less rain than usual, or if the rain comes to an end earlier than usual, tragedy comes to many of India's crowded millions.

Unfortunately, the monsoon often brings tragedy of another kind. Many of the people of India are so poor and so badly fed, and their homes are so lacking in sanitation that there is always much illness and disease; but in the wet season things are worse.

Book: Introducing Earth Part II Page No. 180

Author: L. F. Hobley From: The monsoon ...

Publisher: MacMillan of Canada Date: 1974 To: ... are worse.

1. Number of words in the sample	116
2. Number of sentences in the sample	4
3. Number of words not on the Dale List	34
4. Average sentence length (divide 1 by 2)	29
5. Dale Score (divide 3 by 1, multiply by 100)	12
6. Multiply average sentence length (4) by .0496	1.4384
7. Multiply Dale Score (5) by .1579	1.8948
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.9697

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 20

The people of Assam itself are usually quite prosperous farmers who can grow all they need. They do not as a rule work on the plantations, but many of the other Indian peasants are poor and are willing to go to work there. These save as much as they can, and return to their own village after a few years. The workers live on the plantation in a village of mud and bamboo huts specially built near the estate buildings, with stores where they can buy food and other necessities.

The tea plantation provides work for all the family.

Book: Introducing Earth Part II Page No. 192

Author: L. F. Hobley From: The people ...

Publisher: MacMillan of Canada Date: 1974 To: ... the family.

1. Number of words in the sample	99
2. Number of sentences in the sample	5
3. Number of words not on the Dale List	11
4. Average sentence length (divide 1 by 2)	20
5. Dale Score (divide 3 by 1, multiply by 100)	11
6. Multiply average sentence length (4) by .0496 ..	.9920
7. Multiply Dale Score (5) by .1579	1.7369
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.3658

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 21

The south eastern corner of India and the island of Sri Lanka have rain nearly all the year round, with two seasons wetter than the others. The winds of the winter monsoon, which are normally very dry, pass over the Bay of Bengal before reaching these regions, and consequently bring some rain. The great port of Madras was the centre of British trade in the seventeenth century, in spite of the fact that there was no good harbour and goods had to be unloaded from the ships in surf boats or catamarans. It has an artificial harbour now and is the main port of the southern Deccan and the fourth port of India.

Book: Introducing Earth Part II Page No. 202

Author: L. F. Hobley From: The south...

Publisher: MacMillan of Canada Date: 1974 To: ... of India.

1. Number of words in the sample	111
2. Number of sentences in the sample	4
3. Number of words not on the Dale List	14
4. Average sentence length (divide 1 by 2)	28
5. Dale Score (divide 3 by 1, multiply by 100)	13
6. Multiply average sentence length (4) by .0496	1.3888
7. Multiply Dale Score (5) by .1579	2.0527
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	7.0780

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 22

Most of the land raising coconuts is in quite small estates, and many people have just two or three trees. The coconut palm is a most useful tree; it is said to be the source of over a hundred products. The meat of the nut is used in curries; when dried it is called copra and from it oil is obtained for making soap and candles, and for burning in lamps, while the residue is good cattle food. The immature nuts are used in medicines and candy, and the mature nuts provide sweet milk. The young leaves are used for pickles and preserves, and the sap of the trees, called toddy, can be distilled to make arrack, an intoxicating drink.

Book: Introducing Earth Part II Page No. 212

Author: L. F. Hobley From: Most of ...

Publisher: MacMillan of Canada Date: 1974 To: ... intoxicating drink

1. Number of words in the sample	120
2. Number of sentences in the sample	5
3. Number of words not on the Dale List	16
4. Average sentence length (divide 1 by 2)	25
5. Dale Score (divide 3 by 1, multiply by 100)	13
6. Multiply average sentence length (4) by .0496	1.2400
7. Multiply Dale Score (5) by .1579	2.0527
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.9292

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 23

This soil brought down by the river and the wind from the desert is very fertile, for it is only the lack of water that makes it sterile in the desert. Like the Nile and the Ganges, the Hwang Ho brings life to millions of poor peasants who live beside it. But the Hwang Ho can also be very terrible. It is sometimes called China's Sorrow, because of the appalling damage it can cause with its raging floods. The river bed is sometimes several feet above the surrounding countryside, and only the earth banks built up by the long and patient labour of the peasants can keep the waters within bounds.

Book: Introducing Earth Part II Page No. 221-222

Author: L. F. Hobley From: This soil ...

Publisher: MacMillan of Canada Date: 1974 To: ... within bounds.

1. Number of words in the sample	109
2. Number of sentences in the sample	5
3. Number of words not on the Dale List	11
4. Average sentence length (divide 1 by 2)	22
5. Dale Score (divide 3 by 1, multiply by 100)	10
6. Multiply average sentence length (4) by .0496	1.0912
7. Multiply Dale Score (5) by .1579	1.5790
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	6.3067

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

Sample 24

Japan is in a difficult position. Her small territory is already densely populated. Until recently, that population was growing very rapidly, but now the increase has slowed down. The only way that Japan can feed her vast population seems to be to increase her industries and sell the produce to buy food. This she is doing and the Japanese industries have become so efficient that the country's exports and standard of living have risen rapidly. On the other hand, the Indians and Chinese will probably remain poor for a long time to come — unless other prosperous countries do a great deal to help them.

Book: Introducing Earth Part II Page No. 230

Author: L. F. Hobley From: Japan is ...

Publisher: MacMillan of Canada Date: 1974 To: ... help them.

1. Number of words in the sample	103
2. Number of sentences in the sample	6
3. Number of words not on the Dale List	19
4. Average sentence length (divide 1 by 2)	17
5. Dale Score (divide 3 by 1, multiply by 100)	18
6. Multiply average sentence length (4) by .0496	.8432
7. Multiply Dale Score (5) by .1579	2.8422
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	7.3219

Analyzed by: J.K.A. Date: 12/30/74

Checked by: R.A. Date: 12/30/74

A tabulated list of Formula raw scores for predicting readability level of the textbook: Introducing Earth Part II by L. F. Hobley.

Formula raw score for sample 1 page 2	5.8917
Formula raw score for sample 2 page 11	6.7581
Formula raw score for sample 3 page 22	6.7895
Formula raw score for sample 4 page 32	7.2177
Formula raw score for sample 5 page 42	7.3574
Formula raw score for sample 6 page 52	6.2976
Formula raw score for sample 7 page 62	6.1488
Formula raw score for sample 8 page 72	7.0871
Formula raw score for sample 9 pages 80-81	6.6316
Formula raw score for sample 10 page 92	7.2045
Formula raw score for sample 11 page 102	7.1094
Formula raw score for sample 12 pages 112-113	6.5820
Formula raw score for sample 13 page 122	6.6407
Formula raw score for sample 14 page 132	6.4555
Formula raw score for sample 15 pages 141-142	6.7936
Formula raw score for sample 16 page 151	6.8432
Formula raw score for sample 17 page 162	6.7713
Formula raw score for sample 18 page 172	7.1549
Formula raw score for sample 19 page 180	6.9697
Formula raw score for sample 20 page 192	6.3658
Formula raw score for sample 21 page 202	7.0780
Formula raw score for sample 22 page 212	6.9292
Formula raw score for sample 23 pages 221-222	6.3067
Formula raw score for sample 24 page 230	7.3219

Total Formula raw score for the 24 samples ... 162.7059

Average Formula raw score for original material = $\frac{162.7059}{24}$

= 6.78

A Formula raw score of 6.0 to 6.9 corresponds to 7-8th grade on the Corrected Grade Level used with the Dale-Chall Readability Formula.

APPENDIX E

Rewritten Social Studies Unit

GEOGRAPHY

GRADE VIII

INTRODUCING EARTH PART II

UNIT III

DESERTS and SAVANNAH LANDS of the WORLD

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I THE HOT DESERTS

The tropical forests have too much rain for people to live in comfort. The deserts are too dry, and in many of them it is impossible for people to live. All the continents that reach within the tropics have large stretches of desert (See Fig. 1). Mostly deserts are on the western side of continents. However, they may stretch far inland. In North Africa the desert stretches right across the continent to the eastern coast.

Most of the hottest deserts are not on the equator. They are between 1000 and 2000 miles from it and some are even farther away. The sun is directly overhead for part of the year in some of these deserts. Summer days are more than twelve hours long. The sun generally shines all day. These deserts are a little cooler. However, they are still as hot as it is in most parts of Canada in mid-summer.

In the tropical forests the trees and plants help to keep the air warm during the night. Often clouds keep the heat in. That is why nights at the equator are almost always warm (See Fig. 2). In the desert it is different. Dry sand and stones cool down more quickly than water or damp earth. When the sun goes down the clear sky lets the heat escape, and it soon becomes cold. There may be a greater difference in temperature between day and night in summer than there is between a summer day and winter day.

Fig. 1 shows the hot deserts of the world. It also shows the dry belt of country that stretches north-eastwards

through the interior of Asia. These dry-belt lands of Asia are very cold in winter. In summer they are very hot, because the day is longer than it is in the desert nearer to the equator.

2 THE PEOPLE OF THE DESERT

The Bushmen of the Kalahari

Life in the desert is very hard. Forests can be cut down and burned and the soil used to grow crops. However, it is hard to do anything with dry, wind-blown sand, where rain may not fall from one year to the next. Here and there a river flows through the desert. It brings water from the faraway mountains. Generally rivers in desert lands dry up and disappear in the sands. Still people live in the desert, though there numbers are few. Some are very simple, like the pygmies. They do not know how to grow crops or how to tame animals. One group is the Bushmen of the Kalahari Desert in South Africa.

The Bushmen lived first in East Africa and later in many parts of South Africa. They were slowly driven from the rich lands of the north and east by the Hottentot and Bantu peoples. They were driven from the south by the Dutch, British and German settlers (See Fig. 3).

The Bushmen lived by hunting. They would not live as slaves on the lands that the invaders had taken. They moved to the driest and poorest lands of South Africa.

The Kalahari is not all desert. Sometimes a little rain falls, and rivers run for a time. They soon lose themselves in mud-flats or 'pans' as they are called. Everywhere rainfall is uncertain, and nowhere is there enough for people to live.

There are small patches of dry grass and a few

thorny bushes and acacia shrubs beside the river-beds. Even in the drier parts there are small plants with bulbs or fleshy underground stems. After rain these plants burst into sudden growth. The desert is carpeted with tall green grass and bright flowers. After a few days of hot sun they dry up and the desert is bare and brown again.

Antelopes, giraffes, elephants, zebras, and ostriches feed on the few plants found in the desert. Lions, hyenas and jackals hunt for prey or parts cut off as waste from animals killed for food by the people. These animals are becoming fewer in number and life is getting harder for the Bushmen. They depend upon the game animals for the greater part of their food.

The men make small bows and arrows. Although small, they are skillfully made and are very deadly. The arrows are often made from a water plant, called a reed. The head of the arrow is fitted with a bone from the leg of an ostrich or giraffe. A small piece of hard, sharp stone is fixed to the end of the bone with gum. The ends of the water plant are tied together with thin strips of sinew to keep them from breaking. Poison is found in the juices of different plants. It is painted on the arrow-head. The arrows are carried in a leather case. Sometimes the hunter puts a number of arrows in his hair. He can reach them quickly and shoot them one after the other with great speed.

As the poison takes some time to kill the wounded animal, the hunter must follow it. If it dies before he reaches it, the vultures will tear it to pieces. All he

will find is the bones. If the animal he kills is a large one, he lights a fire. When his family sees the smoke they come to the fire. A new camp is made where the animal was killed. The meat near the wound is cut off and thrown away and the rest is cooked and eaten. Before the meat is all eaten, it may be crawling with maggots. The Bushmen do not mind, they eat the maggots too. They nearly always cook their meat. They make a fire by rubbing one piece of wood against another to make a spark. The Bushman usually hunts alone. He is very clever at making the sounds of the animals he hunts. This helps him to get close enough to shoot them. He puts ostrich feathers over his head and shoulders and holds up a make-believe ostrich head and neck. He acts like he is eating and moves nearer and nearer the animals until he is close enough to shoot. At other times he follows the tracks of animals for miles. When he gets near them he will tie some grass onto his head. He will lie down and move slowly forward until he is within 200 feet. Sometimes a number of Bushmen get together and make a pitfall and then drive the animal into it.

Animals are often hard to get. The Bushmen have no idea of taming animals or growing crops. Instead they feed on wild roots, insects, frogs and snakes. The women dig up roots with a digging stick, a pointed piece of wood weighted with a piece of stone. They also gather the eggs of the white ant and roast them with a little fat. Grass seeds are gathered and stored. They catch locusts and either eat them raw or dry them and crush them to powder. The powder is

mixed with honey and made into cakes. The Bushman likes honey and when he finds a bees' nest he keeps it for himself. He places an arrow with his mark on it near the nest and then no one else will take the honey.

Although food is hard to get, it is even harder to find water. The Bushmen are clever at finding water, if there is any to be found. There are patches of wet sand from which water is drawn very slowly. A hole is made and a long hollow water plant with a piece of grass wrapped round the end is pushed down into the hole. Water can be sucked up through the water plant. It takes a long time to get enough for all the family. The Bushman's lips are often bleeding before he is finished. The valuable water is carefully stored in the shells of ostrich eggs or skin bags. These are often buried in the sand because the Bushman knows there may be a long time without any rain. The animals will then move away. Only this stored food and water stands between the Bushman and death by hunger or thirst.

Such lands as these can supply enough food and water for very few people. The Bushmen live in small groups of twenty to forty people. The group is made up of a number of families with each having their own hut. They move separately over the great stretch of country which they all own.

The group makes camp away from a waterhole so as not to scare the animals away. The huts are roughly made as the group never stays in one place for long. A few sticks are pushed into the ground, woven with twigs and covered with

grass. Some of the earth inside is scraped out and the hole lined with grass. Here the Bushman sleeps on his side with his knees drawn up. Sometimes mats made from water plants are used to cover the huts. The mats are then carried when the group moves to a new camp.

There is little need for clothes in the Kalahari. A small loin cloth or apron of skin is usually the only clothing worn. Women sometimes wear a kaross or cloak of fur around the shoulders. Supplies of firewood, food or a baby can be carried in its folds. Leather sandals are often worn. Both men and women are fond of ornaments. They wear necklaces made from pieces of ostrich shells and paint their bodies in red, yellow and black. They put holes in their noses and wear feathers through them.

Lifelike paintings of animals and scenes have been found on the walls of caves and rocks in many places in Africa. They were painted by early Bushmen. The present-day Bushmen seem to have lost the art.

The Bushmen are only five feet tall yet they are strong. They can survive a long time in the hot desert. They are brave and faithful to their chiefs. They have a strong love of freedom and rather than lose it they have chosen a life of great hardship. Meeting with more civilized races has not changed their way of life. Their hunting grounds are getting smaller and there are less and less animals. Civilization is closing in on them. They are a dying race.

Most of the Kalahari Desert is found in the new, free

country of Botswana which used to be the British Colony of Bechuanaland. All of Botswana is very dry and between 1950 and 1965 there was even less rain. By 1965 almost all crops had failed to grow. About 400,000 or one-quarter of all the cattle died. There was hunger throughout the country.

Only 7,000 square miles out of 250,000 can be used for farming. Of these 7,000 square miles, only 1,900 are at present raising crops. Botswana has to bring in corn and other food from other countries.

To meet the distress caused by hunger a call was made to the World Food Organization. Oxfam and Christian Aid helped by sending food. Sixty per cent of all the people received food in this way.

As is the case in desert and semi-desert lands, communications in Botswana are very poor. There is only one railway which passes through its eastern side, and there are few roads. In 1968 there were only twelve miles of paved roads in the whole country.

There are no great rivers that could bring water to the dry earth. It is hoped a small dam can be built on the Shashi River.

It is hoped that things will improve. Botswana is one of the desert countries that may become rich from the minerals below the sand. Rich deposits of copper and nickel have been found. If these could be mined, this could double the wealth of the country. There are also valuable deposits of salt within 100 miles of the railway and also asbestos and low-grade coal.

The early people of Australia

The early people of Australia are known as Aborigines. They have suffered a fate like that of the Bushmen. Before the white men came they were found over the whole continent. The early people could not live like the white men. They died or moved inland and into the poorest parts of the country.

Like the pygmies and the Bushmen, they do not tame animals or grow crops. Much of Australia is desert or semi-desert. Almost everywhere there are some plants, if only bunches of dry grass. Sometimes there is a tangle of dry, thorny bushes. Sometimes the ground is covered with spinifex (See Fig. 4). Far away this looks like good pasture but really it is made up of stiff, sharp-pointed spikes. Yet it has no food value even for animals used to dry desert plants.

Like other hunting and food-gathering tribes, the men hunt and the women look for roots, fruits, and insects. The men are some of the best hunters and trackers in the world. Because of this they are often called in by the Australian police to help track those who have escaped from prison.

Most of the natives of Australia do not know how to use the bow and arrow. Their chief weapon is the spear. Its head is made from a piece of hard wood or a pointed piece of stone. A woomera, or a spear thrower is used so that the spear can be thrown with more speed. It is a piece of wood nearly 40 inches long with a peg at one end against which the spear rests. It is possible to throw a spear over 200 yards by this means.

The natives of Australia are good at making other weapons, like boomerangs, of which there are several kinds. They are thin curved pieces of wood, two to three feet long. They are thrown so that they hit the ground about 20 yards from the thrower. Then they seem to gain speed and fly another 85 yards or more, a yard or two above the ground. They may hit the ground 6 feet short of the victim and rise up in a way that makes it difficult to escape. Some boomerangs can be thrown 100 feet. They cut deeply into the flesh of the animal when they hit it. One kind is used as a toy, and sometimes to scare birds. It turns in the air and returns to fall at the feet of the thrower. It is thrown above a flight of ducks and the thrower makes the whistle of a hawk. The ducks become afraid and dive down. They are caught in a net held by other hunters.

The largest animals hunted are the kangaroo and the emu, a large and powerful ostrich-like bird. It may weigh as much as 150 pounds. Smaller animals, fish, lizards, frogs, snakes, caterpillars, insects, roots, fruits, and seeds are also eaten. The seeds are crushed between stones, mixed with water and baked into cakes.

The natives of Australia have two ways to make fire, by drilling and by sawing (See Fig. 5). A stick of soft dry wood is held between the hands, and pushed down upon a flat piece, and turned very quickly. Within two minutes a fire is started. A spear thrower and shield are used to start a fire by sawing. The shield is held tightly on the ground with the feet. Two men draw the spear thrower lively backwards and

forwards across the shield. This soon makes some fine powder that begins to smoke. It falls upon dry bark and leaves, which are carefully fanned into a flame.

To save the trouble of fire making they sometimes carry burning sticks with them. Today many of them use matches. Most of their food is roasted over the fire or cooked by means of hot stones. Birds are covered with mud and put on the fire. When ready the mud is removed and the feathers come away with it. Sometimes a whole kangaroo is cooked in its skin. It is laid in a kind of oven in the sand and covered with hot ashes.

The Aborigines do little to store food for a later date. The rainfall of Australia is not spread throughout the year. In the long dry periods food may run short. Then the Aborigine tightens his belt. This happens so often that many of them have quite a large piece of loose skin on the stomach.

They are good at getting water in the driest parts of the continent. There are some plants that store water in their roots. When they are dug and hung up the water slowly drips from them. When an Aborigine is very thirsty, he digs up a certain kind of toad that buries itself in the sand. These toads store up water in wet weather in little bags round their necks and bury themselves in the sand. The Aborigines squeeze the water out of the toad and so have a drink.

Little clothes are worn as a rule. Cloaks and rugs of skin sewn together may be used at night when it is quite

cold. The men wear their hair long and often it is caked into rope-like lengths with red earth, grease and mud. They wear many things made from kangaroo teeth and shells. A hole is made in an Aborigine's nose when he is quite young and a nose-pin is worn through it.

The Aborigines are good swimmers. They will dive into a stream and swim under water until they are beneath a number of wild ducks. They will pull the birds under the water and break their necks one by one without frightening the others.

They use rafts and canoes and are good fishers with spears, nets and poison. The rafts are made of several tree trunks tied together and driven by oars. The canoes are made from a large piece of bark that is cut from a eucalyptus tree with a stone axe. The bark is then shaped, dried and hardened. The ends are sewn up with a string made from another kind of bark. Several sheets of bark are stitched together to make larger canoes. The kinds of canoes and their uses are different for each froup of people from one part of Australia to another. In the north of Australia a few groups use dug-out canoes, sometimes with one out-rigger and sometimes with two. The out-rigger makes it almost impossible to overturn the canoes, which are sometimes 50 feet long (See Fig. 6). Some have sails as well as oars. It is possible that the Australians learned how to make these larger canoes from the people of New Guinea.

The Australian Aborigines, unlike the bushmen, are not kept to the desert. They never stay very long in one place.

They move over a wide part of the country searching for food and water where they are most plentiful. They build very rough huts of a few sticks and branches, sometimes covered with grass or clay. These huts, called wurleys, are large enough for only a small family. They are used for only a few days, perhaps for a single day. The group then moves on and builds another. There is hardly any furniture — a grinding stone, a spindle for making thread, a few wooden bowls, digging sticks and hunter's weapons.

They are fond of games; both parents and children like make-believe games and a kind of cat's cradle.

When the boys and girls are old enough to take on the work of a grown-up, they have to go through several tests some of which are long and painful. The boys often have their front teeth knocked out, and the girls have part of their little finger cut off. The boys are shown the bull-roarer. This is a piece of wood to which a strong string is tied. When it is whirled around quickly it makes a sharp loud noise. The women and girls are never allowed to see the bull-roarer. They are afraid when they hear it. They believe the noises are made by spirits.

The Aborigines are great believers in magic, both good and evil. One of the most important duties of the medicine man is rain making. He does an act to make rain, which is a most valuable thing in this dry and parched land.

Less than a third of the Aborigines live their old way of life. In the early days in Australia many of them were killed in battle with the white people or had their best

lands taken from them. As an old group leader said, "Once I hunt where you now live, once I fish where you now swim. Soon there be no more black feller, only lots more stars."

The Australian government now looks after the health of those who are left. Some of them have changed to the western ways and about a third of them work on sheep and cattle farms. Here they make good stockmen.

A few Aborigines live like the Europeans. A plan has been started to allow a small number of them to get a college education. City and town life does not interest them so the government has set aside some land where they can live their own life (See Fig. 7). White people are not allowed inside these lands without asking the Aborigines.

The life of the Aborigines is very unlike that of white Australians and Canadians. They have hardly any of the things that we feel are important and none of our comforts. Are they less happy than we? When Captain Cook first discovered the eastern coast of Australia he did not think so. He wrote: "They appear to be some of the poorest people upon earth; but they seem to be far happier than we Europeans." He said they were happy with what they had. They did not want fine houses, furniture, and other things. They did not try to be richer or more powerful than others and shared everything with one another, without trace of envy or jealousy.

Most of the desert lands of Australia have no people or a few small moving Aboriginal groups. In parts of Western Australia, however, the desert has something else to offer —

gold. In the 1890's there was a gold rush to some parts of the state, mostly to Coolgardie and Kalgoorlie. These are about 300 miles inland from Perth. In ten years the number of people in the state grew from 46,000 to 195,000.

The rainfall at Kalgoorlie is only 9 inches a year. Tanks were built to catch the little rain. Wells were dug, and drinking water was made from salt water. There was still not enough water and in 1893 people were still paying more than five cents a quart for it.

In 1898 work was started on a dam at Mundaring near Perth. Some 340 miles of pipeline was laid with pumping stations to raise the water 1,300 feet. By 1903 the work was finished.

A railway was built at Kalgoorlie and branches north and south to other mining centres. Towns along the railway also got their water from the pipeline. In 1951 work was begun to raise the dam and the amount of water tripled. It was finished in 1951 and now over fifty towns and two million acres of farmland draw their water from it.

The richest part of the gold field is the 'Golden Mile' of Kalgoorlie. In other places the supply is almost used up. Coolgardie which once had 30,000 people has now only 3000. The land around Coolgardie has many empty buildings and workings.

Kalgoorlie is a rich town, with good stores, hotels and public buildings, and a large Olympic swimming pool. What will happen there when the gold is all used up?

3 THE DESERTS OF THE ARAB LANDS

Life in the desert lands

Many Arab tribes and other groups have lived in parts of the deserts of Arabia and North Africa for thousands of years. There are the Bedouins of the desert plains of northern Arabia, and the Mountain men of the south. In the most southern part of the Sahara are the Sudanese, and in the north-west the Berbers and the Moroccans (See Fig. 8).

The great Nile River flows for 1,500 miles across the desert. A narrow strip of land on each side of the river has been turned into one of the richest and most thickly populated places in the world. Here, and at the mouth of the river, and on the edges of other parts of the desert, the people have built up a highly civilized life. In fact, the Arab civilization was the finest in the world. It was felt from Europe to India. There are growing cities in Egypt and other parts of North Africa, Syria and Iraq. They are more than five thousand years old. Today many people in these cities wear clothes like us, and many buildings are being built like ours. But away from the cities, on the less drier places of the desert, the people follow the age old way of life. They move from one place to another. The Bedouins move from one pasture to another as the scrub is grazed away. Or they may move from one water hole to another as the water becomes used up. There are often fights between groups over who owns the water holes. These blood battles carried on from year to year led to bitter fighting.

Not all parts of the desert are equally dry. Here and there water from under the ground comes to the surface. It forms springs, water holes and lakes and makes rich farming places called oases. Here date treps will grow. Other plants can be raised like figs, apricots, tomatoes, melons, cucumbers, wheat, corn, peas, beans, and cotton. Some of these oases are quite small. Others may be 50 miles across and be large enough for several villages. Some have more than a million date trees.

Life in the oases is settled, and the farmers have no worries about the weather. In most parts of the world farmers fear dry weather. It may dry up the crops. Too much rain may water-log the soil. Storms may beat the harvest to the ground and frosts may destroy a promising crop. In the oasis the weather is always the same, and it is warm enough for good growth. The underground water, which comes from the melting snows or heavy rains of far away mountains, always fills the oasis lake. It gives plenty of water for the growing of crops.

New date trees are planted on the edge of the oases. Trees protect the oasis from the hot sun and provide shelter from the drying desert winds. They keep out the clouds of sand that these winds sometimes bring. The young date trees are planted in deep holes in the sand where the soil is wet and where there is shade for a part of the day.

Many of the smaller oases are not so well-off. The supply of water is not certain, and here the people are more likely to move from place to place.

Between the oases stretch hundreds of miles of desert. It may be hard, flat earth with small brown and yellow stones spread over the surface. It may have rolling hills of moving sand or rock-covered mountainous country with deep, dry valleys and bare cliffs. In some parts there is some rain in spring and the desert is thinly covered with flowers and grass. By the summer all is dry and brown. Any pools that may have formed are dried up and their beds hard and cracked. There is little food, and cups of coffee, and a long-stemmed pipe, passed from hand to hand, helps to keep away the hunger.

The Bedouins live mostly on camel's milk which is drunk sour, dates and flat cakes of bread. They do not stay in one place long enough to harvest a grain crop. They get dates and grain from the settled people in return for camels, sheep and goats. Not very often is a sheep or camel killed by the Bedouins for their own food.

Bedouin boys live a free and easy life. At an early age they have camels of their own, and they ride with guns to guard the flocks from wolves and enemies.

Little children often wear no clothes until they are about four or five years old. The boys then go to school. They may learn to write with a pen made from a water plant, or in the sand. They learn to say the Koran, the holy book of Islam. Most of the girls do not learn to read or write.

Many of the Arab groups have a great fear of evil spirits or jinns. They wear coins with words from the Koran marked on them to keep away the evil spirits. Girls are not

as important as boys. Sometimes boys are dressed as girls in the hope that the jinns will think they are girls and not bother about them.

There are many kinds of Arabs living on the edge of the deserts. The mountain Arabs raise sheep and cattle. They build tall houses and live in the top flat while the animals live downstairs. The marsh Arabs of Iraq make ropes, mats and houses from water plants. The water plants are also used for making beds, fuel and as food for their buffalo.

The desert parts of Africa and Asia are so large that we can describe only a few of the people that live in them.

Not all the Arabs live in the desert. In the richer farm lands there are many settled and developed countries. You will read about some of them farther on in this book.

Oil from the desert

Although the desert parts that cannot get water are useless for growing crops and have few people, they sometimes have valuable minerals. Men live and work there, even though there are hardships. A mineral that has brought riches to many of the Arab desert people is oil.

This is found under the sands and rocks of the Arabian and Sahara deserts. New towns have been built. People who lived very simple lives, living in mud huts, without schools, hospitals, or stores, now find all these things springing up around them.

The oil is thousands of feet below the surface. The great steel towers or derricks are set up to hold the drills that cut down into the earth and rock until they reach the oil. This sometimes comes up freely but mostly it has to be pumped. Many of these derricks cover the surface where the oil is found. New oil fields are often discovered and a large number of derricks are rising in these once deserted lands.

Some of the oil is taken in large ships to Canada and other parts of the world. There it is refined (made pure) and many valuable things are made from it, besides gas. Some of the oil is refined before it leaves the Arab countries. The largest refinery in the world is at Abadan on the Persian Gulf. Some of the oil is taken by huge pipes several miles across the land to the shores of the Mediterranean Sea and loaded into ships. This saves the long trip round Arabia and keeps the ships away from the Suez Canal (See Fig. 9 and 10). New harbors have been built for the ships, new towns for the workers and new roads to take them to work.

In drilling for oil, fresh supplies of water have been found, even in the Sahara. These have made it possible to grow more crops. This helps to feed the extra thousands of people brought in by the oil companies.

The oil companies in the Persian Gulf are mostly owned by the British, Dutch and Americans. They have built houses and hospitals for their workers, and schools for the workers' children. They train many of the Arab people for the important jobs connected with producing and refining the oil.

The chiefs receive part of the money from the oil that is mined. Besides making a rich life for themselves, they are building hospitals, schools, and better houses for their people. They are improving their country with new ways to grow crops, new roads, railways and factories. The oil in Algeria under the Sahara was largely owned by the French and the Americans. The Algerian government has now taken over most of the ownership.

Oil is thus changing the life of the people of the Middle East. The money they can get by working at the oil fields, refineries, docks and factories has changed many of the people. They once moved with their flocks over the semi-desert; now they live a settled life in houses instead of tents and ride in automobiles instead of on camels.

4 THE ICE DESERTS

The hot deserts do not have any plants because it is too dry for anything to grow. There are also deserts where nothing grows because it is too cold. Much of Greenland, some of the northern islands of Canada and almost all of Antarctica are covered with thick sheets of ice and hard snow. The snow that falls here never melts. The land is frozen all year round. As new snow falls, it presses on the snow beneath and slowly makes it into ice. The ice sheet may be more than 3,500 feet thick. The weight of it presses it outwards, until it stretches out into the sea. Then great pieces, perhaps several miles long and 1,000 feet thick, break off and float away as icebergs.

The ice-caps have no settlers, only explorers who live there for a short time. Sometimes scientists set up research stations as they have done in the Antarctica, even a year-round one at the south pole.

On the edges of the ice-cap and around the shores of the Arctic Ocean are lowlands. They are covered with ice and snow most of the year, but are warm enough in the short summer for the snow to melt. These cold plains are called the tundra and here life is possible. Here, too, Eskimo, Laplanders, and Samoyeds have met the hardships of the icy and cold northern climate.

Except for the top 10 - 12 inches the soil remains frozen all the year round. The warm season does not last long enough for crops to be raised. Like the people of the

desert, these northern peoples are hunters and herdsmen.

The Eskimos live on the shores of Greenland, northern Canada, and Alaska (See Fig. 11). They are cut off by the frozen seas to the north and the huge pine forests to the south. Until lately they mixed very little with the rest of the world. Because of this they made for themselves almost everything they needed. They hunted by land and sea, eating the flesh of the seal, whale, walrus, caribou (the American reindeer) and many kinds of fish. The name Eskimo means flesh-eater.

From the fat of these animals, mostly the seal, they make oil for lighting and heating their homes. They use the skins for clothing, tents, and boots. They make needles and spears from the bones. The sinews are used for sewing and tying parts of their weapons and sleds together.

Their summer homes are skin tents. Their winter homes are made of driftwood, whale bones, and stones, or of blocks of hard packed snow. These snow houses are called igloos. They are entered through a long tunnel that keeps out the cold winds. It is warm and comfortable inside the winter homes, which are heated by oil lamps and by the bodies of the people.

The Eskimos move over the frozen tundra and the ice-covered sea in sleds pulled by teams of dogs called huskies. When the sea is open they use skin canoes called kayaks. The frame is made of driftwood or whale bone, and covered over with skin. In the middle is a hole, just large enough for a man to sit. A larger open boat, called an umiak, is used by

some Eskimo people.

Eskimos are happy and cheerful and are able to enjoy life. With the coming of the white man to the Arctic, life became harder for them. The musk-ox, caribou, walrus, whale and fur seal were killed in large numbers. The Eskimos found it hard to get enough food and clothing. Sickness brought by the white man spread death among the people who seemed to be healthy before. Since 1955 the Canadian Government has been playing a greater part in the lives of these people. Most of the aid has been in the form of health care, medical services and in education. Now the number of Eskimos is getting larger. About 95 per cent of the children go to elementary school. Most of the families how live in houses in villages. Many Eskimos make their living by hunting and trapping. A large number of them are working for money in the northern towns. The tundra of Europe and Asia is like that of North America. The growing of crops is impossible under present conditions. The Lapps, Samoyeds, and other groups live partly by hunting and fishing and partly by herding reindeer. These give them milk, meat, clothing, and tent coverings. They also pull the sleds and act as pack animals when the groups move from place to place looking for food for the herd. The reindeer feed on moss which they get in winter from under the thin covering of snow.

For a short season in summer there are millions of flies in the tundra. However, they do not carry sickness, but they bother the reindeer so much that the herds sometimes

stampede. Many groups drive their animals to higher ground until the short summer is over.

The tundra of Asia is crossed by some large rivers. These are frozen for much of their course in winter. As their lower courses are the last parts to thaw, the water from the melting ice and snow farther up the river floods the low-lying tundra. This stays marshy much of the summer.

The government of the U.S.S.R. is beginning to work the far north of Siberia. Wood from the pine forests is floated down the rivers to sawmills. They have been set up at the river mouths. Towns are being built, and ice-breakers keep the Arctic Seas open long enough for freight boats to make the trip to far away harbours of European Russia, or to the harbours of the Pacific.

Some of the shortest air routes between Europe and America and parts of the Far East pass across the North Pole (See Fig. 12). Airports are now being built on the north coast of Siberia. Thousands of people now live in towns where a few years ago there were only a few moving groups. Vegetables and fruit are grown in large green houses far within the Arctic Circle. The Samoyeds will soon have all the things of the white man. They have hardly changed their way of life for hundreds of years but great changes are near at hand.

The cold, icy climate of the frozen northern plains will not stop man from making his home there. Even the hardships of the ice desert will be overcome if valuable minerals are found in its ice-covered waters.

5 MAN AGAINST THE DESERT

Like the tropical forests, the desert has been a calling to man. For thousands of years men have fought it and taken from it a hard living. In places men have done more — they have changed the desert into rich farmland. To do this they have needed a supply of water. This mostly comes from rivers that rise outside the desert and flow through it.

The Nile River is the most important of these. It rises in the mountains far to the south, where heavy rain in spring and summer cause it to flood. As the river flows along its course, the flat land on each side is flooded in early autumn. At first men planted seeds in the mud as soon as the flood waters became lower. Only the land that was flooded, very near the river, could be used. Only the kinds of crops that grew well in the Egyptian winter, such as wheat, barley, clover, and beans could be grown.

Soon, however, men began to tame the waters of the river. Banks were built around the fields that were likely to be flooded. The water was allowed in through an opening in the bank. When the flood level was at its peak, the opening was closed. The trapped water could not flow away. Slowly it sank into the land causing it to be soaked. Another important fact was that the rich mud carried along by the river was allowed to settle instead of being washed away. This is known as basin irrigation.

One of the first simple pieces of machinery to be

used for this was a shadoof. This was a long pole, with a bucket on one end and a lump of clay as a weight on the other (See Fig. 13). It was set up at the edge of the place to be flooded or on the river bank during the dry season. This was, when the water in the river was lower than the land through which it flowed. The bucket end was lowered and the bucket filled. The weight on the other end of the pole made it easier to lift the bucket. It was emptied into a canal or ditch at a higher level. This caused a larger piece of land to be watered.

Even with this, most of the flood waters passed down the river and were lost. Until lately there was little men could do about this. Now it is possible to build large dams across the whole width of the river. A large amount of flood water can be held back and let go at any time in the year when it is needed.

The dam makes a great lake. The surface may be more than 100 feet above the old level of the river. Water can be drawn off from the lake at this level by canals. It can be taken to places where the flood waters could not reach before. This water from the canals then passes through a number of smaller canals to bring water to all the land between the highest canals and the river.

This kind of irrigation not only brings a larger piece of land into use, but makes it possible to grow a larger number of crops. Water can be used throughout the year and planting can be done at any time. Wheat, barley, clover, and beans can still be planted in autumn and

harvested in spring. This has been done for thousands of years. Instead of leaving most of the land dry and wasted until the next flood, cotton, corn, rice, and sugar cane can be planted as soon as the spring crops have been harvested. These can be watered from the canals during the hot, dry summer. In this way it is possible for two or three crops to be grown on the same land each year.

In this way, man is overcoming the desert. He is turning great stretches of sand into rich farmland. What the Nile did to small parts of the river valley thousands of years ago, new ways of irrigation are doing to much larger parts today, not only in Egypt, but in many other drier parts of the world.

Until lately the most important dam on the Nile was that at Aswan. It was built between 1898 and 1902 and was 100 feet high. A few years later it was raised another 27 feet. It is 1½ miles long and the lake formed by the dammed up waters stretches for 129 miles and holds 5,160,000,000 tons of water. Nearly 10,000 miles of large canals carry the water from the lake to the land above the river. Another 50,000 miles of smaller canals and ditches take it through the fields and finally back to the river.

There are other dams near Cairo, at Asyut and elsewhere. These are not as high as the one at Aswan. The amount of land used for growing crops in Egypt was made larger by the water from these dams. Nearly 5,930,000 acres still use the old way of irrigation.

The farms of Egypt are almost always small. Most of

the people are farmers growing their own food and doing almost everything for themselves. They also grow very good cotton which is the most important thing Egypt sells to other countries. The chief harbor of Egypt is Alexandria. The capital is Cairo, a city of over four million people. The most important farmland of Egypt lies in the Valley of the Nile and at the mouth of the Nile.

The river is at its lowest level in May and June. It rises a little in July and in August it begins to flood. It reaches its peak in September and October. Then the water slowly gets lower until next spring. The winter crops are sown as soon as the floods have gone down, or as soon as the corn and cotton are harvested. Cotton is sown while the winter crops are getting ripe, corn as soon as they are harvested. All the growing crops are fully watered once every week or two. This water comes from the river or the canals leading from the lake. Fig. 14 shows what sort of work is going on throughout the year, and the crops that are grown.

Lately the number of people in Egypt has been rising very quickly and there has been a need to improve the irrigation works. In the 1960's another huge dam was built at Aswan, above the old one, and called the High Dam. This made it possible to store larger amounts of water and it also gives a larger amount of electricity. There was a great increase in power from 2,000,000,000 kilowatts in 1958 to 10,000,000,000 in 1968.

The great man-made lake, 400 miles long made by the

new dam would have covered with water some of the early temples and statues of old Egypt at Abu-Simbel. Scientists, historians, and lovers of art in many countries agreed that these old monuments must be saved. Engineering companies from Germany, Sweden, France, and Italy helped the Egyptian companies in this big undertaking. The giant statues 65 feet high, the great hall of the temple made out of rock, and other buildings were sawn into great blocks. These weighed 20 to 30 tons. They were pulled up the hillside and put together above the water level about 185 feet above where they were before.

Irrigation is not all good — there are some bad points as well. The reason for the richness of the Nile Valley is the mud that the flood waters bring with them from the far-away mountains, where the good soil is washed away. The mud is spread over the river valley and at the river mouth by the flood waters. In this way it keeps adding good soil. Now, however, much of the flood water is held back by the dams. A great deal of the rich mud, or silt as it is called, drops to the bottom of the man-made lake instead of on the farmers' fields. Land cannot go on growing good crops unless something is put back in the soil. The farmers of Egypt are too poor to buy enough manure and man-made fertilizer. As a result the crops from some of the land are not as good as they were years ago.

The flood waters were stopped for the first time in 1966 when 70 per cent of the dam was built. The silt brought down by the flooding river was finally ended.

There are other problems. To protect the river course below the dam a number of smaller dams will be needed, costing further money. The flood waters of the Nile used to pour a large amount of organic and mineral matter into the eastern Mediterranean. This was a means of food for many fish. It now will be greatly lessened. It may be that the new High Dam will mean less fish for Mediterranean fishermen.

Another drawback to irrigation is the fact that water is standing in the canal all the year round. The flies that carry sickness are born there and spread sickness to the people.

Two other rivers, the Tigress and the Euphrates, are something like the Nile. They bring water to the desert lands that lie between the mountains and waters of the Persian Gulf. Five or six thousand years ago farmers were able to use the water of these rivers to irrigate Mesopotamia. This is the land between the rivers, now called Iraq. Trade between these farmers and other people grew and cities on the trading lines became important. These lines ran along the edge of the desert but often crossed wide desert stretches. In Iraq, too, large new irrigation works are giving more and richer farmlands and less desert.

The Atacama desert in Chile is one of the driest spots in the world. It has large deposits of nitrate soda. This is used for making two things which the world seems to need more and more of —— fertilizers to give more life, and explosives, mostly used to destroy life. A great nitrate plant grew up in the desert. At first every drop of water

used was brought from the faraway mountain streams in barrels by mules. Now it is brought 290 miles by pipelines. There is a plan to bring water to these desert places by towing icebergs here from the Antarctic.

The drier lands of northern Chile also have other minerals. About 12 per cent of the world's copper comes from there. There are also huge deposits of iron ore.

The ice deserts are also a test for man. They are now beginning to give way before man's know-how. In some places there are minerals beneath the frozen soil. New means of air travel make it possible to carry towns already built, mining machinery and tools over hundreds of miles of rough country. Refrigeration plants, run by oil from the oil fields or by nuclear stations, keep the ground under the houses and other buildings frozen all the time. This is needed, because if the ground melted there would be nothing to keep the buildings up and they would fall.

As well as raising fruit and vegetables in huge glass houses in these 'industrial oase', as they are called, crops are also grown out in the open. In order to do this the frozen soil has to be melted. Snow bounces back the sun's rays so they never get through to the soil beneath, which remains frozen. When the snow is removed the heat from the sun can get through to the soil making it warm. These farming places are always kept clear of snow. Each year the sun's rays go deeper and deeper into the soil until the ground is melted enough for crop growing.

Even far within the Arctic Circle, the summers are

quite warm. The sun shines all day and all night but the season is short. Plant growers are always working to find new plants that can grow more quickly, or with less water, or at lower temperatures. Today there are farms growing potatoes, vegetables, dairy products, and grain, where fifty years ago farming would have been thought impossible.

Glaciers, too, are being used by man. Coal dust, burned wood, leaves and other dark-coloured materials are spread over the surface of glaciers. The heat of the sun can get through to the ice. As the ice is melted the large amounts of water can be used for irrigation and industry. And so the overcoming of the ice deserts is beginning.

6 SAVANNAHS OR HOT GRASSLANDS

The tropical forests are too hot and too wet. The deserts are too hot and too dry. There are other lands that are also very hot but at one time of the year are too wet and at another time too dry. These are the Savannahs, or hot grasslands.

There is no clear line to the tropical forests. If you moved southwards from the Congo forests or northwards from the Ghana coastal forests, you would find the forest is not as thick. The underbush is not so thick and the trees are not so close together. There would be more and more open spaces with tall grass nearly 15 feet high. Even an elephant would be hidden as he walked through it. Only a giraffe could be seen above these forest grasses, and then only his head and the top of his long neck.

Still farther from the equator the open spaces are larger. The trees are farther apart and the grass shorter but still far taller than any wild grass in Canada. The trees become dwarfed, and only tough thorny kinds are seen. The grass gets shorter and there are bare patches with no plants at all. There are more bare patches, and there are no trees except in one or two valleys. Finally, there is no more grass and we are in the desert.

This belt of mostly grassy country between the forest and the desert is often several hundred miles wide. There is a hot and very dry season. It may last for two or three months near the forest but for most of the year near

the desert. During this time the sun shines all day, and the tall grass becomes brown and grey. It is three to six feet high, with sharp, rough ends, and so tangled that it is almost impossible to make one's way through. Such trees as there are, lose all their leaves and look quite dead. Rivers often dry up and lakes and pools become stretches of hard, cracked mud. The air is full of dust, and there are flies everywhere.

It is too hot and dry to work. Dry scorching whirlwinds stir up great clouds of dust. Then comes the first thunderstorms, and bright flowers come out as if by magic. Within a day or two the dead-looking trees are covered with large, bright, sweet-smelling blossoms. The rain gets heavier and more falls in a day than some parts of Canada get in a month. It does not rain as long as it does in the tropical forest.

After a few months, however, the rain stops. For a time everything grows well but no more rain comes, and the dead, dusty, dry season spreads over the land again.

The amount of rain changes a great deal from year to year and from place to place in the hot grasslands. Some years there is barely enough to fill the lakes and rivers. In other years it is so heavy that streams are turned into raging floods and lakes become many times their size.

The rain in the hot grasslands comes in the summer when the sun is almost directly overhead. The winter is often almost as hot, while the dry, dusty, spring may be even hotter.

Many kinds of animals (those that eat grass and leaves) make their homes in the hot grasslands. These animals are elephants, rhinoceros, hippopatamus, giraffes, antelopes, and deer. Flesh-eaters such as the lion and the leopard are also found there. These animals do not attack man very often. Many break into gardens and fields to feed from the crops. A herd of elephants can do a great deal of damage.

Insects cause much trouble in the hot grasslands. The tsetse fly causes sleeping sickness which may kill both men and cattle. Clouds of locusts may eat up a whole crop in a night. Flies spread sickness in the wet season.

Many people of the hot grasslands are hunters or care for animals. Except near rivers that can be used to water the land, much of the hot grassland has too long a dry season. This makes it impossible to raise crops in large amounts.

In places free from tsetse flies, cattle are raised in large numbers but mostly they are very poor. In some parts such as the campos of Brazil, where they are a long way from the coast and where it is difficult to move them, they are often killed for their hides and for the hoofs from which glue is made. The bodies are left to rot.

There are large stretches of hot grasslands in Africa, both north and south of the tropical forest belt. Many groups live by herding cattle in these places. Each man's riches is decided by the number of cattle he owns. Cattle are used as money. Often cattle are given as a gift

to his bride's family when a man marries. This shows that he will care for her in the proper way.

The African herdsman hates to see his herd get smaller. He never kills any of them except when he must. He will sell them only at a very high price. There are more cattle than are needed and more than the valuable pastures can feed properly. Many of them are thin, bony animals. As the grass is eaten faster than it can grow, the soil is worn away, and the country and the prople become poorer and poorer.

The Masai who live in East Africa in Kenya and Uganda do little but herd cattle. They live mostly on milk, blood and meat. The men make tools and weapons and the boys look after the cattle. The women build the huts and the strong thorn fences within which the cattle are kept safe from the wild beasts at night. The women also carry the heavy loads and do all the other work of the village.

Some of the Masai spend the dry season on higher ground. They return to the lower land for the wet season. They build new huts each time they move.

Other people of the hot grasslands are farmers as well as herdsmen. This is the case with the Kaffirs farther south. The women mostly do the planting. They break up the soil with a hoe, and sow corn, millet, peanuts, melons, sweet potatoes, beans and other vegetables. The dried grass is burned off near the end of the dry season. The ashes help to make the soil rich. Only small amounts of these crops are grown, as a rule just enough for the needs of the village.

In some parts of the hot grasslands, Europeans have brought in other crops, which can be grown in large amounts and sold. Where there is enough rain, or where water can be obtained for the crops, rice, cotton, and bananas can be grown. In other parts of the hot grasslands where there is no set water supply, the people move their whole village every few years. They clear a new piece of ground for crops, and allow their old fields and gardens to become grown over with grass and weeds.

The Kikuyu of Kenya are good farmers. They are learning European ways of crop raising. They have, however, cut down so many trees in the more wooded parts of the country that the soil is becoming drier. Then the wearing away of the soil becomes a major problem.

The Baganda of Uganda, who use the plow as well as the hoe, grow several types of crops. They depend mostly on bananas, which they eat in a number of different ways. They also make pleasant drinks from them and use their stems for furniture-making. Their fibres are used for making string and matting, their leaves for weaving, and their sap for making soap.

In northern Nigeria the people of the hot grasslands have been civilized for centuries. The Hausa plant the soil very carefully. They grow peanuts in large amounts which are sent to other countries. They grow cotton which they make into cloth and sell to many nearby peoples. They are good metal and leather workers and carry on a wide trade. They have large towns such as Kano. It was an important

trading center long before the first European traders reached the West African coast, over five hundred years ago.

In South America the hot grasslands of the Llanos, like the Campos, are used mostly for cattle raising. However, there are wide-spread floods in the wet seasons where thousands of cattle may drown. In the long dry season there may be so little pasture that many cattle die of hunger and thirst. This does not make for rich ranching and the cattle are very poor.

Since 1930 when oil was found and one of the richest deposits of iron ore the Llanos has been turned into a very important part of Venezuela. The lower course of the river Orinoco was fixed to take large ships. The ore is carried by road, rail and ship to the U.S.A.

As the industrial work and the number of people grew larger, steps were taken to overcome the dangers of drought and flood. A large dam was finished at Calabozo in 1957 and several other plans were finished as well. Because of this hundreds of ranches were able to raise high-grade beef and dairy products. It turned poor pasture into good farmland.

On the edge of the dry grasslands, where they join the coastal forests of southeast Brazil, is the most important coffee growing place in the world. Here on the sides of the hills are huge coffee farms. Each farm has several million coffee trees, its own villages, stores, factories, church and movie theatre. All the trees are kept well-pruned at a height of 7 - 8 feet. Food crops are grown between the rows of trees.

The coffee berries ripen between May and August. All the workers and their families, men, women, and children, work at picking the dark red berries. They hold one end of each branch and quickly run their hands over it, stripping off the berries and many of the leaves. They all fall to the ground where a cloth may be spread to catch them. If cloths are not used, the berries are raked up and put through a screen. The dirt falls through, and the rest are thrown up in the air, the wind blows away the leaves, and the berries are left. They are then washed in running water which carries them to factories. Here rollers break off and remove the outer skin. This leaves the hard coffee beans which drop through a screen into a tank. From this the water carries them to huge concrete drying floors, where they are spread out to dry in the hot sun. For a week or so the beans are turned, raked, and shoveled until they are fully 'cured'. Other machines then remove the skins which are blown away, together with dirt and dust, by a strong wind.

The beans are then graded and packed in bags each holding 130 pounds and sent to Santos or Rio de Janeiro, the great coffee cities. San Paulo, a city of about six million people, is the center of the coffee growing country. It used to grow more than half the world's coffee but now it grows rather less than half.

The West Indies are partly dry grasslands, and partly tropical forest (See Fig. 15). They have no really dry season. Kingston, the capital of Jamaica, has less than

1 inch of rain in each of January, February, and March, and about 1 inch in December and April. The peak of the wet season is in October, when there are about 7 inches out of a yearly rainfall of 32 inches. Most of the West Indies have a good deal more than this.

Jamaica is famous for its bananas. These are grown on farms which are mostly owned by outside companies but worked by the people of the island. Jamaicans are mainly descendants of slaves who were brought there by the British from Africa centuries ago.

The banana plant, which is not really a tree, is grown from a cutting. It shoots up so quickly that within twelve months it is 15 - 20 feet high. It bears one large bunch of fruit weighing about 55 pounds. The bunches are cut while still growing and taken by ships to the United States or Europe. They are packed in rooms and kept at a steady temperature.

Three men make a cutting team. One cuts the soft stem of the plant partly through, so that it slowly bends over. The second man steadies it and guides its fall, so that the bunch comes to rest on the shoulders of the third man. A bunch is then cut off and carried to a trolley which takes it to the storehouses or directly to the waiting ship. A steady crop is kept by allowing a side shoot to grow at ground level. This soon fruits and the rest of the plant is then cut down and left to rot and so make the soil rich. Other important crops in the West Indies are sugar cane, tobacco, grapefruit and cocoa.

The dry grasslands of the world are not alike. Large parts have not yet been changed by new methods. They will almost certainly become more important in the future. The world is short of food. The greatest need is to grow food more quickly than people are being born. The dry grasslands could grow far more than they do. Floods need to be stopped, large irrigation plans must be carried out. Electric power, railways and roads will be needed. Tsetse flies and other insects will have to be overcome. However, large dams and irrigation plans, and strong fights against insects, cost a great deal of money. They also need the scientific and engineering know-how. The peoples of nearly all the dry grasslands are both poor and lacking in the needed training. These people will need not only to be shown how to use the wealth of the land, but also given the needed money. Only in this way can they improve their own level of living and at the same time help the world to overcome one of its most important problems.

The government of Brazil knows the importance of these lands and has built a new city in the campos. This has taken the place of Rio de Janeiro as capital of the whole country. The new city is named Brasilia. It has some of the newest buildings in the world. It became the capital in 1960.

7 MAN-MADE DESERTS

Although man is now doing much to overcome the desert, much of his work seems to go against him. In some places the deserts are becoming larger. The once rich farmlands have become bare and wasted and fields have died because of the shifting sand. This has happened in parts of Africa where the flocks and herds of the moving tribes have eaten the little grass. This grass has not had a chance to grow again. The roots of the plants help to bind the soil together. Where plants are eaten away, the soil becomes dry and dusty and is blown away by the wind. In this way a new piece of desert has been formed.

When it does rain, if there are no plants to hold the water and keep the soil together, the topsoil is washed away. Bare rock is left behind. The climate itself begins to change. Plants keep the rain from sinking in or running off too quickly. They give off water slowly, and so keep the same amount of water in the air which helps to make it rain. If the rain sinks in or runs off at once, the air quickly becomes dry. There is less chance of further rain and the climate becomes drier and drier. In some parts of the world we have not yet begun to win the battle with the desert.

When the soil is washed away by water or blown away by winds, this is known as erosion. Man is fighting a battle against erosion in many parts of the world, mostly in the hot grassland. It is a most important battle — the

very lives of people not yet born may depend upon it. The number of people in the world is growing very quickly. Already more than half the people of the world do not have enough to eat. Every moment of every day the number of people in the world who need feeding rises by more than a hundred.

One of the worst cases of erosion was that in the middle west of the U.S.A. There valuable crops of wheat were grown year after year. Much of the goodness of the soil was taken away. It became poorer and poorer until it was little better than dust. Then came a number of dry seasons. Strong winds whipped up the dust in great clouds, and blew it away eastwards. Crops in the rich fields to the east were covered with dust, and the farmhouses and buildings were buried under the moving sand.

Twelve hundred miles to the east the skies above New York became dark with the dust clouds. In the cities of the east coast everything was covered with dust. Meanwhile, the wheat lands were left bare and stripped of the valuable topsoil. For a long time this place was known as the Dust Bowl.

Teak forests were cut down in large parts of Thailand. When the trees were gone there was nothing to stop the heavy rain from washing away the soil. The waters of the Mekong River were chocolate color. Then the Forest Conservation Service was set up, and only certain trees were cut. A state farm was set up to grow small teak trees. The people of the forest cleared a piece of land. They were paid by the

government to plant these little teak trees before they moved on to another patch of forest.

The wearing away of the soil can be overcome by not destroying the forest, and by planting the cleared forest land with new trees. Herdsmen in dry places have to be told not to make their flocks and herds too large. In this way too much pasture will not be eaten up; however, this is not easy. As the number of people gets larger the herdsman wants to keep more animals, not less. At the same time more irrigation turns some ground that was once grazing land into farmland. However, things have to be kept equal between the number of animals and the amount of grazing.

Farmers must be told not to grow the same crop on the same land year after year. They should plant different crops, and add manure to the soil. This will put back into the soil the minerals taken out by the crops harvested. But in the lands where the wearing away of the soil is a danger, the people are often very poor. They cannot pay for this. The animal manure is mostly dried and used as fuel.

Where crops are grown on hilly land, the lines made by the plow should go around the hill (contour plowing) instead of up and down the hill. This keeps heavy rain from washing down the hillside carrying the soil with it. These measures are very important with large scale farming where big fields are needed. On smaller farms fences divide the land into fields. This helps to protect the soil from the strong wind.

To cut down on the damage by high winds, long narrow

belts of trees (windbreaks) are planted. This helps to direct the wind upward and stop the wearing away of the soil. Thousands of miles of trees have been planted to protect the grasslands.

When the soil is already very dry and sandy, the planting of trees, mostly pines, or a certain kind of grass helps to bind the soil together. If the soil is very worn out, it may be best to begin by planting some hard weeds.

The U.S.A., China, and the U.S.S.R. have great plans to stop the wearing away of the soil. These are the damming of rivers, so that the water flow can be checked, changing the course of rivers, and the planting of forests on a large scale.

The Hwang Ho, or Yellow River of China, has caused much damage by its floods. It is perhaps the muddiest river in the world. Millions of acres of crops have been buried under yellow mud. Hundreds of thousands of people have lost everything or been killed. Now a great plan, which will build forty-six dams, has been begun to check its waters. Huge parts of soft, sandy soil are now being planted with forests.

In the U.S.A. the whole valley of the Tennessee River has been saved from the damage caused by the washing away of the soil. This was possible by a plan of dams and reforestation.

In the U.S.S.R. near the Aral and Caspian seas, which has been desert for centuries, there were once fine cattle and great irrigation works. Now the Russians have

planted many trees and miles of windbreaks. By damming the Amu-Darya River, water is carried over six thousand miles to the Caspian Sea. It carries water to thousands of square miles on the way. This makes it possible to grow food for a hundred million people.

An even bigger plan is to change the course of the rivers Ob and Yenisei. This will bring the waters of the Yenisei into the Ob. The two waters will move over 1,000 miles to the Aral Sea, and from there to the Caspian.

These plans stop the wearing away of the soil and give water for farming. They also make possible large amounts of electricity for use in industry.

It is possible to greatly improve the amount of food man is able to grow. However, many of the countries of the world who are in most need of extra food are too poor to carry out these big plans. Help is possible through the United Nations and from some of the wealthier countries of the world. They can give machinery and money. This is far from enough to overcome the trouble of the world's hungry people.

Big plans carried out by wealthier countries do not always work. After the Second World War, Britain was very short of fats. The government decided to grow large amounts of peanuts in the grasslands of Tanzania. Machinery tore up the scrub and pulled down the trees. Airplanes and spraying machines covered the land with poison to kill off the tsetse flies, which had made life so hard. Then came the hot sun. The tsetse, living in the shadows of the forest, had protected

the land from man. The trees had been left to grow. They soaked up the rain and protected and held together the soil. Now there were no longer any tsetse flies, but there were no trees either. The number of plants and insects were no longer equal. The newly plowed soil turned to dust. The heavy rain cut deep valleys and washed away the soil. The hopes of a great peanut harvest were gone.

It had already been decided that it would be dangerous to depend solely upon one crop. Another oil-bearing crop — sunflowers — was planted. But sunflowers have to be pollinated by bees, and there were no bees. Before the plan started there had been plenty of bees, but they had been destroyed along with the tsetse flies. Men were rushed out from Britain to Tanzania. In the end millions of bees were brought from Italy and Britain. By then the greater part of the plan had been given up — the things which wear away the soil had won.

A few years later the government of India decided to clear about 4,000 square miles of jungle. India was in great need of more food. The government hoped to use the whole place to produce food, but they were told otherwise. Instead of sweeping away all the useless jungle, more than 2,000 square miles were kept as forest. Here the rain could be soaked up and fed into the underground springs. Also, the animal and insect life could be kept. Machinery, plows and insecticides are not enough.

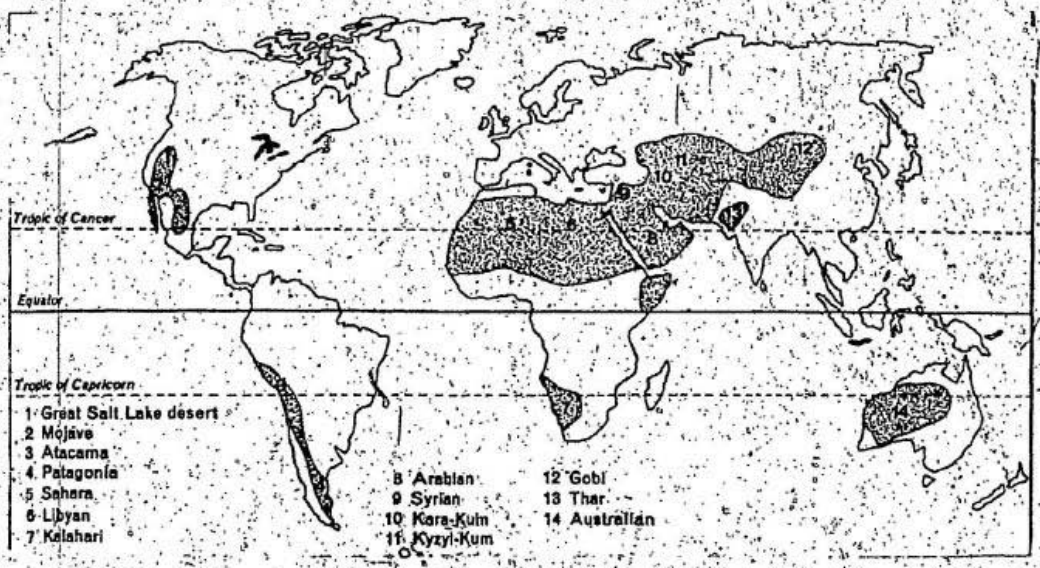
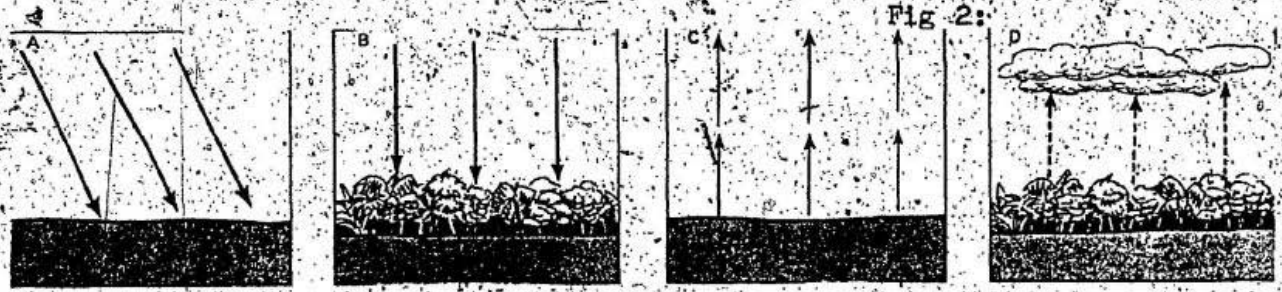


Fig 1: Deserts of the world

Fig 2:



Desert heated by sun

Forest heated by sun

heat lost to air

heat kept down by clouds

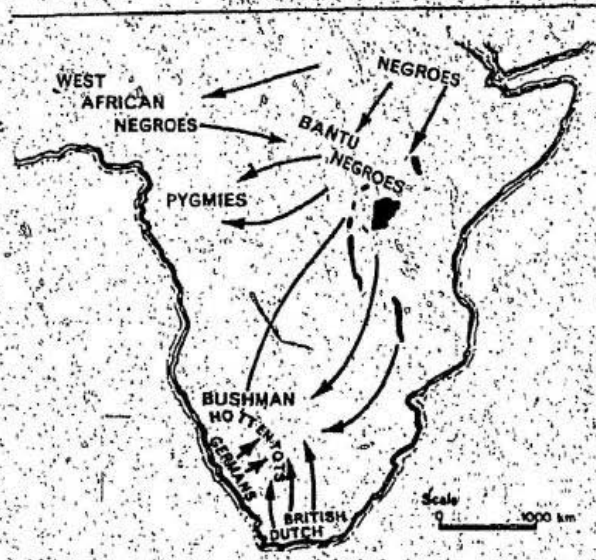


Fig 3:

movements of Peoples of Africa in the past



Fig 4:

Spinifex, a common desert grass



Fig 6:

A canoe and outrigger

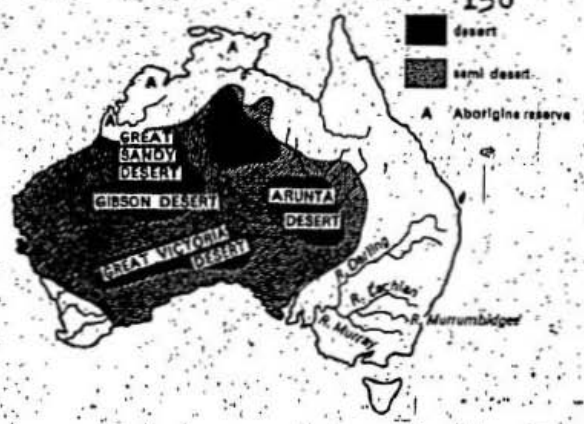


Fig 5:

Aborigines making fire

Fig 7:

Aborigine reserve lands



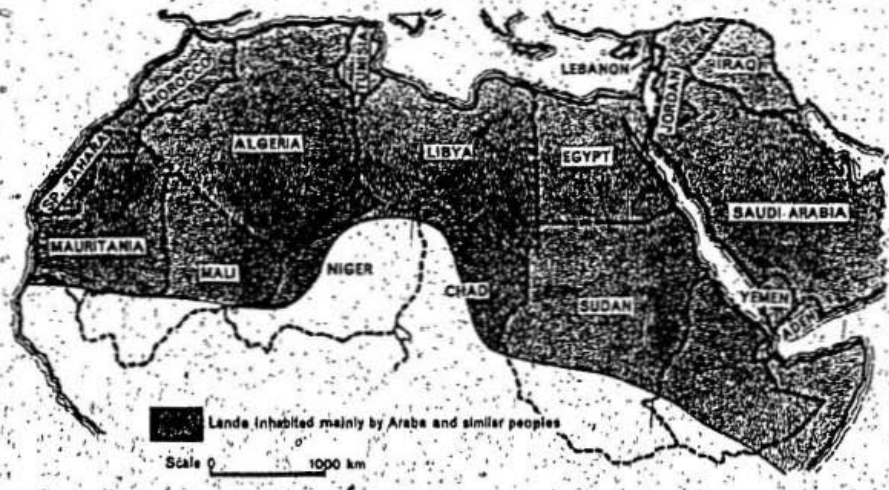
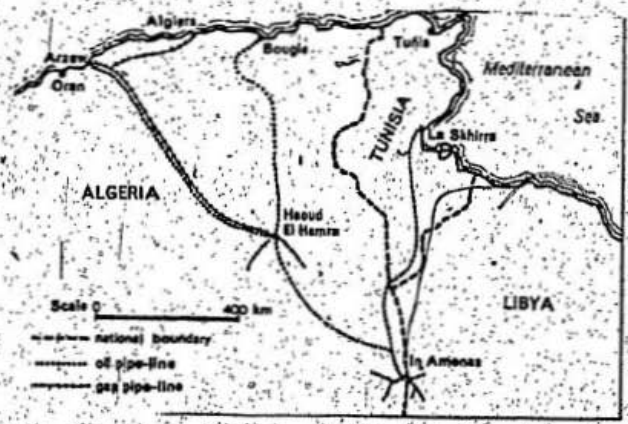


Fig 8: Arab lands of Africa

Fig 9:

Oil Pipe-lines in the Sahara Desert



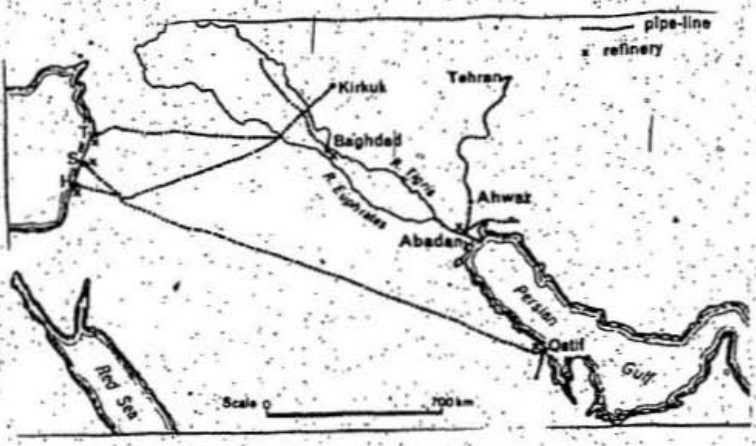


Fig 10: Oil Pipe-lines in the Middle East



Fig 11: Ice desert and tunda regions of North America

Fig 12: Air routes over the Artic

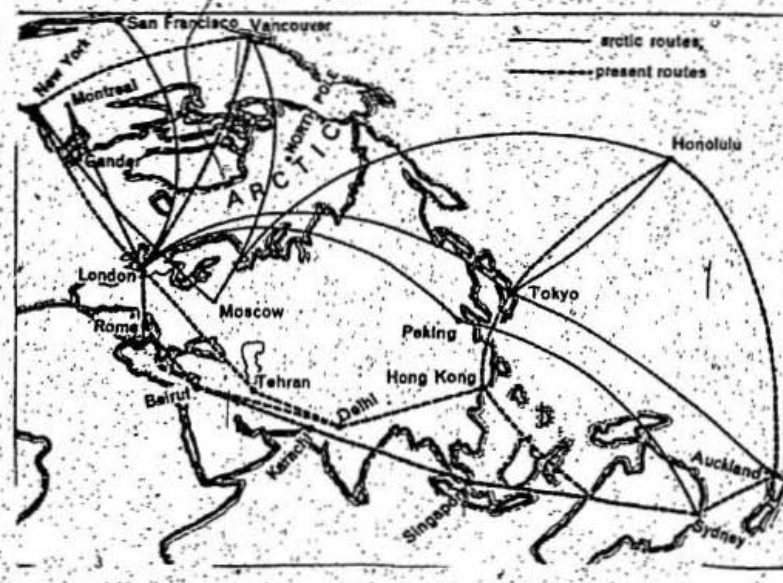




Fig 13:
A
Shadoof

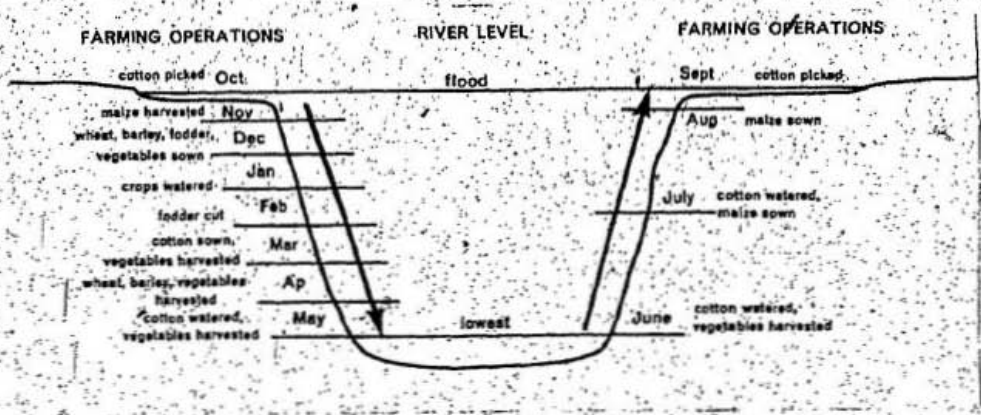
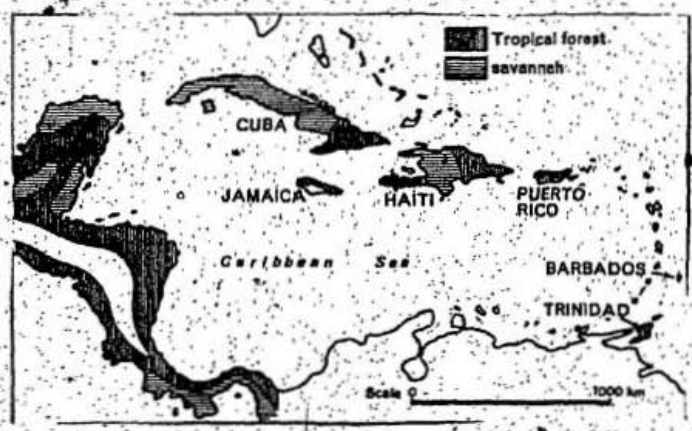


Fig 14: The rise and fall of Nile River

Fig 15:
West Indies



APPENDIX F

Readability Samples for Rewritten Unit

Sample 1

Most of the hottest deserts are not on the equator. They are between 1000 and 2000 miles from it and some are even farther away. The sun is directly overhead for part of the year in some of these deserts. Summer days are more than twelve hours long. The sun generally shines all day. These deserts are a little cooler. However, they are still as hot as it is in most parts of Canada in mid-summer.

In the tropical forests the trees and plants help to keep the air warm during the night. Often clouds keep the heat in.

Book: Rewritten content material of Unit III - Deserts and Savannahs of the World, Introducing Earth Part II by L. F. Hobley.

Page No. 1
From: Most of ....
To: .... heat in.
Date: 1975

1. Number of words in the sample	99
2. Number of sentences in the sample	9
3. Number of words not on the Dale List	2
4. Average sentence length (divide 1 by 2)	11
5. Dale Score (divide 3 by 1, multiply by 100)	2
6. Multiply average sentence length (4) by .0496	.5456
7. Multiply Dale Score (5) by .1579	.3158
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	4.4979

Analyzed by: J.K.A. Date: 2/15/75

Checked by: R.A. Date: 2/15/75

Sample 2

As the poison takes some time to kill the wounded animal, the hunter must follow it. If it dies before he reaches it, the vultures will tear it to pieces. All he will find is the bones. If the animal he kills is a large one, he lights a fire. When his family sees the smoke they come to the fire. A new camp is made where the animal was killed. The meat near the wound is cut off and thrown away and the rest is cooked and eaten. Before the meat is all eaten, it may be crawling with maggots.

Book: Rewritten content material of Unit III - Deserts and Savannahs of the World, Introducing Earth Part II by L. F. Hobley

Page No. 5
From: As the ....
To: .... with maggots.
Date: 1975

1. Number of words in the sample	101
2. Number of sentences in the sample	8
3. Number of words not on the Dale List	2
4. Average sentence length (divide 1 by 2)	12
5. Dale Score (divide 3 by 1, multiply by 100)	2
6. Multiply average sentence length (4) by .0496 ..	.5952
7. Multiply Dale Score (5) by .1579	.3158
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	4.5475

Analyzed by: J.K.A. Date: 2/15/75

Checked by: R.A. Date: 2/15/75

Sample 3

Like the pygmies and the Bushmen, they do not tame animals or grow crops. Much of Australia is desert or semi-desert. Almost everywhere there are some plants, if only bunches of dry grass. Sometimes there is a tangle of dry, thorny bushes. Sometimes the ground is covered with spinifex (see fig. 4). Far away this looks like good pasture but really it is made up of stiff, sharp pointed spikes. Yet it has no food value even for animals used to dry desert plants.

Like other hunting and food gathering tribes, the men hunt and the women look for roots, fruits and insects.

Book: Rewritten content material of Unit III - Deserts and Savannahs of the World, Introducing Earth Part II by L. F. Hobley.

Page No. 10
From: Like the ...
To: ... and insects.
Date: 1975

1. Number of words in the sample	99
2. Number of sentences in the sample	8
3. Number of words not on the Dale-Chall List	5
4. Average sentence length (divide 1 by 2)	12
5. Dale Score (divide 3 by 1, multiply by 100) ...	5
6. Multiply average sentence length (4) by .0496 ..	.5952
7. Multiply Dale Score (5) by .1579	.7895
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	5.0212

Analyzed by: J.K.A. Date: 2/15/75

Checked by: R.A. Date: 2/15/75

Sample 4

The Aborigines are great believers in magic, both good and evil. One of the most important duties of the medicine man is rain making. He does an act to make rain, which is a most valuable thing in this dry and parched land.

Less than a third of the Aborigines live their old way of life. In the early days in Australia many of them were killed in battle with the white people or had their best lands taken from them. As an old group leader said, "Once I hunt where you now live, once I fish where you now swim."

Book: Rewritten content material of Unit III - Deserts and Savannahs of the World, Introducing Earth Part II by L. F. Hobley.

Page No. 15
From: The Aborigines ...
To: .... you swim.
Date: 1975

1. Number of words in the sample	101
2. Number of sentences in the sample	6
3. Number of words not on the Dale-Chall List	2
4. Average sentence length (divide 1 by 2)	17
5. Dale Score (divide 3 by 1, multiply by 100)	2
6. Multiply average sentence length (4) by .0496 ..	.8432
7. Multiply Dale Score (5) by .1579	.3158
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	4.7955

Analyzed by: J.K.A. Date: 2/15/75

Checked by: R.A. Date: 2/15/75

Sample 5

Between the oases stretch hundreds of miles of desert. It may be hard, flat earth with small brown and yellow stones spread over the surface. It may have rolling hills of moving sand or rock covered mountainous country with deep, dry valleys and bare cliffs. In some parts there is some rain in apring and the desert is thinly covered with flowers and grass. By the summer all is dry and brown. Any pools that may have formed are dried up and their beds hard and cracked. There is little food, and cups of coffee, and a long stemmed pipe, passed from hand to hand, helps to keep away the hunger.

Book: Rewritten content material of Unit III - Deserts and Savannahs of the World, Introducing Earth Part II by L. F. Hobley.

Page No. 20

From: Between the ...

To: .... the hunger.

Date: 1975

1. Number of words in the sample	110
2. Number of sentences in the sample	7
3. Number of words not on the Dale-Chall List	2
4. Average sentence length (divide 1 by 2)	16
5. Dale Score (divide 3 by 1, multiply by 100)	2
6. Multiply average sentence length (4) by .0496 ..	.7936
7. Multiply Dale Score (5) by .1579	.3158
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	4.7459

Analyzed by: J.K.A. Date: 2/15/75

Checked by: R.A. Date: 2/15/75

Sample 6

The hot deserts do not have any plants because it is too dry for anything to grow. There are also deserts where nothing grows because it is too cold. Much of Greenland, some of the northern islands of Canada and almost all of Antarctica are covered with thick sheets of ice and hard snow. The snow that falls here never melts. The land is frozen all year round. As new snow falls, it presses on the snow beneath and slowly makes it into ice. The ice sheet may be more than 3,500 feet thick. The weight of it presses it outwards, until it stretches out into the sea.

Book: Rewritten content material of Unit III - Deserts and Savannahs of the World, Introducing Earth Part II by L. F. Hobley.

Page No. 25

From: The hot ...

To: ... the sea.

Date: 1975

1. Number of words in the sample	108
2. Number of sentences in the sample	8
3. Number of words not on the Dale-Chall List	0
4. Average sentence length (divide 1 by 2)	13
5. Dale Score (divide 3 by 1, multiply by 100)	0
6. Multiply average sentence length (4) by .0496 ..	.6448
7. Multiply Dale Score (5) by .1579	.0000
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	4.2813

Analyzed by: J.K.A. Date: 2/15/75

Checked by: R.A. Date: 2/15/75

Sample 7

The Nile River is the most important of these. It rises in the mountains far to the south, where heavy rain in spring and summer causes it to flood. As the river flows along its course, the flat land on each side is flooded in early autumn. At first men planted seeds in the mud as soon as the flood waters became lower. Only the land that was flooded, very near the river, could be used. Only the kinds of crops that grew well in the Egyptian winter, such as wheat, barley, clover, and beans could be grown.

Book: Rewritten content material of Unit III - Deserts and Savannahs of the World, Introducing Earth Part II by L. F. Hobley.

Page No. 30

From: The Nile ....

To: .... be grown.

Date: 1975

1. Number of words in the sample	98
2. Number of sentences in the sample	6
3. Number of words not on the Dale-Chall List	1
4. Average sentence length (divide 1 by 2)	15
5. Dale Score (divide 3 by 1, multiply by 100)	1
6. Multiply average sentence length (4) by .0496 ..	.7440
7. Multiply Dale Score (5) by .1579	.1579
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	4.5384

Analyzed by: J.K.A. Date: 2/15/75

Checked by: R.A. Date: 2/15/75

Sample 8

The flood waters were stopped for the first time in 1966 when 70 percent of the dam was built. The silt brought down by the flooding river was finally ended.

There are other problems. To protect the river course below the dam a number of smaller dams will be needed, costing further money. The flood waters of the Nile used to pour large amounts of organic and mineral matter into the eastern Mediterranean. This was a means of food for many fish. It now will be greatly lessened. It may be that the new High Dam will mean less fish for Mediterranean fishermen.

Book: Rewritten content material of Unit III - Deserts and Savannahs of the World, Introducing Earth Part II by L. F. Hobley.

Page No. 35
From: The flood ....
To: .... fishermen.
Date: 1975

1. Number of words in the sample	105
2. Number of sentences in the sample	8
3. Number of words not on the Dale-Chall List	4
4. Average sentence length (divide 1 by 2)	13
5. Dale Score (divide 3 by 1, multiply by 100)	4
6. Multiply average sentence length (4) by .0496 ..	.6448
7. Multiply Dale Score (5) by .1579	.6316
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	4.9129

Analyzed by: J.K.A. Date: 2/15/75

Checked by: R.A. Date: 2/15/75

Sample 9

It is too hot and dry to work. Dry scorching whirl winds stir up great clouds of dust. Then comes the first thunderstorm, and bright flowers come out as if by magic. Within a day or two the dead looking trees are covered with large bright, sweet smelling blossoms. The rain gets heavier and more falls in a day than some parts of Canada get in a month. It does not rain as long as it does in the tropical forest.

After a few months, however, the rain stops. For a time everything grows well but no more rain comes, and the dead, dusty, dry season spreads over the land again.

Book: Rewritten content material of Unit III - Deserts and Savannahs of the World, Introducing Earth Part II by L. F. Hobley.

Page No. 40

From: It is ...

To: ... land again.

Date: 1975

1. Number of words in the sample	108
2. Number of sentences in the sample	8
3. Number of words not on the Dale-Chall List	1
4. Average sentence length (divide 1 by 2)	13
5. Dale Score (divide 3 by 1, multiply by 100)	1
6. Multiply average sentence length (4) by .0496	.6448
7. Multiply Dale Score (5) by .1579	.1579
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	4.4392

Analyzed by: J.K.A. Date: 2/15/75

Checked by: R.A. Date: 2/15/75

Sample 11

When it does rain, if there are no plants to hold the water and keep the soil together, the topsoil is washed away. Bare rock is left behind. The climate itself begins to change. Plants keep the rain from sinking in or running off too quickly. They give off water slowly, and so keep the same amount of water in the air which helps to make it rain. If the rain sinks in or runs off at once, the air quickly becomes dry. There is less chance of further rain and the climate becomes drier and drier.

Book: Rewritten content material from Unit III - Deserts and Savannahs of the World, Introducing Earth Part II by L. F. Hobley.

Page No. 50
From: When it ...
To: ... and drier.
Date: 1975

1. Number of words in the sample	97
2. Number of sentences in the sample	7
3. Number of words not on the Dale-Chall List	2
4. Average sentence length (divide 1 by 2)	14
5. Dale Score (divide 3 by 1, multiply by 100)	2
6. Multiply average sentence length (4) by .0496 ..	.6944
7. Multiply Dale Score (5) by .1579	.3158
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	4.6467

Analyzed by: J.K.A. Date: 2/15/75

Checked by: R.A. Date: 2/15/75

Sample 10

As the industrial work and the number of people grew larger, steps were taken to overcome the dangers of drought and flood. A large dam was finished at Calabozo in 1957 and several other plans were finished as well. Because of this hundreds of ranches were able to raise high grade beef and dairy products. It turned poor pasture into good farmland.

On the edge of the dry grasslands, where they join the coastal forests of southeast Brazil, is the most important coffee growing place in the world. Here on the sides of the hills are huge coffee farms.

Book:- Rewritten content material of Unit III - Deserts and Savannahs of the World, Introducing Earth Part II by L. F. Hobley.

Page No. 45
From: As the ....
To: ... coffee farms.
Date: 1975

1. Number of words in the sample	99
2. Number of sentences in the sample	6
3. Number of words not on the Dale-Chall List	4
4. Average sentence length (divide 1 by 2)	16
5. Dale Score (divide 3 by 1, multiply by 100)	4
6. Multiply average sentence (4) by .0496	.7936
7. Multiply Dale Score (5) by .1579	.6316
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	5.0617

Analyzed by: J.K.A. Date: 2/15/75

Checked by: R.A. Date: 2/15/75

Sample 12

Big plans carried out by wealthier countries do not always work. After the Second World War, Britain was very short of fats. The government decided to grow large amounts of peanuts in the grasslands of Tanzania. Machinery tore up the scrub and pulled down the trees. Airplanes and spraying machines covered the land with poison to kill off the tsetse flies, which had made life so hard. Then came the hot sun. The tsetse, living in the shadows of the forest, had protected the land from man. The trees had been left to grow. They soaked up the rain and protected and held together the soil.

Book: Rewritten content material from Unit III - Deserts and Savannahs of the World, Introducing Earth Part II by L. F. Hobley

Page No. 55

From: Big plans ...

To: ... the soil.

Date: 1975

1. Number of words in the sample	106
2. Number of sentences in the sample	9
3. Number of words not on the Dale-Chall List	3
4. Average sentence length (divide 1 by 2)	12
5. Dale Score (divide 3 by 1, multiply by 100)	3
6. Multiply average sentence length (4) by .0496	.5952
7. Multiply Dale Score (5) by .1579	.4737
8. Constant	3.6365
9. Formula raw score (add 6, 7, and 8)	4.7054

Analyzed by: J.K.A. Date: 2/15/75

Checked by: R.A. Date: 2/15/75

A tabulated list of Formula raw scores for predicting readability level of the rewritten content material of Unit III- "Deserts and Savannahs of the World", from Introducing Earth Part II by L. F. Hobley.

Formula raw score for sample 1 page 1 ..... 4.4979

Formula raw score for sample 2 page 5 ..... 4.5475

Formula raw score for sample 3 page 10 ..... 5.0212

Formula raw score for sample 4 page 15 ..... 4.7955

Formula raw score for sample 5 page 20 ..... 4.7459

Formula raw score for sample 6 page 25 ..... 4.2813

Formula raw score for sample 7 page 30 ..... 4.5384

Formula raw score for sample 8 page 35 ..... 4.9129

Formula raw score for sample 9 page 40 ..... 4.4392

Formula raw score for sample 10 page 45 ..... 5.0617

Formula raw score for sample 11 page 50 ..... 4.6467

Formula raw score for sample 12 page 55 ..... 4.7054

Total Formula raw score for the 12 samples 56.1936

Average Formula raw score for rewritten material = $\frac{56.1936}{12}$

= 4.6828

A Formula raw score of 4.9 and below corresponds to the 4th grade and below on the Corrected Grade Level used with the Dale-Chall Readability Formula.

APPENDIX G

Exam for Rewritten Unit

March, 1975 Grade VIII

St. Patrick's Hall Central High School
Department of Social Studies
Second Term Examination

Geography
Part I
A

Multiple Choice: Place the letter corresponding to the correct answer in the space at the right.

1. The Buchmen live in the ( )
a) Australian desert b) Kalahari desert c) Sahara desert
d) Gobi desert

2. The early people of Australia are known as ( )
a) Bushmen b) Bedouins c) Arabs d) Aborigines

3. A spiky desert grass which contains no food value for animals is ( )
a) Spinifex b) Pans c) Savannah d) quebracho

4. A curved piece of wood used as a weapon by the Aborigines is a ( )
a) Woomera b) boomerang c) reed d) wurley

5. The native huts of the Aborigines are called ( )
a) Wurleys b) Woomera c) igloos d) tents

6. The most important river of the Arab lands is ( )
a) Tigress b) Euphrates c) Nile d) Mississippi

7. A wet fertile area in the desert supplied with underground water is called a (an) ( )
a) Oasis b) Pamperos c) Patagonia d) Piedmont

8. A mineral that has brought riches to many of the Arab people is ( )
a) gold b) silver c) oil d) iron

9. The Lowland plain of the far north where the Eskimos and the Laplanders live is called the ( )
a) tundra b) savannah c) pampa d) patagonia

10. The tiny one man skin canoes of the Eskimo is called a (an) ( )
a) Umiak b) out-rigger c) kayak d) dory

Geography
Part I
B

Fill in the blanks:

1. Another name for the mud flats into which desert streams disappear is _____
2. The chief weapon of the Aborigine group is the _____
3. The holy book of the Bedouin group is the _____
4. The name given to evil spirits by the Bedouins is _____
5. The snow houses of the Eskimo group are called _____

Part I
C

Place the letter of the correct answer in the space provided.

a. Bushmen
b. Aborigines
c. Bedouins
d. Eskimos
e. Masai

_____ A group from Kenya in East Africa that live mostly on milk, blood and meat.

_____ A group from the Sahara Desert. They herd camels, and live on sour camels' milk, dates and flat cakes of bread.

_____ A group from Greenland, Northern Canada, and Alaska. They live on the flesh of seal, whale, walrus, caribou and many kinds of fish.

_____ A group from the Kalahari Desert. They live on wild animals, roots of plants, insects, frogs, and snakes.

_____ A group from the Australian Desert. They live on wild animals, birds, and fish.

March, 1975 Grade VIII

St. Patrick's Hall Central High School
Department of Social Studies
Second Term Examination

Geography
Part II

Students were required to answer any five (5) questions.

The Bushmen:

1. a) Although food is hard to get, it is even harder to find water. Explain how the Bushmen are able to get water in the desert.

b) The chief weapon of the Bushmen is the bow and arrow. Although it is small it is skillfully made and it is very deadly. Explain how the Bushmen are able to make the bow and arrow.

The Aborigines:

2. a) When the Aborigines children are old enough to become adults they have to go through many tests. Explain one test the boys have to go through and one test the girls have to go through to become adults.

b) Many of the Aborigines have an out-rigger on their canoes. What is the purpose of an out-rigger on a canoe?

The Arabs:

3. a) Many of the Arab groups have a great fear of evil spirits. List two ways the Bedouin boys are protected from the evil spirits.

b) A mineral that has brought riches to many of the Arab desert people is oil. Explain how oil is changing the life of the Arab people.

The Eskimos:

4. a) The Eskimos are happy and cheerful and are able to enjoy life. With the coming of the white man to the Arctic, life became harder for them. List two (2) ways the white man has made life hard for the Eskimo.

b) How is the Canadian government trying to provide

better conditions for the Eskimo?

c) The seal is a very valuable animal to the Eskimo. What uses are made of seals by the Eskimos?

Man Against the Desert:

5. a) One of the first simple pieces of machinery to be used for watering the fields in Egypt was a shadoof. Explain what a shadoof is and how it works.

b) Irrigation is not all good, there are some bad points as well. List three (3) problems caused by building dams on the Nile River.

6. a) The huge ice-sheets of the far north are now being used by man to get water for industry and for irrigation. How does man melt the huge ice-sheets?

b) When the soil is washed away by water or blown away by wind, this is known as erosion. There are many things farmers can do to stop erosion. List two ways the farmers are able to stop erosion.

APPENDIX E

Pupil Achievement Scores for

First and Second Semesters

TABLE I

ACHIEVEMENT SCORES FOR GROUP X FOR SEMESTERS ONE AND TWO (PERCENTAGES)

PUPILS	SEMESTER ONE ORIGINAL MATERIAL	SEMESTER TWO ORIGINAL MATERIAL
I	63	79
II	45	60
III	45	55
IV	45	60
V	60	63
VI	35	55
VII	57	52
VIII	53	55
IX	42	53
X	61	78
XI	68	78
XII	63	67
XIII	52	60
XIV	55	61
XV	61	63
XVI	55	68
XVII	60	55
XVIII	58	70
XIX	71	83
	Mean 54.7	Mean 63.9

TABLE II

ACHIEVEMENT SCORES FOR GROUP Y FOR SEMESTERS ONE AND TWO (PERCENTAGES)

PUPILS	SEMESTER ONE ORIGINAL MATERIAL	SEMESTER TWO REWRITTEN MATERIAL
I	79	93
II	58	88
III	36	73
IV	66	88
V	--	48
VI	49	85
VII	47	82
VIII	59	79
IX	29	50
X	54	76
XI	46	82
XII	41	92
XIII	56	84
XIV	46	62
XV	56	68
XVI	24	81
XVII	28	72
	Mean 50.25	Mean 76.6

TABLE III

ACHIEVEMENT SCORES FOR GROUP Z FOR SEMESTERS ONE AND TWO. (PERCENTAGES)

PUPILS	SEMESTER ONE ORIGINAL MATERIAL	SEMESTER TWO REWRITTEN MATERIAL
I	55	59
II	90	94
III	80	77
IV	43	56
V	67	82
VI	48	76
VII	48	67
VIII	91	94
IX	53	66
X	62	74
XI	68	78
XII	69	86
XIII	43	51
	Mean 62.8	Mean 73.8

APPENDIX I

Composition and Nature of Groups used for Study

Composition and nature of groups
used for study

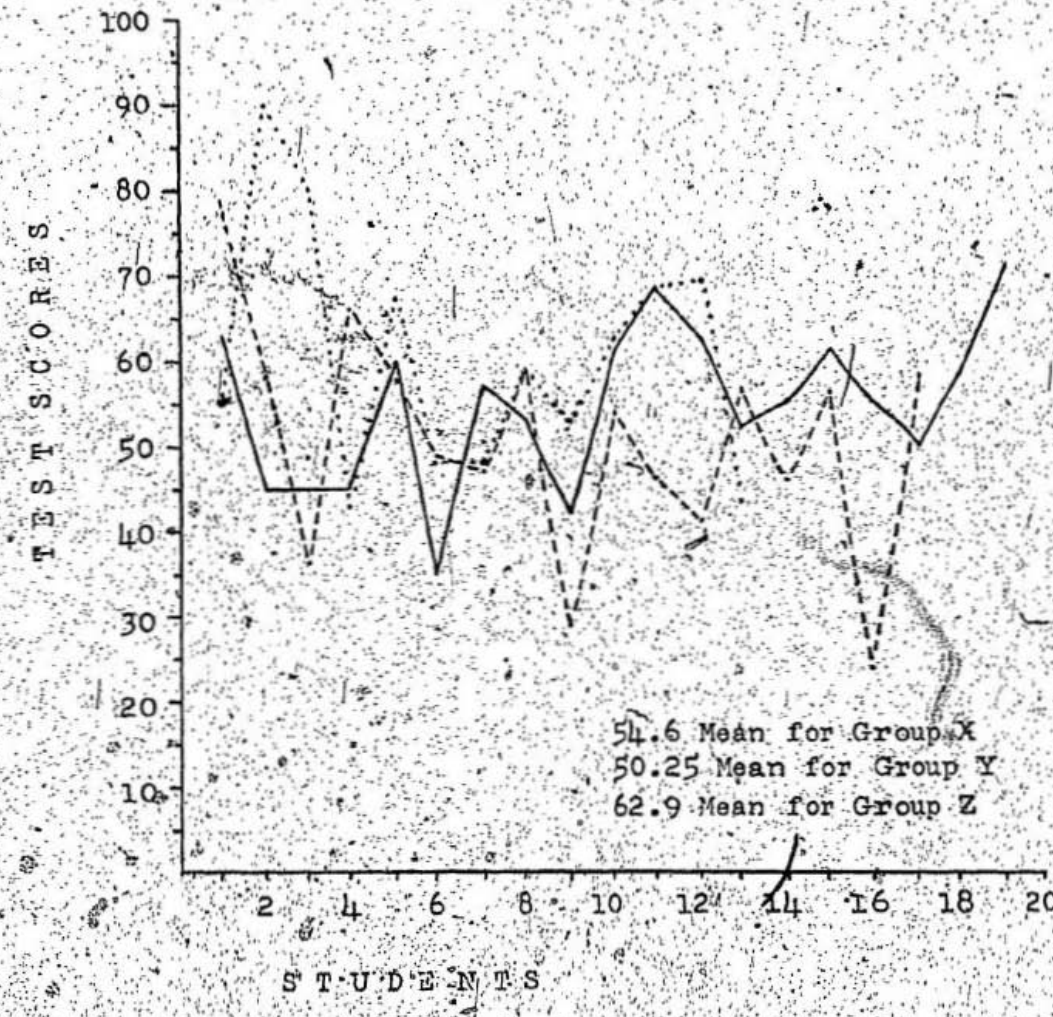
Groups	Nature of groups	Treatment
X Control group taught by intern	Mean I.Q. 94 Mean SRA Reading Record Total Score 18.0	Original Textbook Material
Y Experimental group taught by intern	Mean I.Q. 96 Mean SRA Reading Record Total Score 13.6	Rewritten Version of Textbook
Z Experimental group taught by cohort teacher	Mean I.Q. 84 Mean SRA Reading Record Total Score 6.3	Rewritten Version of Textbook

APPENDIX J

Comparison of Test Scores for First and Second Semester

FIGURE 4

A Comparison of Test Scores for all Three Groups for the First Semester

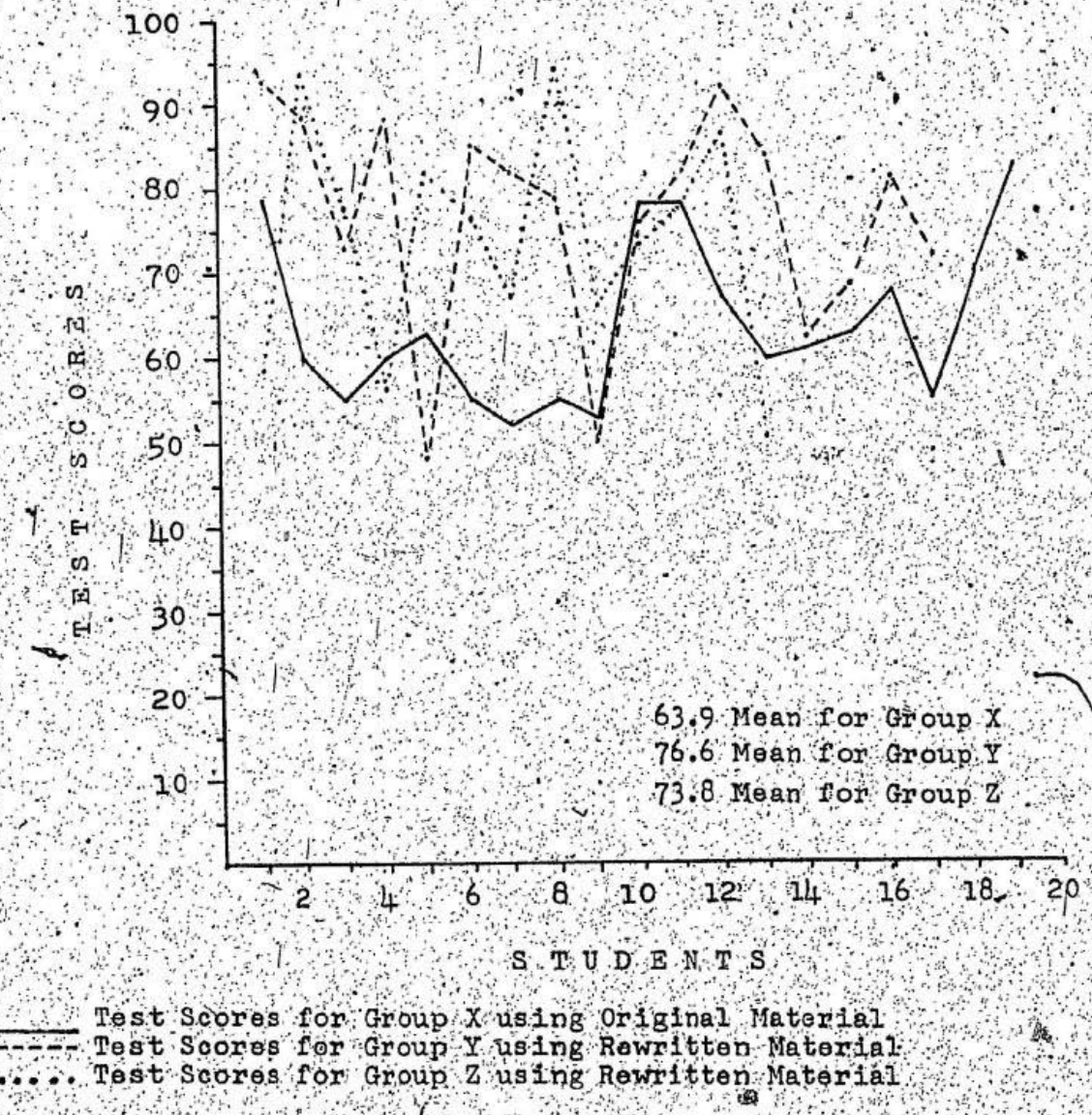


——— Test Scores for Group X using Original Material
----- Test Scores for Group Y using Original Material
..... Test Scores for Group Z using Original Material

* No Test Score for Pupil Number 5 - Group Y

FIGURE 5

A Comparison of Test Scores for all Three Groups for the Second Semester



Test Scores for Group X using Original Material
----- Test Scores for Group Y using Rewritten Material
..... Test Scores for Group Z using Rewritten Material