THE EFFECT OF THEORETICAL AND SITUATIONALKNOWLEDGE OF READING ON TEACHERS'ESTIMATES OF READABILITY
by
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ABSTRACT<br>THE EFFECT OF THEORETICAL AND SITUATIONAL KNOWLEDGE OF READING ON TEACHERS' ESTIMATES OF READABILITY

This stüdy sought to determine:

1. To what extent teachers who possess theoretical and situational knowledge of elementary reading instruction are accurate in estimating the readability levels of materials.
2. To what extent teachers who possess theoretical and situational knowledge of elementary reading instruction are more accurate in estimating the readability levels of materials than
a) in-service teachers who possess only situational knowledge of reading from teaching experience?
b) pre-service teachers who possess only theoretical knowledge of elementary reading instruction?
c) pre-service teachers who possess neither theoretical knowledge of elementary reading instruction nor situational knowledge of reading from teaching experience?

Data were collected from 72 subjects who were enrolled in undergraduate classes in the Faculty of Education at The University of British Columbia and who were categorized, in groups of 18 , with respect to pre-service or in-service preparation in elementary reading instruction as well as
classroom teaching experience at this level.
The results indicated that teachers who possessed theoretical and situational knowledge of reading were not more accurate than other teachers in estimating the readability levels of the selected passages, and that the accuracy with which teachers in all groups, estimated the readability levels of passages decreased as the readability levels of the passages increased.

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## CHAPTER ONE

## THE NATURE OF THE PROBLEM

## INTRODUCTION

Teachers make instructional decisions at various stages during an academic year. Farr and Brown (1971); Meyers (1970); Palardy (1955); Shavelson (1976); and Taylor (1970) have discussed the importance of decision making in educational settings and express the view that teachers': decisions may significantly influence outcomes such as students' achievement and affective growth.

Other educators have attempted to identify factors that affect decision making. Greenwood et al. (1971) advance the premise that teachers typically make decisions on the basis of personal beliefs. Broudy (1972) and Merrill (1968) consider theory to be important in decision making. They claim that the utilization of theoretical knowledge, by teachers, increases the effectiveness of their decisions. MacDonald (1970) also discusses decision making in education. He equates professional decision making - decisions made by persons in various professions - with rational decision making and states that this emerges from the utilization of theoretical and situational knowledge.

Decision making is an essential part of teachers' jobs. The frequency with which instructional decisions are made suggests that teachers' skills in decision making develop partly from the kinds of experiences and feedback that are available in their practical setting. Moreover, the claim that decision making is enhanced by the use of theoretical knowledge leads to the expectation that teachers who possess such knowledge, in addition to their practical experiences, ought to make rational decisions.

## THE PROBLEM

In the implementing of curricular goals, teachers select from among a variety of commercially developed reading materials. The selection of materials for reading instruction is one of the curriculum planning tasks that involves decision making. Some educators consider this task to be difficult and have recommended guidelines to assist teachers in the evaluation of reading materials (Bell, 1976; Clark-Jones and Parks, 1976; Mac Intyre and Nelson, 1969; and Sabol, 1970). Evaluation of materials represents one aspect of the selection process. Another important aspect is the estimating of the readability levels of materials.

Teachers' estimates of the readability of materials that may be selected for instructional use are necessary for the following reasons:

1) Individual differences in levels of pupil achievement are usually present in every class of students. It is therefore necessary for teachers to select also, reading materials that are appropriate to the levels of those students who are reading above or below the class level (grade level).
2) Readability levels are not indicated on some reading materials that may be suitable for instructional use, and
3) Research findings indicate that some publishers' materials may be too difficult for the students for whom they were intended (Arnsdorf, 1962; Cramer and Dorsey, 1969; Feinberg et al., 1973; Miller, 1962; Mills and Richardson, 1963 ; and Smith, 1962).

These reasons suggest that teachers ought to make accurate estimates of readability levels of materials to ensure that materials that are selected are appropriate to students: levels of reading achievement and would not frustrate students' learning by imposing barriers to understanding (Harker, 1977).

Klare (1974) states that teachers have long been making subjective estimates of readability with skill developed largely from experience and feedback from readers. Theoretical knowledge from behavioral sciences such as psychology of reading and linguistics, that concerns factors that are associated with the difficulty levels of reading materials, is also important for making accurate subjective estimates of readability. The relative effect of theoretical knowledge of reading on the accuracy of experienced.. teachers' subjective estimates of readability has been ignored in previous research. This study was
undertaken to investigate the effect of theoretical and situational knowledge of reading on teachers' subjective estimates of readability.

## PURPOSE OF THE STUDY

The purpose of the study was to investigate the extent to which theoretical and situational knowledge of reading contributes to the accuracy of teachers' estimates of the reading levels of selected prose passages. The following research questions were investigated.

1) To what extent teachers who posses theoretical and situational knowledge of elementary reading instruction are accurate in estimating the readability levels of materials?
2) To what extent teachers who possess theoretical and situational knowledge of elementary reading instruction are more accurate in estimating the readability levels of materials than
a) inservice teachers who possess only situational knowledge of reading from teaching experience?
b) pre-service teachers who possess only theoretical knowledge of elementary reading instruction?
c) pre-service teachers who possess neither theoretical knowledge of elementary reading instruction nor situational knowledge of reading from teaching experience?

It was assumed that teachers would accurately judge matters which they properly understand. Such understanding may develop from theoretical knowledge and from practical experience. The first research question investigates the accuracy with which teachers in elementary schools who
possess theoretical knowledge from university level reading courses and who have practical experience from matching students with materials, make subjective estimates of readability.

The second research question seeks to determine whether teachers who possess situational knowledge of reading from matching students with reading materials but who have not taken university level courses in elementary reading; pre-service teachers who have taken university level courses in elementary reading, as well as those who have not taken such courses are as accurate in making subjective estimates of the readability levels of materials, as those teachers who possess theoretical and situational knowledge of elementary reading.

Data from the study may provide definite answers to the research questions and may have implications for preservice and in-service teacher preparation in elementary reading.

## LIMITATIONS OF THE STUDY

The limitations of this study are the following:

1) The sample of subjects that was used consisted only of teachers who were taking pre-service or in-service teacher training at The University of British Columbia.
2) The subjects were selected from intact university classes.

For the purpose of this study the following terms are defined.

1) Accurate estimates of readability refers to teachers' subjective estimates, of the readability levels of materials, which are the same as or which are not statistically, significantly different from the actual readability levels of the materials.
2) Situational knowledge of reading is used in this study to refer to knowledge that is acquired from evaluating and matching students with reading materials.
3) Theoretical knowledge of reading refers to knowledge of reading that is acquired from university level courses in elementary reading instruction.
4) Readability level is defined as the grade level at which material may be read by children of average reading ability, with at least 95\% word recognition and at least 75\% comprehension (Betts, 1946).

OVERVIEW OF STUDY
The general procedures followed in this investigation were (1) a review of literature, (2) selection of subjects, (3) construction of an instrument,
(4) collection of data, and (5) analysis of data. A brief discussion of each step is presented in this section.

Review of Literature.
The literature was reviewed to (1) determine what has been done in previous studies in which subjects estimated the reading levels of materials and, (2) determine what needs to be done.

Reviews of studies in which librarians and teachers' estimates of the readability of books were investigated, are followed by reviews of studies that investigated teachers' estimates of the readability of selected passages. Selection of Subjects

In order to collect data to answer the research questions, four groups of subjects whose status differed in teaching experience and in theoretical knowledge of reading were selected. These subjects were enrolled in the Faculty of Education at The University of British Columbia and were taking in-service or pre-service teacher training.

Instrumentation
The instruments that were used in the study were a questionnaire, a rating scale and reading passages. The questionnaire was designed to collect biographical information on each subject.

The rating scale was used by the subjects to indicate their estimates of the readability levels of the passages. It ranged from one to ten with an interval of ten grade points between each grade level. The scale was accompanied by instructions for its usage and for estimating the grade levels of the reading passages.

The reading passages were selected from the Diagnostic Reading Scales: Revised Edition. The reading levels of the passages ranged from grade 1.6 to grade 7.5. The rating scale, mentioned above, was reproduced below each
passage.

## Collection of Data

The instruments were administered by the investigator to each group of subjects during the final half hour of their class period. Each subject completed the questionnaire and used the rating scale that was provided for each passage to indicate an estimate of the grade level of the passage on the basis of the instructions that were given. All data were collected within one week.

## Analysis of Data

Deviation scores for each passage were obtained by calculating the difference between each estimate and the actual grade level of a passage. Deviation scores were used for calculating the mean estimate for each passage for each group. In order to determine whether the results were statistically significant the following tests were performed:

1) The analysis of variance for a two-factor experiment with repeated measures on one factor. The test was performed by the U.B.C. BMD 08V Computer Programme.
2) Simple correlations. The U.B.C. Simcort Computer Programme calculated the correlations among the estimates for all passages, and
3) Linear and non-linear tests for trend were performed on the mean estimate for each passage.

SUMMARY
The present chapter has presented a statement of the problem which is to determine the effect of theoretical and
situational knowledge of reading on teachers' subjective estimates of the grade levels of reading materials. The need for the study, its limitations and a brief description of procedures that were followed, were also presented.

## ORDER OF PRESENTATION

The content and organization of the chapters in this study are as follows:

Chapter One presents the problem, the need for the study, the limits of the study, and an overview of the general procedures.

Chapter Two deals with the related literature including research on librarians' judgements of reading materials.

Chapter Three provides a detailed description of the method and includes the characteristics of the subjects, the construction of the instrument, the collection and the analysis of data.

Chapter Four contains a report on the results of the statistical analyses that were performed on the data.

Chapter Five concerns the findings, conclusions, practical implications and implications for future research.

Appendix A presents all items on the questionnaire.
Appendix $B$ contains the passages that were used for collecting data for the study.

Appendix $C$ contains the rating scale and instructions for its usage and for estimating the reading levels of the passages.

## CHAPTER TWO

## REVIEW OF RELATED LITERATURE

The curriculum planning task of matching students with materials involves the estimating of the grade levels of reading materials. Teachers frequently make subjective estimates of such materials. The extent to which their estimates are accurate has been investigated by researchers who have compared teachers' estimates and objective measurements of reading materials.

The present chapter presents a review of research deäling with (1) librarians' and teachers' estimates of the readability of selected books, and. (2) teachers' estimates of the difficulty of curricular material and selected passages.

## LIBRARIANS' AND TEACHERS' ESTIMATES OF BOOKS

In this section, reviews of studies in which teachers' estimates of readability were compared with objective measurements from cloze tests and readability formulas are presented. The review of literature indicates that the cloze procedure provides valid measures of reading comprehension (Taylor, 1953) and that cloze scores and multiple
choice comprehension test scores for the same reading material correlate highly (Bormuth, 1968).

Two of the factors on which readability formulas are based correlate highly with the difficulty of reading materials. Chall (1958) and Lorge (1949) claim that vocabulary load is the best single element for the prediction of any aspect of expressional difficulty. The other factor that correlates highly with reading difficulty is sentence length (Glazer, 1974; Harris, 1974; MacGinitie and Tretiak, 1971). Additional support for both factors as valid measures of the difficulty of reading materials is provided by Coke (1973) who reported that they are reasonably good predictors of comprehensibility.

In 1951, Russell and Merrill compared estimates of the readability of 60 books, that were made by librarians and by readability formulas. They sent the titles of the books to children's librarians who were working in ten different states and who were requested to state the best grade level to which each book was suited. The estimates made by 63 librarians were compared with estimates of readability made by the Dale-Chall, Flesch, Lewerenz, Lorge, Winnetka and the Yoakam formulas.

The results indicated that, in general, children's librarians did not agree closely with one another in their estimates of the readability of the books, but that their combined ratings closely approximate the results of the combined readability formulas.

Findings similar to the above were reported by Jongsma (1972) who investigated the degree of correspondence between estimates of the readability of twelve books by 53 children's librarians and by the Dale-Chall, Flesch, Fry, Gunning and McLoughlin formulas; and Russell and Fea (1951) who used data from the Russell and Merrill (1951a) study.

Russell and Fea compared the librarians' estimates on twelve of the 60 books on which they agreed mostly closely with objective estimates, for the twelve books, by the Dale-Chall, Flesch, Lewerenz, Lorge, WashburneMorphett, and Yoakam formulas.

In 1954, Wood undertook a similar study in which the Dale-Chall and Yoakam formulas were used. His purpose was to determine the extent of agreement or disagreement between the estimates of the readability of twelve intermediate grade textbooks that were made by 32 experienced teachers who were using the books, and estimates made by the two formulas. Wood observed a moderate agreement between the teachers' and formula estimates and reported that teaching experience seemed to have no significant effect on the number of books that was chosen by the teachers as satisfactory.

The validity of the findings from the above studies is questionable. The subjects were asked to estimate the difficulty of books with which they were familiar and for which they had probably acquired much information from
feedback from readers. It is not clear from the procedures that were used, the extent to which the librarians' and teachers' estimates were biased by feedback from readers or whether the estimates were independent of such information.

Whereas the subjects' familiarity with books that were selected in the preceding studies appear to be a limitation, in Boyce' (1974) study, it was part of the experimental design. Boyce compared teachers' estimates of the readability of books with scores that were obtained by students on cloze tests.

The subjects were experienced teachers who were asked to select materials that were suitable for the independent reading level of groups of grade six students. The results indicated that the material that was selected was directed more to the mean of the groups rather than for the groups as a whole.

In this study, teaching experience and principals' ratings of the teachers were the main teacher characteristics that were considered in the selection of the subjects. The lack of a significant relationship between teaching experience and accurate estimates may have been due mainly to the fact that only four teachers were selected.

Boyce's finding was partly supported by Pikulski and Pikulski (1977) who also investigated the accuracy of teachers' estimates of students' reading level. The
subjects were experienced teachers who placed 127 grade fivie children into homogenous reading groups, based on the teachers' estimates of the students' ability to read the grade five basal reader at the independent, instructional or frustration level. Half of the subjects received a cloze test and the other half received a maze test which were constructed from a passage in their basal reader.

The results revealed much variability in students' scores and a moderate agreement of 67 per cent between cloze scores and teachers' estimates of students' reading ability. The limitations in the study concern the sample and the reading material. The investigators used only one reading passage; and a small sample of seven teachers.

TEACHERS' ESTIMATES OF CURRICULAR MATERIAL AND READING PASSAGES

The findings from studies in which teachers judged the difficulty of test items and reading passages are inconclusive. In 1930, Smith compared the estimates of difficulty of test items made by teachers and by experts in test construction. His purpose was to determine whether experienced teachers were accurate in their judgments. The subjects were 125 experienced teachers who were teaching grades 3-9, 125 pre-service teachers,
and 29 experts in test construction. Each subject estimated the difficulty of items from a subject area that was chosen by the subject.

The results indicated that the experienced teachers were better able to judge the difficulty of the items; and that their judgments for arithmetic, word meaning, history and geography test items were significantly higher than judgments made by the inexperienced teachers and reading experts. Teachers in Smith's study were not asked to indicate grade levels at which the items may be appropriate but used a ten point scale to arrange the item in order of difficulty.

The importance of situational knowledge in estimating reading difficulty is also indicated by Dale and Chall (1948). They compared the subjective estimates of reading difficulty of expert teachers in social studies on 78 passages of foreign affairs from current-events magazines, government pamphlets, and newspapers with estimates for the passages from their readability formula. They reported a correlation co-efficient of .90 between the formula and teachers' estimates but neglected to indicate the number of teachers that was used in the study, and the procedures that were used in selecting the teachers and for collecting the data.

The high relationship between teaching experience and accuracy in estimating readability that was reported in the above studies, was not obtained by Herrington and

Mallinson (1958). The purpose of their study was to determine whether measurements made with readability formulas were more accurate than estimates of readability made by reading experts.

The researchers asked superintendents of 100 large public school systems to recommend the most qualified person on their staff in the field of reading to assist in the study. Each subject received an instrument that was made up of a sheet with instructions and 21 science passages that were approximately 100 words in length. The estimates made by the experts were compared with measurements of the passages from the Dale-Chall, Flesch and Lorge formulas.

The results indicated a great difference between the readability formulas and reading experts' judgments; and that the reading experts were less consistent in their estimates. The limitations in the study concern the material and the subjects. The qualifications of the reading experts, their teaching experience, and the criteria on which the superintendents based their selections were not mentioned.

The other limitations concerns the exclusive use of science material. Powers, Sumner and Kearl (1958) state that differences in estimates that are observed whenever readability formulas are used, may result whenever the nature of the material on which the formulas are to be used differs from that of the material used in computing
the formula. The use of science material may have been mainly responsible for the lack of significant agreement between the reading experts and the formulas; and for the finding that the accuracy with which experts estimated the materials decreased as the difficulty of the materials increased.

Jorgenson (1975) investigated the accuracy of experienced teachers estimates of the readability levels of selected passages. He used a cross-section of teachers who were teaching different grades in elementary schools in urban and sub-urban districts. Each subject received a sheet with instructions, and six reading passages that were selected from the Informal Reading Inventory that accompanies the Betts Basic Readers.

The results showed much variability in the subjects' estimates of the readability of the passages. Jorgenson reported that the more experienced teachers tended to make more accurate estimates of the reading levels of the passages than the less experienced teachers; but that the accuracy with which the subjects estimated the readability levels of the passages decreased as the readability levels of the materials increased.

The subjects in the study were not randomly selected but were selected intact by administrators in two school districts who were in charge of elementary curriculum and who were asked by Jorgenson to recommend "typical" schools in the districts. Jorgenson neglected to investigate the
relative contribution of factors, other than teaching experience, on the accuracy of teachers' estimates of readability and to provide an adequate description of the educational characteristics of the subjects. The instructions that were given to the subjects, for estimating the readability of the paragraphs were too general. Materials may be suitable for students' independent, instructional and frustration reading levels. Jorgenson neglected to instruct the subjects to estimate the readability of the materials in accordance with the criteria for word recognition and for comprehension that were used in determining the readability levels of the paragraphs.

In the analysis of the data deviation scores were not used to determine whether there were statistically significant differences among the teachers' estimates of readability. Instead, the analysis of variance was calculated on the mean estimate of the subjects' responses to each passage.

SUMMARY
The findings from studies that were reviewed indicate much variability in teachers' and librarians' estimates of readability. Experienced teachers or reading experts were used but the findings of the effect of experience on the accuracy of estimates of readability are inconclusive. The differences that were reported on
the effect of teaching experience seem to be influenced by the nature of the task. Teaching experience did not have any significant effect on teachers' estimates of books that they were using but was related to more accurate estimates in some studies in which reading passages were used.

The finding that the accuracy in teachers' estimates of the grade levels of reading passages decreased as the difficulty of the passages increased is consistent. In all studies the researchers neglected to provide an adequate description of the teachers and to investigate the effect of factors other than experience, on the making of accurate estimates of readability.

The review of literature indicates that studies on the effect of theoretical and situational knowledge of reading on the making of accurate estimates of the grade levels of reading materials, have not been undertaken.

CHAPTER THREE

## METHOD

This study was concerned with the extent to which theoretical and situational knowledge of reading influence the accuracy of teachers' estimates of the reading levels of selected prose passages. In order to answer the research questions that. were formulated, it was necessary to (1) select groups of subjects, (2) construct instruments, (3) collect data, and (4) analyze the data. In this chapter, a detailed description of each of the procedures is presented.

## THE SUBJECTS

The 72 subjects in the study were selected from undergraduate classes in the Faculty of Education at The University of British Columbia. For the investigative purposes of the study, subjects were categorized with respect to pre-service or in-service preparation in elementary reading instruction as well as classroom teaching experience at this level. Table 1 illustrates this partitioning and the number of subjects in each group. The relevant biographical data for the subjects in the

TABLE 1

## ALLOCATION OF SUBJECTS TO EXPERIMENTAL CONDITIONS BACKGROUND

Teaching
Education

|  | Reading | No Reading |
| :--- | :---: | :---: |
| Teaching Experience | 18 | 18 |
| No Teaching Experience | 18 | 18 |

TABLE 2
BIOGRAPHICAL CHARACTERISTICS OF SUBJECTS

| Groups | $$ | Range of years of teaching experience | Average No. of years of teaching experience | Average No. of reading courses presently taking |
| :---: | :---: | :---: | :---: | :---: |
| 1 | $0 \quad 18$ | 2-25 | 6.38 | 1 |
| 2 | 315 | 2-26 | 9.35 | 1 |
| 3 | 216 | 0 | 0 | 0 |
| 4 | 513 | 0 | 0 | 0 |

study are given in Table 2.
Table 3 contains reading courses that subjects had taken or were taking at the time this study was conducted.

## TABLE 3

READING COURSES

| Course Number | Title and Brief Description |
| :---: | :--- |
| Educ. 305 | Curriculum and Instruction in De- <br> velopmental Reading in the Ele- <br> mentary School. <br> (The reading process and the teach- <br> ing of basic reading skills from <br> beginning stages through the <br> elementary school). |
| Educ. 476 | Remedial Reading. <br> (Individual diagnosis and treatment <br> of severe reading difficulties. <br> Intensive laboratory practicum. <br> Prerequisite: Educ. 305 and at <br> least one school year of teaching <br> experience). |
| Educ. 473a. | Materials of Reading Instruction. <br> (Analysis and evaluation of materials <br> for reading instruction. Pre- <br> requisite: Educ. 305). |

## Note:

Course description is enclosed in parentheses.
$\mathrm{a}_{\text {Fewer }}$ than 5 subjects in groups 1 and 3 took this course.

Group 1 consisted of in-service teachers who were selected from Education 476. These teachers had completed Education 305. Eight teachers in this group had taught in the Primary and Intermediate Divisions. Seven had taught in one division only; and three had taught exclusively as Special Education teachers.

Subjects in Group 2 were in-service teachers who were teaching in elementary schools and who were selected from Education 305 during their first week of attendance at that course. Three subjects in this group had taught in the Primary and Intermediate Divisions. Thirteen had taught in one division only and two subjects had taught exclusively in Learning Assistance Centres.

The pre-service, inexperienced teachers in Group 3 and and 4 were undergraduates who were enrolled in teacher training programmes. Subjects in Group 3 were being trained for teaching service in the Primary Division. A table of random numbers was used to select 18 subjects fro Group 3 from a class of 35 students who had completed Education 305.

Subjects in Group 4 had not taken any reading courses at university level. A table of random numbers was used to select subjects for this group from two classes of subjects who were being trained for teaching service in the Intermediate Division of Elementary Schools.

## INSTRUMENTATION

The subjects in the study were asked to estimate the grade level at which selected prose passages would be suitable for instructing children of average reading ability. The tasks.which were to be performed by the subjects necessitated the utilization of professionally developed reading materials; and the development of a questionnaire and a rating scale.

The purpose of the questionnaire which is reproduced in Appendix $A$, was to collect information on background variables including teaching status, teaching experience, and on reading courses that subjects had taken or were taking at the time this study was conducted.

The passages that comprise the reading instrument were selected from the Diagnostic Reading Scales: Revised Edition. The passages and their respective grade levels are presented in Appendix B. The test manual for the Diagnostic Reading Scales states that the Spache readability formula, groups of subjects and teachers' judgments were used in determining the grade levels of passages for the primary grades. The Dale-Chall readability formula and groups of students were used in establishing the grade levels of passages for the intermediate grades.

Both readability formulas have been used extensively for estimating the difficulty of reading materials.

Klare (1963) states that the Dale-Chall formula is the most accurate formula and that it is consistently more accurate than others in comparison. Powers, Summer and Kearl (1958) recommended that the Dale-Chall formula be used wherever possible on account of it's small margin of error and high prediction power.

The published technical data for the Diagnostic Reading Scales: Revised Edition indicate that a testretest reliability co-efficient of .84 was obtained for passages at the instructional level. Concurrent validity co-efficients of .63 to .92 were-obtained for passaces between arades 2 and 6 on the Diagnostic Reading Scales: Revised Edition and the California Reading Test. Arrangement of Passages

The grades $1 \mathrm{~A}, 1 \mathrm{~B}$ and 2 B passages were selected intact. They were retyped, using single line spacing and were rearranged as continuous prose. Segments of approximately 110 words were selected from the $3 \dot{A}, 3 B, 4 A$, 4B, 5A, 6A, 6B and 7A passages. This upper limit was chosen mainly on the basis of the claim that the DaleChall and Spache formulas, as well as other formulas that use counts of vocabulary and sentence length, can predict the reading level of a passage that contains a minimum of 100 words.

A table of random numbers was used to arrange the passages into the order in which they were presented to all subjects.

Data from all the A passages were used for calculating the analysis of variance. The reliability of the instrument was computed from data from all $A$ and $B$ passages at the same grade level.

A rating scale was constructed for subjects to record their estimates of the grade levels of the reading passages. The scale ranged from one to ten. Between each (grade) level were ten grade points. The scale was reproduced below each reading passage and was accompanied by instructions for it's usage (Appendix C); and for grading each passage. A part of the instructions was designed to limit comparisons, by subjects, among the various passages.

## COLLECTION OF DATA

Permission to collect data in classes that were attended by the subjects was obtained from the instructor for each class. The investigator visited each class, briefly introduced himself, explained the purpose of the study and the tasks to be performed by each subject.

Attempts were made to ensure that the instructions for grading the passages and for using the rating scale were clearly understood. The investigator explained each item on the questionnaire; the meaning of the grade points on the rating scale; and demonstrated how the scale may be used to record an estimate. The instruments were distributed to the subjects who completed the
questionnaire and estimated the grade level of each passage.

## PREPARATION OF DATA

All data were collected by the investigator within a period of one week. Personal data and subjects estimates of the reading levels of the passages were coded on sheets before being recorded on IBM data cards. The difference between each observed estimate and the actual grade level of the passage was calculated in preparation for computer processing.

## ANALYSIS OF DATA

The statistical technique that was used to determine whether there was any significant difference among the mean deviation score for each task, by the four groups, was the analysis of variance for a two factor experiment in which there are repeated measures on one factor. The repeated measures design is appropriate for analyzing the data as the same groups of subjects were observed under each of the levels of treatment. The procedures for this statistical design are outlined by Winer (1962).

The analysis of variance was performed specifically on subjects responses to $1 A, 2 A, 3 A, 4 A, 5 A, 6 A$ and $7 A$ passages. The deviation scores, the difference between the observed score and the actual grade level of a passage
were analyzed using the BMD 08V programme available at The University of British Columbia computing centre.

The grand mean for each of the above mentioned passages was used to determine whether linear and nonlinear tests for trend were significant. The computational procedures for these tests are described by Winer (1962a). Subjects responses for the corresponding 1A, 1B, 3A, 3B, 4A, 4B, 6A and 6B passages were analyzed using the Simcort programme which is also available at The University of British Columbia computing centre. This programme was used to obtain simple correlations for the purpose of determining the reliability of the subjects' estimates for reading passages at the same readability level.

## SUMMARY

This chapter has presented a description of the educational and experiential background of the four groups of subjects, the instruments and the procedures that were used to collect and to analyze the data. The instruments that were used were a questionnaire which was designed to collect biographical data on the subjects; reading passages which were chosen from the Diagnostic Reading Scales: Revised Edition and which were administered to each group of subjects; and a rating scale with instructions for its usage. The data that were collected
for specific passages were analyzed using the analysis of variance for a two factor repeated measures design to determine whether significant differences existed among the four groups; and whether a significant linear or non-linear trend was indicated. The data from all passages that were at the same grade level were analyzed to determine the reliability of the reading instrument. The results from these statistical analyses are reported in chapter four.

## CHAPTER FOUR

## THE RESULTS

The purpose of this chapter is to describe the methods that were used in the analyses of the data and to present the results. The study sought to determine:

1. To what extent teachers who possess theoretical and situational knowledge of elementary reading instruction are accurate in estimating the readability levels of materials.
2. To what extent teachers who possess theoretical and situational knowledge of elementary reading instruction are more accurate in estimating the readability levels of materials than
a. in-service teachers who possess only situational knowledge of reading from teaching experience?
b. pre-service teachers who possess only theoretical knowledge of elementary reading instruction?
c. pre-service teachers who possess neither theoretical knowledge of elementary reading instruction nor situational knowledge of reading from teaching experience?

The data that were collected for each subject in each of the four groups were punched on separate IBM cards in preparation for processing by computer. Deviation scores the difference between subjects' grade estimates and the actual grade level - for passages were calculated. Deviation scores were used in calculating group means, which
are presented in Table 4 , for specific passages. The results, show differences among group estimates of the grade levels of passages at primary and intermediate levels.

TABLE 4
THE MEAN DEVIATION SCORE FOR EACH PASSAGE

|  | PAS SAGES |  |  |  |  |  |  |
| :---: | :---: | :---: | ---: | ---: | :---: | :---: | :---: |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | .427 | .438 | .672 | 1.133 | 1.350 | 1.600 | 1.677 |
| 2 | .366 | .427 | .811 | 1.044 | 1.244 | 1.405 | 1.300 |
| 3 | .494 | .638 | .694 | .861 | 1.133 | 1.316 | 1.661 |
| 4 | .533 | .600 | .972 | .772 | 1.083 | 1.272 | 1.133 |

The analysis of variance for a two factor experiment with repeated measures on one factor was performed to determine whether significant differences existed among the groups in the accuracy of their judgements of materials at various readability levels. The results of the analysis of variance are summarized in Table 5. They show no significant differences among the group means $(\mathrm{F}=0.42, \mathrm{~d} f=3 / 68, \mathrm{p}>.05)$.

## SUMMARY TABLE OF THE ANALYSIS OF VARIANCE

| Source of Variation | df | Mean Square | F |
| :---: | :---: | :---: | :---: |
| Between Subjects | 71 |  |  |
| Groups | 3 | . 4057 . | <1 |
| Subjects within groups | 68 | . 9578 |  |
| Within subjects | 432 |  |  |
| Tasks | 6 | 11.478 | 26.38* |
| Groups x Tasks | 18 | . 4475 | 1.03 |
| Tasks x Subjects within groups | 408 | . 4351 |  |

[^0]The interaction (groups x tasks) was also not significant ( $F=1.03$, $\mathrm{df}=18 / 408, \mathrm{p}>.05$ ) but a significant main effect for tasks was obtained ( $F=26.38$, $d f=6 / 408, p<.01)$ indicating much variability in subjects' responses across tasks. The range of the variability in the subjects' responses is observed in Tables $6,7,8$ and 9 which are the frequency distributions of the groups' estimates of the readability levels of the passages.

The subjects' estimates of readability for passages at the primary level were more accurate than were their estimates of readability for passages at the intermediate

## TABLE 6

## A FREQUENCY DISTRIBUTION OF THE READABILITY ESTIMATES

 OF EACH PASSAGE FOR GROUP ONE| Passages | Observed Estimate of Reading Level of Passage |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Readability Level | $\begin{aligned} & 1.0- \\ & 1.4 \end{aligned}$ | $\begin{array}{l\|} \hline 1.5- \\ 1.9 \end{array}$ | $\begin{array}{l\|} \hline 2.0- \\ 2.4 \end{array}$ | $\begin{array}{l\|} 2.5- \\ 2.9 \end{array}$ | $\begin{array}{\|l\|} \hline 3.0- \\ 3.4 \end{array}$ | $\begin{array}{l\|} \hline 3.5- \\ 3.9 \end{array}$ | $\begin{aligned} & 4.0- \\ & 4.4 \end{aligned}$ | $\begin{aligned} & 4.5- \\ & 4.9 \end{aligned}$ | $\begin{aligned} & 5.0- \\ & 5.4 \end{aligned}$ | $\begin{aligned} & 5.5- \\ & 5.9 \end{aligned}$ | $\begin{aligned} & 6.0- \\ & 6.4 \end{aligned}$ | $\begin{aligned} & 6.5- \\ & 6.9 \end{aligned}$ | $\begin{aligned} & 7.0- \\ & 7.4 \end{aligned}$ | $\begin{aligned} & 7.5- \\ & 7.9 \end{aligned}$ | $\begin{aligned} & 8.0- \\ & 8.4 \end{aligned}$ | $\begin{array}{\|l\|} 8.5- \\ 8.9 \end{array}$ | $\begin{aligned} & 9.0- \\ & 9.4 \end{aligned}$ | 9.5- | 10 |
| 1.6 | 3 | 8 | 3 | 3 | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2.3 | 1 | 7 | 5 | 3 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3.3 |  |  | 4 | 5 | 3 | 3 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |
| 4.5 |  | 1 | 1 | , 1 | 4 | 5 | 2 | 2 |  | 1 | 1 |  |  |  |  |  |  |  |  |
| 5.5 |  |  | 1 | 1 | 2 | 2 | 3 | 3 | 1 | 2 | 1 |  | 2 |  |  |  |  |  |  |
| 6.5 |  |  |  |  | 3 |  | 3 |  | 3 | 2 | 3 |  | 2 |  | 1 |  | 1 |  |  |
| 7.5 |  |  |  |  |  |  | 2 | 2 | 3 | 1 | 2 | 1 |  | 2 | 3 |  | 1 |  | 1 |

A FREQUENCY DISTRIBUTION OF THE READABILITY ESTIMATES

## OF EACH PASSAGE FOR GROUP TWO

| Passages | Observed Estimate of Reading Level of Passage |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Readability Level | $\begin{aligned} & 1.0- \\ & 1.4 \\ & \hline \end{aligned}$ | $\begin{aligned} & 1.5- \\ & 1.9 \end{aligned}$ | $\begin{aligned} & 2.0- \\ & 2.4 \\ & \hline \end{aligned}$ | $\begin{aligned} & 2.5- \\ & 2.9 \\ & \hline \end{aligned}$ | $\begin{aligned} & 3.0- \\ & 3.4 \end{aligned}$ | $\begin{aligned} & 3.5- \\ & 3.9 \end{aligned}$ | $\begin{aligned} & 4.0- \\ & 4.4 \end{aligned}$ | 4.5- | $\begin{aligned} & 5.0- \\ & 5.4 \end{aligned}$ | $\begin{aligned} & 5.5 \\ & 5.9 \end{aligned}$ | $\begin{aligned} & 6.0- \\ & 6.4 \end{aligned}$ | $\begin{aligned} & 6.5- \\ & 6.9 \end{aligned}$ | $\begin{aligned} & 7.0- \\ & 7.4 \end{aligned}$ | $\begin{aligned} & 7.5- \\ & 7.9 \end{aligned}$ | $\left\lvert\, \begin{aligned} & 8.0- \\ & 8.4 \end{aligned}\right.$ | $\begin{aligned} & 8.5- \\ & 8.9 . \end{aligned}$ | $\begin{aligned} & 9.0- \\ & 9.4 \end{aligned}$ | $9.5-1$ | 10 |
| 1.6 | 4 | 8 | 4 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2.3 | 1 | 7 | 5 | 4 | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3.3 |  |  | 5 | 4 | 5 | 1 | 1 | 1 |  | . | 1 |  |  |  |  |  |  |  |  |
| 4.5 |  |  | 2 | 1 | 9 | 2 | 3 |  | 1 |  |  |  |  |  |  |  |  |  |  |
| 5.5 |  |  |  | 4 | 3 | 4 | 1 | 3 | 1 | 1. |  | 1 |  |  |  |  |  |  |  |
| 6.5 |  |  |  | 2 |  | 2 |  | 4 | 2 |  | 4 |  | 1 |  |  |  |  |  |  |
| 7.5 |  |  |  |  |  | 2 |  | 2 | 1 | 3 | 2 | 5 |  | 1 |  | 2 |  |  |  |

TABLE 8
A FREQUENCY DISTRIBUTION OF THE READABILITY ESTIMATES
OF EACH PASSAGE FOR GROUP THREE

| Passages | Observed Estimate of Reading Level of Passage |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Readability Levels | $\begin{aligned} & 1.0- \\ & 1.4 \end{aligned}$ | $\begin{array}{\|l\|} \hline 1.5-1 \\ 1.9 \end{array}$ | $\begin{array}{l\|} 2.0- \\ 2.4 \end{array}$ | $\begin{aligned} & 2.5- \\ & 2.9 \end{aligned}$ | $\begin{array}{\|l\|} 3.0- \\ 3.4 \end{array}$ | $\begin{array}{\|l\|} \hline 3.5- \\ 3.9 \end{array}$ | $\begin{aligned} & 4.0- \\ & 4.4 \end{aligned}$ | $\begin{aligned} & 4.5- \\ & 4.9 \end{aligned}$ | $\begin{aligned} & 5.0- \\ & 5.4 \end{aligned}$ | $\begin{aligned} & 5.5- \\ & 5.9 \end{aligned}$ | $\begin{aligned} & 6.0- \\ & 6.4 \end{aligned}$ | $\begin{aligned} & 6.5- \\ & 6.9 \end{aligned}$ | $\begin{aligned} & 7.0- \\ & 7.4 \end{aligned}$ | $\begin{aligned} & 7.5- \\ & 7.9 \end{aligned}$ | $\begin{aligned} & 8.0- \\ & 8.4 \end{aligned}$ | $\left(\begin{array}{l} 8.5- \\ 8.9 \end{array}\right.$ | $\begin{array}{\|l\|} 9.0 \\ 9.4 \end{array}$ | $\begin{aligned} & 9.5- \\ & 9.9 \end{aligned}$ | 10 |
| 1.6 | 1 | 8 | 3 | 3 | 1 |  | 2 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2.3 | 1 | 6 | 3 | 4 | 1 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3.3 | 1 | 1 | 3 | 3 | 6 | 2 | 1 |  | 1 |  |  |  |  |  |  |  |  |  |  |
| 4.5 |  |  |  |  | 4 | 3 | 5 | 4 |  |  | 1 |  | 1 |  |  |  |  |  |  |
| 5.5 |  |  |  |  | 2 | 3 | 3 | 3 | 5 |  |  | 1 | 1 |  |  |  |  |  |  |
| 6.5 |  |  |  |  | 1 | 1 | 3 |  | 6 | 1 | 3 |  | 3 |  |  |  |  |  |  |
| 7.5 |  |  |  |  |  |  | 1 |  | 4 | 2 | 3 |  | 2 | 2 | 1 |  |  |  | 3 |

THBLE 9

## A FREQUENCY DISTRIBUTION OF THE READABILITY ESTIMATES

OF EACH PASSAGE FOR GROUP FOUR

| Passages | Observed Estimate of Reading Level of Passage |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Readability Level | $\begin{aligned} & 1.0- \\ & 1.4 \end{aligned}$ | $\begin{aligned} & 1.5- \\ & 1.9 \end{aligned}$ | $\begin{array}{l\|} 2.0-1 \\ 2.4 \end{array}$ | $\begin{aligned} & 2.5- \\ & 2.9 \end{aligned}$ | $\begin{array}{\|l\|} 3.0- \\ 3.4 \end{array}$ | $\begin{aligned} & 3.5- \\ & 3.9 \end{aligned}$ | $\begin{aligned} & 4.0- \\ & 4.4 \end{aligned}$ | $\left\lvert\, \begin{aligned} & 4.5- \\ & 4.9 \end{aligned}\right.$ | $\begin{aligned} & 5.0- \\ & 5.4 \end{aligned}$ | $\left\|\begin{array}{l} 5.5- \\ 5.9 \end{array}\right\|$ | $\begin{array}{\|l\|} 6.0- \\ 6.4 \\ \hline \end{array}$ | $\begin{array}{\|l\|} 6.5- \\ 6.9 \end{array}$ | $\begin{array}{\|l\|} 7.0- \\ 7.4 \end{array}$ | $7.5-$ | $\begin{array}{\|l\|} 8.0- \\ 8.4 \end{array}$ | $\begin{array}{\|l\|} 8.5- \\ 8.9 \end{array}$ | $\begin{aligned} & 9.0- \\ & 9.4 \end{aligned}$ | $\begin{aligned} & 9.5- \\ & 9.9 \end{aligned}$ | 10 |
| 1.6 | 1 | 6 | 7 | 1 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2.3 |  | 5 | 6 | 2 | 3 |  | 1 |  | 1 |  |  |  |  |  |  |  |  |  |  |
| 3.3 |  | 1 | 1 | 5 | 3 | 2 | 3 | 1 |  |  | 1 |  | 1 |  |  |  |  |  |  |
| 4.5 |  |  |  | 1 | 6 | 1 | 3 | 4 | 2 |  |  |  | 1 |  |  |  |  |  |  |
| 5.5 |  |  |  | 1 | 1 | 1 | 5 |  | 6 |  | 3 |  | 1 |  |  |  |  |  |  |
| 6.5 |  |  |  |  |  | 1 | 1 | 2 | 4 | 2 | 3 |  | 2 |  | 3 |  |  |  |  |
| 7.5 |  |  |  |  |  |  | 1 |  | 1 |  | 3 |  | 5 | 1 | 4 |  | 2 |  | 1 |

level. Fifty four percent of the total sample estimated the grade: 1 passage as being suitable for grade 1 students. Forty six percent of the total sample estimated the grade 2 passage as being appropriate for grade 2 students while thirty four percent of the subjects estimated the grade 3 passage at that level.

Among the passages at the intermediate level the subjects were most accurate in estimating the grade 4 passage. Thirty four percent of the total sample estimated that passage at the grade four level while only sixteen percent of the total sample estimated the grade 6 passage as being suitable for grade six students. Eight teachers estimated the grade 7 passage at the grade four readability level while 10 teachers indicated it's readability level at grades 9 and 10.

All groups consistently underestimated the readability levels of the passages. The extent to which the mean estimate of each group across the seven tasks deviated from the actual reading level of each passage is illustrated in Figures 1 and 2.

The mean deviation score for the combined groups across the seven tasks for which the analysis of variance was calculated, is plotted in Figure 3. The results indicate a strong relationship between an increase in the readability level of the material and a decrease in the accuracy of teachers' estimates of readability.


Figure 1. Accuracy of Estimates of Readability For Groups 1 and 2.


Figure 2. Accuracy of Estimatès of Readability For Groups 3 and 4.


Figure 3. Accuracy of The Mean Deviation Score For The Combined Groups.

Tests for trend were performed to further examine the relationship between the increase in the readability of the materials and the decrease in the accuracy of teachers' estimates. The results for the linear trend are statistically significant $(F=155.05, ~ d f 1 / 408, \mathrm{p}<.01$ ). The sum of squares for the tasks factor, as determined by the analysis of variance, is 68.87; and the variation due to the linear trend is 67.46. This means that 97.9 per cent of the variation in the
deviation scores may be accounted for by the linear component of the trend. The non-linear test for trend, was not statistically significant $(F=0.652, d f 5 / 408$, $p$ >.01). Only l.4l units of the score variation were not predicted by the linear regression equation.

Subjects' scores on the $1 B, 3 B, 4 B$ and $6 B$ passages were correlated with their scores on the 1A, 3A, 4A and 6A passages for the purpose of determining the reliability of their estimates for material at the same reading level of difficulty. The means and standard deviations for these passages are reported in Table 10; and the correlation co-efficients that were computed for the pairs of passages are presented in Table ll. The critical values of the correlation co-efficients for 71 degrees of freedom at the .05 level is given by Downie and Heath (1974). Significant relationships exist between the subjects' estimates of readability for the $1 A$ and $1 B$ passages and the 6A and 6B passages.

The low co-efficient of .46 that was obtained for the 4 A and 4 B passages may be explained in terms of the sampling of content material, the similarities in factors that influence the difficulty of materials at various grade levels and the order in which the material was presented. It may have been easier for subjects to be more consistent in their judgments of the readability of materials at the grades 1 and 6 levels mainly on basis of obvious differences such as content and vocabulary. The differences between

TABLE 10

MEAN ESTIMATE AND STANDARD DEVIATION FOR COMBINED GROUPS

| Passage Actual Readability <br> Level  | Mean | S.D. |  |
| :---: | :---: | :---: | :---: |
| TA | 1.6 | 1.9 | .49 |
| TB | 1.6 | 1.7 | .48 |
| 3A | 3.3 | 3.2 | 1.04 |
| 3B | 3.3 | 3.8 | 1.27 |
| 4A | 4.5 | 3.8 | 1.00 |
| 4B | 4.5 | 4.2 | 1.35 |
| 6A | 6.5 | 5.5 | 1.34 |
| 6B | 6.5 | 5.4 | 1.26 |

TȦBLE 11
CORRELATION CO-EFFICIENTS FOR PAIRED OBSERVATIONS

| Passages | 1 A | 3A | 4A | 6 A |
| :---: | :---: | :---: | :---: | :---: |
| 1B | . 80 * |  |  |  |
| 3B |  | . 63 |  |  |
| . 4 4B |  |  | . 46 |  |
| 6B |  |  |  | .70* |

material at the grades 4 and 5; 5 and 6 ; or 6 and 7 may not be as obvious. This factor, in addition to the order in which the passages was presented may have affected the consistency with which the grade 4 passages was estimated. Both grade 6 passages appeared in the first and second positions in the instrument while the grade 4 passages appeared in the fourth and tenth positions.

## SUMMARY

The present chapter has described the methods that were used in the analysis of the data and has presented the results. The groups' estimates of the readability of the $1 A, 2 A, 3 A, 4 A, 5 A, 6 A$ and $7 A$ passages were analyzed to determine whether significant differences existed among the groups. The analysis of variance for a two-factor experiment with repeated measures on one factor indicated no significant differences existed; that the interaction (groups by tasks) was not significant; but a significant effect existed for tasks. In general, the accuracy of the subjects estimates of the readability of passages decreased as the difficulty of the reading material increased. A correlation matrix that was calculated on the subjects' scores for the $1 \mathrm{~A} .1 \mathrm{~B}, 3 \mathrm{~A}, 3 \mathrm{~B} ; 4 \mathrm{~A}$, 4B; 6A and 6B passages for the purpose of determining the reliability of estimates, indicated significant correlations existed between the 1 A and $1 B$; and the 6A and 6B passages.

## CHAPTER FIVE

SUMMARY, DISCUSSION, AND CONCLUSION

## THE PROBLEM

The selecting of reading materials by elementary school teachers for instructional use is one of the curriculum planning tasks which consists of several related tasks and which involves decision making. One of the related tasks is the estimating of the readability levels of materials. Accurate estimates of readability levels are needed for matching students with materials and are necessitated by research findings that some professionally developed materials may be too difficult for the students for whom they were designed; by interindividual differences in reading achievement that are usually present in a class of students; and by the omission of readability levels from some publishers' materials that may be suitable for instructional use:

Previous research in which teachers' estimates of the readability levels of materials were investigated focussed mainly on the relationship between teaching experience and the accuracy of teachers' estimates of readability. The effect of theoretical and situational knowledge of reading on the making of accurate estimates of readability levels
was not previously investigated. The present study sought to determine the relative influence of theoretical and situational knowledge of reading on the accuracy of teachers' estimates of the readability of selected prose passages.

## THE METHOD

Specifically, the study sought to answer the following research questions:

1. To what extent teachers who possess theoretical and situational knowledge of elementary reading instruction are accurate in estimating the readability levels of materials?
2. To what extent teachers who possess theoretical and situational knowledge of elementary reading instruction are more accurate in estimating the readability levels of materials than
a. in-service teachers who possess only situational knowledge of reading from teaching experience?
b. pre-service teachers who possess only theoretical knowledge of elementary reading instruction?
c. pre-service teachers who possess neither theoretical knowledge of elementary reading instruction nor situational knowledge of reading from teaching experience?

In order to answer the research questions that were formulated for the study data were collected from 72 subjects who were enrolled in undergraduate classes in the Faculty of Education at The University of British Columbia. For the investigative purposes of the study subjects were categorized, in groups of 18 , with respect to pre-service or in-service preparation in elementary reading instruction
as well as classroom teaching experience at this level.
Group One consisted of in-service teachers who were selected from Education 476 - Remedial Reading, and who had completed Education 305, the basic developmental reading course that is a pre-requisite for other courses in reading that are offered by the university. The average number of years of teaching experience for this group was 6.38 years.

Group Two was made up on in-service teachers who were selected from Education 305 during their first week of attendance at that course. These subjects had not completed any courses in elementary reading instruction at university level. Their average number of years of teaching experience was 9.35 years.

The subjects in Group Three were pre-service teachers who had completed no courses in reading instruction other than Education 305. The subjects in Group Four were also taking pre-service teacher training but had not enrolled in any courses in reading instruction that were offered at university level.

The instruments that were used for collecting data were a questionnaire which was used for collecting biographical data on each subject; eleven reading passages; and a rating scale which ranged from one to ten and which was reproduced below each reading passage. The scale was used by the subjects to indicate their readability estimate of the passage.

The passages were selected from the Diagnostic Reading Scales: Revised Edition. The test manual for that instrument states that the Spache and Dale-Chall readability formulas, groups of subjects and teachers judgments were used in establishing the readability levels of the passages. The published technical data for the passages indicates that a reliability co-efficient of .84 was obtained on a test-retest for passages at the instructional level and that a median validity co-efficient of .78 was obtained between the Diagnostic Reading Scales: Reivsed Edition and the California Reading Test for passages between grades 2 and 6. Segments of approximately 110 words were chosen from those passages whose length exceeded 100 words. All passages were retyped as continuous prose and were arranged in random order.

Prior to the distribution of the instruments to the subjects, the investigator explained the purpose of the study and demonstrated the use of the rating scale for recording estimates of the readability levels of the passages. All subjects estimated the readability levels of the selected passages after it was sufficiently clear that the instructions and the nature of the task were ủnderstood.

## ANALYSIS OF DATA

The analysis of variance for a two factor experiment with repeated measures on one factor was performed
specifically on the subjects' responses to the $1 \mathrm{~A}, 2 \mathrm{~A}$, 3A, 4A, 5A, 6A and 7A passages to determine whether there were any significant differences among the mean deviation score for each task, by the four groups. The data for these passages were analyzed using the BMD 08V programme available at the UBC Computing Centre. Tests were also performed on the grand mean for each of the above passages to determine whether linear and non-linear tests for trend were significant.

The subjects' responses to the 1A, 1B; 3A, 3B; 4A, 4B; 6A and 6B passages were analyzed using the Simcort programme available at the UBC Computing Centre to obtain simple correlations for the purpose of determining the stability of the subjects responses.

## FINDINGS

The results of the analysis of variance for a two factor experiment with repeated measures on one factor indicated that the subjects who possessed theoretical and situational knowledge of reading were not more accurate than the other subjects in estimating the readability of the passages; and that there were no significant differences among the groups' estimates of readability ( $\mathrm{F}=0.42$, df $=3 / 68, p>.05$ ). The interaction (qroups $x$ tasks) was not siqnificant ( $F=1.03, \mathrm{df}=18 / 408$, p > . 05) , but the main effect for tasks was significant ( $\mathrm{F}=26.38$, $\mathrm{df}=6 / 408, \mathrm{p}<.01)$.

A test for trend indicated a strong linear relationship between an increase in the difficulty of the readability levels of the passages and a decrease in the accuracy of teachers' estimates of readability ( $F=155.05$, df $=1 / 408, p<.01)$. The linear trend accounted for approximately $98 \%$ of the observed variation in teachers' estimates of readability.

A correlation matrix that was computed for specific pairs of passages indicated statistically significant correlation co-efficients of . 80 and . 70 for the subjects' responses to the $1 A$ and $1 B$; and to the $6 A$ and $6 B$ passages.

## DISCUSSION

Each teacher posseses knowledge of factors that are associated with the varying levels of difficulty of reading materials. It was assumed that such knowledge would influence the accuracy with which teachers make subjective estimates of readability; and that teachers who possess situational knowledge of reading from matching students with reading materials and who have taken university level courses in elementary reading instruction would be more accurate in making subjective estimates of readability than teachers who do not possess such knowledge and/or preparation in elementary reading.

The above assumption was not supported by the results that were obtained from the analysis of the data. The finding that all groups were equally accurate in estimating
the readability of the passages may be explained in terms of practices that are followed by teachers whenever they estimate readability; and in terms of limitations that may have arisen from the experimental design of this study and which may have affected the accuracy with which the in-service teachers, especially those who possessed theoretical and situational knowledge of reading, made subjective estimates of readability.

Publishers often indicate the readability levels of their materials and the population of students for whom the materials may be suitable. Teachers use such information whenever they make subjective estimates of readability but may base their estimates mainly on the likelihood that the materials are likely to be suitable, too easy or too difficult for typical students from their classes, whose reading achievement levels are known to the teachers. In this study teachers may have been deprived of such frames of reference and consequently may have been unable to make more accurate estimates of the readability of the passages.

The second explanation concerns the use of readability formulas. Teachers may make more objective estimates of readability (readability formula estimates) than subjective estimates of readability. Reliance on readability formula estimates may limit teachers' ability to make subjective accurate estimates of readability and may explain why the subjects in Group One, inspite of their
accreditation from university courses in elementary reading, were not more accurate in estimating readability than the other subjects.

The third explanation that may account for the finding being discussed, concerns the amount of material with which the subjects were presented and the amount of material on which their subjective estimates of readability in their practical settings, are based. Teachers may utilize several selections of reading material that contain more than 110 words whenever they make subjective estimates of the readability of materials. The amount of material that was used may have definitely limited the ability of teachers who possessed theoretical and situational knowledge of reading to be more accurate in their estimates of readability.

The fourth explanation concerns procedures utilized by teachers, whenever they estimate the readability of materials of varying levels of readability, that are independent of the amount of material that was presented to the subjects. Whenever teachers make subjective estimates of the readability levels of materials of varying levels of readability, they may utilize procedures which are more elaborate than those which were permitted in this study. The subjects were instructed to estimate the grade level (readability level) of each selection in turn; to look neither forward nor backward at other selections while they were in the process of estimating a particular
selection; and to make no changes in their estimates. These instructions were designed to determine whether teachers are able to accurately estimate the readability of a selection without reference to another selection.

It is likely that teachers who perform tasks similar to those of the experiment, in their practical settings, utilize different procedures that may include an arrangement of the materials in apparent order of difficulty prior to estimating their readability levels. The random order in which the materials were presented may have prevented the teachers from being more accurate in their estimates of readability.

The above explanations are presented to account for limitations that may influenc "the finding that all groups were equally accurate in estimating the readability of the passages but they do not explain the finding that the accuracy with which teachers estimated the readability of the materials decreased as the readability levels of the materials increased. This finding may be explained in terms of the characteristics of the material.

At the primary level, it was easier for subjects, to utilize their knowledge of factors that influence readability such as sentence length and vocabulary. These factors are also important in estimating the readability of materials at the intermediate levels but other factors such as conceptual load, sentence transformations and the varied meanings of a word in different contexts
also have to be considered. It is possible that the subjects in the study are aware of these factors that influence readability but may have been prevented from effectively utilizing their knowledge, partly on the basis of the amount of material that was presented. This explanation is presented mainly on the basis of an apparent relationship between the amount of material that was presented and the subjects' tendency to underestimate the readability levels of the material. The consistent pattern that emerged from the subjects' estimates seems to suggest that the subjects were equating the difficulty of the material partly with the amount of material that was presented.

## CONCLUSION

On the basis of the data that were analyzed in the present study it may be concluded that teachers vary widely in their estimates of the readability of materials; and that they are more accurate in estimating the readability of primary level material that contain approximately 110 words than they are in estimating the readability of intermediate level material that contain a similar number of words. The research finding that there is a significant relationship between an increase in the readability levels of materials and a decrease in teachers' estimates of readability is sufficient cause for undertaking research to further investigate the accuracy of
teachers' subjective estimates of the readability levels of reading materials.

## Implications for Future Research

The findings of this study and the need for teachers
to accurately estimate the readability levels of materials
for the purpose of matching students with materials suggest
that the study may be replicated with the following vari-
ables being manipulated:

1. Quantity of material. The minimum amount of material that is necessary for making accurate estimates of readability may be determined from pilot studies in which experienced teachers who have not taken university courses in elementary reading are used. These subjects are recommended on the basis of the implications that the findings may have for pre-service and in-service teacher training.
2. Factors that influence readability. The factors that are considered by teachers in estimating the readability levels of materials needs to be investigated. Teachers may be presented with reading passages and may be instructed to estimate the readability levels of the materials; and to list the factors that they considered in arriving at their estimates of readability. This procedure provides the researcher with information on factors considered by the subjects and whether their weaknesses may lie in a lack of specific training in estimating the readability of materials.
3. Grade ranges. The use of grade ranges seems worthy of investigation. Teachers may be asked to express their estimates of readability in not more than 2 grade levels e.g. 4.5-5.5; 6.1-7.1. This procedure allows teachers greater latitude to express estimates of readability.

## Practical Implications

The findings of this study have implications for preservice and in-service teacher training. They suggest
that teachers may need specific training in estimating the readability levels of materials. Teachers are fairly accurate in estimating the readability levels of materials for the primary grades but may need assistance in coping with the subtle differences that exist between material at higher grade levels e.g. 5-6; 6-7. Support for specific training in estimating readability is provided by Popp and Porter (1975) who demonstrated that judges become very accurate in estimating readability after they have been taught what characteristics of reading materials to consider and which ones to ignore whenever they make subjective estimates of the readability levels of materials.

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## APPENDIX A

QUESTIONNAIRE

## APPENDIX A

## QUESTIONNA IRE

Name: $\qquad$
Sex: M $\qquad$ F $\qquad$
Year in University: $1 \begin{array}{llllll}2 & 2 & 4 & 5 & 6\end{array}$
Present teaching status: Full time teacher: $\qquad$
Part time teacher: $\qquad$
Substitute teacher: $\qquad$
Not teaching:
No. of years of teaching experience: (0) (1-2) (3-5) (6-9) (10+)
No of years of experience at each grade: K $\qquad$ 1 $\qquad$ 2 $\qquad$ 3 $\qquad$ 4 5 6 $\qquad$ 7 $\qquad$
Grade presently teaching: K $\qquad$ 1 $\qquad$ 2 $\qquad$ 3 $\qquad$ 4 $\qquad$ 5 $\qquad$ 6 $\qquad$ 7 $\qquad$
If you have "0 years" of teaching experience, select a grade that you would prefer to teach: K $\qquad$ 1 2 $\qquad$ 3 $\qquad$ 4 $\qquad$
5 $\qquad$ 6 $\qquad$ 7

Reading Courses completed: Educ. 305 $\qquad$ Educ. 473 $\qquad$
Educ. 476 $\qquad$ Educ. 477 $\qquad$
Educ. 405 $\qquad$ Other Courses $\qquad$
Reading Courses presently taking: Educ. 305 $\qquad$ Educ. 405 $\qquad$ Educ. 473 $\qquad$ Educ. 476 $\qquad$ Educ. 477 $\qquad$ Educ. 475 $\qquad$ Other Courses $\qquad$

## APPENDIX B

## APPENDIX B

READING PASSAGES
6B GRADE 6.5

When the early settlers came to America, trade was carried on by barter or by using such things as tobacco, sugar, and furs as money. Sometimes the settlers used Indian wampum. Wampum was shells that were made into beads and was used by the Indians as decoration and as money. Of course, when more people came from Europe to settle in America, they found they would need money to pay workmen. A mason did not always want his wages in grain or tools. People had to have coins, so they used whatever was available - English shillings, Swedish and Dutch money, and Spanish dollars or "pieces of eight".

## 6A GRADE 6.5

Elephants are found wild today only in warm regions in tropical Africa and in India. The story was very different 50 thousand years ago. Then, two species of the elephant family roamed North America and Europe in vast numbers

One of them was the mastodon. The mastodon lived in the eastern part of our country during the period of the Great Ice Age. In the swamps that were formed when the ice disappeared, many of the huge creatures were trapped and killed. We have found some of their skeletons. At a glance, the mastodon must have looked much like the elephants of today, except that it was covered with coarse, wooly hair and its tusks were much larger.

## 5A GRADE 5.5

As a ship's boy, John Paul had all sorts of odd jobs on board. Sometimes he scrubbed decks or helped the cook. He cleaned the captain's cabin and ran errands, but he had other duties that pleased him more. He helped to clean
the guns, which the merchant ship carried for protection. An several times he stood behind the big wheel to steer the ship.

Captain Benson wrote in the ship's log, or daily record, that the trip was calm and smooth-sailing. Nothing unusual happened, but every day was a real adventure for the new ship's boy. At the end of the coyage it was a thrill to sight land.

4A GRADE 4.5
Yesterday Bob took a trip to a city market that was like a store but a great deal bigger. It didn't have any bread or canned goods like the grocery stores. But there were a great many big boxes of vegetables and fruits.

Bob was hungry and wanted just one plum or cherry to taste. He wondered if one of the men would sell him just one plum. Everyone was buying the fruit and vegetables by the whole crate: When Bob asked the man to sell him one plum, he laughed and gave Bob an extra large plum wrapped in paper but wouldn't take any money.

3B GRADE 3.3
Mary was going downtown to watch the parade. She skipped and ran along the street because she could hardly wait to get there. She was early and found a good place to stand.

Pretty soon she could hear the music of the bands coming down the main street. The men of the first band were dressed in scarlet, with white feathers in their hats. The men of the second band were clad in dark blue, with red feathers in their caps. After them came the trucks loaded with flowers and fruti. Then came a.company of soldiers in dark green uniforms. Last of all was another band dressed in white suits and yellow feathers.

7A GRADE 7.5
Just as in driving a car, we use at least three speeds in reading. High gear in reading is called skimming, while studying is reading in low gear. Between these two, at second gear, is what might be called a
moderate speed of reading. As you may have heard, the good reader adaps his rate to the purpose of his reading. The rate he uses is determined by how much he wants to get out of the material he is reading. His rate is also influenced by the difficulty of the reading material. Thus, he shifts from gear to gear according to the amount he wants to retain or how difficult he finds the going.

2A GRADE 2.3
Bob has a little red wagon. He likes to ride in it. He pulls it slowly up the hill. Then he rides it quickly down again.

One day he took his dog with him. He pulled the dog up the hill. Then they rode down the hill. But the dog did not like to ride down. He jumped out of the red wagon. Bob went down by himself.

Now he does not try to take his dog in the wagon.

## 1A GRADE 1.6

Mary was on her way to school. She came to the corner. She saw a red light. Then she saw the green light. Then she went on to school.

## 1B GRADE 1.6

Bob had a dog. The dog's name was Spot. Spot had a big brown spot on his back.

Bob and Spot played together. Bob threw a stick. Spot ran after it. They had fun together.

4B GRADE 4.5
Mary's teacher took her class for a nature walk one sunshiny day last week. Every time the group came to a new plant, they would stop and examine it while the teacher explained its parts. She showed them how a bee gets its honey from. flowers and how a bug had eaten part of the leaves from some plants. On a few plants, the flowers had fallen off, and seeds had begun to form.

Later, while they were looking at some blossoms, one boy spied a nest hidden in a tree. They were very quiet, hoping the mother would return to feed her young ones.

3A GRADE 3.3
Bob has a brown and white dog named Spotty. He is called Spotty because he has brown spots on his nose. Bob always takes his dog on his trips to the woods. The dog helps scare the rabbits. Bob walks slowly, but his dog scampers through the leaves.

One day Spotty left Bob and went off by himself. Bob called and whistled, but the dog did not come back to him. After a while Bob heard the dog barking a long way off. Bob walked toward the sound of the barking until he found the dog. Spotty thought he had caught a black and white kitten.

## APPENDIX C

RATING SCALE

## APPENDIX C

## RATING SCALE

Read the first selection. Put an $X$ on the scale, below the selection, to indicate your estimate of the grade level difficulty of the material. For example: you may mark a passage as 3.5 if you feel that an average child who has spent 3 months in grade 3 could, read the passage with no less than $95 \%$ accuracy in word recognition and $75 \%$ in comprehension (i.e. the child's instructional level).

##  $\begin{array}{llllllllll}1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10\end{array}$

Estimate the grade level of each selection in turn, i.e. estimate the first before you estimate the second; the second before the third, etc. Do not change any of your grade estimates.


[^0]:    * $\mathrm{p}<.05$

