CHAPTER - III

REVIEW OF RELATED LITERATURE

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CHAPTER - III

REVIEW OF RELATED LITERATURE

An intensive visual survey of the realm of the research done in the past develops the in-sight of the researcher and strengthens his information which saves much of his time and energy. It also gives him an opportunity of gaining in-sight into the methods, measures, subjects and approaches employed by other research workers. He also knows the limitations of the tools of research employed by other research workers. The in-sight that the investigator gains as a result of review of related literature leads him to significant improvement of his research design. At the same time a careful consideration of 'recommendations for further research' in various research studies guides him regarding the suitability of the problem and assisting him in delimiting his research problem. Therefore, the investigator has tried to review the literature of the past studies on Readability to benefit himself in the above mentioned ways.

The review of the literature is divided in two broad-sets:

i. Research done in other countries.

ii. Research done in India.
3.1 RESEARCH IN OTHER COUNTRIES:

There has been a lot of thinking about the readability of reading materials and the reading ability of students during the last three or four decades. This indicates that the persons working in the field of education in other countries are extremely conscious about the importance of readability of reading material in the process of teaching-learning. Unfortunately, in India this field has remained almost unexplored. The researches that would be mentioned in the coming few pages will certainly throw light on the relevance of the problem under study.

3.1.(a) Text-books: Their Readability versus Reading Ability of the students:

Study – I:

Browning compared the rated readability of four college drafting text-books with the reading abilities of 431 college drafting students and with informational achievement in drafting. Data for the study were gathered through application of Dale-Chall formula of readability for the selected text-books. 59.87% of the students were found to be capable

of reading the samples on the thirteenth to fifteenth grade level and 7.43 per cent were capable of reading and understanding material on the sixteenth plus level. It was found that a small percentage of material in beginning college drafting text-books can be read by students with no higher than eighth grade reading abilities. While other parts would require sixteen plus reading abilities. Beginning college drafting students would require higher reading abilities than those possessed by students in this study in order to read and comprehend the most difficult sections in the text-books. General, rather than technical vocabulary used in the text-books was one of the chief reasons for the reading difficulty.

The study revealed that the readability of the text-books is much higher than the reading abilities of the students. Hence the students found them difficult to comprehend.

Study - II:

Miller\(^2\) compared the readability of five general shop text-books. He determined the readability of text-books by the Dale-Chall and Flesch formulae. The readabilities thus found were compared with the reading abilities of 411 ninth graders. The reading ability was measured by silent reading comprehension section of the IOWA tests of basic skills. While

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a composite readability rating showed that these texts ranged from grade levels 9.25 to 10.00 with a median grade of 9.5. Individual texts varied widely in readability from seven grade levels in one text to eleven grade levels in another text, according to different samples within each text. Since 70% of the students were found to be reading below the ninth grade level, substantial portions of each text, were found to be above the student's level of reading ability. Hence it is clear from this study that the major portion of the texts was found to be above the reading abilities of the students.

Study - III:

Jacobson3 studied the relative reading difficulty of Physics and Chemistry texts used in Minnesota Public Schools. He used the underlining tests and subsequent analysis of variance with samples from texts not frequently used in the public schools. Subjects were students from randomly selected schools. A phase of the investigation utilized co-variance and regression, analysis to obtain equations for predicting the reading difficulty of text passages by means of independent variable, determined from the passages. The study revealed that there was a wide range of reading difficulty in Physics as well as in Chemistry text-books.

Study - IV:

Belden\(^4\) studied the relationship of the readability of five high school Biology text-books and reading ability of Biology students. He used Dale-Chall formula for assessing readability of text-books and the reading ability of 357 tenth grade Biology students was measured by the Nelson, Deny Reading Test. He accepted a criterion that the reading achievement levels of students using a book should be one grade above the difficulty level of the book. The author found that five books met this criterion for the following percentages of students per book: 37.0, 39.5, 42.3, 49.6 and 58.5 per cent.

He concluded that only one of the five text-books was appropriate in terms of its difficulty in relation to student's reading achievement for over one half of the students.

Study - V:

Ottley\(^5\) also made an assessment of Science text-books for the fourth, fifth and sixth grade levels. For the purpose of determining the readability he used the revised (1961) Lorge readability formula. As a result of the assessment of

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readability that text-books at the three grade levels differed very little in reading difficulty. In other words the fourth grade text-book is quite difficult to comprehend for the students of the fourth grade. The author says further that the sixth grade text-book was well suited to the sixth graders.

Study - VI:

Porch\(^6\) carried out an investigation wherein the Lorge formula of readability was applied to social study text-books which were used from grade three - through twelve. The findings indicated that though a progression of difficulty was existing from one grade to another, the progression was not consistent.

The progression could not provide for the normal growth in reading ability of the students who were excepted to read them. The greatest departure from the uniform progression was found to be between the sixth and seventh grade text-books, and between the ninth and tenth grade text-books.

3.1.(b) Readability of basal and occupational materials:

Study - I:

'The Readability of Basal Social Studies Materials'

Arnsdrof\(^7\) studied 25 books which were designed for use in

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primary and intermediate grade levels in four basal studies. For this purpose he used Spache formula and Dale-Chall formula.

One hundred samples were drawn randomly from each third of the twenty five (25) books for analysis. They had readability levels in line with the publishers recommended-sequency when estimates were based upon the entire text but 12 of the texts were found to have increasing difficulty from the first third through the last third of text material.

Study - II:

Mills and Richardsons\(^8\) examined the accuracy of grade level listings of publishers of two hundred basic readers and other texts. These basic readers and texts were recommended for use in grades one to three and an unspecified number of books recommended for use in grades four to eight. The primary materials were graded by remedial clinicians according to the Spache formula while the Dale-Chall formula was used for books and upper-grade levels. Using these formulae as criteria, it was found that only about one half of the primary materials were appropriately labelled, while the results for grades four through eight books were comparable to those found in the study.

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Study - III:

The readability of occupational materials from 1959 career information kit supplement of SRA occupational file was studied by Ruth. These materials were designed for high school use. Five samples were selected from each of 85 SRA occupational briefs and 35 other items included in the 1959 career information kit supplement. The Farr-Jenkins and Paterson simplification of the 1948 Flesch Reading Ease Index was applied to find out the Reading Ease Score of these materials. The reading ease grade levels were found to range from grade nine to sixteen plus, with a mean of 14.7, a level judged by the author to be too high for incidental reading use by most high school students. It was also noted that while the materials used a simple vocabulary readability showed a slight increase because of the presence of over long sentences.

Therefore, it is quite significant to note that mere lowering down the number of hard words is not enough, the longer sentences are equally responsible for higher readability of reading materials.

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3.1.(c) Research on Comparative Readability of Text-books and other materials:

Study - I:

Marshall\(^\text{10}\) used Flesch Reading Ease Formula to compute the readability of seven most commonly used text-books in Physics Courses in New York State, exclusive of New York city. He then selected an original passage on basic electricity from a widely used text-book with a low reading ease score (thirteen grade level) and prepared a re-written version of the same material to raise the reading ease score to approximately eighth to ninth grade level (principally shortening the average sentence length to about half of that the original). One hundred forty four Physics students matched for reading ability and Physics attitude, were sub-divided into two groups each to read one of the passages. He used 31 Item, multiple choice test to measure comprehension of the passage.

An analysis of variance revealed no significant differences in comprehension but difference in scores between reading levels and between Physics ability levels were significant at the 0.05 level.

Study - II:

Keeran and Bell\(^{11}\) studied the effectiveness of communication with materials written in simplified style. The investigators re-wrote the five-rules for a state hospital in two styles. For one, he followed the traditional format of the old rules and for other he used simplified style and decreased the sentence length. The Flesch Readability formula was applied to both versions. It was found that the simplified version was rated more readable.

The administrators of the hospital made a point by point comparison of both the versions and found that both the versions contained the same informations. The effectiveness of the communication was measured in terms of (i) frequency with which each passage was read and (ii) comprehension scores.

The entire nursing department staff was given either the traditional \((N = 199)\) or the simplified \((N = 190)\) version of the rules. They issued a questionnaire also. The questionnaire revealed that the two groups did not differ significantly in frequency with which the rules were read i.e., traditional 35.7 per cent simplified 42.8 per cent.

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The study revealed that subjects who had read simplified version scored higher than those who had read the original version.

Study - III:

Mo. Taggart\textsuperscript{12} reported a study where the investigator tried to evaluate the Flesch and the Dale-Chall readability formulas as objective aids in selecting high school health texts. The specific purposes of this study were:

(i) to compare students comprehension of selected health passages of 7th, 9th and 12th grade reading difficulty levels as estimated by (a) the 1948 Flesch formula and (b) the Dale-Chall formula.

(ii) to determine the effect of health knowledge on students' comprehension of selected health passages.

The investigator carried out this study on 257 students taken as sample from nine classes of ninth grade. They were given the Kilander Health Knowledge test. The students were divided into good and poor health sections. Each of these sections was then divided into three main groups. Students of each of these groups were matched on the basis of

intelligence and reading ability. For the determination of intelligence Hemon-Nelson tests of mental ability were adminis-
tered. Their reading ability was determined with the help of Reading Tests.

Nine health passages were used in the Flesch comprehen-
sion test, and a different nine health passages were used in the Dale-Chall comprehension test. These passages of approximately 250 words each were selected from current high school health text-books.

Control group B read the nine health passages as they were found in the text-book (9th grade level) Experimental Group C read the same nine passages, but in a re-written form which made them easier to read (7th grade) Experimental group A read the same nine passages re-written to make them more difficult (12th grade) comprehension of each group was deter-
mined by the students ability to answer questions after reading the health passages. Group comparisons were made by comparing the mean comprehension scores for each of the groups.

The findings revealed that:

(i) the students with good health knowledge scored signi-
ficantly higher than students with poor health know-
ledge. In good health section significant differences were seen between groups reading at the 7th and 12th grade level and also between those reading at 7th and
9th grade level. In the poor health knowledge section however, no significant differences were observed.

(ii) When comparing the means of good and poor health knowledge sections, it is found that there are significant differences between the groups reading at 7th and 12th grade levels and also between those reading at the 7th and 9th grade level.

Study - IV:

Williams\textsuperscript{13} carried out a study of almost of the same nature. The purpose of the study was to determine the effect on sixth grade pupils' comprehension when sixth grade science materials were re-written to a lower level of readability. One chapter from a popular text was re-written to a third grade level of readability according to Yoakam formula. Simpler words were substituted for non-technical words, technical words were more fully explained and long sentences were rephrased and shortened to make a thoughts more clear and distinct.

A total of 417 pupils from fifteen six-grade class rooms of Illinois Community were taken as sample. The students were randomly selected to form control and Experimental groups.

The control group read the original material and the experimental group read the re-written material. Both groups responded to the same multiple-choice comprehension item.

Conclusions:

(i) Writing sixth grade text-book - selections to a lower level of reading difficulty through simplification of style and vocabulary and amplification of technical vocabulary helped sixth grade pupils increase their reading rate and comprehension.

(ii) Sixth grade pupils with lower reading ability read with greater speed and understanding when they were provided science reading materials more closely written to their reading achievement level.

(iii) Sixth grade pupils with average and above average reading ability read with greater speed and better comprehension when they read science text-book material which had been re-written to a lower level of readability than when they read sixth grade level science text-book materials.

(iv) Sixth grade pupils with average and above average reading ability comprehend better than good readers even when the good readers read science text-book materials specially prepared for poor readers.
3.1.(d). Readability of Text-books and its estimates by Teachers and others:

Study - I:

Ressel\textsuperscript{14} used subjective analysis of content and motivation, objective analysis of vocabulary and readability and comments by first and second graders and their teachers in educating 10 (ten)'Easy to Read' Trade books for children. The books represented well known authors and various categories of content.

The findings of Russel are reported in the following paragraphs:

(i) The readability as measured by Spache Readability Formula ranged from 1.9 to 2.9 in grade level placement.

(ii) The books corresponded in difficulty estimated upon several bases to the first reader and level one, second reader from two well-known series.

(iii) Any one trade book provided about the same amount of reading material as a second basal premier.

(iv) The books were generally well received by teachers and pupils. It is significant that in a month's "Classroom trial, these books were read mostly by pupils in grades 2 and 3.

Study - II:

Herrington\(^{15}\) conducted a study to determine whether the measurements made with readability formula of the reading difficulty of certain passages from text-books for elementary science are more consistent than the estimates made by reading experts of the reading difficulty of these same passages.

Samples were taken from Mallinson's studies of text-books designed for grades four through eight. The hundred and ninety-nine samples were selected at random from 39 Science text-books. Out of these 199 samples, again 21 samples were selected at random. This selection was made by twenty-six teachers who were named as reading experts. Instructions as how to evaluate the passages were also attached to the samples. The same passages were than evaluated with the help of Flesch Lorge, and Dale-Chall formulae of readability.

It was found that there was a great difference between the consistency with which the reading formulae evaluate the grade level of difficulty of the samples and the consistency with which the reading experts evaluate the grade level of reading difficulty of the samples.

A follow up study was conducted by Mallinson and Homes. Here, the investigators adopted the same procedure as adopted by Harrington in the above study. The additional thing that they adopted was, that two elementary teachers in each of the school systems in which experts were employed were requested to undertake the task of evaluating the sample passages.

The results were tabulated according to grade level of difference between the highest and lowest measurements or estimates of the level of reading difficulty of sample, together with the number of sample for which that difference was evident.

The results showed that the median difference for measurements by reading formulae was 1.0 years. It was 3.0 years for reading experts and 4.0 years for elementary teachers estimates. The investigators concluded that the use of reading formulae for determining the level of reading difficulty was not only justified but useful also.

3.1.(e). Research on Shortening of Sentence and its effect on comprehension:

Coleman examined the question whether or not shortening of sentences improves comprehensibility. The investigator prepared three versions of the same material. The

16. Ibid., p. 301.

versions had lengths of 39.23 and 15 words. He used the close test procedure for measuring the readability of the nine different selections thus obtained for 90 college-under graduate students. By dividing the subjects into five groups and constructing each with a different selection of words deleted, a score was obtained for every word. The sum of scores for all words in the passage was the score for the passage as subjects were given 50 seconds to read the passage and were tested only on the portion completed. Each subject read one passage in each style, but different subjects read different style passage having different style combinations.

It was found by T. Tests that the shortest version than the larger ones though the advantage was comparatively small being seven per cent more comprehensible.

The author suggested that shortening a clause may be more important than emphasizing the boundaries with a period and a capital.

3.1.(f) Studies on vocabulary and its Development:

Study - I:

Bjornsson reported a comprehensive analysis of the vocabulary of over 2000 school text-books in Sweden. His

analysis was concerned with twelve factors, among these were word-length, central words, different words, unusual words, abstract words, sentence length, long words, and subordinate clauses per hundred words.

The study revealed that 28 per cent of words in grade I texts were unusual words defined as words not included in the Hassler-Govansson list of the 1000 most frequently used words in the Swedish language. Again it is reported that the most reliable factors for the measurement of the readability of school books identified in the study were, sentence length and word length, the multiple correlation being .89.

Study - II:

Lockwood\textsuperscript{19} reported a monumental study done by Curtis about the development of scientific vocabularies for use in the text-books for Science. The study sought answers to the following questions:

(i) Are the vocabularies found in text-books of Science actually too difficult for the pupils for whom the books are intended?

(ii) Is there some definite and readily determined level of vocabulary in present text-books of Science which marks a sharp increase in difficulty of comprehension

by pupils and which, therefore, is the level at which simplification of vocabulary in such text-books should begin?

(iii) Is the difficulty which pupils encounter in reading text-books of Science attributable to any considerable extent, to non-scientific and hence non-essential vocabulary?

(iv) Do present text-books of Science provide adequately for the mastery of essential vocabulary through definition and repetition?

(v) What are important terms which should be mastered in various courses of Science?

For this study the data were obtained from one hundred master's theses completed under his direction. The lists of words were prepared by examining the glossaries of text-books for General Science, Biology, Chemistry and Physics. The word-lists thus prepared were compared with the lists of words assembled by others such as Thorndike.

The words were then supplied to qualified teachers to determine their values for inclusion in the respective courses. From the data obtained, lists of words—essential and desirable, were developed. The findings are as follows:

1. Both the technical and the non-technical vocabularies, of text-books of General Science, Biology,
Chemistry and Physics are too difficult for the pupils for whom the books are written.

ii. There is insufficient provision in such text-books of Science for repetition of difficult scientific terms and non-technical words.

iii. Most of the difficult words found in such text-books of Science are non-scientific or non-technical words.

iv. Very few of the scientific terms introduced into such text-books of Science are defined.

v. Not only infrequently the definitions of Scientific terms fail to appear in the text-books until the terms have been used more or less extensively in earlier parts of the books.

Study - III:

Mallison\(^20\) conducted a study of the similar nature. They used the same procedure as is described in the study by Curtis for the purpose of developing a scientific vocabulary for General Physical Science.

A list of words was compiled through the use of text-books, courses of study and these compassing the area of

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20. Ibid., pp. 297-298.
General Science. The investigator appointed a Jury to go through it. The list was submitted to the Jury of forty four persons who had either written books or articles on General Physical Science or had helped develop courses of study in this area.

As a result, a list of four hundred words considered to be very essential vocabulary for General Physical Science plus two hundred words considered to be desirable vocabulary for General Physical Science was prepared.

3.1 (g). *A Study in Readability Formula for short Passages:* 21

One of the persistent problems of readability formula users has been "What do you do if you have only a short passage?" Most formulas require a passage of 300 words or longer. Using them on shorter passages causes much less reliability - the scores jump around a lot and you can be less sure of the "true" readability score.

This presents a problem for assessing readability of short but important passages such as those in Science textbooks, Maths text-books, passages used in tests, manufacturer's warranties and rules and procedures in driver's training booklets.

Even though the use of readability formulas has been questioned or criticized by some, those objections were at least partially answered (Fry (1989 a) in an article where he showed that the validity of readability formulas has been demonstrated by using various other measures such as reading comprehension, cloze scores, oral reading errors, subjective judgement, and correlation between formulas. In any event, readability formulas continue to be used by many in education, publishing, business and law, "The Social Science Citation Index" shows that readability articles are among the most frequently cited research in a wide variety of professional articles.

The new readability formula given hereafter in Tables 1, 2 and 3 are designed to work on passages from 40 to 99 words long provided that they contain at least 3 sentences. For anything shorter than that, you can get some insights from word-difficulty and sentence-difficulty, but a readability score is apt to be considerably less reliable. This new formula can also be used on passages between 100 and 300 words long.
Table - 1

SHORT PASSAGE READABILITY FORMULA
by Edward Fry, 1989

Rules:
1. Use on a passage that is at least 3 sentences and 40 words long.
2. Select at least 3 key words that are necessary for understanding the passage.
3. Look up the grade level of each key word in "The Living Vocabulary".
4. Average the 3 hardest key words. This gives you word difficulty.
5. Count the number of words in each sentence and give each sentence a grade level using the sentence length chart (Table: 2).
6. Average the grade level of all sentences. This gives you sentence difficulty.
7. Finally, average the sentence difficulty (step - 6) and the word difficulty (step-4). This gives you the readability estimate of the short passage.

\[
\text{Readability} = \frac{\text{Word Difficulty} + \text{Sentence Difficulty}}{2}
\]

* By Edgar Dale & Joseph O'Rourke, Elgin IL: Dome 1976.
Cautions:

A. This method should be used only when a long passage is not available. With anything 300 words or longer, use the regular Readability Graph.

B. This method was developed on passages at least 3 sentences and 40 words long. With anything shorter than that, use the formula at your own risk. It may be better than nothing, but certainly has less reliability.

C. Be careful when looking up the grade level or the key words that you get the grade level for the same meaning of that key words as it is used in the passage.

D. The range is grade levels 4-12. In reporting any score 4.0 or below, call it "4th grade or below" and any score above 12.9 call "12th grade or above."

To use the formula, you must look up each key word by its particular meaning in the passage, and assign it a grade level. The average level of the three hardest key words is the first input for the formula.

A key word is defined as word necessary for understanding the passage. Usually the key words are the most difficult words in the passage.
The second major input for the short passage Readability Formula is a sentence difficulty measure that can be obtained for each sentence from the chart in Table - 2. This chart is based on the median sentence difficulty of the Readability Graph (Fry 1977). The grade levels of all the sentences in the short passage are averaged.

Then the sentence difficulty and key word difficulty are averaged to give a Readability Grade level.

Thus this formula follows the insight by Klare (1984) which held that both a word difficulty (semantic) measure and a sentence difficulty (Syntactic) measure are necessary for a readability formula.

The research data reported in Table 4 are based on short passages (42 to 99 words) taken from 15 articles of expository and narrative writing ranging from 3rd to 15th - grade difficulty level, all of which have been previously graded using the Fry readability formula (1989 b). Correlational validity between the short passage Readability Formula and the regular formula is .82 of all passages used and .95 if the passage at Grade 15 is removed. For those not familiar with correlation scores (Y), a score of .82 is high and .95 is very high. A typical validity score, say for a major reading test is often around .75 or .80 when it is compared to another major reading test.
### Table: 2

**SENTENCE LENGTH (DIFFICULTY) CHART**

<table>
<thead>
<tr>
<th>Words per sentence</th>
<th>Grade level estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.6 or below</td>
<td>1</td>
</tr>
<tr>
<td>8.6</td>
<td>2</td>
</tr>
<tr>
<td>10.8</td>
<td>3</td>
</tr>
<tr>
<td>12.5</td>
<td>4</td>
</tr>
<tr>
<td>14.2</td>
<td>5</td>
</tr>
<tr>
<td>15.8</td>
<td>6</td>
</tr>
<tr>
<td>18.2</td>
<td>7</td>
</tr>
<tr>
<td>20.4</td>
<td>8</td>
</tr>
<tr>
<td>22.2</td>
<td>9</td>
</tr>
<tr>
<td>23.2</td>
<td>10</td>
</tr>
<tr>
<td>23.8</td>
<td>11</td>
</tr>
<tr>
<td>24.3</td>
<td>12</td>
</tr>
<tr>
<td>25.0</td>
<td>13</td>
</tr>
<tr>
<td>25.6</td>
<td>14</td>
</tr>
<tr>
<td>26.3</td>
<td>15</td>
</tr>
<tr>
<td>27.0</td>
<td>16</td>
</tr>
<tr>
<td>Above 27</td>
<td>17</td>
</tr>
</tbody>
</table>

For use with the Fry Short Passage Readability Formula, 1989.
Table - 3

A SAMPLE READABILITY ESTIMATE
OF A SHORT PASSAGE

Sample Short Passage:

These record-smashing feats were accomplished at the 39th Annual Convention of the International Jugglers Association, held in San Jose, California. In that contest, Anthony competed against the World's best jugglers. Many were more than twice his age, but there was no doubt who was best.

<table>
<thead>
<tr>
<th>Sentences (all)</th>
<th>Key words (3 hardest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (Number of words)</td>
<td>Grade levels</td>
</tr>
<tr>
<td>21</td>
<td>8.6</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>17.5 + 3 =</td>
<td>20 + 3 =</td>
</tr>
<tr>
<td>5.8 average sentence difficulty</td>
<td>6.7 average key word difficulty</td>
</tr>
<tr>
<td>5.8 sentence difficulty</td>
<td>6.7 key word difficulty</td>
</tr>
<tr>
<td>12.5 + =</td>
<td></td>
</tr>
<tr>
<td>6.3 readability score (in grade level)</td>
<td></td>
</tr>
</tbody>
</table>
Table - 4

COMPARISON OF KEY WORD READABILITY ESTIMATE ON SHORT PASSAGES WITH FRY READABILITY GRAPH SCORES ON LARGE PASSAGES

<table>
<thead>
<tr>
<th>Passage</th>
<th>Fry Readability Graph estimate for large passage (grade level)</th>
<th>Text-type (narrative/expository)</th>
<th>Length of short passage (words)</th>
<th>Key word difficulty (grade level)</th>
<th>Sentence difficulty (grade level)</th>
<th>Readability of short passage (grade level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5</td>
<td>E</td>
<td>69</td>
<td>4.6</td>
<td>4.9</td>
<td>4.7</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>N</td>
<td>49</td>
<td>4.6</td>
<td>4.0</td>
<td>4.3</td>
</tr>
<tr>
<td>C</td>
<td>7</td>
<td>N</td>
<td>74</td>
<td>5.3</td>
<td>8.4</td>
<td>6.8</td>
</tr>
<tr>
<td>D</td>
<td>6</td>
<td>N</td>
<td>52</td>
<td>4.7</td>
<td>5.7</td>
<td>5.2</td>
</tr>
<tr>
<td>E</td>
<td>6</td>
<td>E</td>
<td>46</td>
<td>6.7</td>
<td>5.8</td>
<td>6.3</td>
</tr>
<tr>
<td>F</td>
<td>8</td>
<td>N</td>
<td>59</td>
<td>8.6</td>
<td>6.0</td>
<td>7.3</td>
</tr>
<tr>
<td>G</td>
<td>7</td>
<td>N</td>
<td>65</td>
<td>6.0</td>
<td>6.2</td>
<td>6.1</td>
</tr>
<tr>
<td>H</td>
<td>8</td>
<td>E</td>
<td>82</td>
<td>6.0</td>
<td>9.8</td>
<td>7.9</td>
</tr>
<tr>
<td>I</td>
<td>8</td>
<td>E</td>
<td>66</td>
<td>8.6</td>
<td>6.2</td>
<td>7.4</td>
</tr>
<tr>
<td>J</td>
<td>10</td>
<td>E</td>
<td>99</td>
<td>8.0</td>
<td>9.2</td>
<td>8.6</td>
</tr>
<tr>
<td>K</td>
<td>12</td>
<td>N</td>
<td>68</td>
<td>15.0</td>
<td>11.3</td>
<td>13.1</td>
</tr>
<tr>
<td>L</td>
<td>15</td>
<td>E</td>
<td>61</td>
<td>10.6</td>
<td>8.3</td>
<td>9.4</td>
</tr>
<tr>
<td>M</td>
<td>10</td>
<td>E</td>
<td>69</td>
<td>6.0</td>
<td>12.5</td>
<td>9.2</td>
</tr>
<tr>
<td>N</td>
<td>4</td>
<td>E</td>
<td>42</td>
<td>4.0</td>
<td>3.2</td>
<td>3.6</td>
</tr>
<tr>
<td>Mean</td>
<td>7.7</td>
<td></td>
<td>66.7</td>
<td>6.8</td>
<td>7.2</td>
<td>7.1</td>
</tr>
</tbody>
</table>

- Each short passage was taken from the large passage.
- Large passages were of 300 words or more.
- Product-moment correlation between large passage and short passage readability is .82 for all passages and .95 if passage
3.2 STUDIES IN INDIA:

3.2 (a) Study on Vocabulary:

Study - I:

Shri K.S. Vakil\textsuperscript{22}, studied "The Basic Vocabulary of Gujarati Children at the age of 11 plus. Its objectives were:

(1) to prepare a vocabulary list in Gujarati for pupils who have completed the first year of senior basic or the secondary school (11 plus) stage, based on a study of text-books in common use, and to find out how many of the words in the list form part of the children's active recognition vocabulary.

(2) to ascertain the reproduction vocabulary of children at that stage.

(3) to compare it with the recognition vocabulary. The investigator has restricted himself to only one year in order to make a thorough analysis of the vocabulary problems at the age of 11 plus.

The investigator studied the following Gujarati textbooks used in Std. V:

(1) Sahitya Pathavali
(2) Sahitya Pravesh
(3) Sahitya Kallol
(4) Kishore Vachanmala
(5) Sahitya Parichaya
(6) Gujarat Vidyapith Vachanmala

The investigator classified all the words covered by them and arranged them alphabetically. As a result, the investigator found 1000 words of recognition and reproduction vocabularies.

This study and three mentioned in the proceeding section about the development of vocabulary apparently do not have a straight bearing on the present study but they have given a very helpful insight to the investigator to plan a method to decide the 'Impedixae' - an important plank for computing readability of different chapters of Geography textbook for Standard - VIII.

3.2.(b) Studies of Readability Indices:

Study - I:


on Reading Comprehension. The major objectives of the study were:

(i) to prepare a list of impedilexae from the chapters of the text-book.

(ii) to select suitable readability formula and to study its readability.

(iii) to determine the readability index of each chapter.

(iv) to prepare a tool for measuring comprehension based on the three chapters having highest readability index.

(v) to rewrite the chapters to a lower level of readability.

(vi) to study the effect of materials having high and low levels of readability on pupils' comprehension and

(vii) to study the effect of materials having high and low levels of readability on the comprehension of students who are intellectually below and above the average value and those who are below and above the average value of the reading ability.

In order to achieve the above objectives the investigator has used an experimental method of equivalent groups design. Fourteen classed of ten schools were arranged into seven pairs of equivalent groups thus comprising seven
replication of the experimental design. In each replication of the two groups, one was control and the other was experimental. In all 588 pupils participated in the study.

The control group read original textual material of high readability while experimental group read rewritten textual material of low readability for specified time. After reading, comprehension test in science was administered.

The major findings of the study were:

(i) In general, the pupils could comprehend the low readability material better than the high readability and
(ii) Reading ability and I.Q. were found to have an effect on the reading of the materials at different levels of readability.

Study - II:

U.S. Patel examined the Readability Indices of original and re-written text-book in Science for Class V.

The major objectives of the study were:
(i) to prepare a list of impedilexae from the original material.

(ii) to study the reliability of the Aukerman's formula.

(iii) to find out the readability of each chapter of the text-book.

(iv) to find out the readability of each chapter of re-written text-book.

(v) to compare the readability of both the text-books.

In order to achieve the above objectives the investigator has tried to find out the readability of both the text-books with the help of Aukerman's formula.

The major findings of the study were:

(i) The chapters of original text-book are totally different from the re-written text-book from the readability point of view.

(ii) The highest and the lowest readability scores in original text-book are 325.80 and 76.68 respectively.

(iii) Out of 27 chapters in original text-book six chapters 8, 9, 13, 16, 17, 27 were found the most difficult while chapters No. 6, 19, 13 were found to be easy.
Study - III:

U.C. Trivedi examined the readability of text-book in Geography for Standard X.

The major objectives of the study were:
(i) to prepare a list of impedilexae in Geography for Std. X.
(ii) to find out the readability of the each chapter of the text-book using Aukerman's formula.
(iii) to find out easy chapters with the help of readability score.
(iv) to find out difficult chapters with the help of readability score.

The investigator has tried to achieve the above objectives. The readability of each chapter of the text-book were counted using Aukerman's formula.

The major findings of the study were:
(i) Readability score of each chapter shows that each chapter differs in presentation and style.
(ii) Readability sequence of the chapters are not maintained.

(iii) Terminology used in the text-book are not explained anywhere in the book.

(iv) No. of impedilexae are big in Chapter 9 which No. of impedilexae are small in Chapter 12, 13.

Review of Researches done in past shows that not much has been done in the field of readability and comprehension in the school subjects in English medium schools in India. Some work is done to measure the readability of the text-books in Geography and Science. Looking to the craze of parents for education through English medium the children with great differences in reading abilities get admitted to the English medium schools. Therefore, the investigator has tried to measure the I.Q., Reading ability and Reading comprehension of the students of English medium schools in the present study. In order to achieve the objectives of the present study the investigator has also calculated the readability of the text-book. The most difficult chapters are made easy and a comprehension test is also constructed and standardized by the investigator.