CHAPTER - IV

RESEARCH METHODOLOGY
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4.1 Introduction
4.2 Rationale of the Study
4.3 Statement of the Problem
4.4 Background of the Research Design
4.5 Objectives
4.6 Assumptions of the Study
4.7 Hypotheses
4.8 De-Limitations of the Study
4.9 Research Design
4.10 Sampling
4.11 Variables
4.12 Definition Key of Terms
4.13 Operational Definitions
4.14 Tools of the Study
4.15 Research Process
4.16 Problems Encountered by the Researcher
4.17 Chapterization
4.1 INTRODUCTION

This chapter describes the procedure adopted to conduct the investigation. The entire chapter has been discussed under various sub-headings such as rationale for the study, statement of the problem, background of the research design, objectives formulated, hypotheses framed, sampling, operational measurement of variables, operational definitions, tools of the study, research process, techniques of data collection and statistical techniques employed therein.

4.2 RATIONALE OF THE STUDY

The major problem with low vision children is related to the fact that they are neither accepted by sighted nor by the blind. When a low vision child cannot function visually to the expectation of the sighted world, he is moved into the world of the blind. Thus one finds most of the children with low vision, in schools for the blind reading Braille but in reality they can function with residual vision in large print and sometimes in normal print. This leads to frustration which in turn is aggravated by lesser degree of social acceptance in the group of visually impaired persons.

Reading is inevitable not only in education, but is a part and parcel of every day life. Reading materials include letters and all kinds of correspondence and books for leisure, knowledge, self-development aesthetic experience etc. With the increased focus on mass media, reading is becoming increasingly important.
The role of reading in advertisements, notices, pamphlets, price lists etc. cannot be overlooked. Persons with low vision have many ways to maximize their vision. Environmental manipulation is one approach that includes making changes in regard to lighting, contrast, colour, distance and size. The use of optical devices is another approach. Optical devices are mainly used in one’s life when they are portable, appropriate and used throughout the day and for many tasks in many settings. Those who feel uncomfortable or conspicuous using optical devices in public can overcome these obstacles by working with professionals to increase their level of comfort with the devices. The use of computers is still another approach. Computers can be integrated into different life styles when they provide efficient access to the screen through such options as enlarged image and voice output.

Approaches to solving the challenges of low vision are not always clearly evident. As there is not always a single best solution for performing a visual task, one chooses from several available options. The type of visual impairment and fluctuations in vision, the level of visual stamina and the person’s self-advocacy skills are among the factors that affect these choices.

The professional who takes these factors into account in presenting the many choices available, will be able to assist the child or adult with low vision to integrate the best visual practices and adaptations effectively into his or her daily life.
The learning media assessment is the key to ensuring that students with visual impairment gain full and meaningful literacy skills. The process of selecting the learning media begins in infancy and continues throughout the student's school years and ideally, through out life.

In choosing the print medium, the educational team gathers objective data on the student's efficiency in using the senses to gain information preferences for the size of the objects and the working distances, the prognosis of the eye condition and the implications of additional disabilities. This information is used to match the student's characteristics to a specific print medium or a combination of media. The assessment phase ensures that the student learns to use a variety of print media to meet the demands of present and future environments.

A crucial decision made on behalf of a student with low vision is the literacy medium. Koenig and Holbrook (1989, 1991, 1995) suggested that educational teams gather data based on

- the student's use of visual sense for gathering information
- the student's use of the tactile or other senses for gathering information
- the sizes of objects and working distances
- the stability and prognosis of the eye condition
- the influence of additional disabilities on learning to read.

The assessment phase of print media is a safety net that ensures that each student with visual impairment continues to develop functional literacy skills.
that he or she needs for independent living and employment. It begins as soon as the initial decision is made and continues throughout the student’s schooling. If the educational system has prepared the student to be self sufficient and to serve as an advocate for himself or herself, the student should take over the process of assessing his or her literacy needs and will strive to meet them throughout life and the special educator should know the student’s reading efficiency rates, accuracy, comprehension and eye stamina of low vision child to determine whether the student reads with efficiency to complete academic tasks successfully and comfortably.

Studies on these variables had been conducted separately by many researchers. But there has been no research on reading efficiency in relation to Tamil Font. The present study focuses on the reading efficiency of children with low vision using Tamil Font.

4.3 STATEMENT OF THE PROBLEM

The selection of appropriate print media has been a primary educational issue for professionals in the field of visual impairment. The examination of low vision children’s reading efficiency in various print media allows the educational team to judge the relative effectiveness of reading regular print, large print, CCTV and computer. It also provides objective information of reading speed, accuracy, comprehension, eye stamina in Tamil print reading.

The low vision student must learn how to choose a sense or combination of senses which is needed to complete a task effectively. Low vision students
tend to use their senses they have been reinforced for using. Those with low vision may be subtly reinforced for using only vision.

The appropriate selection of print media must occur within the context of other sources of information such as clinical low vision evaluation, ophthalmology evaluation, and the administration of general achievement tests. Teachers sometimes provide students with large print, regular print without objectively documenting its value of efficiency for the students. They may believe that large print is more efficient and less fatiguing for students or can be used at a greater working distance.

The use of extensive amount of regular print materials and the limited amount of large print materials, the reliance in large print substantially restricts an individual’s access to the majority of print materials. Therefore, a procedure that helps a teacher make these decisions for individual student is most appropriate. This made the investigator to proceed to study the level of reading efficiency of low vision children in various print media.

4.4 BACKGROUND OF THE RESEARCH DESIGN

The current research poses the following questions which gives a focus and definite direction to the research.

1. What is meant by efficiency in reading?
2. How can it be evaluated?
3. Would this evaluation be useful to the low vision children?
4. How far it would be useful for special educators?
5. Does regular print with spectacles enhance reading performance in low vision children?

6. Does large print enhance reading performance in low vision children?

7. Does CCTV enhance reading performance in low vision children?

8. Does computer enhance reading performance in low vision children?

9. Does various print media affect the reading efficiency in low vision children?

4.5 OBJECTIVES

1. To find out the socio-demographic details of respondents.

2. To study the preference in use of sensory channel for children with low vision.

3. To identify the suitable Tamil Font for children with low vision.

4. To assess the reading efficiency of children with low vision using Tamil Font in various print media
   a) Regular print
   b) Large Print
   c) Closed Circuit Television
   d) Computer

5. To assess the reading efficiency of children with low vision in various dimension.
   a) Reading speed,
   b) Reading Accuracy,
   c) Reading Comprehension,
   d) Eye fatigue and Stamina.

148
4.6 ASSUMPTIONS OF THE STUDY

1. Selecting suitable Tamil print media will be beneficial for low vision children.

2. Training special educators in various print media will help them to guide low vision children in the selection of suitable print media.

3. Resource teachers in Integrated Education and Inclusive Education should adopt some strategies to select suitable print media for low vision children for better reading efficiency.

4. Reading speed of low vision children in large print and computer is high.

5. Reading accuracy of low vision children in regular print is low.

6. There is significant correlation between reading speed and reading comprehension of low vision children.

7. Level of reading efficiency of low vision children using CCTV is less.

8. As age advances reading efficiency increases correspondingly.

9. Level of reading comprehension in regular print is less for low vision children.

10. Decrease of visual acuity results in reduced reading efficiency.
4.7 HYPOTHESES

1. Boys and girls do not differ significantly in their reading efficiency.

2. Urban and rural students do not differ significantly in their reading efficiency.

3. Students from special school and integrated education do not differ significantly in their reading efficiency.

4. Children with congenital handicap and adventitious handicap do not differ significantly in their reading efficiency.

5. Students affected by central vision and peripheral vision do not differ significantly in their reading efficiency.

6. Students of classes 6\textsuperscript{th}, 7\textsuperscript{th} and 8\textsuperscript{th} do not differ significantly in their reading efficiency with regard to Regular Print.

7. Students of classes 6\textsuperscript{th}, 7\textsuperscript{th} and 8\textsuperscript{th} do not differ significantly in their reading efficiency with regard to Large Print.

8. Students of classes 6\textsuperscript{th}, 7\textsuperscript{th} and 8\textsuperscript{th} do not differ significantly in their reading efficiency with regard to CCTV.

9. Students of classes 6\textsuperscript{th}, 7\textsuperscript{th} and 8\textsuperscript{th} do not differ significantly in their reading efficiency with regard to Computer.

10. Students affected with eye problems do not differ significantly in their reading efficiency with regard to Regular Print.
11. Students affected with eye problems do not differ significantly in their reading efficiency with regard to Large Print.

12. Students affected with eye problems do not differ significantly in their reading efficiency with regard to CCTV.

13. Students affected with eye problems do not differ significantly in their reading efficiency with regard to Computer.

14. There is no significant relationship between the age of the respondents and reading efficiency in various print media
   a) Regular Print, b) Large Print, c) CCTV and d) Computer.

15. There is no significant relationship between the academic status of the respondents and reading efficiency in various print media
   a) Regular Print, b) Large Print, c) CCTV and d) Computer.

16. There is no significant relationship between the degree of impairment of the respondents and reading efficiency in various print media
   a) Regular Print, b) Large Print, c) CCTV and d) Computer.

17. There is no significant relationship between Near Vision Value of the respondents and reading efficiency in various print media
   a) Regular Print, b) Large Print, c) CCTV and d) Computer.

18. There is no significant relationship between suitable Print Size and reading efficiency of the respondents in various print media
   a) Regular Print, b) Large Print, c) CCTV and d) Computer.
4.8 DE-LIMITATIONS OF THE STUDY

1. This investigation was confined to children with low vision studying in middle schools.

2. This investigation was confined only to children with low vision studying in special schools and integrated schools.

3. The study was limited to the selected samples from selected institutions in Tamil Nadu for the visually impaired.

4. Non-availability of standardized tools in the limited context for eliciting information from the research subject.

5. Lack of relevant literature on reading efficiency of low vision in Tamil Print.

4.9 RESEARCH DESIGN

The research design gives holistic structure of the research procedure. It provides planning on selection of subjects, data gathering devices and data analysis techniques in relation to objectives of research.

Designing is a preliminary step in every activity. "A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure".

Research design is a catalogue of various phases and facts relating to the formulation of a research effort. It is the over all operational pattern or framework of the study that stipulates what information is to be collected, from which sources and by what procedures (Saravanavel, 1991).
The present investigation is based on descriptive research and carried out on survey method. Descriptive research studies are those which are concerned with describing the characteristics of a particular individual, or of a group.

The survey is an important type of study which involves a clearly defined problem and definite objectives. It requires expert and imaginative planning, careful analysis and interpretation of the data gathered and logical and skillful reporting of the finding.

In the present study the researcher has attempted to portray the reading efficiency of children with low vision in various print media namely regular print, large print, closed circuit television and computer. The study focuses on the above mentioned variables with detailed numerical description for a systematic and precise measurement using statistical analysis. The relationships and association of variables upon which hypotheses were formed has also been attempted (Royle Singleton, Bruce C. Straits, Margret M. Straits and Ronald J. Mc. Allister, 1988). A descriptive design has been adopted for the present study. In this present investigation, the researcher conducted the survey in two phases to collect data from the same section of respondents.

4.10 Sampling

Sampling, a very vital step in any research endeavour, is the selection of some part of an aggregate or totality on the basis of which a judgement or inference about the aggregate or totality is made.
In the present research exercise, the purposive sampling technique was employed to select the samples for the study.

To ascertain information on the selection of print media for children with low vision, the researcher at random chose 10 special schools out of 20 institutions and 95 integrated education programmes out of 250 institutions working for the visually impaired in the state of Tamil Nadu.

Subsequent to this exercise, the researcher noted the population of the visually impaired children in these 20 special schools and found that there were 1500 visually impaired children and in 250 integrated education programmes 1285 visually impaired children with varying degrees of visual loss. As a result, the researcher studied the reading efficiency among 150 visually impaired children (40 from special schools and 110 from integrated education programme) in middle school spread over 105 institutions.

As a result, the investigator had employed descriptive design. The design is depicted as following:

Use of sensory channel → Reading Preference Test → Selection of suitable Tamil Font → Test for Reading Efficiency

Hence the investigator administered a test to measure that the child uses vision as the primary sensory channel and hearing and touch as the secondary channel. The investigator used this test with 350 low vision children and identified only 260 children using vision as the primary channel.
Then they were given reading preference test to know the reading preference of a low vision child before selecting the print media. The investigator used this task with 260 children and identified only 150 children as independent readers.

Then the researcher used various styles of Tamil Font size - 18 point to find out the suitability for the low vision children.

The researcher used Test for Reading Efficiency to study their reading speed, accuracy, comprehension, fatigue and stamina using regular print, large print, closed circuit television and computer. Then in short, by employing the purposive sampling technique a total number of 150 children with low vision were chosen as samples for the study.

4.11 VARIABLES

The present investigation is an attempt to determine "An Analysis of Reading Efficiency of Low Vision Children in various Print Media" and to estimate the extent of relationship between selected variables.

a) Independent Variables:

- **Age**
  - Students of 11, 12, 13 years have been chosen.

- **Sex**
  - The study was conducted with both male and female students.
➢ Economic status - Annual income below Rs. 11,000/- is considered low and above Rs. 11,000/- is high.

➢ Academic performance - Average marks scored by the student in the last two exams.
  0 – 35%           - low
  36% – 50%         - average
  51% – 70%         - good
  71% and above     - v.good

➢ Causes of Eye Problems - Glaucoma, Corneal conditions and disorders of lens, neuro problems, retinal conditions and refractive errors.

➢ Native Background - Urban, Rural

➢ Type of School - Special school, Integrated Education Programme

➢ Onset of condition - Congenital – A condition that is present at birth or during the first five years of life.
  Acquired – A condition that is present after birth.

➢ Print Media - Regular print, Large print, Closed Circuit Television and Computer
b) **Dependent Variables:**

- Reading speed,
- Accuracy,
- Reading Comprehension,
- Eye Fatigue and Stamina

4.12 **DEFINITION OF KEY TERMS:**

**NORMAL VISION**

A person with normal vision is able to perform all close and distant visual tasks that normally is expected in his community.

**VISUAL IMPAIRMENT**

It is the reduced vision caused by eye disease, accident or by a condition present from birth.

**TOTALLY BLIND**

Totally blind individuals use their tactual and auditory senses to acquire information about their environment. These individuals do not receive meaningful input through the visual sense.

**FUNCTIONALLY BLIND**

Functionally blind is a term used to describe those individuals who can use their available vision to some limited degree (to sort color or to determine the presence of a light source), but who primarily acquire information about the environment through their auditory and tactual senses.
LEGAL BLINDNESS

Legal Blindness is a term that refers to individuals whose central visual acuity, when measured in both eyes and when wearing corrective lenses, is 20/200 or who has a visual field of no more than 20 degrees.

LOW VISION

The recent WHO definition, defines a low vision person as 'A person with low vision is one who has an impairment of visual function even after treatment and or refractive correction and has a visual acuity in the better eye of less than 20/60 to light perception or a visual field less than 10 degrees from the point of fixation but who uses or potentially is able to use vision for the planning or the execution of the tasks.

It should be noted that this new definition has combined the classification of low vision and blindness (20/60-PL). This suggests that people with very gross visual abilities should not be thought of as blind.

RESIDUAL VISION

As used in this study residual vision is defined as any degree of vision, which though not describable in numerical terms could be clinically described as light perception, object perception or counting fingers and was sufficient to make the individual to discriminate and recognize visually suitable materials within his low vision range.
FUNCTIONAL VISION

This refers to the use of vision for a particular purpose. Even small amount of vision can be useful, for example, to recognize a person close up, or to recognize objects. The use made of vision depends on a person's experiences and can vary with different conditions. Functional vision may be improved with refractive correction, low vision devices or instruction in the use of vision.

FIELD OF VISION

Field of vision, or visual field is the entire area of which an individual is visually aware when that individual is directing his or her gaze straight ahead.

TUNNEL VISION

Tunnel vision occurs when an individual's visual field is reduced significantly so that only a small area of central visual acuity remains. The affected individual has the impression of looking through a tunnel or tube and is unaware of objects to the left, right, top, or bottom. A person with tunnel vision may be able to read small print but is considered severely visually impaired because of the difficulties associated with safe travel and locating objects in the environment.

VISUAL EFFICIENCY

Visual efficiency has been defined by Barraga (1983) as the "most inclusive of all terms – visual acuity at a distance and at near range, control of eye movements, accommodative and adaptive capabilities, the visual
mechanism, speed and filtering abilities of the transmitting channels and quality of processing ability of the brain are all related to visual efficiency.

LOW VISION DEVICES

These are optical or non-optical devices. Optical devices magnify the size of objects for distance and near tasks. Optical devices may be called magnifiers or magnifying glasses. Non-optical devices such as a reading stand help to make objects easier to see.

4.13 OPERATIONAL DEFINITIONS:

EFFICIENCY

Efficiency is transformation of inborn / innate qualities and concealed / hidden strength of the individual into application (utility).

READING EFFICIENCY

Acting or operating effectively to apprehend the meaning of by perceiving the form and relation of the printed or written characters.

READING SPEED

It is the ability of the child to read the number of words per minute.

READING ACCURACY

The number of words which is expected to be read without substitution, addition, omission and deletion from the text taken.
READING COMPREHENSION

From the given passage for reading, five questions were asked and out of five the number of questions answered was recorded.

READING MEDIUM

Reading medium is a term used to describe the format(s) preferred by people who have visual impairments to access written materials and generally refers to print, large print, or Braille.

PRINT MEDIA

An impression made by type or plates that have been inked in an instrument or means by which something is accomplished.

REGULAR PRINT

Confirming to a fixed or proper procedure an impression made by type or plates that have been inked.

LARGE PRINT

Book printed with bold types with high contrast, specially for partially sighted.

CLOSED CIRCUIT TELEVISION

Closed Circuit Television have a movable platform for book or paper, a video camera with zoom lens, and a large screen video display – set up as a complete system on a desktop. The CCTV facilitates comfortable reading and writing at a desk, by people with very poor visual acuity (typically in the range
20/200 to 20/2000). Some models can be set for any degree of magnification from 2x to 40x or even 60x. Most desktop systems display images magnified, in full color on screen sizes from 17 to 21 inches, diagonally. Some portable models are also available, most with smaller displays and without color.

COMPUTER:

An electronic machine capable of accepting data, manipulating or performing arithmetic functions such data at high speed and showing or printing the results.

ERRORS IN READING

a) SUBSTITUTIONS

The reader substitutes words which look the same (house for home; guess for guest): There is a great deal of wild, meaningless guessing (bus is called biscuit). One reason why this occurs is that the child focuses only on the initial-part of the word and ignores the rest. It may be that the child is over-relying on configuration cues and ignoring the context. He probably has a poor sight vocabulary and inadequate word-recognition and decoding skills. Mispronunciation which is also a form of substitution, could be the result of poor auditory discrimination, undetected hearing or vision defects, poor syllabification and phonics skills. Some children feel they have to read very fast without interruptions and so they substitute any word that they can think of, rather than trying to analyze the word and the context.
b) **OMISSIONS**

The reader omits letters (for example belt/bet) or whole words when reading. Generally, it is the middle and end part of a word that is omitted, so the child's attention must be directed to special features of the word.

c) **REPETITIONS OR REGRESSIONS**

A child frequently repeats words because he cannot make sense of the meaning or is embarrassed and nervous when reading. The end result is a very slow, erratic rate of reading. Regressions occur generally because the child feels a need to verify what was read, he missed the meaning in the sentence, or there is lack of confidence.

d) **ADDITIONS AND INSERTIONS**

The child inserts a letter/s where not required (play / played) or a syllable (care/careful). This happens because he fails to follow the context, is unable to identify the words quickly, or fails to comprehend the meaning of what he is reading.

4.14 **TOOLS OF THE STUDY**

(i) Use of Sensory Channels : Observation Form (A.J. Koenig, and M.C. Holbrook, 1985).

(ii) Reading Preference Test (M.N.G. Mani)

(iii) Test for Reading Efficiency (Developed by the Investigator)
4.15 RESEARCH PROCESS

The research process involving the selection of samples, formulation and administration of tools and the collection of data was accomplished in 2 phases. The various steps in the two phases of the research process is represented below.

![Research Process Diagram]

<table>
<thead>
<tr>
<th>S. No.</th>
<th>PHASE – I</th>
<th>PHASE – II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Study of low vision children</td>
<td>Study of Reading Efficiency of low vision children</td>
</tr>
<tr>
<td>1.</td>
<td>Preparation and use of sensory channel checklist</td>
<td>Preparation of reading material – Test for Reading Efficiency in regular print</td>
</tr>
<tr>
<td>2.</td>
<td>Selection of institutions for the visually impaired</td>
<td>Development of reading material in large print</td>
</tr>
<tr>
<td></td>
<td>a) Special Schools</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Integrated Education Programme</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Administration of the checklist</td>
<td>Development of reading material for CCTV</td>
</tr>
<tr>
<td></td>
<td>a) Pre-Testing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Format of the final checklist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d) Reliability of the checklist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e) Validity of the checklist</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Selection of suitable Tamil Font for low vision</td>
<td>Preparation of reading material for Computer</td>
</tr>
<tr>
<td>6.</td>
<td>Administration of Tamil Font for low vision</td>
<td>Administration of Test for Reading Efficiency</td>
</tr>
<tr>
<td></td>
<td>a) Pilot Study</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Administration of Reading Preference Test</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Selection of low vision children</td>
<td></td>
</tr>
</tbody>
</table>
PHASE – I

PREPARATION OF USE OF SENSORY CHANNEL CHECKLIST

The investigator administered a test (Figure – 7) to measure that the child uses vision as the primary sensory channel and hearing and touch as the secondary channels. The primary channel is marked with boxes, and the secondary channel with circles. Those with low vision may be subtly reinforced for using only vision. Students with low vision hesitate to explore objects tactiley, perhaps because they perceive that they should “look but not touch” as a result of the over emphasis on the use of vision as part of visual efficiency training. However to use their vision efficiently, students must learn how to choose a sense or a combination of senses to complete a task efficiently.

<table>
<thead>
<tr>
<th>Student</th>
<th>Murugesan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting / Activity</td>
<td>Language and O &amp; M Lesson</td>
</tr>
<tr>
<td>Date</td>
<td>26.09.2003</td>
</tr>
<tr>
<td>Observer</td>
<td>Mrs. P. Nagalakshmi</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Observed Behaviour</th>
<th>Sensory Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>V</td>
</tr>
<tr>
<td>Located desk</td>
<td>V</td>
</tr>
<tr>
<td>Reached for recorder</td>
<td>V</td>
</tr>
<tr>
<td>Switched on plug-in-strip</td>
<td>V</td>
</tr>
<tr>
<td>Gathered papers together</td>
<td>V</td>
</tr>
<tr>
<td>Walked to reading circle</td>
<td>V</td>
</tr>
<tr>
<td>Glanced around room</td>
<td>V</td>
</tr>
<tr>
<td>Put on glasses</td>
<td>V</td>
</tr>
<tr>
<td>Looked at book</td>
<td>V</td>
</tr>
</tbody>
</table>

165
<table>
<thead>
<tr>
<th>Observed Behaviour</th>
<th>Sensory Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Took off glasses</td>
<td>V T A</td>
</tr>
<tr>
<td>Listened to story</td>
<td>V T A</td>
</tr>
<tr>
<td>Stared at overhead light</td>
<td>V T A</td>
</tr>
<tr>
<td>Clapped hands</td>
<td>V T A</td>
</tr>
<tr>
<td>Identified parts of cane</td>
<td>V T A</td>
</tr>
<tr>
<td>Located office</td>
<td>V T A</td>
</tr>
<tr>
<td>Walked in straight line</td>
<td>V T A</td>
</tr>
<tr>
<td>Waved at friends in hall</td>
<td>V T A</td>
</tr>
<tr>
<td>Turned corner</td>
<td>V T A</td>
</tr>
<tr>
<td>Looked behind self</td>
<td>V T A</td>
</tr>
<tr>
<td>Went to office door</td>
<td>V T A</td>
</tr>
<tr>
<td>Located office number</td>
<td>V T A</td>
</tr>
<tr>
<td>Shook hands with teacher</td>
<td>V T A</td>
</tr>
<tr>
<td>Examined poster on bulletin board</td>
<td>V T A</td>
</tr>
<tr>
<td>Located specific room number</td>
<td>V T A</td>
</tr>
<tr>
<td>Located drinking fountain</td>
<td>V T A</td>
</tr>
</tbody>
</table>

- **Probable Primary Channel**: Visual
- **Probable Secondary Channel(s)**: Tactile and auditory

**Figure 7**: Use of Sensory Channels – Observation Form
SELECTION OF INSTITUTIONS FOR THE VISUALLY IMPAIRED

Subsequent to the formulation of the checklist, the researcher studied the reading competency of low vision children in various print media. To accomplish this objective, the researcher referred the Directory of Institutions for Visually Impaired published by Summary of Survey Findings Report No.485, Disabled persons in India, July-December 2002 and collected the addresses of various institutions. Totally there are 20 special schools for the visually impaired in Tamil Nadu. However, the researcher chose to confine the study within her home state and selected the samples from 105 institutions in Tamil Nadu. Inclusion of all the 270 institutions (both special schools and integrated education programmes) for the study was not possible due to distance and operational difficulties and moreover children in middle schools with low vision who can also be considered as independent readers were very few. Hence the researcher employed purposive sampling to select 10 special schools from 20 schools and 95 integrated education programmes from the 250 institutions. The researcher was careful to select only those institutions that catered to the special needs of low vision children. In the state, the institutions were selected from 5 districts spread over as follows:

- 2 Institutions from Chennai
- 4 Institutions from Madurai
- 30 Institutions from Coimbatore
- 12 Institutions from Cuddalore
- 4 Institutions from Karur
14 Institutions from Kancheepuram
1 Institute from Tiruchirappalli
1 Institute from Tirupathur

The names of the list of institutions are kept confidential respecting the ethical sentiments of the research subjects and also to thwart attempts that would spoil the reputation of the institutions.

The researcher has maintained confidentiality of responses and this was made known to the low vision individual and list of teachers in the rapport building exercise. Further data collection was made in due privacy, involving the subject and the researcher. There was no mention of the name of the subject, the institution they hail from or their problems individually.

The researcher had also ensured that the collected information will not be utilized for any paper presentation / publication of any form before submission of the doctoral thesis.

**ADMINISTRATION OF THE CHECKLIST (USE OF SENSORY CHANNELS)**

The documentation of a student’s use of sensory channels is the most basic procedure to make a decision on the student’s initial print medium. This procedure involves sampling a student’s behaviour in selected settings, noting specific behaviours that he or she demonstrate, and judging whether the student uses vision, touch or hearing (or any combinations) to perform each behaviour.
During an observation, each discrete behaviour that the student demonstrates is recorded in the order in which it occurred. Since this procedure samples the student's behaviour, it is important to determine that the behaviours that are noted are truly representative of the entire observation period. When a student engages in a continuous behaviour, this behaviour is recorded once and the other unique behaviours within the continuous behaviour were recorded.

After each behaviour was recorded, the investigator made an immediate professional analysis as to whether the student used visual, tactile or auditory information to perform it. Figure - 7 presents a coded observation of a 6th standard student with microphthalmia. If subsequent observations were consistent with this one, then it may be concluded that the child uses vision as primary sensory channel and hearing and touch as secondary channels. The primary channel is the one that has been most consistently marked with boxes, and the secondary channel with circles. The observation form is appended as Appendix – 1.

a) PRE-TESTING

Pre-testing the data collection instruments is indeed a vital step in the investigative procedure. This testing procedure prevents one from difficulties of comprehension, amplification and invalidity of questions.

In this study, the use of sensory channels - observation form consisting of 26 items was pre-tested. The draft items were administered randomly to the low vision children in 105 selected institutions for the visually impaired. The subjects
were carefully chosen based on the use of vision as primary sensory channel for information.

The procedure described in this section will document that vision is the primary sensory channel because it does not yield data on efficiency. Necessary modifications were made in certain items before the actual try out was done on certain items not feasible in classroom situation. This test was tried out on a sample of 350 low vision children studying from 6th to 8th standard. Only 260 samples out of 350 was selected carefully to represent the sample for the next step. These 260 sample scored above 90% in use of sensory channels — observation form.

b) FINAL STRUCTURED OBSERVATION FORM

The use of sensory channel observation form was ultimately formulated. The finally structured form comprised of 24 items grouped under 2 dimensions as follows:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Aspect / Dimension</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Class room</td>
<td>12</td>
</tr>
<tr>
<td>2.</td>
<td>Orientation and Mobility</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>

The observation form finally was constructed pre-cautiously incorporating the following steps:

- To collect clear unambiguous opinions
- To include comprehensive students
- To enable respondents to respond appropriately to all the items in the schedule
c) RELIABILITY OF THE OBSERVATION FORM

Determining the reliability of the data gathering tool is indeed the most important step in a research exercise.

There are several methods in research to calculate the reliability of tests, they include,

- Kuder Richardson estimates
- Test – retest reliability
- Split-half reliability
- Alternate or parallel form reliability

Split-half method was used in the present study to test the reliability of the test because this method is considered to be one of the best methods through which the data for computing reliability are obtained by one testing.

Employing the split-half method, the test was divided into two equivalent halves and the test items were grouped to be odd and evenly numbered. **Reliability co-efficient of the test is 0.843.**

d) VALIDITY OF THE OBSERVATION FORM

A tool should intentionally measure what it is supposed to measure, only then it is considered to be valid. In this study, the seven dimensions of the observation form was scrutinized and was found to satisfy content validity, item validity and intrinsic validity.
i) Content Validity

Determining the validity of the test contents is indeed a most important aspect of a research endeavour. Content validity of a research tool has to be established because inferences can be made on this basis. The test items were formulated after extensive reviewing of related literature and also after due consultation with field experts. Based on the experts’ comments and suggestions, suitable changes were made and the tool was made contently valid.

ii) Item Validity

Item analysis was employed and invalid items were discriminated and only valid items were retained.

iii) Intrinsic Validity

The intrinsic validity of items in the use of sensory channel checklists was found out and the intrinsic value of co-efficients are given below:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Dimensions</th>
<th>Intrinsic Validity</th>
<th>Whole Test Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Class room</td>
<td>0.76</td>
<td>0.87</td>
</tr>
<tr>
<td>2.</td>
<td>Orientation and Mobility</td>
<td>0.74</td>
<td>0.86</td>
</tr>
</tbody>
</table>

The coefficient of intrinsic validity is high and it indicates the validity of the checklist.

SELECTION OF SUITABLE TAMIL FONT FOR LOW VISION

To start with, the investigator reviewed pertinent literature relating to visually impaired and also contacted and got in touch with ophthalmologists,
special educators, resource teachers, low vision experts, parents and others working and living with them and enquired the issues, problems and areas of concern for the low vision. Of all the issues discussed, the area of selection of suitable print style was indeed crucial and was felt to be the area which needed immediate attention and intervention.

To find out the suitable Tamil Font to use in various print media, the investigator initiated steps to formulate content. The researcher reviewed and extensively studied about the APHont. Keeping this as guidance many items from Tamil Font were selected. Besides these items, the investigator also went through related studies and discussed with special education experts on typography of Tamil Font used by low vision children. Different types of Tamil Font were categorized and a final Tamil Font suitable for low vision children was developed.

The final list comprised of 5 various Tamil Fonts namely Tamil007, Tamil017, Tamil039 developed by Ashish (Indian Fonts, (c) Cyber Multimedia (India) LTD., Moolam and Ganeshaw developed by R. Kalaimani. These Fonts were selected based on even spacing between letters, no scripts, widen letters, bold letters. They were sent to leading experts and field facilitators. Their valuable suggestions and ideas were obtained and accordingly suitable changes were made.
ADMINISTRATION OF TAMIL FONT FOR LOW VISION

A pilot study was conducted in a local institution consisting of 50 low vision children. Material using 5 different Tamil Fonts namely (Ganeshaw, Moolam, Tamil007, Tamil017, Tamil039) were given to the students to find out their preference and their reading efficiency. It was found that more than 90% of the students preferred Tamil007 Font. Reading material is appended in Appendix – 2.

Figure 8 : Distribution of Respondents based on Preference of Tamil Font
ADMINISTRATION OF READING PREFERENCE TEST

The test has 25 test items, some of them gave an objective response whereas some are qualitative in nature. Therefore interpretation of the responses of the child cannot be made only on the basis of quantitative measures. The items 24 and 25 are seeking additional information regarding the use of residual vision and therefore, there is no specific score assigned. The interpretation is made on the basis of the scores for the items 1-23 and also on the basis of the responses for the items 24 & 25. The maximum score that can be obtained in assessment is 30, whereas the minimum is zero. The reading preference test for children with low vision is appended as Appendix-3.

This test was administered on a sample of 260 low vision children of which 170 were selected carefully for the final study. These samples were chosen from 105 different institutions across the state. The scores of samples included for this study are given in the following figure.

![Performance of the Respondents in Reading Preference Test](image_url)
SELECTION OF LOW VISION CHILDREN

The sample for the study were selected based on use of sensory channel checklist and reading preference test. Children who had read 60 words per minute in the reading preference test were selected for the final reading efficiency inventory. The children were chosen from 10 special schools and 95 integrated education programmes in Tamil Nadu who were studying in middle schools.

Thus, the researcher selected only 170 low vision children and administered the reading efficiency test to find out their reading efficiency using Tamil Font in various print media.

PHASE – II

The second phase of the research study comprised of full fledged reading efficiency study with the low vision children using regular print, large print, closed circuit television and computer. It refers to the scale devised by the researcher to measure the visual efficiency of low vision children and the dimensions of reading speed, accuracy, comprehension and eye fatigue and stamina. These dimensions are reflective of reading efficiency of low vision children. To achieve this object the following steps were incorporated in Phase – II.

(i) A PROCEDURE FOR DOCUMENTING READING EFFICIENCY

Prior to the formulation of reading materials, the researcher extensively reviewed pertinent literature and also met a number of low vision experts and ophthalmologists and explained to them the objectives of the study. Incorporating
their suggestions, the researcher proposed to devise the assessment areas into 4 broad dimensions and these 4 dimensions were tested in four print medias.

The researcher selected a passage from a textbook prescribed for the particular class of the child. A passage of 250 words were selected for testing students from 6th, 7th and 8th standard. The passage was new to the child; in this manner the effect of familiarity in reading speed was controlled. Students were asked to read the passage orally using the stop watch. The time taken by the student to read was recorded in seconds.

The rate of reading was calculated as follows:

\[
\frac{\text{Number of words in passage}}{\text{Number of seconds spent in reading}} \times 60 = \text{wpm}
\]

**READING SPEED**

The oral reading rates were then calculated for the reading episode in each medium. The working distance was calculated in the reading episode.

**ACCURACY**

While reading a passage the frequency of the following errors were observed and noted in the following areas:

a) Substitution

b) Omission

c) Repetitions or Regressions

d) Additions or Insertions
READING COMPREHENSION

Thus the researcher asked the 5 comprehension questions for each passage and scored the student’s responses.

EYE FATIGUE AND STAMINA

Six factors were isolated as commonly reported symptoms of eye fatigue. They are avoidance, tiredness, sore eyes, blur loss of concentration and headache. Children were asked to inform the researcher when they feel one of these symptoms.

(ii) RELIABILITY AND VALIDITY OF THE TEST FOR READING EFFICIENCY

The content validity was done by the critical analysis done by the experienced special educators. The reliability of the tool was established by Test retest method. It was found to be 0.864 which was established.

(iii) PILOT STUDY

The researcher undertook the pilot study to ascertain the feasibility of conducting the research. Visits were made to thirty respective schools (Government Special Schools and Integrated Education Programmes) to obtain permission from the Headmasters to conduct the study with the students in their school. The purpose and need of the study had to be explained to school authorities, regular teachers and resource teachers. During the subsequent visits permission was sought from the various heads of schools and their suggestions and opinions were also incorporated regarding the usefulness of the study to the
visually impaired children. Based on the sample size and mode of data collection, data were finalized for data collection.

(iv) PRE-TESTING

This test was tried on a small sample of 20 respondents (30 schools from 2 districts). In the personal details questionnaire, the researcher, based on the responses of the students, made minor changes. The total time to read the passages in four print media was found to be approximately 4 hours for each student. The final form of the test and the data collection process was prepared accordingly.

The reading efficiency aspects that were designed under 4 broad areas were devised after formal meeting with authorities involved in training low vision children. The following criteria have been laid down for the selection of reading passage.

- keeping the language of the paragraph simple, clear and according to their level
- avoiding overlapping of concepts
- selection of paragraphs in Tamil Font.

The pre-test sample frame was drawn based on the result of Test for Reading Efficiency. The test was tried on a sample of 20 respondents. The total time taken to read the regular print was found to be minimum one hour for each student depending on visual acuity.
(v) DATA COLLECTION

The final version of the test was administered to the sample of 150 respondents (from 10 special schools and 95 integrated education programmes) which did not include the respondents from the pilot study. The respondents from each of the schools were separately grouped based on their standard, visual acuity and met during the allocated dates and times.

The aim of the study and the reading mode was briefly explained to them and they were assured about the confidentiality of their responses, and they were then administered the test. Data collection was carried out between August and December 2003.

(vi) STATISTICAL MEASURES APPLIED

The end result of the data collection is the accumulation of raw data in a quantitative form. Such data were then summarized and subjected to statistical analysis. Standard scoring procedure was adopted and data was analyzed statistically by using the SPSS (Statistical Package for Social Sciences).

The statistical design comprised of the frequency distribution, mean, quartile and standard deviation, 'Z' test, 'F' test, Karl Pearson's coefficient of correlation.

The 'Z' test was used to assess the statistical difference between two mean scores of the population having quantitative measures namely sex, native background, type of school, on set of condition and field of vision.
The ‘F’ test or analysis of variance is used to find out the variance within groups and the variance between groups namely the various standards, eye problems.

Pearson’s product movement correlation co-efficient is used to find out the relationship between independent and dependent variables quantitative in nature namely age, academic status, degree of impairment and near vision value.

4.16 PROBLEMS ENCOUNTERED BY THE RESEARCHER

1. Some of the students took longer time to read the passage. The reading method had to be explained in detail.

2. Assembling the required sample of students from each school in a particular place took time and invariably the researcher had to take permission for extra time to explain the method to use closed circuit television and computer. This took a longer time for the children to practice.

4.17 CHAPTERIZATION

The first chapter focuses on the problem area of the study. It provides a brief description of the problems faced by low vision children in reading. The second chapter highlights the review of literature related to the various print media.

The third chapter describes the conceptual frame work related to the reading efficiency of low vision children in various print media.
The fourth chapter describes the methodology adopted in the study and includes aspects such as the research design, tools of data collection and statistical design.

The fifth chapter deals with the analysis of data and its interpretation. The final chapter concludes with a summary of the research study. It contains the major findings of the study. Suggestions for reading efficiency for low vision children for future research have been offered.