APPLICATION OF NEMETH CODE FOR LEARNING MATHEMATICS AMONG STUDENTS WITH VISUAL IMPAIRMENT

Submitted by

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(Reg.No.20PSE003)

Under the guidance of

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A THESIS SUBMITTED TO THE

AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN

COIMBATORE-641043

INPARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF EDUCATION SPECIAL EDUCATION

(VISUAL IMPAIRMENT)

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CERTIFIED AS ABONAFIDERESEARCH WORK

Signature of the Head of the Department	**Signature of the Dean of the Faculty**	**Signature of the Guide**

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CHAPTER 1

INTRODUCTION

"Without Mathematics, There's nothing you can do. Everything around you is Mathematics. Everything around you is Numbers ".

- SHAKUNTALA DEVI

1.1.0 INTRODUCTION

Education is essential for human beings. It is not only for normal peoples. Early days most of the persons with visual impairment not get educational opportunities properly. Then Government gives educational opportunities for all persons with disabilities. There is lot of provisions and concessions are provided by government for persons with disability. Several type of vision loss children are needs different educational needs. In addition, persons with similar degrees of vision loss may function very differently. So provide various facilities in their educational purpose. Visually impaired people might look at things in a different way, but seeing is in the perception of them. The persons with visual impairment learning the knowledge through touching, listening, smelling, tasting, moving, and using whatever vision they have. Persons with visual impairments can surely learn and do learn well, but they lack the easy access to visual learning that sighted children.

Vision is the one of our five senses. When a person loss their vision they delayed in developing wide range of skills. Persons with visual impairment students are those who have lost their sight to the extent that they cannot find their way in a place that is unknown to them without being guided.

1.2.0 CONCEPT OF MATHEMATICS

In Education, Mathematics is a basic subject. It is one of the subjects in class room learning. It is a challenging subject for blind and visually impaired students because it requires specialized instruction to meet their unique accessibility needs. The visually impaired students are facing many challenges in learning mathematics. So mathematics devices are developed for learning mathematical easy way for visual impairment students. The devices are Braille, Abacus, Taylor frame, Geo board, Geometry kit etc. These devices are give knowledge about various mathematical concept and skills.

Students with visual impairments require a thorough understanding of mathematics to function in today's society. Mathematics is present in all aspects of our daily lives. Students with visual impairments are able to learn math with the support of a variety of teaching/learning strategies and tools for access and concept development (Smith, 2017). As mathematics is often visual or spatial in nature, it is essential for students with visual impairments to have ample opportunities and time to develop these mathematical concepts. Mathematical aids such as the abacus, talking graphing calculator, tactile graphics and accessible manipulative can be used to support math learning for students with visual impairments. Introduce the abacus in a systematic way to promote speed and accuracy in performing calculations.

1.3.0 CONCEPT OF THE BRAILLE

Early Braille education is vital to literacy and education among the persons with visual impairment. It consists of Braille symbols is called Braille cell. The each cell are arranged 6 dots in a rectangle shape. In each cell has 2 columns and 3 rows dots. Braille can be written using various devices such a slate and stylus, a Braille writer and an electronic Braille. Some devices are with the use of computer connected to a Braille embosser. There is a variety of electronic devices that serve the need of persons with visual impairment such as Braille e-books and refreshable Braille displays that use different technology for transmitting Braille in graph pictures, maps and texts etc. Braille is a system of reading and writing by touch used by persons with visual impairment.

In Braille one of the important skill is that Braille users ability to create smooth and even pressures when running ones finger along with the words. There are different kind of styles, methods and techniques used for the understanding and development of Braille. In addition some letters punctuations and contractions also include in the Braille writing.

1.4.0 USAGE OF BRAILLE TO VISUAL IMPAIRMENT STUDENTS

The persons with visual impairment are using Braille for their learning in various aspects. So the Braille is very effective method of learning for who are blind or who are Low Vision. Sometimes low vision children may not use Braille. But visually impaired children should be use Braille in their learning. This only gives foundation of their learning and day to day learning also. Braille is key to a visually impaired child's reading and writing skills, enabling them to master the rules of spelling, punctuation,

grammar in a script created for them to access text, mathematics, music, and other information.The benefits of Braille also make it evident that technological devices should be used to enhance Braille learning and use, not to replace it.

Braille is a learning system. Louis Braille developed the Braille system for visually impaired. It raised dots that can be used by who are blind or low vision. It is also reads and writes by visual impairment students. Braille is used by many visually challenged persons in all over world with their native language and gives literacy for all. It is not a language. It's a code by which much Language like English, Spanish, and Arabic may be written and read. Braille is formed with space it is called Braille cells. It consists raised six dots arranged in two parallel rows each having three dots. The dots positions are identify by numbers 1 to 6. There are 64 Braille combination are possible. Here different kinds, of contraction also available in the Braille it means more than 180 contractions

A person who can read Braille can be run a life independently among the community. For visually impaired, Braille is used in every day Communication. Person who read and writes Braille correctly, their learning is good at many academic levels. So Braille brings sight for visually impaired students. Learning to Braille read and writes are very challenging and also its take more time and practice.

1.5.0 BRAILLE NEMETH CODE

According to the Abraham Nemeth,The Nemeth Braille Code for Mathematics is a Braille code for encoding mathematical and scientific notation linearly using standard six-dot Braille cells for tactile reading by the visually impaired. The Nemeth Code was first written up in 1952. With Nemeth code, one can render all mathematics and technical documents into six- dot Braille.

Braille including expressions in these areas, such as Arithmetic, Column arithmetic including carrying and borrowing , Long division, Algebra, Geometry,Trigonometry, Calculus.

1.6.0 USAGE OF NEMETH CODE TO STUDENTS WITH VISUAL IMPAIRMENTS:

Student with visual impairment to understand the concept of Nemeth Code plays major role to access Mathematics. Nemeth Code is a special type of Braille used for math and science notations. It was developed in 1946 by Dr. Abraham Nemeth as part of his doctoral studies in mathematics. In 1952, the Braille Authority of North America (BANA)

accepted Nemeth Code as the standard code for representing math and science expressions in Braille.Effective use of Nemeth code makes student with visual impairment to learn all Mathematical concepts. Nemeth Code is a special type of Braille used for math and science notations. The Nemeth Code provides a conceptual framework for the blind. Its use in transcribing into Braille and solving higher mathematical equations and scientific notations. It also uses many linear format, spatial arrangements and special symbols to convey the meanings for persons with visual impairment.

Although visually impaired students have benefited from talking calculators, the abacus is still very often taught to these students in early grades, both in public schools and state schools for the blind. Blind students also complete mathematical assignments using a Braille writer and Nemeth code. Recently many more Nemeth code materials are available. Thus, the student may be able to write Nemeth code faster. Nemeth code is a type of Braille used for math and science notation for children with visual impairment. It provides mathematical problems to transcribing into Braille in solving higher mathematical equations. Nemeth code used in six dot cells. The Braille readers use the Nemeth code when they in math class.

The Nemeth code is easily understand the all mathematical equation for visual impairment. In Nemeth code the numbers are written by number sign so the students know the numbers easily. There are many rules about how to write Nemeth code properly. The students not only learn how to do math and also they know reading and writing it Braille too. Nemeth code access is provides solution of the all mathematics problem in various level. Nemeth code is essential for accessing all grade levels mathematics and who are blind and low vision. Through Nemeth code, students are easily build their mathematics problems. The Nemeth code helps to develop mathematics ability including achievement in math concepts. The student ability to think critically. Through this support student to acquire and new skills and learn Braille symbols. Nemeth is transcribed all mathematical or chemical formulae in Braille easily.

1.7.0 IMPORTANCE OF THE BRAILLE READING AND WRITING

Braille literacy is very important for who are blind and low vision students. So everyone should learn Braille read and write. Many of the studies shows that Braille read and write are not only improve their Braille literacy it is correlated their academic achievement and employment among visual impairment.A person who reads Braille can

live independently among the community as Braille increasingly is showing up everywhere and every time.

To read without Braille, a person who is blind is entirely dependent on computers, audio recording. Literacy is vital role in career, education and quality of life in present world.

Some of the importance of Braille read and write to Students with visual impairment

- To able to understand the concept development in all subject
- To develop independent learning
- To develop eye hand coordination
- To develop academic and non academic learning
- To develop self confidence

Braille allows reading and writing skills to be developed. Because literacy is based on the ability to read and write, Braille is the only media available for obtaining literacy for people who use their tactile sense as the primary means of gathering information. Braille allows the student who is functionally blind to have the same "written" information in the classroom as sighted peers. Braille allows for instruction in correct written language usage such as structuring sentences, spelling, formatting paragraphs and editing. Braille allows the selection of a book for the pleasure of reading independently at any time or place without additional equipment.

Some of the benefits of learning Braille for visually impaired students

- Develop communication skill
- Use residual vision
- Become literate
- Develop self confidence
- Live independently

1.8.0 STATEMENT OF THE PROBLEM

The statement of the problem for the present study is "**Application of Nemeth Code for Learning Mathematics amongStudents with Visual Impairment".**

1.9.0 TERMS USED IN THIS STUDY

- Blindness

- Low vision
- Braille
- Nemeth Code
- Alphabets
- Numerals
- Fundamental symbols
- Special cases

1.10.0 DEFINITIONS

BLINDNESS

Blindness refers to condition where a person suffers from any of the following conditions namely,

- Total absence of sight, or
- Visual acuity not exceeding 6/60 or 20/200 (Snellen) in the better eye even with correction lenses or
- Limitation of the field of vision subtending an angle of 20 degree or worse

-The Rights of Persons with Disabilities Act, 2016

LOW VISION

"Low vision means a condition where a person has any of the following conditions namely, visual acuity not exceeding 6/18 or less than 20/600 upto 3/60 or upto 10/200 (snellen) in the better eye with best possible corrections"

-The Rights of Persons with Disabilities Act, 2016

BRAILLE

Braille is a learning system. The raised printing that can be felt with the fingers and read that way by people who are blind or visually impaired is called Braille.

NEMETH CODE

Nemeth code is a code for learning mathematics. It provides students and transcribes in to Braille all mathematics problems. The code was developed by Abraham Nemeth.

ALPHABETS

It means a system of signs or signals that serve as equivalents for letters. Totally 26 letters. The Alphabets are a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z.

NUMERALS

It means a sign or symbol that represents a quantity. It is used in Nemeth code for students with visual impairment to develop mathematics concepts.

Examples: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

FUNDAMENTAL SYMBOLS

The fundamental symbols are very important in the learning mathematics. Here list of some fundamental symbols are +, —, ×, ÷, ., <, >, ≤, ≥, =, ≠, ≈, √.

SPECIAL CASES

List of the some special cases in mathematics are ( ), [], {}, /, _,!, comma, ?, Σ, %.

1.11.0 OBJECTIVES OF THE STUDY

The major objectives of the study were

- To analyze level of application of Nemeth code among Children with Visual Impairment through a Pre test
- To develop strategies to foster usage of basic Nemeth code
- To implement the strategies for intervention to improve the level and usage of Nemeth code
- To find out the efficacy of the intervention through a post test

1.12.0 HYPOTHESIS OF THE STUDY

The study explore the hypothesis as

- There is no significance difference between the learning Nemeth code among Students with Visual Impairment in before and after Intervention.
- There is no significance difference between the learning Nemeth code among Students with Visual Impairment in Alphabets before and after Intervention.

- There is no significance difference between the learning Nemeth code among Students with Visual Impairment in Numerals before and after Intervention.
- There is no significance difference between the learning Nemeth code among Students with Visual Impairment in Fundamental symbols before and after Intervention.
- There is no significance difference between the learning Nemeth code among Students with Visual Impairment in Special cases before and after Intervention.
- There is no significance difference between the learning Nemeth code among Students with Visual Impairment in Alphabets with respect to Standard, Type of Disability, Onset of Disability, Locality, Parents Qualification, Type of Family and Braille Skills before and after Intervention.
- There is no significance difference between the learning Nemeth code among Students with Visual Impairment in Numerals with respect to Standard, Type of Disability, Onset of Disability, Locality, Parents Qualification, Type of Family and Braille Skills before and after Intervention
- There is no significance difference between the learning Nemeth code among Students with Visual Impairment in Fundamental Symbols with respect to Standard, Type of Disability, Onset of Disability, Locality, Parents Qualification, Type of Family and Braille Skills before and after Intervention
- There is no significance difference between the learning Nemeth code among Students with Visual Impairment in Special Cases with respect to Standard, Type of Disability, Onset of Disability, Locality, Parents Qualification, Type of Family and Braille Skills before and after Intervention

1.13.0 NEED & IMPORTANCE OF THE STUDY

Braille Nemeth Code learning is not only give the clarification in fundamental mathematics it gives effective of all other mathematics related subject like trigonometry, algebra etc. It is believed that the movement using fingers gives them an opportunity to activate the brain sensors. While learning Nemeth Braille code will develop their self confidence in math skills such as Algebra, Trigonometry etc. In Nemeth code the person can easily go back and check any previous step in Braille as they continue toward their solution with using writing mathematics in Braille. Tactile devices can easily take the

place of pencil and paper and speed up calculations greatly Braille slates and writers are still popular and useful tools for teaching math.

Nemeth code learning gives effective learning in mathematics. It is used to develop communication of mathematics knowledge and skills. The Nemeth code gives confidence in solving different type of mathematics problems. It is not only help for visually impaired student butt also helps to develop teachers learning. Through this Nemeth code learning gives many opportunities for visual impairment students.

1.14.0 DELIMITATIONS OF THE STUDY

The following were the limitations of the study:

- This study was conducted only for the girls visually impaired
- This study focuses only on Trichy district.
- This study was including only basic symbols Braille Nemeth code in mathematics

1.15.0 SCOPE OF THE STUDY

- This study highlight the use of learning Nemeth Code for visually impaired persons in mathematics
- This study will be very useful for the visually impaired persons to learn mathematics in Braille.
- It enhances the visually impaired persons to solve the basic mathematics problems in Braille using Nemeth code.
- This study helps us to know the level of Braille reading speed by the all individual visually impaired persons.

1.16.0 ORGANISATION OF THE STUDY

The present work "**Application of Nemeth Code for Learning Mathematics among Students with Visual Impairment**" is composed in five consecutive parts

- The first chapter deals with Introduction, Need and Importance of the study, Definition of technological terms, Objectives, scope and Limitation of the study.
- The second chapter presented the Review of Literature connected to topic.
- The third chapter contains selection of samples, tools used, Hypothesis, collection of data and statistical procedure followed.

- The fourth chapter deals with analysis and interpretation of data in the form of tables.
- The fifth chapter presents the summary of the findings, discussion, recommendations, suggestions and conclusion

REVIEW OF LITERATURE

CHAPTER-II

REVIEW OF LITERATURE

CHAPTER-II

REVIEW OF LITERATURE

2.1.0 INTRODUCTION

A review of literature is a systematic processes for collect many other researcher articles, books and different reports on particular topic. It helps to create for further research. Generally, review of literature provides in-depth understanding and explanation on how findings are similar to research work. It also reveals techniques and statistical procedure that have not been attempted by others. It will explain the procedures other researchers used and methods similar to the ones are proposing. Review of literature could help us shape research problem because the process of reviewing the literature helps to understand the subject area better and thus helps to conceptualize your research problem clearly and precisely.

2.2.0 DEFINITION

"A literature review is an evaluate report of information found in the literature related to selected area of study. The review describes, summarizes, evaluates & clarifies this literature. it gives a theoretical base for the research & helps to determine the nature of research."

(QUEENSLAND UNIVERSITY 1999)

2.3.0 PURPOSE OF LITERATURE REVIEW

The purpose of a literature review is to convey to the reader previous knowledge and facts established on a topic and their strength and weakness. It also provide the knowledge about the problems faced by the previous researchers while studying same topics.

The main purpose of literature review is to compile, organize and assess all the previous researchers conducted on the topic and present them in a clear, concise and objective manner so that the reader knows the history of your research and your purpose for choosing the topic.

The literature pertaining to the study is presented below with the following chapters:

1. Studies related to teaching mathematics among students with visual impairment

2. Studies related Teaching Mathematics in Nemeth code for visual impairment

3. Studied related to use of technology in teaching mathematics using Nemeth code to visual impairment

2.3.1 STUDIES RELATED TO TEACHING MATHEMATICS AMONG STUDENTS WITH VISUAL IMPAIRMENT

Oliv G. Klingenberg, Anne H. Holkesvik &Liv BeritAugestad (2019) conducted study on "Research evidence for mathematics education for students with visual impairment: A systematic review" The aim of the study was to conduct a systematic review in order to synthesize the evidence-based literature on mathematics education among students with visual impairment (VI).. The studies focused on teachers' attitudes and experiences, the use of abacus, tactile graphics, and the development of mathematical concepts. The results showed that the studies had different aims and methods, and only four studies reported eye disorder diagnoses. The ability to choose suitable teaching strategies that involve individual instructions requires qualified and enthusiastic teachers who allow students to experience a sense of accomplishment and success. Additionally, it is important to gain information on eye disorder diagnoses and possible learning disabilities. The authors conclude that it is to be expected that students with VI but without cognitive disabilities will follow their grade level in mathematics. The findings highlight the need for more randomly controlled, high quality trials in order to obtain more evidence and knowledge of mathematics education among students with VI.

*M S Oyebanji, Ubong Sam IdiongI(2019) conducted study on "*Challenges of Teaching Mathematics to Students With Visual Impairment". This study aimed at investigating the challenges of teaching mathematics to visual impaired students in school of the blind, a case study of some selected schools for the visually impaired. Questionnaire and interview were used for data collection from the respondents. The hypotheses in the study were tested using t-test with α-level of 0.05 through SPSS. The study followed a cross-section survey design and involved 80 respondents 20 for the visually impaired students, 10 for the Mathematics teachers, 10 special mathematics teachers, 40 low vision and non-visually impaired students. The findings revealed the visually impaired students receive bursaries from the government and non-government organization; meal, accommodation, and few scholastic materials from their school; extra time during mathematics classes and examination and friend support. However, constraining

limitations in the method of instruction assessment used and the instructional materials provided were noted, on the basis of these findings, recommendation towards the better education of the visually impaired student studying mathematics should be encouraged and employment of special mathematics teachers.

Mensure Aydin (2015) conducted study on "Examining the impact of chess instruction for the visual impairment on Mathematics**"** The purpose of the study is to explore the impact of chess instruction for visually impaired children on math achievement. The study group consists of a total of 26 visually impaired students from inclusion classes in inclusive secondary schools of MoNE (Ministry of National Education), 9 male and 5 female students in the experiment group and 8 male and 4 female students in the control group. The experiment group consisted of those who were trained for chess over a 12 week- period as of the semester break and the control group consisted of those who were never trained for chess. Math scores of the both groups during the fall and the spring semesters which were the recorded scores in the "e-school" system of the Provincial Directorate for National Education were verbally learned from those who were included in the study. In the comparative study of the experiment group and the control group in both semesters, there was no significant difference at the level of 0,905 for the fall semester ($p>0,05$) while there was a significant difference at the level of 0,002 for the spring semester ($p<0,05$). As a result, chess instruction for the visually impaired has proven to be influential on math achievement.

FatmaNurAktaş, ZiyaArgün (2020) conducted study on "Examination of Mathematical Language Use of Individuals with Visual Impairment in Mathematical Communication Processes: The Role of Braille" . Mathematical language, which embodies visuals and abstract concepts such as symbols, shapes, contains differences for visually impaired individuals. Using various writing codes that make these differences and reading by touch is the source of mathematical communication for visually impaired individuals. Mathematical language does not have a common framework in Braille, which differs according to countries and institutions. Therefore, there is no standard in mathematical language for Braille in Turkey. This situation is reflected in the mathematical communication of visually impaired students. In this study, it is examined the role of Braille in mathematical communication. The participants of the study which was designed in a multi-case study design were six visually impaired individuals

determined according to the criteria and stratified sampling method. The texts, tables and graphics that the participants frequently use in classrooms were used in the clinical interviews on their experiences in mathematics learning and their reflections on some algebraic concepts. When the findings obtained by content analysis were examined, it was found that Braille caused difficulties in mathematical language usage and played an important role in the use of symbols and shapes. In addition, it has been determined that embossed writing should be adapted in a way to enable communication with visually impaired individuals in the educational practices and in consideration of mathematical language requirements.

Hemndolwa, Mwitango (2016) conducted study on "Analyzing factors affecting performance in mathematics among students with visual impairment in public and private primary schools in tanga region, tanzania " .This study analyzed factors that influenced performance in mathematics among students with visual impairment in Tanga Region, Tanzania. The study used Descriptive survey research design. Purposive sampling and simple random sampling techniques were used. Fifty (50) respondents were involved including thirty six (36) students with visual impairment, twelve (10) teachers, two head teachers and two (2) District Education Officers. The criterion that was used in selecting sample schools was the presence of children with visual impairment. The findings revealed that students with visual impairment are not given extra time in test and in classroom assignments which is essential for the performance of mathematics among children with visual impairments. On the other hand the study revealed that there is the shortage of specialist teachers who work hand in hand with the general teachers who teach mathematics to students with visual impairment. Finally, due to the fact that, there are few studies conducted on this area the current study has ventured on, it is recommended that, further studies should be carried out not only on mathematics but also on other subjects in different settings to enhance transferability of the findings using the same or different methodologies.

Michele Capella McDonnall, Brenda S. Cavenaugh, J. Martin Giesen(2010) conducted study on "The Relationship Between Parental Involvement and Mathematics Achievement for Students With Visual Impairments" This study investigated the association between parental involvement (both at home and at school) and mathematics

achievement for students with visual impairments. The samples used for the study (N = 341 and N = 324) were taken from the nationally representative Special Education Elementary Longitudinal Study. Multilevel modeling for longitudinal data was used to investigate the research questions. Parental involvement at school was positively associated with mathematics achievement for students who began the study in elementary school, and parental involvement at home was negatively associated with mathematics achievement for students without a cognitive disability. However, there was a strong positive association between mathematics achievement and parental involvement at home for students who also had a cognitive disability.

2.3.2 STUDIES RELATED TEACHING MATHEMATICS IN NEMETH CODE FOR VISUAL IMPAIREMENT

Sarah, E, lvy ,jonathan d ,hooper, (2015) conducted a research on "Using Constant time delay to teach Braille and the Nemeth code for Mathematics and Science Notation to Students making the Transition from Print to Braille" . many students with adventitious vision loss or progressive vision loss need to transition from print to braille as a primary literacy medium. a single-subject, multiple-probe research design was used to test the effectiveness and efficiency of constant time delay to teach literary braille or nemeth code. three female students, aged 13 to 15 years, participated at a specialized school for students with visual impairments. the students' braille and math instructor delivered interventions in the classroom. procedural fidelity and interobserver agreement data were collected. two students each learned 40 short-form literary braille contractions, and one Student learned 28 nemeth code symbols throughout the study. students appeared to generalize learning after instruction with the first word set to identify similar contractions. Students maintained learning throughout the study at high levels. visual analysis of the data suggests a functional relationship between constant time delay and contraction identification.

L. Penny Rosenblum and Sheila Amato (2004) conducted study on "Preparation in and Use of the Nemeth Braille Code for Mathematics by Teachers of Students with Visual Impairments" . the study preparation in and use of the Nemeth braille code by 135 teachers of student with visual impairments.. A total of 262 surveys were returned. Many

of the surveys returned were not fully completed because the respondents were not employed as teachers of students with visual impairments (*n*= 77) or were not certified teachers of students with visual impairments (*n* = 50). Thus, the data reported in this article are from 135 respondents who completed all four sections of the survey and were working as teachers of students who are visually impaired. In discussion 50% to 75% of children with visual impairments have additional disabilities (Silberman, 2000), many are not learning the Nemeth code. That the participants attended a total of 36 university programs indicates that good representation of the universities that prepare teachers of students with visual impairments was achieved. Only 18 participants reported receiving no instruction in the Nemeth code at the university level. However, 45 had taken only one course that combined both literary braille and the Nemeth code, both of which are complex and take consisting time to learn. Only 37 participants thought that their university preparation in the Nemeth code provided them with the information they needed to do their jobs.

MbulaheniMaguvhe(2015) conducted study on "Teaching science and mathematics to students with visual impairments : reflections of a visually impaired technician : original research". This study reports on factors that limit the participation of blind and partially sighted learners in mathematics and science education. Since the teacher, still remains one of the most crucial factors in any education system, the researcher deemed it important to investigate the role of the teacher as understood by a blind technician in promoting the participation of blind and partially sighted learners in mathematics and science subjects, which few of these learners take beyond primary school. A case study was conducted interrogating a blind technician, who regards himself as an unqualified scientist, in his understanding of various school factors that could entice blind and partially sighted learners to participate in mathematics and science education, and to promote their retention in related professions. A semi-structured interview schedule was followed and the responses were recorded by mutual consent. Analysis was conducted based on questions put to the participant. The study revealed that teacher motivation and mentorship in mathematics and science methodologies and the use of tools for learner empowerment are lacking. It further revealed that teachers lack the requisite skills in special education to harness learner potential in mathematics and science. This situation necessitates government action in teacher training and development.

GözdeİremBayram, M SencerCorlu, Emin Aydın, DenizOrtaçtepe, BurcuAlapala(2015) conduced a study on "An exploratory study of visually impaired students' perceptions of inclusive mathematics education". The Turkish Disability Act introduced inclusive education to Turkey as a solution to the problems experienced by students with disabilities, including visually impaired students. The main purpose of this study was to explore the challenges faced by visually impaired students learning high school mathematics in inclusive classrooms in Turkey. The data were qualitative, consisting of interviews conducted with three high school graduates; they were analysed using the constant comparison method. In the interviews, students described the effects of various teaching methods on their learning and evaluated the social aspect (broadly speaking) of inclusive education. The results show that while the social needs of visually impaired Turkish students were adequately met through inclusive education, their academic needs were not, which we speculate to be partly because of mathematics teachers' negative attitudes towards inclusive education.

KokabNosheen (2010) presented a study entitled "The ways of teaching mathematics to visually impaired students". In this paper we present overview of actual situation of teaching mathematics to visually impaired students at each level of education (primary, secondary, university) in Slovakia. Problem of accessibility of mathematics to visually impaired students has the solution in linear notation. One of the possibilities to access math is the Lambda editor, which besides the linear notation in Lambda code offers also the graphic visualization for sighted people. The Lambda editor is considered as tool within the material milieu of didactical situation. The shows that In the last years the solution of problem of accessibility mathematics to visually impaired students seems to have an electronic form. There exist softwares that are blind friendly and so the visually impaired students can do (calculate, read, write) mathematics the way that is also accessible for their sighted schoolmates and teachers. In Slovakia we have started to use the LAMBDA system and adapt it to the local conditions. The time will show whether LAMBDA proves as the effective and helpful tool for study and teaching mathematics at Slovak elementary and secondary schools and universities, in other words, whether LAMBDA will be essential element of material milieu within the education of visually impaired students.

M S Oyebanji, Ubong Sam Idiong (2021)) presented a study entitled "Challenges of Teaching Mathematics to Students With Visual Impairment". This study aimed at investigating the challenges of teaching mathematics to visual impaired students in school of the blind, a case study of some selected schools for the visually impaired. Questionnaire and interview were used for data collection from the respondents. The hypotheses in the study were tested using t-test with α-level of 0.05 through SPSS. The study followed a cross-section survey design and involved 80 respondents 20 for the visually impaired students, 10 for the Mathematics teachers, 10 special mathematics teachers, 40 low vision and non-visually impaired students. The findings revealed the visually impaired students receive bursaries from the government and non-government organization; meal, accommodation, and few scholastic materials from their school; extra time during mathematics classes and examination and friend support. However, constraining limitations in the method of instruction assessment used and the instructional materials provided were noted, on the basis of these findings, recommendation towards the better education of the visually impaired student studying mathematics should be encouraged and employment of special mathematics teachers.

ZafarIqbal, Muhammad; Noor, Hina; Nadeem, Muhmmad Hamid; Javed, Tariq; Shams, Jahan Ara(2021) conducted a study presented on "Problems in Learning of Mathematics: A Case of Visually Impaired Students". The study was aimed to explore the problems faced by visual impaired students in learning of Mathematics at secondary level in Rawalpindi and Islamabad-Pakistan. Qualitative research approach was used to explore the problems of students. Research design adopted was case study of visually impaired secondary school students. Semi structured interviews were conducted from the participants 14secondary school students of Rawalpindi and Islamabad. The Interviews were audio recorded. Data analysis was done in stages. Firstly, data were transcribed, and next coding was done. It was found that visual impaired students (VIS) are facing diversified problems in learning of Mathematics such as Fatigue, lack of interest and motivation, behavior of teachers and administration, lack of skilled professional Mathematics teachers, and lack of equipment and resources for studying. It was recommended to that institutions may provide the visually impaired students with appropriate hardware and software facilities, also, teachers should be skilled in managing such visually impaired students.

Kapperman, G., Sticken, J., & Smith, T. (2011). The study was presented on "The effectiveness of the Nemeth Code tutorial for the BrailleNote". This study evaluated the effectiveness of a software tutorial that can be installed on the BrailleNote and used by students who are blind to learn the Nemeth Code of braille mathematics notation. Performance on reading and writing mathematical symbols for students with visual impairments who completed the tutorial was compared to the performance of a matched control group. To be eligible for participation in the study, students had to be enrolled in at least the 5th grade but no higher than the 11th grade at the beginning of the treatment period. They had to be competent braille readers, functioning academically within 2 years of their grade placement in reading and mathematics. Each student had to have ready access to a BrailleNote with a braille display and be proficient in the operation of this device. Grade placement, reading and math instructional levels, and braille competence were reported by each applicant's vision teacher, based on the standards specific to each student's school district. Proficiency with the BrailleNote was also reported by each applicant's teacher, based on the application of a skills checklist developed by the researchers Results indicated that the students who used the tutorial showed significantly greater growth in both reading and writing mathematical symbols. Additionally, the amount of time students spent on the tutorial was significantly associated with growth on both performance measures.

Paul B. Stanley & Arthur I. Karshmer (2006) study was conducted on "Translating Math ML into Nemeth Braille Code". In this study An assistive software application has been created that translates math statements encoded as MathML into Nemeth Braille Code (NBC). This translation is conducted in two phases, the translation of the MathML elements into NBC, then the implementation of rules specific to Nemeth Braille that are irrelevant to MathML. All MathML elements holding semantically relevant information are translated by this program, including the nesting of elements to any level. Some of the syntactical rules inherent to NBC such as the use of the numeric indicator; additional space characters; and some contractions have also been implemented; other rules remain to be incorporated. The NBC can be exported in three ways (1) directly to a refreshable Braille device via a serial connection in real time; (2) saved as a text file then downloaded into a Braille device; and (3) save as a text file then embossed by a third party application. This application allows a person with no Braille experience to enter a math equation into

any equation editor that can save that statement in the MathML format, and then convert that statement into Nemeth Braille Code for perusal by the visually impaired.

Oliv G. Klingenberg, Dr. Polit. Liv BeritAugestad (2012) the study was conducted on "An Examination of 40 Years of Mathematics Education among Norwegian Braille-Reading Students". The study presented here estimated the occurrence of braille-reading students in Norway who were educated according to their grade-level progression in mathematics from 1967 to 2007. It also analyzed the association among these students' progression in mathematics and the causes of visual impairment, the age at which the diagnosis was established, the students' gender, and the students' use of reading media (braille as the sole, primary, or secondary literacy medium). A retrospective, population-based study design was used. All the students who had received braille education in the past four decades prior to the study were included. The following data were abstracted from each student's records: birth year, country of birth, gender, year diagnosed, diagnosis, type of reading media, and whether the student's education had followed their grade-level progression. In total, 248 braille-reading students were identified. There were no statistically significant associations between gender and the abstracted variables or between mathematics education and reading media. During the four decades under study, there was some variation in the distribution of different diagnoses. Students with diagnoses related to the central nervous system had comparatively higher risk of not attaining their normal grade level in mathematics.

Islam Elkabani; RachedZantout (2015) the study was conducted on "A framework for helping the visually impaired learn and practice math". In this paper, a framework is introduced which will enable visually impaired students to learn and practice mathematics like sighted students. The framework was instantiated successfully to enable visually impaired students to learn and practice linear algebra. An electronic system was developed which was used by visually impaired university students. In addition, an instantiation was implemented to help visually impaired upper elementary and middle school students learn and practice Algebra using either Arabic or English. This instantiation has been implemented as an electronic system and tested for upper elementary students. Encouraging results were reported. Currently work is ongoing to augment it to serve middle school students.

Aljundi, K., &Altakhayneh, B. (2020).was investigated on "Obstacles to Blind Students' Learning Maths in Jordan from Students' and Teachers" The present study aims at investigating the obstacles to learning maths by blind students from the perspectives of students and teachers. The sample of the study consisted of 30 students who are blind or with visually impaired. To learn about the obstacles they faced in learning maths, a questionnaire was employed, which was verified in terms of validity and consistency. In addition, 2 math teachers at blind schools in the Jordanian capital Amman were interviewed. The results showed that the obstacles were so high by 89, 3%, downwards for the following aspects: administrative 94%, cultural 89% and curricular 85%. The researchers recommend providing supporting programmes and curricula which meet the needs of blind students in Jordan.

Stoeger, B., Batusic, M., Miesenberger, K., &Haindl, P. (2006), conducted a study on Supporting blind students in navigation and manipulation of mathematical expressions: Basic requirements and strategies The problems faced by a blind or visually impaired student in doing Mathematics were analyzed, and the basic ideas of a MAWEN (Mathematical Working Environment), a software solution to help overcome these pressing difficulties, were described. The present paper builds upon the latter one, refining the ideas sketched there. After a thorough description of the state of the art, we present some general considerations on the problems met by a blind pupil when navigating within mathematical expressions and when doing calculations. Finally, through several case studies taken from mainstream school books, strategies to provide computer aided support to overcome the problems are outlined.

2.3.3 USE OF TECHNOLOGY IN TEACHING MATHEMATICS USING NEMETH CODE TO VISUAL IMPAIRMENT:

Gangsar Ali Daroni, Gunarhadi, EdyLegowo(2018) conduced study on " Assistive Technology in Mathematics Learning for Visually Impaired Students". This article is a literary study which aims to provide information about the difficulty for the visually impaired students in mathematics learning and assistive technologies that have been developed to support the learning. This article can be used as the basis for developing new assistive technology in mathematics learning. The method used in this study is literary study. Literary study is a series of activities related to collecting literature data, reading and recording, and processing of library materials (Khatibah, 2011). Visually impaired

children are characterized by the abnormality they have.Educational, Scientific and Cultural Organization classify visually impaired children into two namely sightlessness and low vision: 1) Sightlessness: A person who is sightless has a total or high degree of vision loss. About 18% of sightless people are totally sightless - the remaining 82% can distinguish between light and dark. Assistive Technology in Mathematics Learning. The World Health Organization's definition of low vision is visual acuity less than 6/18 and equal to 3/60 in the best eye with the best correction.

Oliv G Klingenberg, Anne H Holkesvik, Liv BeritAugestad(2019) conducted a study on "Digital learning in mathematics for students with severe visual impairment: A systematic review". The aim of the study was to summarize current evidence-based knowledge about e-learning in mathematics among students with severe VI. A systematic review was conducted of articles published from January 2000 to November 2017. A total of 13 publications met the inclusion criteria, of which 12 reported studies with an intervention or an experimental design and one had a cross-sectional design. The number of students with VI varied from three to 16 (Mage = 19 years). Four publications reported either ophthalmic diagnoses or World Health Organization's (WHO) definition of vision loss. The mathematical training was reported as lasting from one session to 18 weeks of training. Eight papers reported the use of audio-based applications as learning aids. The authors conclude that interactive e-learning with audio and tactile learning programmes may be a useful resource for students with VI to enhance their mathematical skills. However, there is lack of evidence for how digital technologies improve inclusion potentials and learning in mathematics for students with VI, and hence, there is a need for additional research and more reflection on the subject.

Dra. Maria Adelina RauppSganzerla Dra. Marlise Geller (2021) study was presented on "Study On The Construction Of Early Mathematical Concepts Involving Visually Impaired Students And Assistive Technology" This article presents an excerpt from a doctoral investigation to reflect on the process of blind and/or low vision students' construction of early mathematical concepts with the use of Assistive Technology (AT). From a qualitative approach, the research was founded on the Discursive Textual Analysis, based on observations and interventions carried out during the attendance offive elementary school students by the Specialized Educational Service (SES). This work reports the different stages the participants under went to understand the mathematical concepts that involve counting, recognition of quantities, numerical symbols, besides basic

mathematical operations. The results suggest that visually impaired children have the same potential as sighted children concerning the construction of the concept of number. However, it is essential to use ATs and adapted materials to make this concept effective

LahiriSoysa; KulariLokuge; IsuruWimalasundera; Menaka N De Silva (2010) the study was conducted on "Enhancing learning for Visually Impaired with technology: MATHVIS". This research focuses on providing access to education for all, including the visually impaired, using MATHVIS, which embraces game based learning methodology. The critical factor in the project is the use of sound to communicate with the visually impaired students. All voice instructions were provided along with soundtracks and a menu to enable selecting local languages such as Sinhala and English. The main emphasis of this paper is to discuss the current generation of MATHVIS, which has been extended in several ways, through intensive evaluation and testing. The evaluators selected from categories such as technical personnel, instructors and visually impaired students carried out in depth reviews of the application. This paper discusses the features of the application, evaluation carried out, the technology and learning pedagogy used to develop the application for visually impaired students. The paper also highlights how MATHVIS can be used to provide education for all, including the visually impaired.

Michal Mackowski, PoitrBrzoza, Marek Zabka& Dominik Spinczyk (2017) study was conducted on " Multimedia Platform for mathematics interactive learning accessible to blind people" . The article presents the developed method used for creating interactive steps of decomposed math's exercise solution and alternative description of math formulas accessible for the blind. The elements of proposed methodology: generation of state machine, design and presentation of transition conditions, generating the presentation layer and a typical usage by a blind user are presented. A set of rules for describing mathematical formulas were proposed after consultation with mathematicians and teachers of blind people. The application was developed as web application. The graphical interface of presented application was designed using PHP and JavaScript technologies. The collection of prepared exercises include about 240 prepared exercises from different areas of mathematics and 60 selected exercises including alternative description layer. About 1000 students and about 40 impaired students, from 6 faculties of the university use this platform during math courses for both self and class learning. The defined rules were used to read aloud mathematical formulas to the visually impaired people with a different

level of mathematical knowledge. The results confirmed good understanding of mathematical formulas by using prepared alternative description.

Ali AWDÉ (2009) study was presented on “multimodal interaction techniques for mathematics access by visually impaired users”. This thesis deals with Human-Computer Interaction and especially with the multimodal interfaces designed for visually-impaired users. The main topic concerns the presentation of mathematical expressions to visually-impaired users. Mathematics is a fundamental foundation of science. Learning and accessing to mathematics for visually-impaired people is a significant challenge and can form an obstacle separating them from sciences studies. The present works describe the problems and the challenges that underlie the design of a system allowing the access to mathematics for visually-impaired users. Indeed, we present an analysis of the previous works then we propose solutions to fill their weaknesses. A multimodal system allows user to interact with more than one mode of interaction. Incorporating multimodality into a computing system makes it more accessible to a wider range of users, including those with disabilities. It is adaptive to user’s condition and environment. Hence, it adapts automatically its configuration based on the changes of the context, without any human intervention. To make an adaptive system, we elaborated a model for determining complexity of the mathematical expression and we integrated a machine learning to implement the mechanisms of decisions. Finally, the proposed architecture is a multi-agent one. These techniques were validated through case studies and formal specification using Petri nets and a simulation tool set: JADE.

GaylenKappermen, Jodi Sticken, and Larry Skutchan (2016) this study was presented on “Technical Aspects of the Development of a Web-based, Interactive Nemeth Code Tutorial”. The authors describe the steps involved in the development of the Nemeth Code Tutorial, a web-based tutorial for blind persons to learn to read and write the code of braille mathematics. The tutorial which we have developed is a tool which is available on the APH website at no cost. The tutorial consists of 55 different lessons. Each lesson contains four sections. The first is an explanatory section in which a specific set of Nemeth Code symbols are described; the rules governing the use of those symbols are described in detail along with examples. There are three interactive sections in each lesson following the explanatory section: reading, writing, and proofreading. The second

interactive section deals with writing Nemeth Code math expressions. In this section, the learner is given a math expression in written (literary) form, and is asked to use six-key entry or a braille display to input the expression in Nemeth Code. The software will provide feedback as either correct or incorrect (depending on the accuracy of the response). The learner may repeat the exercise as many times as desired to have each subsequent response graded. The third section is dedicated to proofreading. Here the learner is given a Nemeth Code expression in words along with the expression in Braille. The Braille expression contains one or more errors. The learner is instructed to find the errors and correct them using mainstream editing commands; this response can then be graded. The exercise can be repeated as many times as required to determine the correct response.

Nikisha B. Jariwala ,Bankim Patel (2017) study was presented on "Conversion of 2D Mathematical Equation to Linear Form for Transliterating into Braille: An aid for Visually Impaired People". In this paper, researcher has discussed on the issues in representing mathematical text into Braille and further, the researcher has also provided solution to it. The tool is designed and developed that convert's mathematical text into Braille. Rules are created, transformation table is formed, mathematical notations are recognized and it is converted into the linear form which can be easily transliterated into Braille for blind people. Braille content generated is stored into the text file which can further be printed on embosser. Braille document generated after the transliteration are tested by Braille experts – teachers teaching Braille. After the verification of the output documents by the Braille experts, they agree with 98.70% of accuracy and it shows satisfactory results. It will also be useful to visually impaired students in learning mathematics

Dooley, S. S., Osterhaus, S., Brown, D., Lozano, E., & Park, S. H. (2016). Conducted a study on "Online nemeth braille input/output using content mathml". The goal of this current work is to provide a software system that supports the automatic generation of Nemeth Braille output, and the automatic backward translation of Nemeth Braille input, in the context of a WYSIWYG equation editor designed for sighted math users. This software lets a sighted math user, who need not know Nemeth Braille, produce high-quality braille materials for math in a fraction of the time, and at a fraction of the expense, of current best practices for print-to-braille translation. It also allows a Nemeth Braille user who is unable to access the printed form of an equation to produce high-

quality print mathematical formulas in a fraction of the time, and at a fraction of the expense, of current best practices for braille-to-print translation. This software supports automatic, two-way conversion from printed math notation into Nemeth Braille, including reverse translation from Nemeth Braille into printed math notation. Using this software, a sighted user can communicate mathematics online and in real-time with a visually-impaired Nemeth Braille user. This kind of instantaneous interaction has the potential to reduce, or even eliminate, many of the communication barriers that inhibit visually-impaired students from participating in mainstream math and science classrooms.

Ali, Clement Ayarebilla (2021) conducted a study on "Visually Impaired Student-Teachers' Knowledge and Use of Basic Assistive Technology Tools for Mathematics". The main purpose of this study was to expose student-teachers with visual impairments to basic assistive technology tools. The knowledge and use of the tools helped to convert, convey and interpret basic mathematical equations. The design was a case study involving five student-teachers who were admitted to the Department of Basic Education, University of Education, Winneba to pursue a Post Diploma in Mathematics programme. A semi-structured interview guide was used to collect the data whose items contained tools for general administration, additional support, STEM, mathematics instruction, polynomials and assessment. These served as the cases of the study and data analysis. The analysis was undertaken in two stages. The first stage explored their knowledge and use of the assistive technology tools. The second stage analyzed transcriptions of statements. The two stages helped to corroborate the findings. The findings showed that the student-teachers had little knowledge and use of the basic assistive technology tools. However, they were still desirous to learn and use the basic assistive technology tools for mathematics teaching and learning. It was therefore recommended that stakeholders make available and accessible common basic assistive technology tools to schools, and restructure the mathematics curriculum to suit the integration of assistive technology tools.

2.4.0 CONCLUSION

The literatures presents in this chapter gives a clear structure of the research done earlier and the important findings related to the study. A thorough review provided picture to the investigator to carry out the study. There are more reviews already done by various teachers in field of education. Many Nemeth code reviews were conducted on students visual impairment and teachers with visual impairment. Some are the review in technology wise. These review were helped to the study.

METHODOLOGY

CHAPTER-III
METHODOLOGY

3.0.0 INTRODUCTION

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CHAPTER-III
METHODOLOGY

3.0.0 INTRODUCTION

Research is creative and deliberate work embraced to build the load of information, about the particular research topics. Research is considering all the aspects such as finding Implementation, Data analysis, Interpretation and Conclusions. Research is a systematic process of collecting and analyzing information to increase our understanding about the research.

Methodology is a important parts of all research. It is a systematic way to sole research problem in better manner. It is give the work plan of research. The researcher to not only know the research methods. It is important to take correct research methodology. In research, the methodology part of the study allows readers to evaluate the overall validity and reliability of particular study.

Methodology in research is defined as the systematic method to resolve s research problem through data gathering using various techniques, providing an interpretation of data gathered and drawing conclusions about the research data. Essentially, a research methodology is the blue point of a research or study (Murthy &Bhojanna 2009).

The present section deals with the methodology of the study entitled **"Application of Nemeth Code for Learning Mathematics among Students with Visual Impairment"** are presented under the following headings

3.1.0 AREA OF STUDY

For this study the school has been chosen in Trichy. Samples are selected from "**Government Girls Higher Secondary School for the Blind, Trichy".**

3.2.0 SELECTION OF THE SAMPLE

A sample is a subset or some part of a larger population. Selection of sample is very important in the research study. Through sample the researcher unknown the good Characteristics of the population on a good representative sample. Sampling is an act or technique of selecting representation of population for research.

One of the most essential aspects in research study is selecting the samples. The sample of the present study consisted of 30 visually impaired and Low Vision Students. The sample consisted of 30 females only.

3.3.0 DISTRIBUTION OF SAMPLE

TABLE 3.3.1

Standard and disability wise distribution of the sample

S.No.	Name of the school	Standard							
		VI		VII		VIII		IX	
		B	LV	B	LV	B	LV	B	LV
1	Government girls higher secondary school for the blind, Trichy	4	5	0	2	3	3	6	7

(Category-B- Blind; LV- Low Vision)

3.4.0 VARIABLES OF THE STUDY

Correct selection of variables is more vital while doing research. The present study aims in finding "**Application of Basic Nemeth Code for Learning Mathematics among Students with Visual Impairment".**

3.4.1 Independent Variables:

The independent variables used in this study were Locality, standard and Type of Disability, type of family, onset of disability and parental qualification and Braille skills.

3.4.2 Dependent Variables:

The dependent variables used in this study were learning Nemeth code in Alphabets, Numerals, Fundamental symbols and Specific symbols.

3.5.0 INDEPENDENT VARIABLES AND THEIR LEVELS

Since it is based on Locality, Grade and Type of Disability, Type of family, Onset of disability and Parental qualification and Braille skills

TABLE 3.3.2

INDEPENDENT VARIABLES OF THE STUDY

Variables	Levels
INDEPENDENT VARIABLES	
Standard	VI to VII
	VIII to IX
Type of disability	Blindness
	Low vision
Locality	Rural
	Urban
Type of family	Nuclear
	Join
Qualification of Parents	Literate
	Illiterate
Onset of disability	Congenital
	Acquired
Braille Skills	Good
	Poor

3.6.0 SELECTION OF METHOD FOR THE STUDY

In this study used Quasi Experimental method. This method is capable of deciding the relationship between independent and dependent variables. This method include hypothesis and methods are manipulated by the researcher. The researcher variables can be measured and calculated in proper manner. After the completed this study researcher can be correlate the two variables used in the study.

3.7.0 DESIGN OF THE STUDY

In this study conducted the experimental method. The study objective is finding the usage of the Nemeth code in mathematics at middle and high school level. A checklist is used for collect the data.

The layout of the design carried out in this study is given below.

PRE TEST	INTERVENTION	POST TEST
01	X	02

Here,

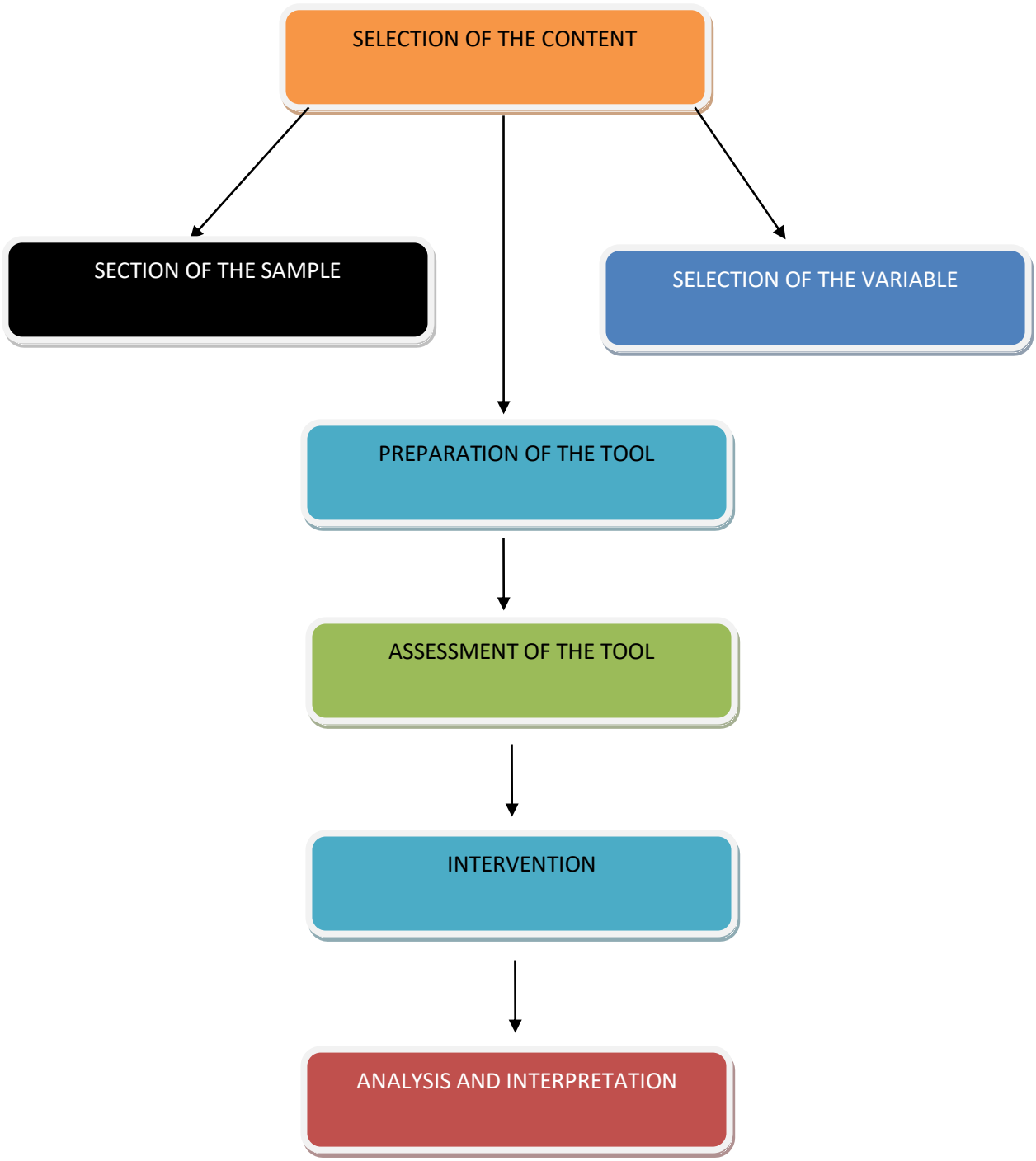
O1 means Pre test

O2 means Post test

X means Intervention

FIGURE 3.1

FLOW CHART



3.8.0 CONSTRUCTION OF TOOL

Tools in research provide quantitative measures for recording the outcomes of the behavior of the subjects of study. A good research study also depends on the type of the tool selected to gather information from the sample.

The investigator prepared Questionnaire for the present study to "**Application of Nemeth Code for Learning Mathematics among Students with Visual Impairment"**

3.8.1 PERSONAL DATA SHEET

The personal data was administrated to the entire sample. It consists of general information such as name, age, gender, locality, Type of School, nature of visual impairment, Mother & Father Qualification and mother & father Occupation. (Appendix 1)

3.8.2 DESCRIPTION OF THE TOOL

List of Nemeth code

The tool consists of 4 components namely Alphabets, Numerals, Fundamental Symbols and Special Cases. Each Component consist 13 questions. Totally 52 Questions. (Appendix 2).

3.9.0 SCORING PROCEDURE

The tool consists of 4 components namely Alphabets, Numerals, Fundamental Symbols and Special Cases. For the correct response score of 1 will be given and for the wrong response a score of 0 will be given**.**

TABLE 3.3.3

SCORING PROCEDURE FOR COMPONENTS IN NEMETHCODE

S.No.	Components	No. of Questions	Scores		Total
			Correct	Incorrect	
1.	Alphabets	13	1	0	13
2.	Numerals	13	1	0	13
3.	Fundamental symbols	13	1	0	13
4.	Special Cases	13	1	0	13
				TOTAL	52

3.10.0 JURY OPINION

The expert group consisted of the guide teacher, head of department, other staff members and specialists in the area of visual impairments. The prepared questionnaire was circulated to experts for further modification. This type of opinion is vital to pinpoint the do's and do not's of the research tool. Therefore based on the comment on the relevance of the tool prepared the final tool was framed by the investigator incorporating the suggestions given by the experts.

3.11.0 PILOT STUDY

A smaller version of a larger study that is conducted to prepare for that study. A pilot study can involve pre testing a research tool, like a new data collection method. It can also be used to test an idea or hypothesis. A pilot study performed both quantitative and qualitative studies in research.

A pilot study is a small feasibility study designed to test various aspects of the methods planned for a larger, more rigorous, or confirmatory investigation (Arain, Campbell, Cooper, & Lancaster, 2010).

The samples for the pilot study were selected from Coimbatore district. The tool was administrated to a sample of 10 visually impaired students in school by the investigator herself to get responses of the sample group as natural and real possible.

3.12.0 VALIDITY AND RELIABILITY

Validity refers to the truthfulness of a test and the degree to which the test actually succeeds in measuring what it wants or intends to measure. (vijayalashmi et al., 2008)

Reliability is a degree to which measures a free from error and free and therefore yield consistent result" (siddhu, K., 2003).

The reliability of test refers to the consistency of the scores obtained by the same individual on different occasions or by different individuals or different occasions. Reliability is also known as reproducibility or repeatability.

It was found that the tool was reliable and valid because of the effectiveness of pilot study. In pilot study the sample was distributed to 1o students with visual impairment to analysis the tool. Their response is in the effective manner.

3.13.0 INTERVENTION STRATEGIES

The prepared tool was used as the medium of instruction for providing intervention on Nemeth code for learning mathematics among students with visual impairment. The intervention package was developed by the investigator. More illustration was given in the package for the students to Understand about Nemeth code for learning mathematics. During intervention Braille and Taylor frame was used for better understanding of Nemeth code for learning mathematics. It was helped the students to understand to concept with ease and it made them to learn without any confusion. More exercise sheet was given to each individual of the sample where it allowed them to use and learn Nemeth code in their hostel and it was easy for them to work on homework. It helped the Students to improve their scores in the test.

3.14.0 DATA COLLECTION

PHASE I

Identifying the Students with Visual Impairment from VI to IX from the Government school for the Blind in Trichy.

PHASE II

The Students with Visual Impairment were identified by gathering information from teachers and also though the case profile from parents.

PHASE III

Pretesting was done to assess the understanding of Nemeth code in Braille among selected sample. The tool was developed and used by the investigator on the 20 question on basic mathematics symbols. The test was administered for 30 minutes to the Students with Visual Impairment.

PHASE IV

Intervention was given to the students on Braille Nemeth code with additional resources were given for further reference to children along with daily and weekly exercise. The time taken for each class with 2 hours.

PHASE V

A post test was conducted using the same tool to measure understanding of the Nemeth code in Braille among the Students with Visual Impairment from grade 6 to 9 before and after the Intervention was given. The test was administered for 30 minutes to the Students with Visual Impairment.

PHASE VI

In this step the scores of students from pre and post test were compared and analyzed.

3.15.0 STATISTICAL TECHNIQUES USED IN THE STUDY

The collected data were consolidated and tabulated and analyzed statistically by using the following tests

- Mean
- Standard derivation
- Test of significant 't' test

Mean

The mean is the arithmetical that is obtained by adding all scores X (Mean) in distribution and dividing by the number of scores.

$$\text{Mean } X = A + \frac{\sum fx}{\sum f} \times i$$

X = Mean

$\sum$ = summation sign

f = frequency

i=the class interval

Standard Deviation

Standard deviation is defined as the square-root of the average of square of deviation, when such deviations for the values of individual items in a series are obtained from the arithmetic average. The most widely used measure of dispersion of the series and commonly denoted by the symbol "σ" (pronounced as sigma).

$$\boldsymbol{\sigma = \frac{\sqrt{\Sigma(X-\mu)2}}{N}}$$

X-The value in the data collection

μ -The population means

N -Total number of observation

Test of Significance

A t-test is an analysis of two population's means through the use of statistical examination; a t-test with two samples is commonly used with small sample sizes, testing the difference between the samples when the variances of two normal distributions are not known.

Formula for Independent t-test

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}}}$$

$\bar{X}_1$– Mean value of the first group

$\bar{X}_2$ – Mean value of the second group

S_1^2 – Standard derivation of the first group

S_2^2 - Standard derivation of the second group

N_1 – Size of the first group

N_2 – Size of the second group

3.16.0 CONCLUSION

In this chapter a report on selection of the sample, area of sample, used tool for this study and method used its clear about the methodology of the study. The next chapter will lead towards the analysis and interpretation of the data.

ANALYSIS AND INTERPRETATION

CHAPTER IV

ANALYSIS AND INTERPRETATION

4.0.0 INTRODUCTION

SECTION A QUALITATIVE ANALYSIS ON THE BACKGROUND DETAILS

4.1.0 BACKGROUND INFORMATION OF THE SELECTED SAMPLES

SECTION B QUALITATIVE ANALAYSIS

4.2.0 PRE AND POST TEST MEAN SCORES OF THE SELECTED SAMPLES WITH RESPECT TO LEARNING NEMETH CODE FOR STUDENTS WITH VISUAL IMPAIRMENT

4.3.0 PRE AND POST TEST MEAN SCORES OF THE SELECTED SAMPLES WITH RESPECT TO LEARNING NEMETH CODE FOR STUDENTS WITH VISUAL IMPAIRMENT

4.3.1 Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Alphabets

4.3.2 Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Numerals

4.3.3 Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Fundamental Symbols

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4.4.0 COMPARISON POST TEST MEAN SCORES OF LEARNING NEMETH CODE IN ALPHABETS WITH RESPECT TO INDEPENDENT VARIABLES

4.4.1 Comparison Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Standard

4.4.2 Comparison Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Onset of Disability

4.4.3 Comparison Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Type of Disability

4.4.4 Comparison Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Locality

4.4.5 Comparison Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Type of Family

4.4.6 Comparison Post test Mean Scores of Learning Nemeth code in Alphabets with respect to P Qualification of Parents

4.4.7 Comparison Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Braille Skills

4.5.0 COMPARISON POST TEST MEAN SCORES OF LEARNING NEMETH CODE IN NUMERALS WITH RESPECT TO INDEPENDENT VARIABLES

4.5.1 Comparison Post test Mean Scores of Learning Nemeth code in Numerals with respect to Standard

4.5.2 Comparison Post test Mean Scores of Learning Nemeth code in Numerals with respect to Onset of Disability

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4.5.6 Comparison Post test Mean Scores of Learning Nemeth code in Numerals with respect to Qualification of Parents

4.5.7 Comparison Post test Mean Scores of Learning Nemeth code in Numerals with respect to Braille Skills

4.6.0 COMPARISON POST TEST MEAN SCORES OF LEARNING NEMETH CODE IN FUNDAMENTAL SYMBOLS WITH RESPECT TO INDEPENDENT VARIABLES

4.6.1 Comparison Post test Mean Scores of Learning Nemeth code in Fundamental Symbols with respect to Standard

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4.6.6 Comparison Post test Mean Scores of Learning Nemeth code in Fundamental Symbols with respect to Qualification of Parents

4.6.7 Comparison Post test Mean Scores of Learning Nemeth code in Fundamental Symbols with respect to Braille Skills

4.7.0 COMPARISON POST TEST MEAN SCORES OF LEARNING NEMETH CODE IN SPECIAL CASES WITH RESPECT TO INDEPENDENT VARIABLES

4.7.1 Comparison Post test Mean Scores of Learning Nemeth code in Special Cases with respect to Standard

4.7.2 Comparison Post test Mean Scores of Learning Nemeth code in Special Cases with respect to Onset of Disability

4.7.3 Comparison Post test Mean Scores of Learning Nemeth code in Special Cases with respect to Type of Disability

4.7.4 Comparison Post test Mean Scores of Learning Nemeth code in Special Cases with respect to Locality

4.7.5 Comparison Post test Mean Scores of Learning Nemeth code in Special Cases with respect to Type of Family

4.7.6 Comparison Post test Mean Scores of Learning Nemeth code in Special Cases with respect to Qualification of Parents

4.7.7 Comparison Post test Mean Scores of Learning Nemeth code in Special Cases with respect to Braille Skills

4.8.0 COMPARISON OF DOMAIN

CHAPTER IV

ANALYSIS AND INTERPRETATION

4.0.0 INTRODUCTION

Data analysis part is important in research because its gives result on accurate and makes studying data a lot simpler. It helps the researchers straightforwardly interpret the information. It's a way to analyze the huge data used particular study. Interpretation of knowledge refers that important part of the investigation, which is associating with the drawing of inferences from the collected facts after analytic study. Through interpretation only can expose relations and processes that underlie findings. To finish this study properly, it is necessary to analyze the data collected in order to check the hypothesis and answer the research questions. In this chapter, the captured data from the qualitative and quantitative research is presented, analyzed, described and interpreted in an exceedingly systematic manner as the next step of the research process.

The analysis and interpretation of the data pertaining to this study on Application of Nemeth code for Learning Mathematics among Students with Visual Impairment. The data pertaining to the study were consolidated, tabulated, and interpretation in the following tables.

4.1.0 Background information of the students

4.2.0 Pre and post test mean scores of the selected samples with respect to learning Nemeth code for students with visual Impairment

4.3.0 Pre and post test mean scores of the selected samples with respect to learning Nemeth code for students with visual impairment

4.4.0 Comparison of post test mean scores of learning Nemeth code in Alphabets with respect to independent variables

4.5.0 Comparison of post test mean scores of learning Nemeth code in Numerals with respect to independent variables

4.6.0 Comparison of post test mean scores of learning Nemeth code in Fundamental symbols with respect to independent variables

4.7.0 Comparison of post test mean scores of learning Nemeth code in special cases with respect to independent variables

4.8.0 Comparison of Domains

SECTION A QUALITATIVE ANALYSIS

4.1.0 BACKGROUND INFORMATION OF THE SELECTED SAMPLE

The background details of the selected sample are discussed under the following headings:

Table 4.1.0

Background information of the selected sample

particulars	Categories	No .of sample	Percentage
Standard	VI –VII	11	37
	VIII-IX	19	63
Type of Disability	Totally Blindness	23	77
	Low vision	7	23
Locality	Rural	25	83
	Urban	5	17
Qualification of Parents	Literate	11	37
	Illiterate	19	63
Onset of Disability	Congenital	21	70
	Acquired	9	30
Type of Family	Nuclear	17	57
	Joint	13	43
Braille Skills	Good	17	57
	Poor	13	43

The table reveals that the students are divided into 2 grades in which 37% students fall in the VI to VII standard and 63% of students in VIII to IX standard. Hence, the most of the selected visual impairment students are from VIII to IX Standard.**(Table 4.1.0)**

Table 4.1.0 indicates that type of disability of the selected samples 77 percent of the students were totally blind and 23 percent were student with Low Vision. Hence the

concluded that most of the visually impaired students were studying in school than the low vision students.

The above table 4.1.0, It was found out 67 percent of the visually impaired students were from in rural area and 33 percent were from the Urban area. The regards of the samples we can conclude that the most of the visually impaired students were from rural areas than other areas.

The above Table 4.1.0 shows that the parent's qualification of students with visual impairments. It was observed that 37 percent of the parents of visual impairments come under literate level and 63 percent were illiterate parents of visual impairment. Thus we can conclude that maximum of the parent, of visually impaired students are illiterate.

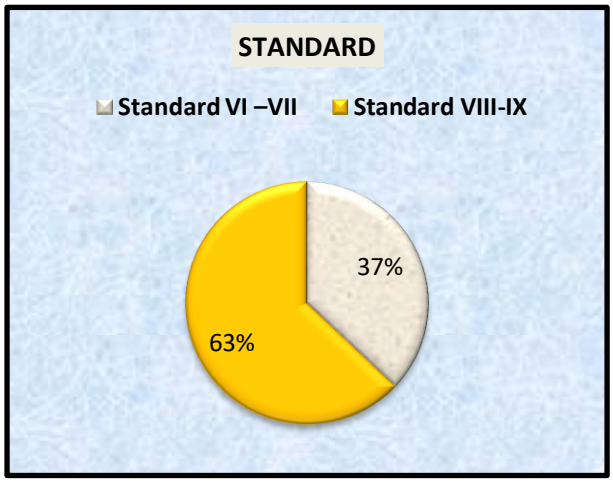
The above table revealed that the distribution of sample based on Onset of Disability. It shows that only less percent (30%) are acquired blindness than the congenital blindness(70%).

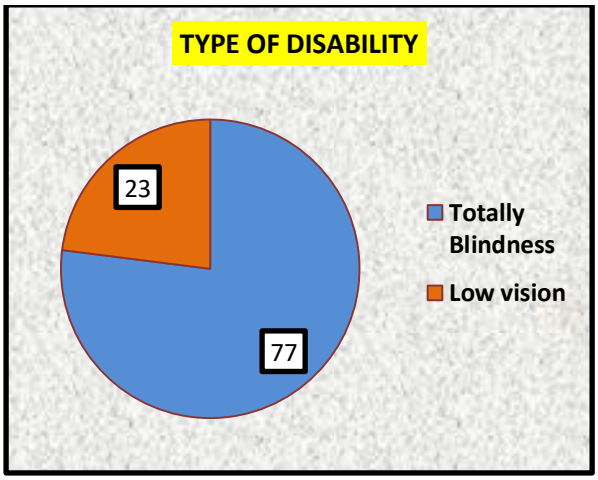
The above table portrays that the type of family wise distribution. Most of the visual impairment students (57%) were living in nuclear family and 43% students with visual impairment were living in joint family. Hence, the most of visually impaired students living with nuclear family.

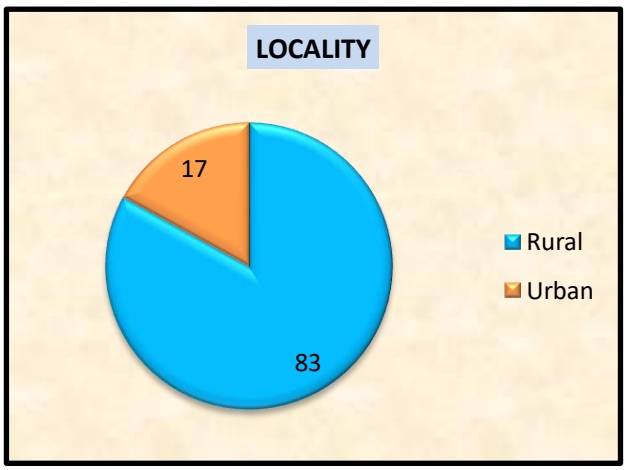
The above table portrays that the Braille skills of the visually impaired in learning Braille Nemeth code. In that the visual impairment students 53% of them have good Braille knowledge and 47% of them having poor knowledge in Braille. Hence it is concluded that majority of the visually impaired student having good Braille skills.

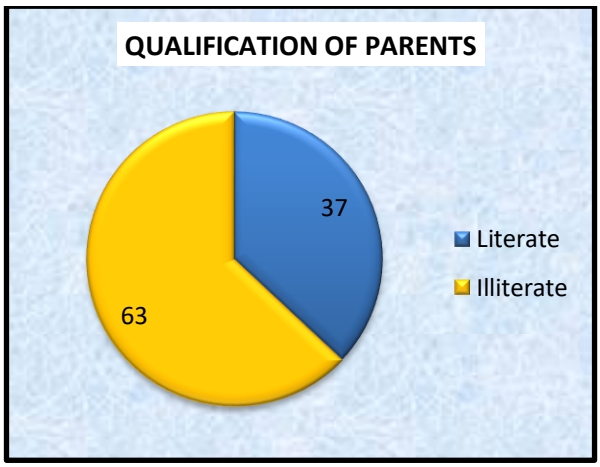
FIGURE 4.1.0

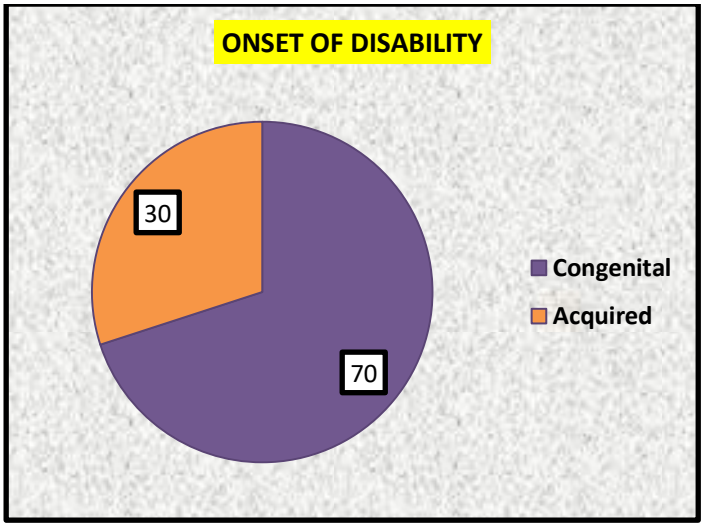
Background information of the selected sample

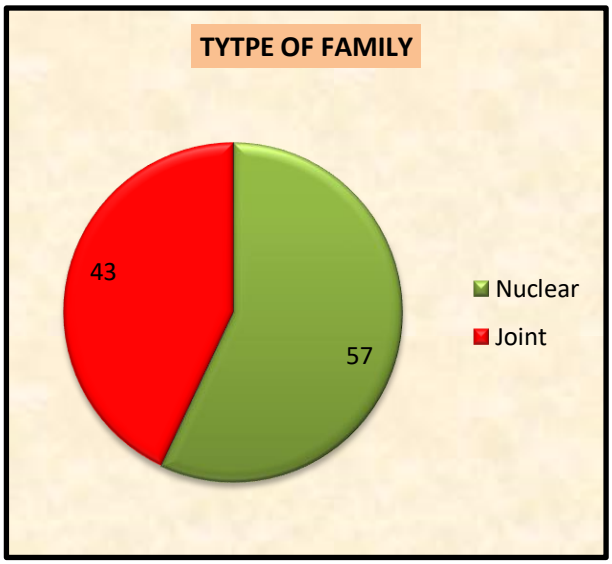


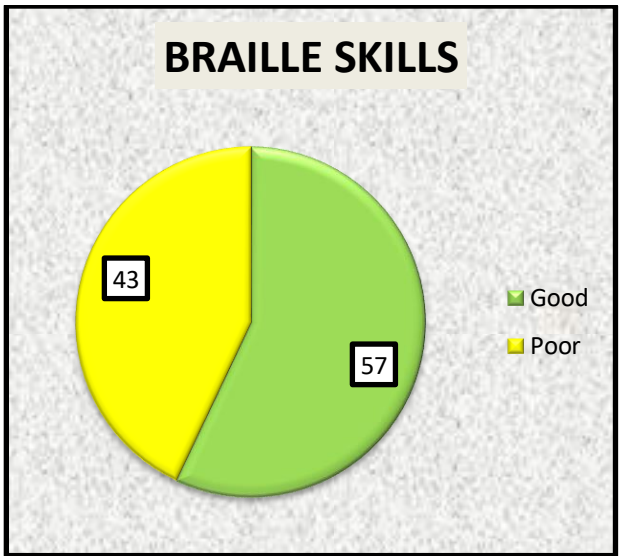







ONSET OF DISABILITY
30
70
Congenital
Acquired


TYTPE OF FAMILY
43
57
Nuclear
Joint


BRAILLE SKILLS
43
57
Good
Poor

SECTION B QUALITATIVE ANALAYSIS

4.2.0 PRE AND POST TEST MEAN SCORES OF THE SELECTED SAMPLES WITH RESPECT TO LEARNING NEMETH CODE FOR STUDENTS WITH VISUAL IMPAIRMENT

Table 4.2.1

Pre and post test mean scores of the selected samples with respect to learning Nemeth code for students with visual impairment

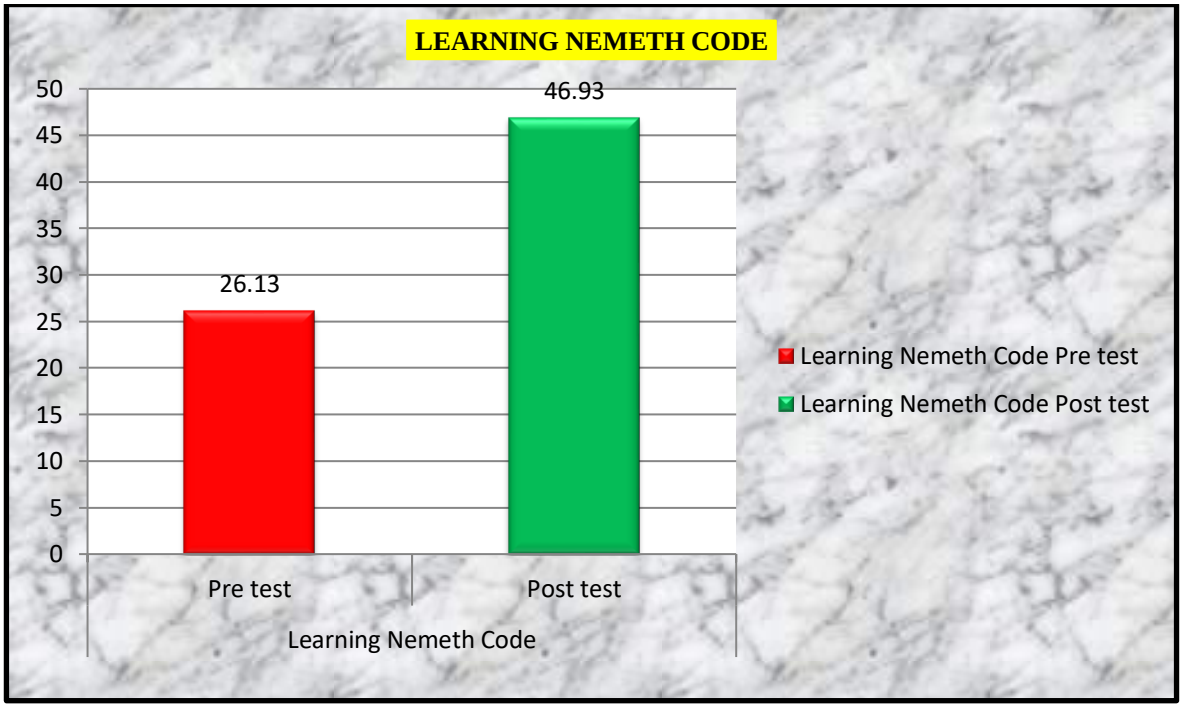
Particulars	N	DF	Testing	Mean	SD	t- value
Learning Nemeth Code	30	29	Pre test	26.13	5.606	-32.480**
			Post test	46.93	3.403	

****Significance at 0.01 level**

The above table revealed that the t- value of the students when compared to their pre and post-test learning Nemeth code is 32.480. This value is significant at 0.01 with respect to using Nemeth code to learning Nemeth code among students with visual impairment. Therefore, the stated hypothesis "There is no significant difference between the students in learning Nemeth code before and after intervention" is rejected. Hence prove that, learning Nemeth code for students with visual impairment improves in learnt effectively after intervention.

FIGURE 4.2.1

Pre and post test mean scores of the selected samples with respect to learning Nemeth code for students with visual impairment



4.3.0 PRE AND POST TEST MEAN SCORES OF THE SELECTED SAMPLES WITH RESPECT TO LEARNING NEMETH CODE FOR STUDENTS WITH VISUAL IMPAIRMENT

4.3.1 Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Alphabets

Table 4.3.1

Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Alphabets

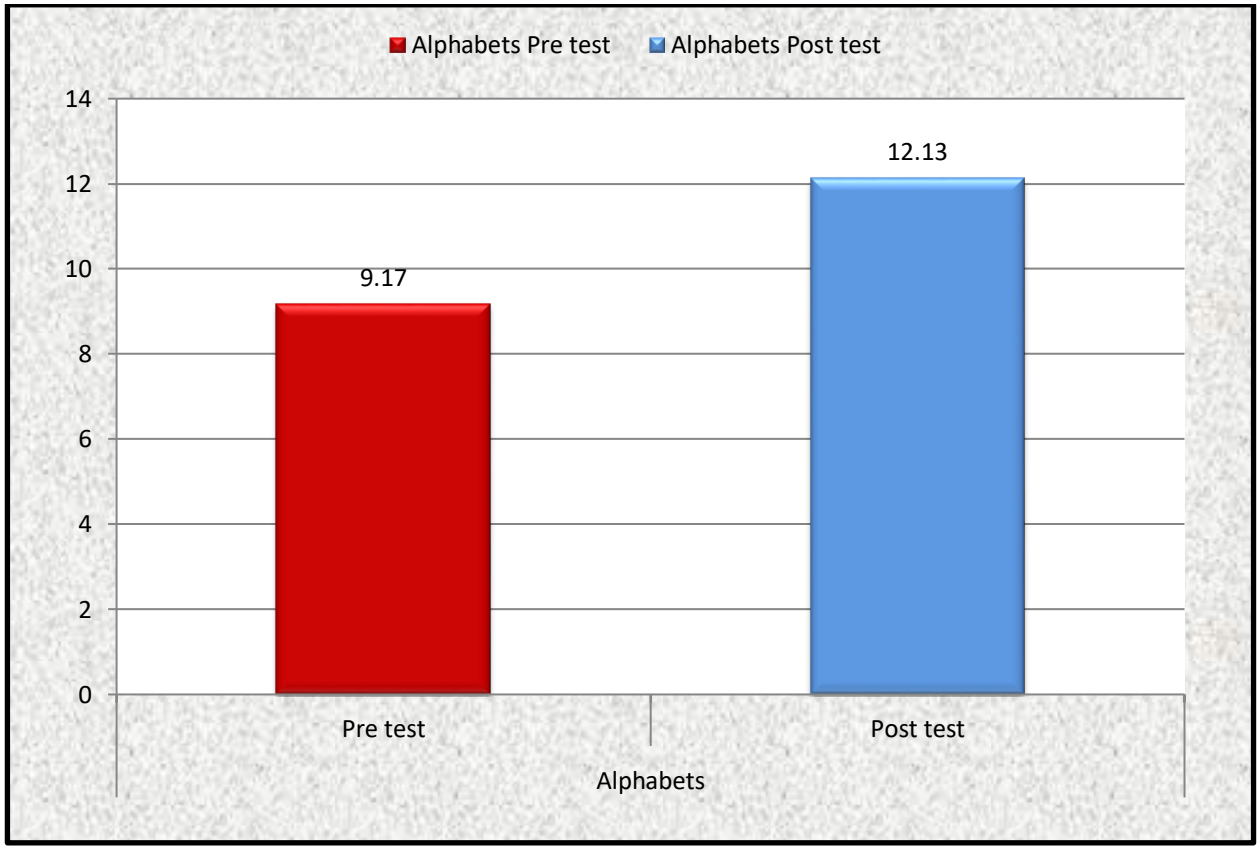
Particulars	N	DF	Testing	Mean	SD	t- value
Alphabets	30	29	Pre test	9.17	2.151	-8.708*
			Post test	12.13	1.196	

***Significance at 0.05 level**

From the above table indicate that there is a significant difference between pre and post test mean scores of the selected samples in Alphabets domain. The significance at 0.05 level. So null hypothesis stated that "There is no significant difference between pre and post test mean scores of the students with visual impairment in learning Nemeth code in Alphabets" is rejected. Hence it proves that, students with visual impairment improved in using alphabets in Nemeth code due to the after intervention.

FIGURE 4.3.1

Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Alphabets



4.3.2 Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Numerals

Table 4.3.2

Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth with respect to Numerals

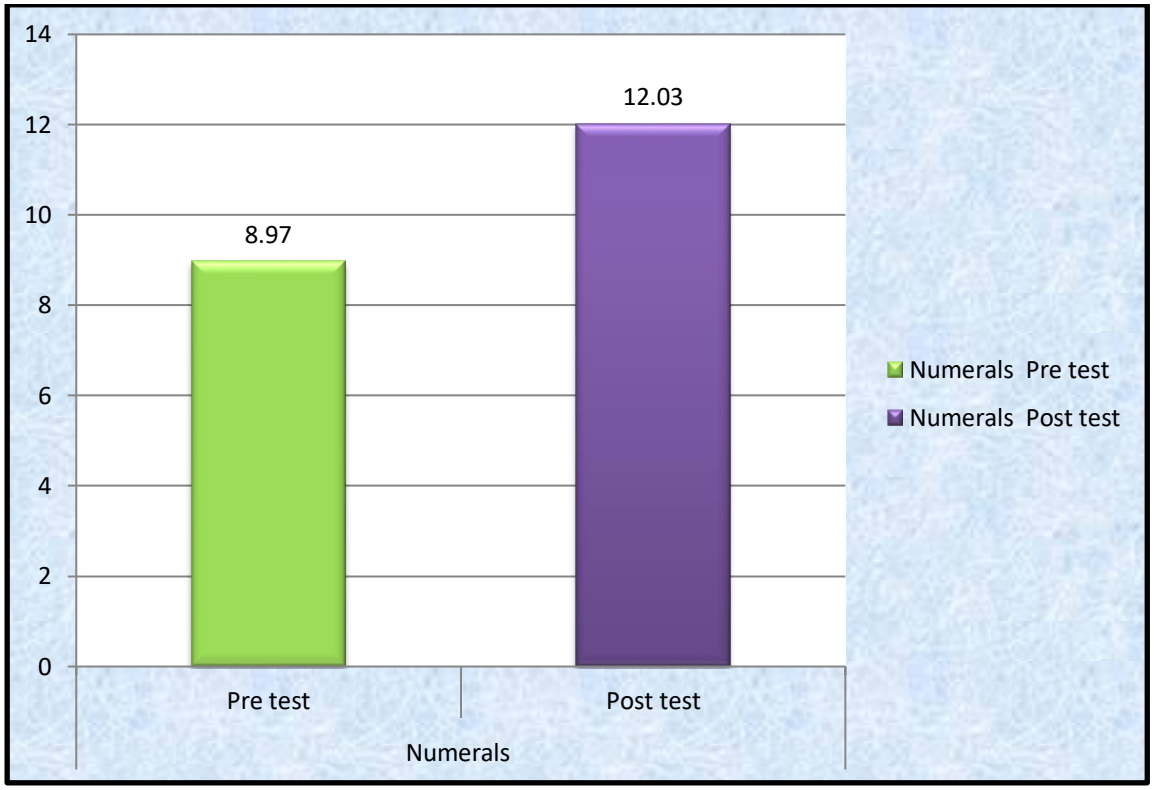
Particulars	N	DF	Testing	Mean	SD	t- value
Numerals	30	29	Pre test	8.97	1.810	-11.500**
			Post test	12.03	0.964	

****significance at 0.01 level**

Above table revealed that there is a significant difference between pre and post test mean scores of the selected samples in Numerals domain. The significance at 0.01 level. So null hypothesis stated that "There is no significant difference between pre and post test mean scores of the students with visual impairment in learning Nemeth code in Numerals" is rejected. Hence it proves that, students with visual impairment improved in using Numerals in Nemeth code due to the after effective intervention

FIGURE 4.3.2

Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth with respect to Numerals



4.3.3 Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Fundamental Symbols

Table 4.3.3

Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Fundamental Symbols

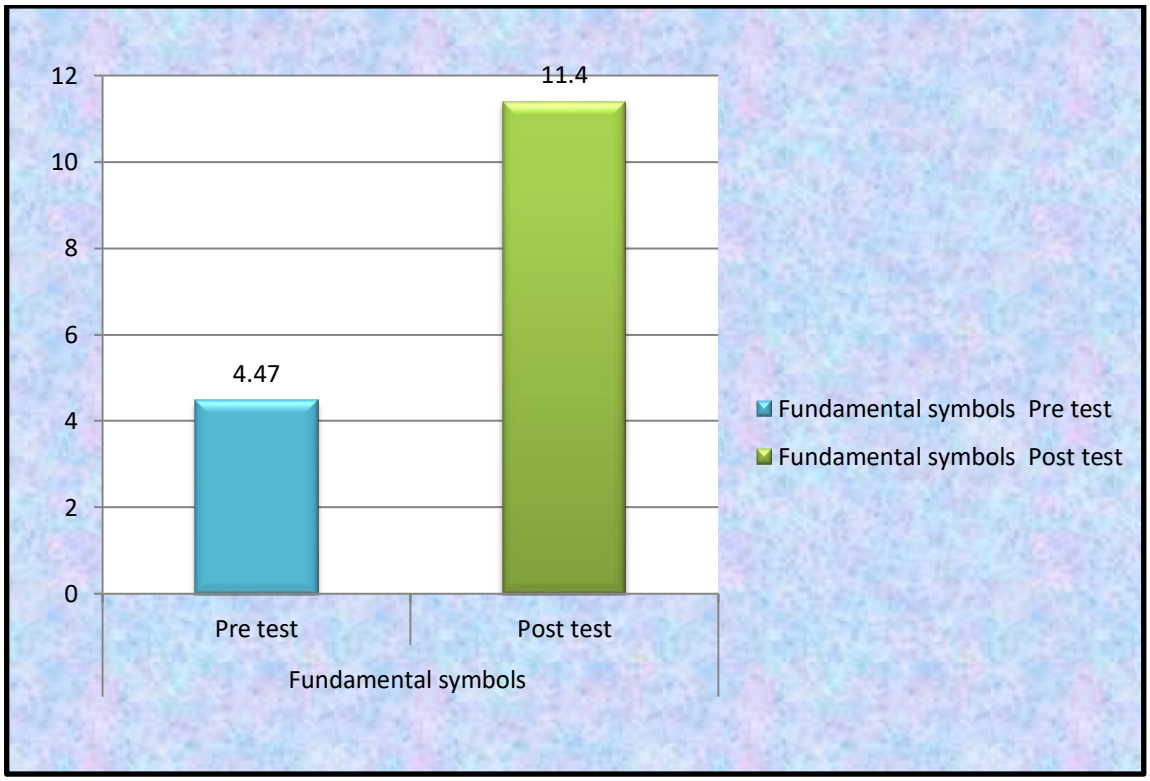
Particulars	N	DF	Testing	Mean	SD	t- value
Fundamental symbols	30	29	Pre test	4.47	2.360	-20.887**
			Post test	11.40	1.354	

**** Significance at 0.01 level**

The above table depicts that the t- value of the students learning Nemeth code in Fundamental Symbols is 20.887. This value is significant at 0.01 with respect to learning Nemeth code in Fundamental Symbols among students with visual impairment. Therefore, the stated null hypothesis "There is no significant difference betweenPre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Fundamental Symbols before and after intervention" is rejected. Stating that the Nemeth code had made a significant impact on students in fundamental symbols. The result is a cause of more practice of sums using Nemeth code given during intervention on Fundamental symbols.

FIGURE 4.3.3

Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Fundamental Symbols



4.3.4 Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Special Cases

Table 4.3.4

Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Special Cases

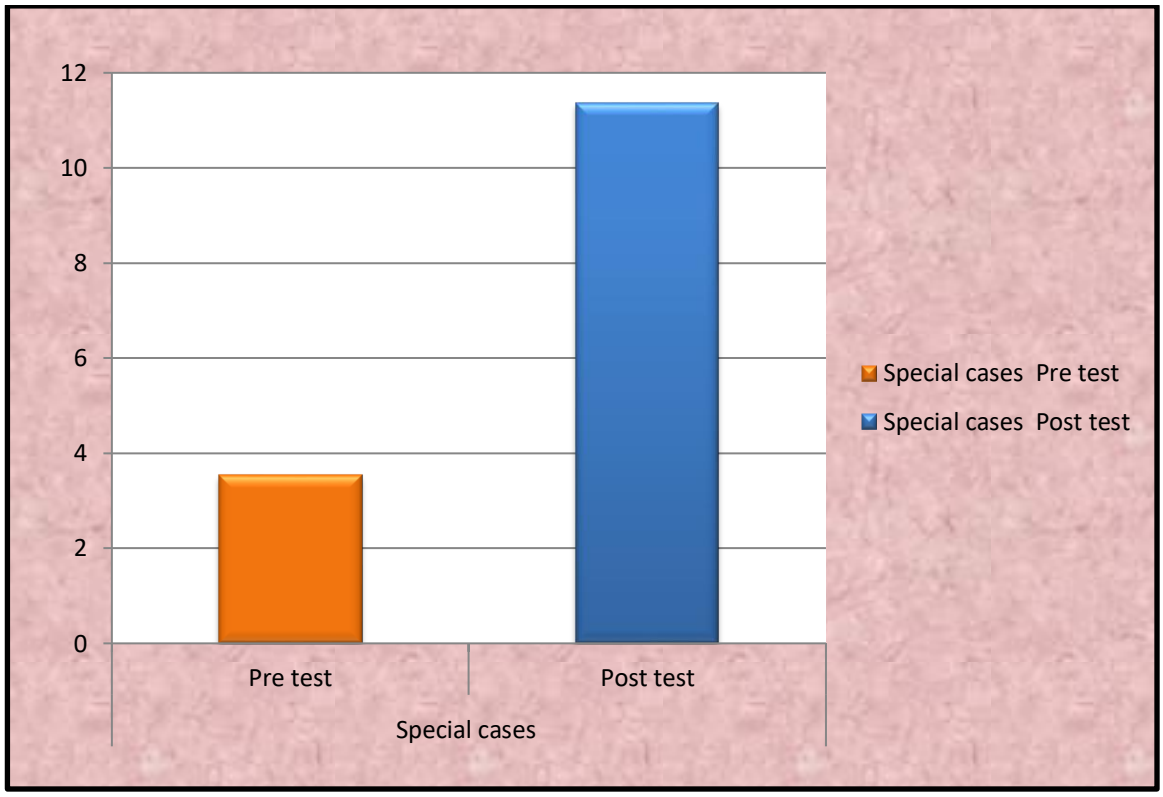
Particulars	N	DF	Testing	Mean	SD	t- value
Special cases	30	29	Pre test	3.53	1.776	-33.291**
			Post test	11.37	1.299	

****Significance at 0.01 level**

The above table revealed that the t- value of theStudents with Visual Impairment in Learning Nemeth Code with respect to Special Cases is 33.291 . This value is significant at 0.01 with respect to learning Nemeth code to special cases in Nemeth code among students with visual impairment. Therefore, the stated hypothesis "Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Special Cases before and after intervention" is rejected. Stating that the Nemeth code had made a significant impact on students in Special cases in Nemeth code. This can be due to the practice of Nemeth code sums and its application during intervention.

FIGURE 4.3.4

Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Special Cases



SECTION C QUALITATIVE ANALAYSIS ON THE ACHIEVEMENT

4.4.0 COMPARISON OF POST TEST MEAN SCORES OF LEARNING NEMETH CODE IN ALPHABETS WITH RESPECT TO INDEPENDENT VARIABLES

4.4.1 Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Standard

Table 4.4.1

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Standard

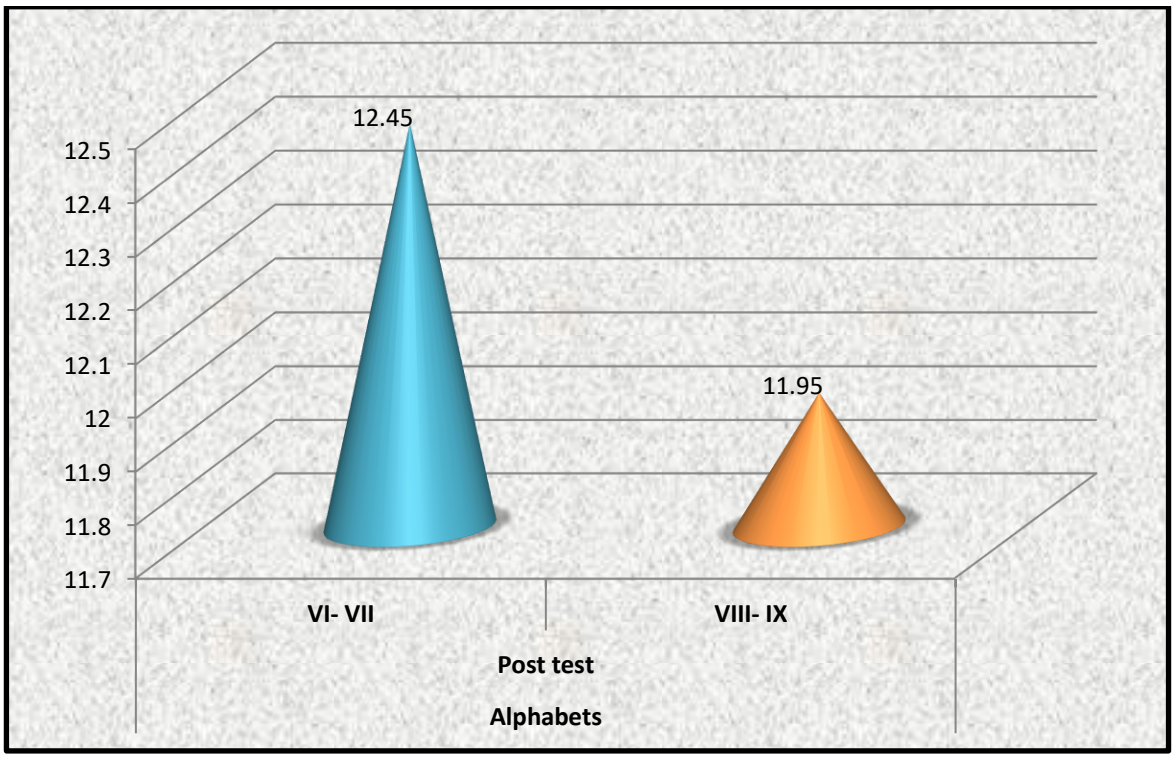
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Alphabets	Post test	VI- VII	11	12.45	1.036	28	1.125^{NS}
		VIII- IX	19	11.95	1.268		

NS- Not Significance

The above table revealed that the t- value of the students at the Standard namely VI to VII and VIII to IX. These values are not significant with respect to learning Nemeth code in Alphabets among students with visual impairment. So, the stated hypothesis" There is no significant difference between the students with visual impairment based on their standard in terms of learning Nemeth code in Alphabets before and after intervention" is accepted.

FIGURE 4.4.1

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Standard



4.4.2 Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Onset of Disability

Table 4.2.2

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Onset of Disability

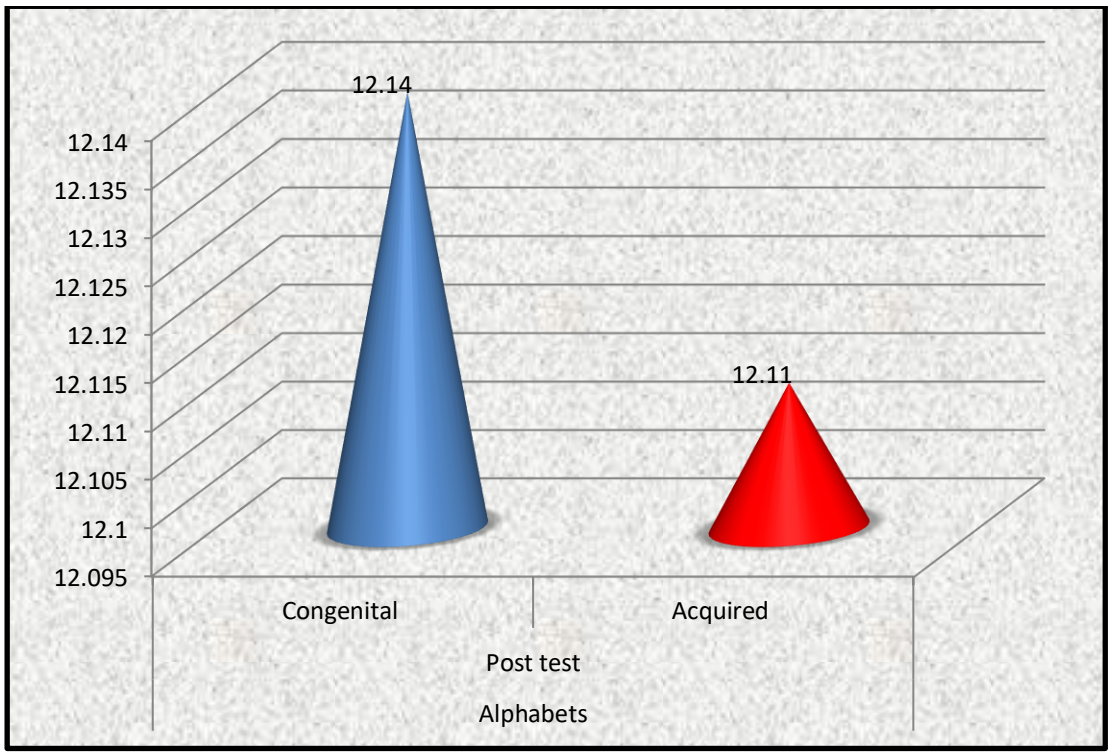
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Alphabets	Post test	Congenital	21	12.14	1.108	28	0.065^{NS}
		Acquired	9	12.11	1.453		

NS- Not Significance

It was found that the t- value of the students at the onset of disability namely congenital and acquired. These values are not significant with respect to learning Nemeth code in Alphabets among students with visual impairment. So, the stated hypothesis" there is no significant difference between the students with visual impairment based on their onset of disability in terms of learning Nemeth code in Alphabets before and after intervention" is accepted. The students who are congenital visually impaired have performed better when compared to Acquired visually impaired.

FIGURE 4.2.2

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Onset of Disability



4.4.3 Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Type of Disability

Table 4.4.3

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Type of Disability

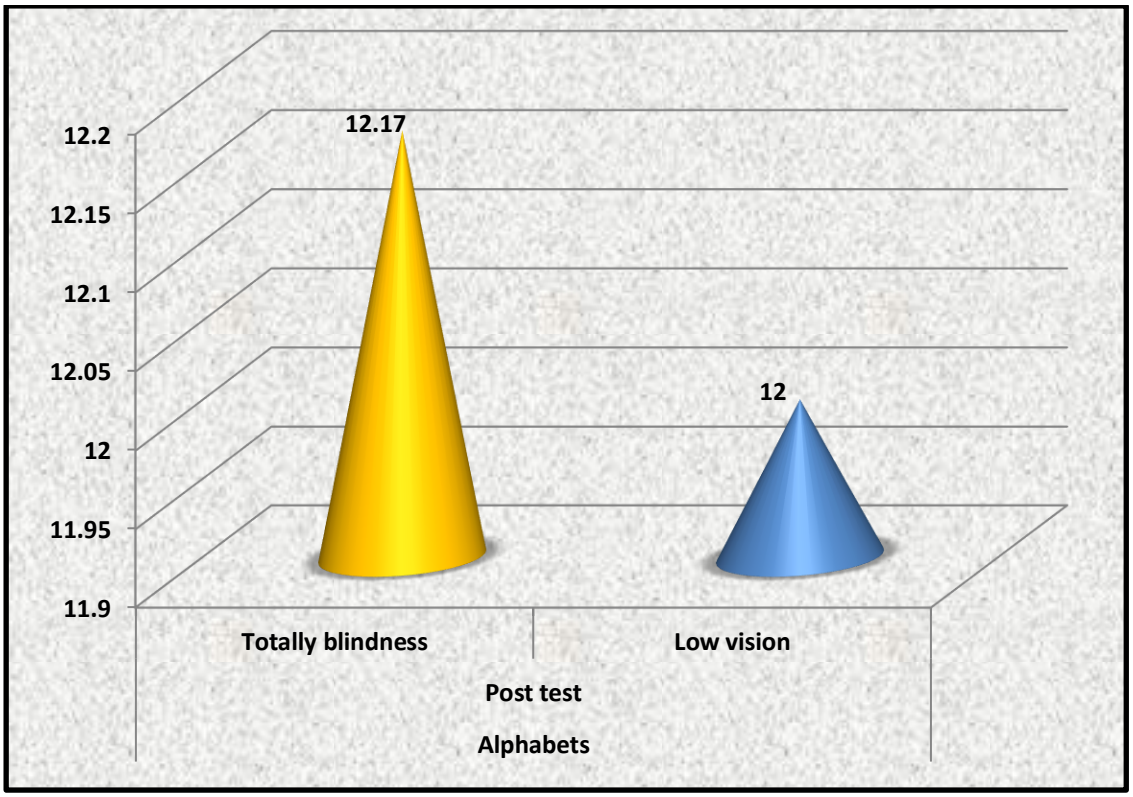
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Alphabets	Post test	Totally blindness	23	12.17	1.267	28	0.332^{NS}
		Low vision	7	12.00	1.000		

NS- Not Significance

The above table revealed the t- value of the students based on their type of disability. These values are not significant with respect to learning Nemeth code in Alphabets among students with visual impairment. So, the stated hypothesis" there is no significant difference between the students with visual impairment based on their Type of disability in terms of Learning Nemeth code in Alphabet before and after intervention" is accepted.

FIGURE 4.4.3

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Type of Disability



4.4.4 Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Locality

Table 4.4.4

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Locality

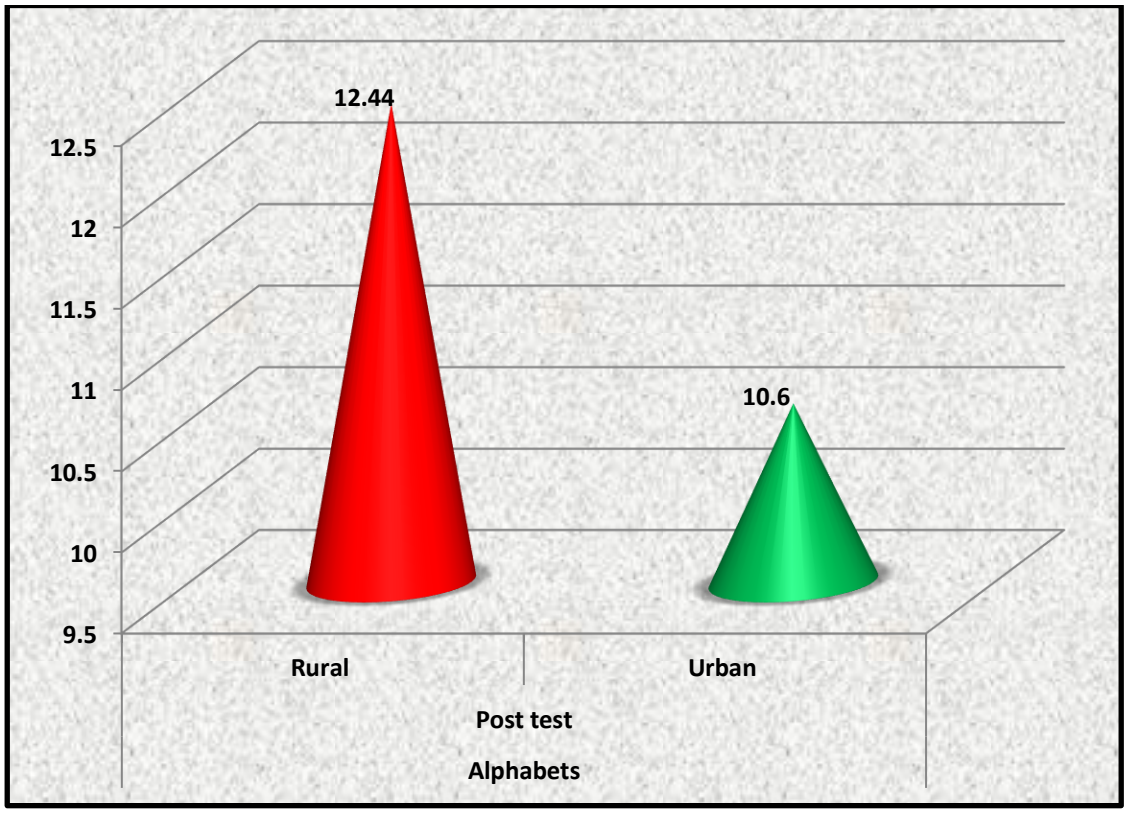
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Alphabets	Post test	Rural	25	12.44	1.003	28	3.800**
		Urban	5	10.60	0.894		

****Significance at 0.01 level**

There was a statistically significant difference between comparison of pre and post test mean scores in alphabets with respect to locality. The value is 3.800. Hence the null hypothesis stated that, "There is no significance in the learning Nemeth code in alphabets with respect to locality before and after intervention" is rejected. Hence it may be noted that, there is an impact of intervention to learning Nemeth code in alphabets.

FIGURE 4.4.4

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Locality



4.4.5 Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Type of Family

Table 4.4.5

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Type of Family

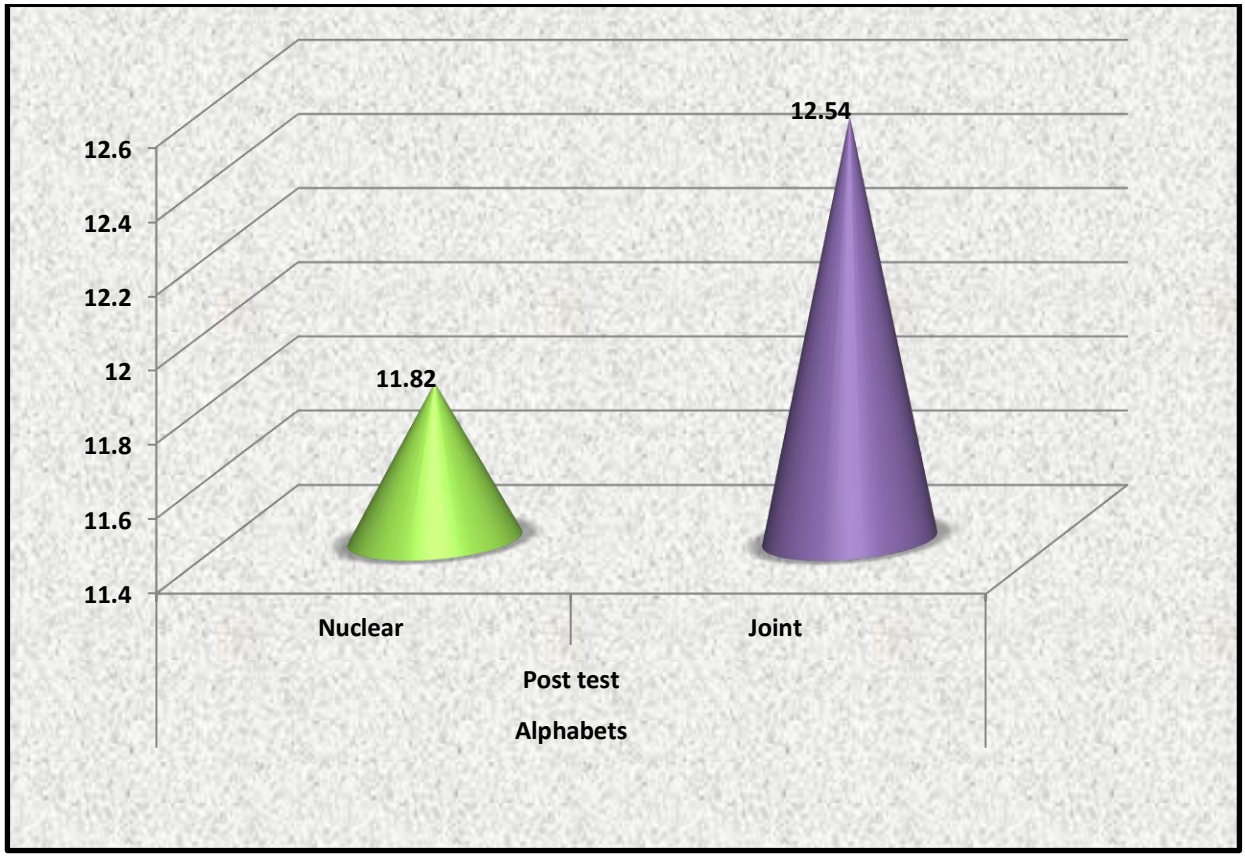
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Alphabets	Post test	Nuclear	17	11.82	1.286	28	-1.672^{NS}
		Joint	13	12.54	0.967		

NS- Not Significance

The above table revealed that the t- value of the students at the type of family namely nuclear and joint. These values are not significant with respect to learning Nemeth code in Alphabets among students with visual impairment. So, the stated hypothesis "there is no significant difference between the students with visual impairment based on their type of family in learning Nemeth code in Alphabets before and after intervention" is accepted .

FIGURE 4.4.5

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Type of Family



4.4.6 Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Qualification of Parents

Table 4.4.6

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect toQualification of Parents

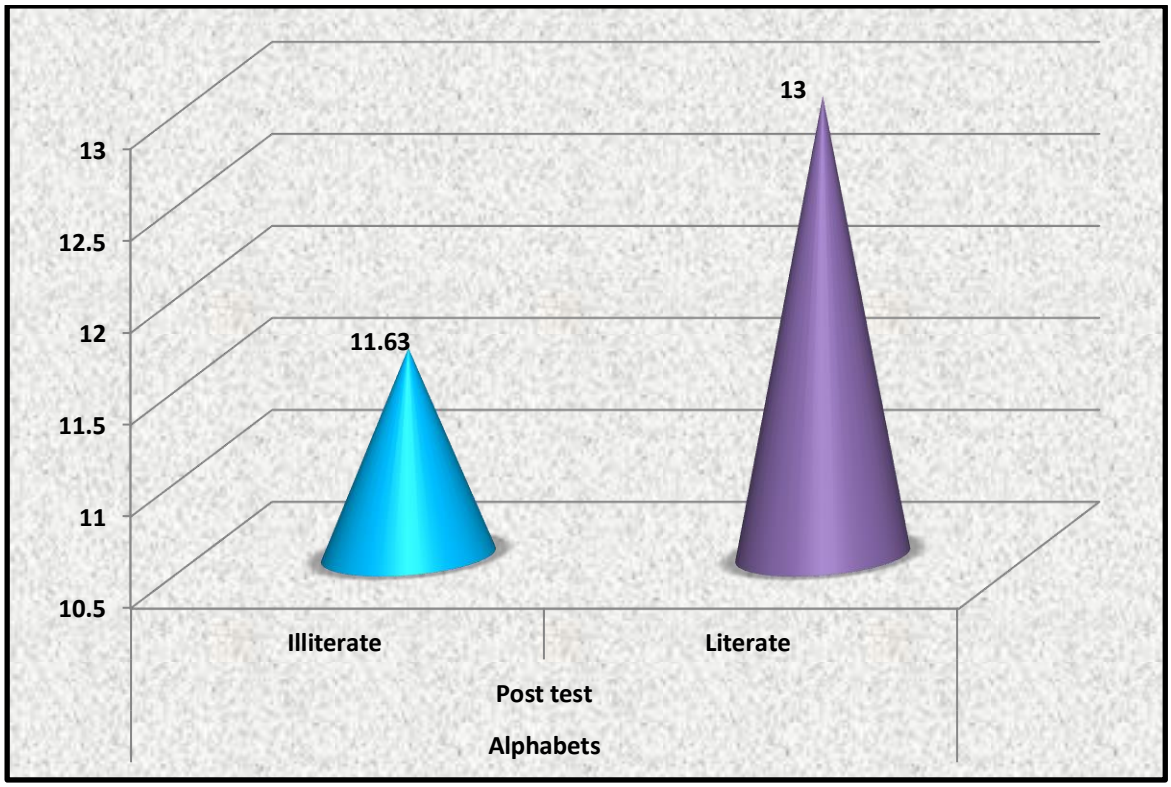
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Alphabets	Post test	Illiterate	19	11.63	1.25	28	-3.585**
		Literate	11	13.00	0.00		

****Significance at 0.01 level**

It was observed that there is significant difference between theComparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Qualification of Parents. The value is significant at 0.01 level. Hence, the null hypothesis stated as "There is no significance difference between Comparisons of post test mean scores of the learning Nemeth code in alphabets with respect to Qualification of Parents" is rejected. Hence it may be concluded that positive impact of the intervention.

FIGURE 4.4.6

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect toQualification of Parents



4.4.7 Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Braille skills

Table 4.4.7

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Braille skills

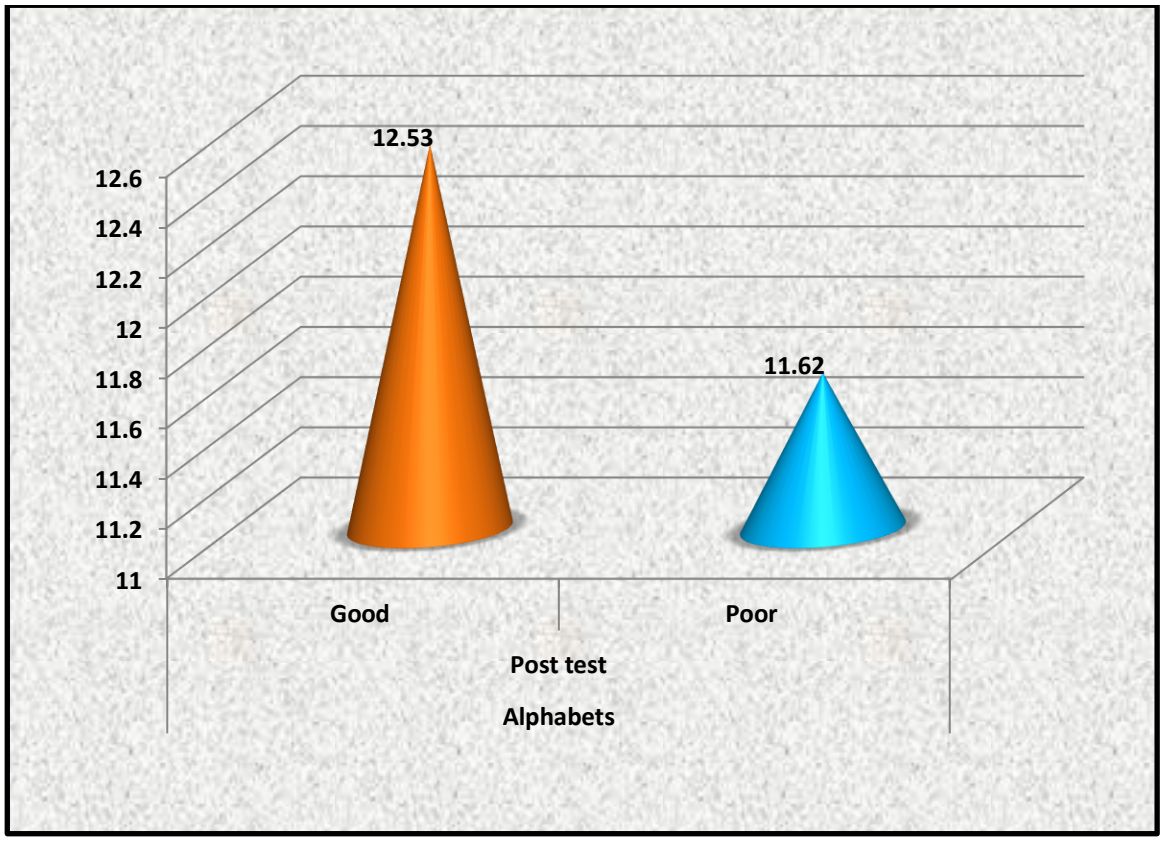
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Alphabets	Post test	Good	17	12.53	0.943	28	2.209*
		Poor	13	11.62	1.325		

***Significance at 0.05 level**

It is evident from the table that, there is significance between the Comparisons of post test means scores students with visual impairment with respect to Braille skills. The value is at 0.05 level. Hence, the null hypothesis stated as "There is no significance differences between comparisons of post test mean score of the student with visual impairment in Learning Nemeth Code in Alphabets with respect to Braille skills" is rejected. Hence it may be concluded intervention had created a significant impact in learning Nemeth code.

FIGURE 4.4.7

Comparison of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Braille skills



4.5.0 COMPARISON OF POST TEST MEAN SCORES OF LEARNING NEMETH CODE IN NUMERALS WITH RESPECT TO INDEPENDENT VARIABLES

4.5.1 Comparison of Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Standard

Table 4.5.1

Comparison of Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Standard

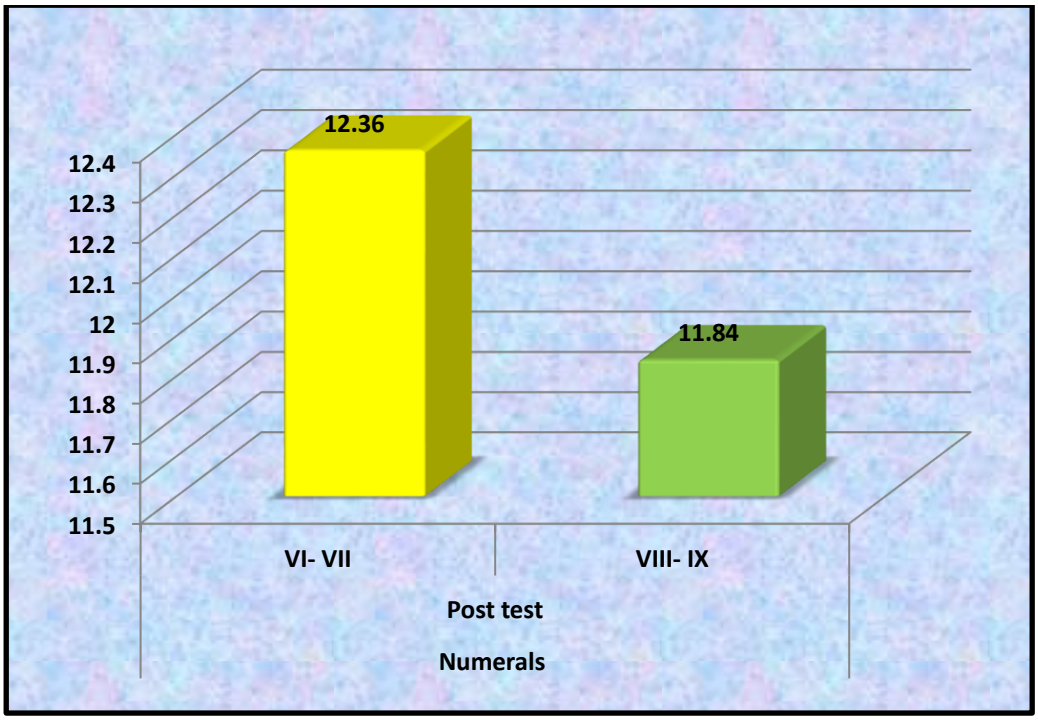
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Numerals	Post test	VI- VII	11	12.36	0.809	28	1.455^{NS}
		VIII- IX	19	11.84	1.015		

NS- Not Significance

It was observed that the t- value of the students at the Standard namely VI to VII and VIII to IX. These values are not significant with respect to learning Nemeth code in Numerals among students with visual impairment. So, the stated hypothesis" There is no significant difference between the students with visual impairment based on their standard in terms of learning Nemeth code in Numerals before and after intervention" is accepted.

FIGURE 4.5.1

Comparison of Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Standard



4.5.2 Comparison of Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Onset of Disability

Table 4.5.2

Comparison of Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Onset of Disability

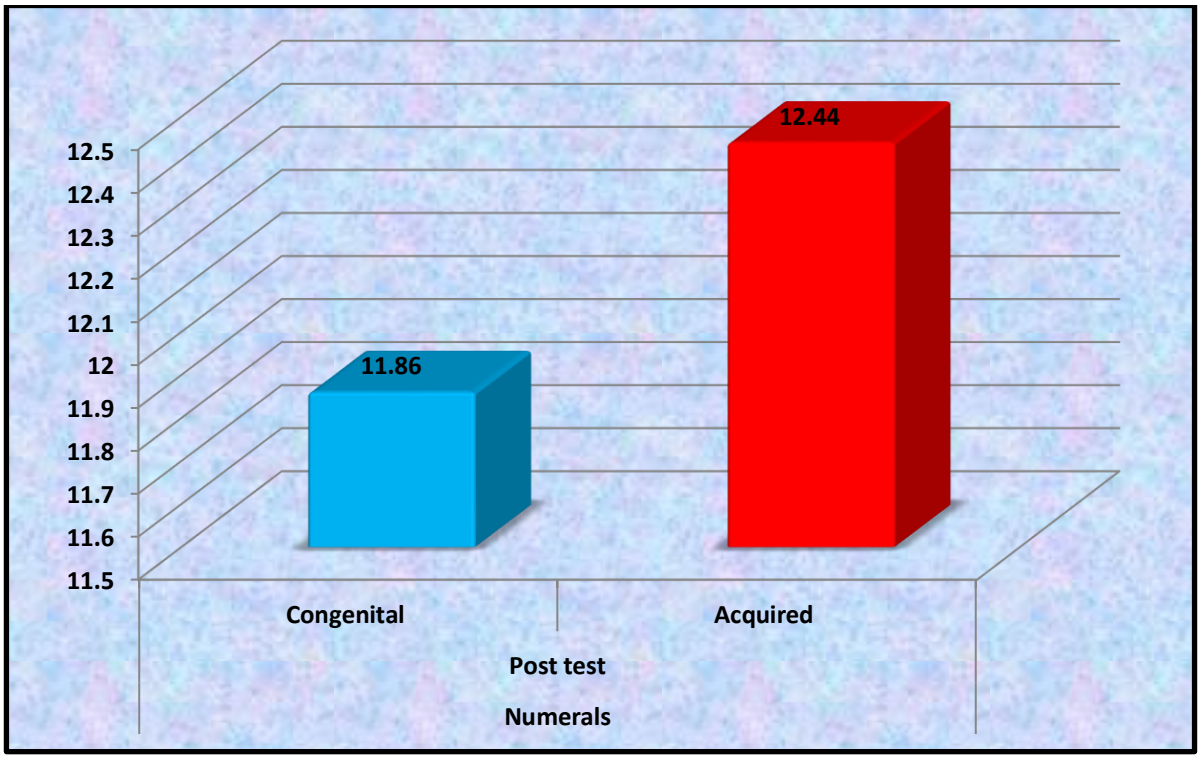
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Numerals	Post test	Congenital	21	11.86	1.06	28	-1.567**
		Acquired	9	12.44	0.52		

**** Significance at 0.01 level**

The above table reflects that, there is a significant difference between Comparison of post test mean scores of the selected samples in numerals with respect to Onset of Disability. This value is significant at 0.01 level. So null hypothesis stated that "There is no significant difference between Comparison of Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code in Numerals with respect to Onset of Disability" is rejected. Hence it proves that, Nemeth code in Numerals was helpful to learnt Nemeth code for students with visual impairment**.**

FIGURE 4.5.2

Comparison of Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Onset of Disability



4.5.3 Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Type of Disability

Table 4.5.3

Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Type of Disability

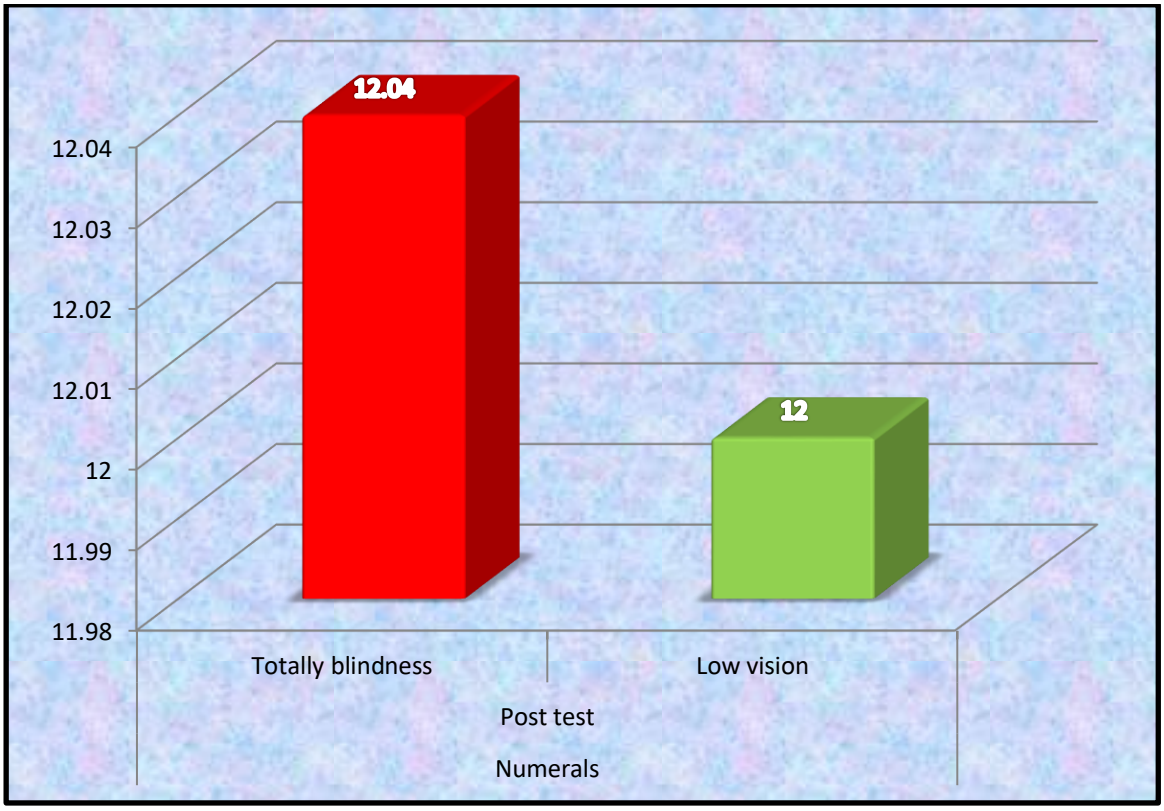
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Numerals	Post test	Totally blindness	23	12.04	0.928	28	0.103^{NS}
		Low vision	7	12.00	1.155		

NS- Not Significance

The above table revealed the t- value of the students based on their type of disability. These values are not significant with respect to learning Nemeth code in Numerals among students with visual impairment. So, the stated hypothesis" there is no significant difference between the students with visual impairment based on their Type of disability in terms of Learning Nemeth code in Numerals before and after intervention" is accepted.

FIGURE 4.5.3

Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Type of Disability



4.5.4 Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Locality

Table 4.5.4

Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Locality

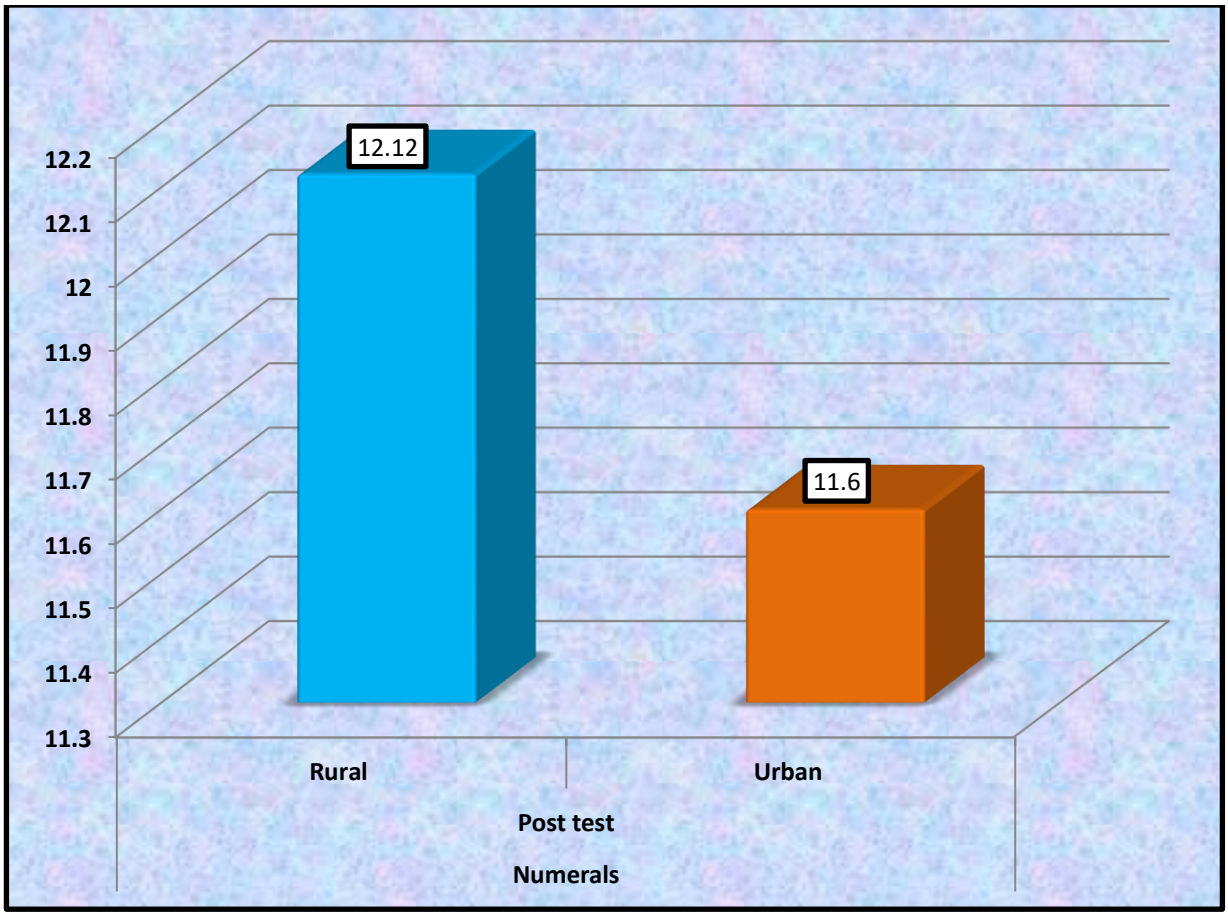
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Numerals	Post test	Rural	25	12.12	0.92	28	1.105^{NS}
		Urban	5	11.60	1.14		

NS- Not Significance

The above table revealed that the t- value of the students at the type of locality namely rural and urban. These values are not significant with respect to learning Nemeth code in Numerals among students with visual impairment. So, the stated hypothesis" there is no significant difference between the students with visual impairment based on their locality in terms learning Nemeth code in Numerals before and after intervention" is accepted .

FIGURE 4.5.4

Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Locality



4.5.5 Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Type of Family

Table 4.5.5

Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Type of Family

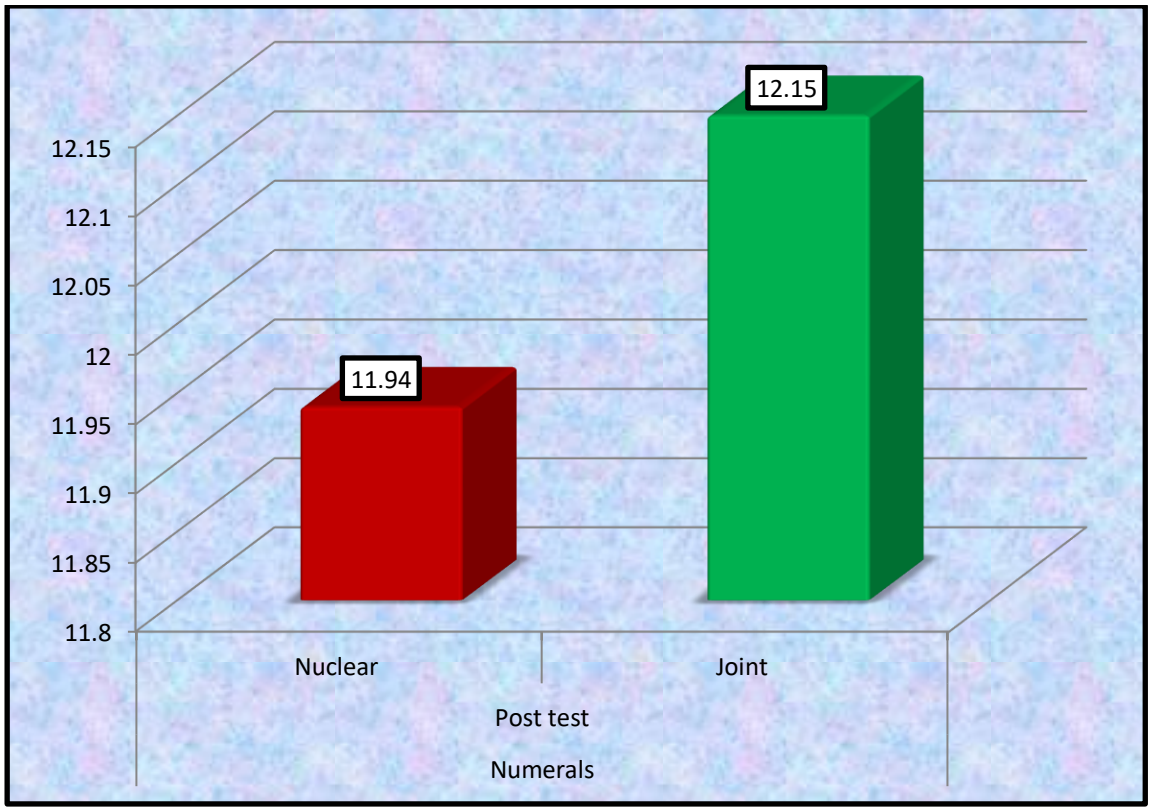
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Numerals	Post test	Nuclear	17	11.94	0.95	28	-0.592^{NS}
		Joint	13	12.15	0.98		

NS- Not Significance

It was observed that the t- value of the students at the type of family namely nuclear and joint . These values are not significant with respect to learning Nemeth code in Numerals among students with visual impairment. So, the stated hypothesis “there is no significant difference between the students with visual impairment based on their type of family in learning Nemeth code in Numerals before and after intervention” is accepted .

FIGURE 4.5.5

Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Type of Family



4.5.6 Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Qualification of Parents

Table 4.5.6

Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect Qualification of Parents

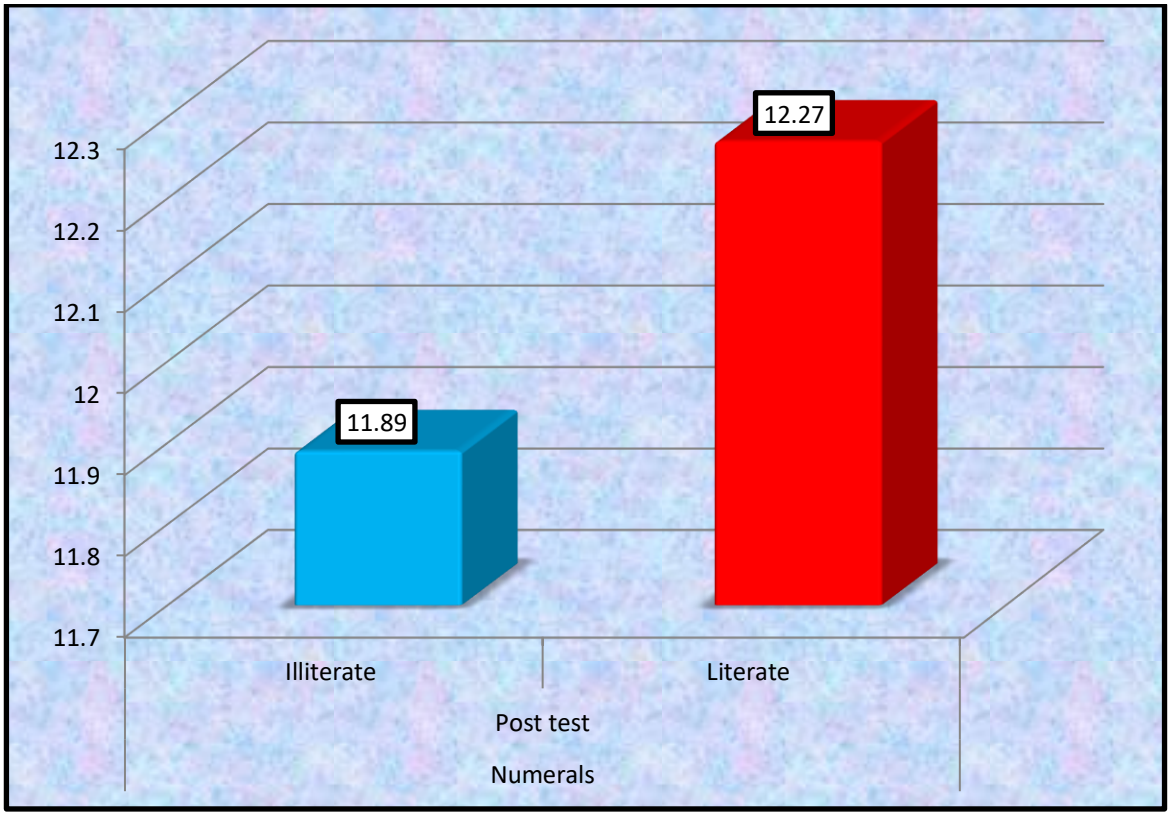
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Numerals	Post test	Illiterate	19	11.89	1.04	28	-1.036^{NS}
		Literate	11	12.27	0.78		

NS- Not Significance

The above table revealed the t- value of the students based on their qualification of Parents. These values are not significant with respect to learning Nemeth code in Numerals among students with visual impairment. So, the stated hypothesis "there is no significant difference between the students with visual impairment based on their parents educational qualification in to learning Nemeth code in Numerals before and after intervention" is accepted

FIGURE 4.5.6

Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect Qualification of Parents



4.5.7 Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Braille skills

Table 4.5.7

Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Braille skills

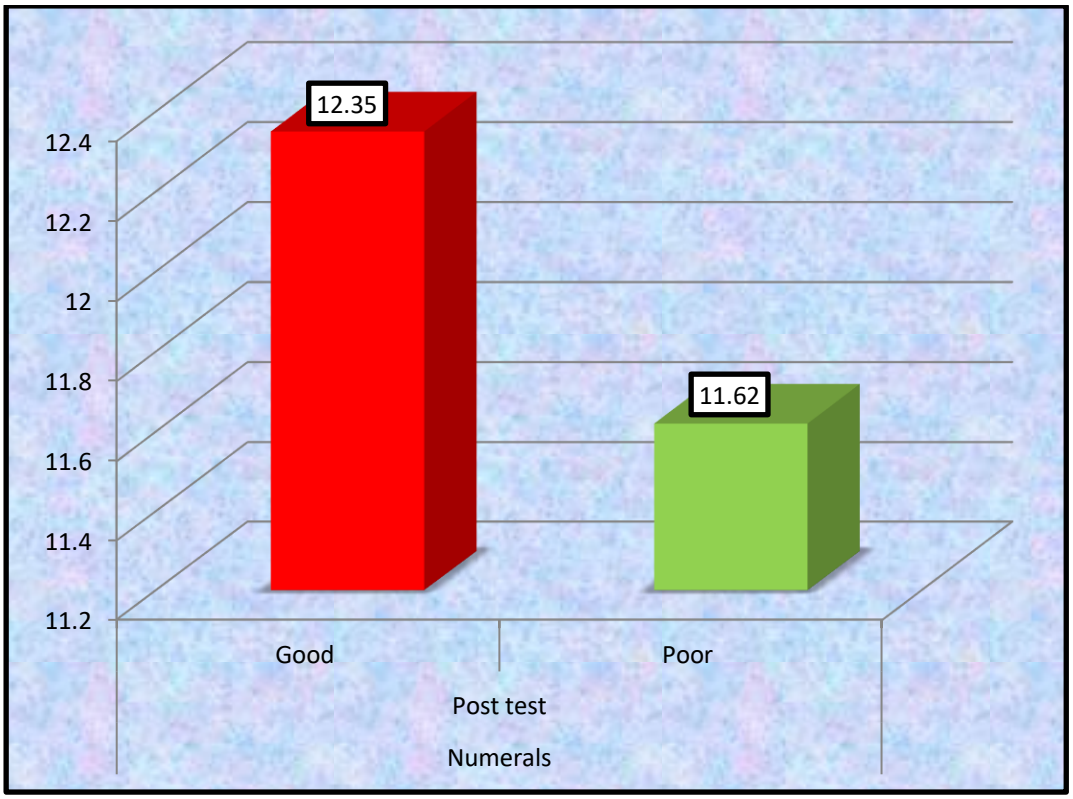
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Numerals	Post test	Good	17	12.35	0.78	28	2.21*
		Poor	13	11.62	1.04		

***Significance at 0.05 level**

The above table reflects that, there is a significant difference between Comparison of post test mean scores of the selected samples in Numerals with respect to Braille Skills. The value is significant at 0.05 level. So null hypothesis stated that "There is no significant difference between Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code in Numerals with respect to Braille Skills" is rejected. Hence it proves that, Nemeth code in Numerals was helpful to learning Nemeth code for students with visual impairment**.**

FIGURE 4.5.7

Comparison Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Braille skills



4.6.0 COMPARISON OF POST TEST MEAN SCORES OF LEARNING NEMETH CODE IN FUNDAMENTAL SYMBOLS WITH RESPECT TO INDEPENDENT VARIABLES

4.6.1 Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Standard

Table 4.6.1

Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Standard

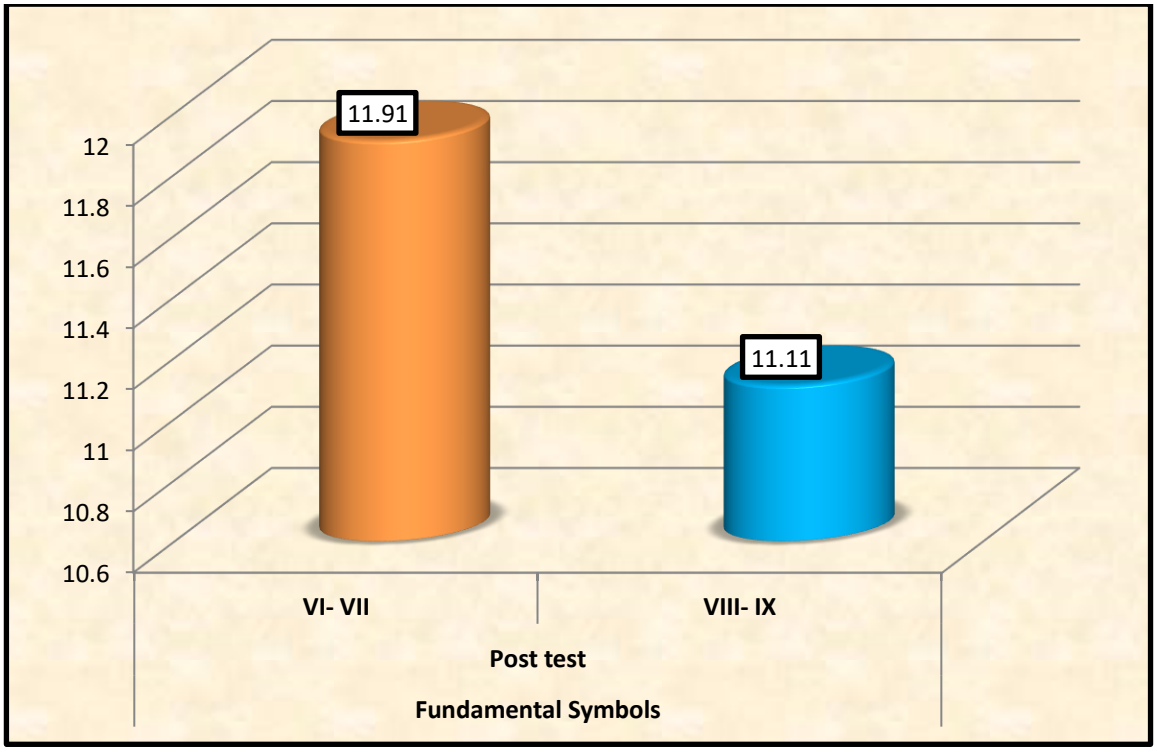
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Fundamental Symbols	Post test	VI- VII	11	11.91	1.15	28	1.609^{NS}
		VIII- IX	19	11.11	1.19		

NS- Not Significance

The above table revealed that the t- value of the students at the Standard namely VI to VII and VIII to IX. These values are not significant with respect to learning Nemeth code in Fundamental symbols among students with visual impairment. So, the stated hypothesis" There is no significant difference between the students with visual impairment based on their standard in terms of learning Nemeth code in fundamental symbols before and after intervention" is accepted.

FIGURE 4.6.1

Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Standard



4.6.2 Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Onset of Disability

Table 4.6.2

Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Onset of Disability

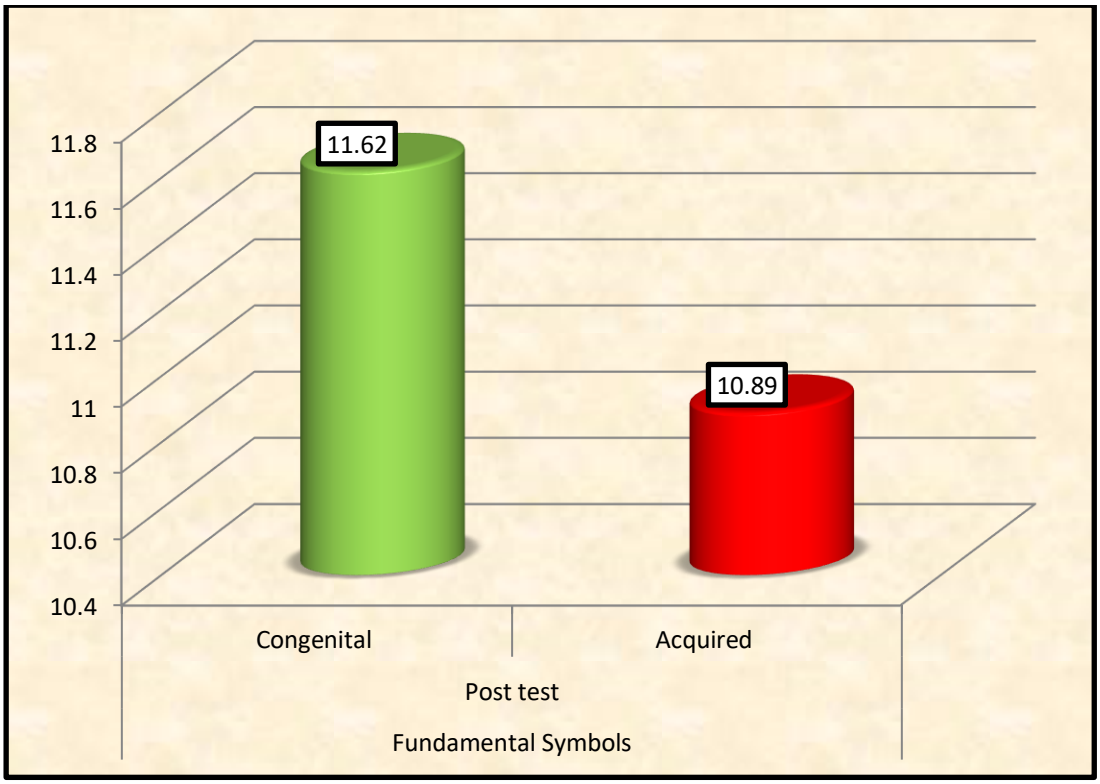
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Fundamental Symbols	Post test	Congenital	21	11.62	1.28	28	1.374^{NS}
		Acquired	9	10.89	1.45		

NS- Not Significance

The above table revealed that the t- value of the students at the onset of disability namely congenital and acquired. These values are not significant with respect to learning Nemeth code in Fundamental Symbols among students with visual impairment. So, the stated hypothesis" there is no significant difference between the students with visual impairment based on their onset of disability in terms of learning Nemeth code in Fundamental Symbols before and after intervention" is accepted.

FIGURE 4.6.2

Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Onset of Disability



4.6.3 Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Type of Disability

Table 4.6.3

Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Type of Disability

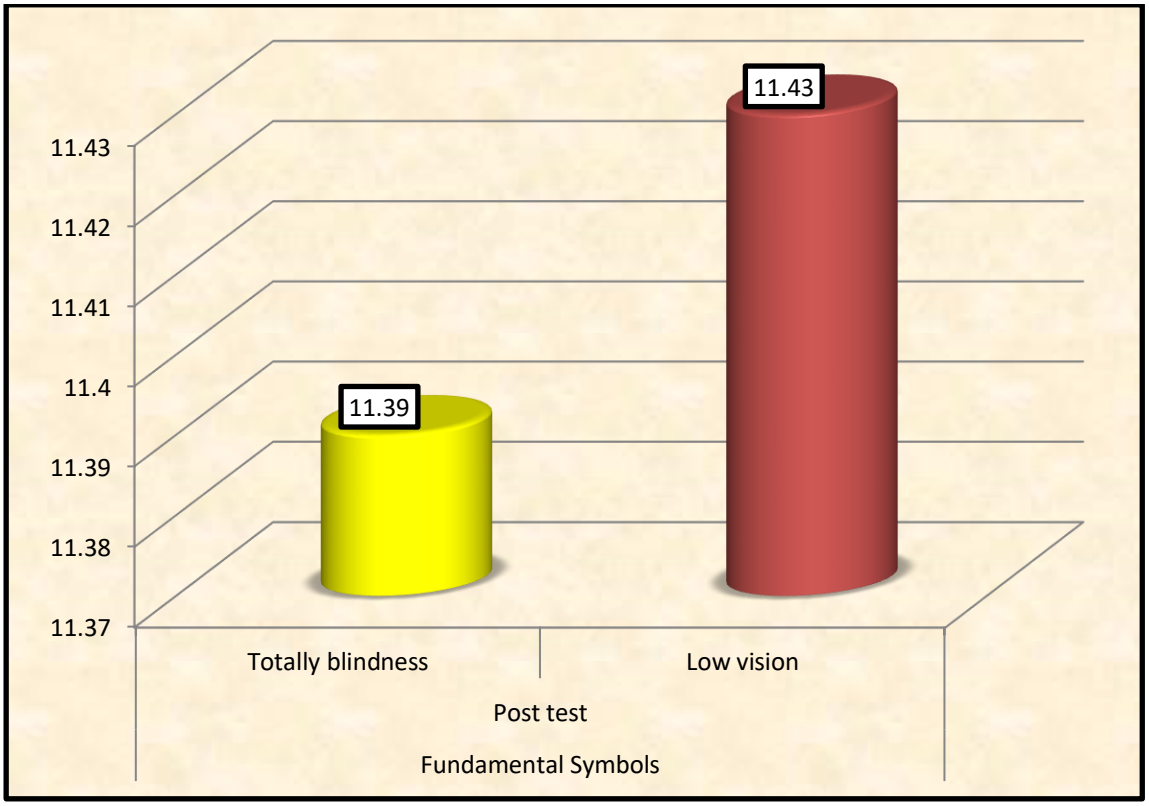
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Fundamental Symbols	Post test	Totally blindness	23	11.39	1.34	28	-0.063^{NS}
		Low vision	7	11.43	1.51		

NS- Not Significance

The above table revealed the t- value of the students based on their type of disability. These values are not significant with respect to learning Nemeth code in Fundamental Symbols among students with visual impairment. So, the stated hypothesis" there is no significant difference between the students with visual impairment based on their Type of disability in terms of Learning Nemeth code in Fundamental Symbols before and after intervention" is accepted.

FIGURE 4.6.3

Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Type of Disability



4.6.4 Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Locality

Table 4.6.4

Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Locality

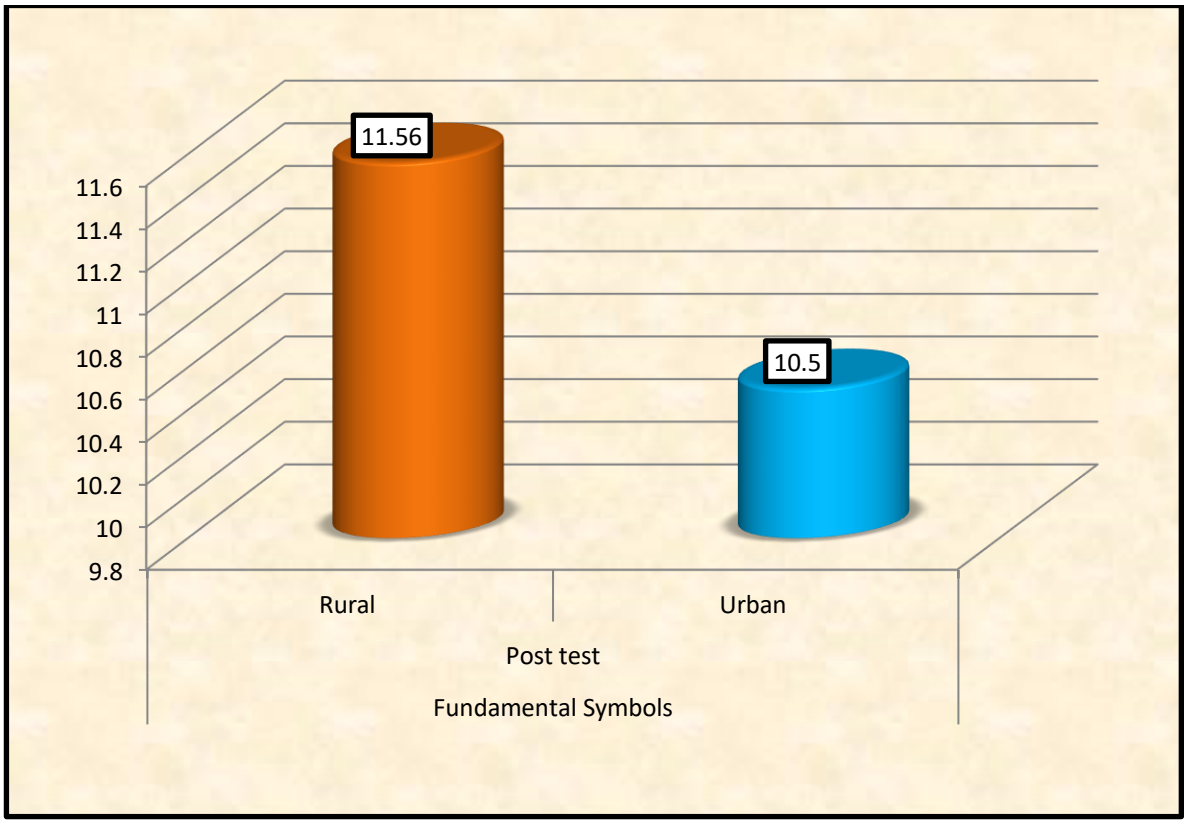
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Fundamental Symbols	Post test	Rural	25	11.56	1.35	28	1.476^{NS}
		Urban	5	10.50	1.14		

NS- Not Significance

The above table revealed that the t- value of the students at the type of locality namely rural and urban. These values are not significant with respect to learning Nemeth code in Fundamental Symbols among students with visual impairment. So, the stated hypothesis" there is no significant difference between the students with visual impairment based on their locality in terms learning Nemeth code in Fundamental Symbols before and after intervention" is accepted .

FIGURE 4.6.4

Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Locality



4.6.5 Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Type of Family

Table 4.6.5

Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Type of Family

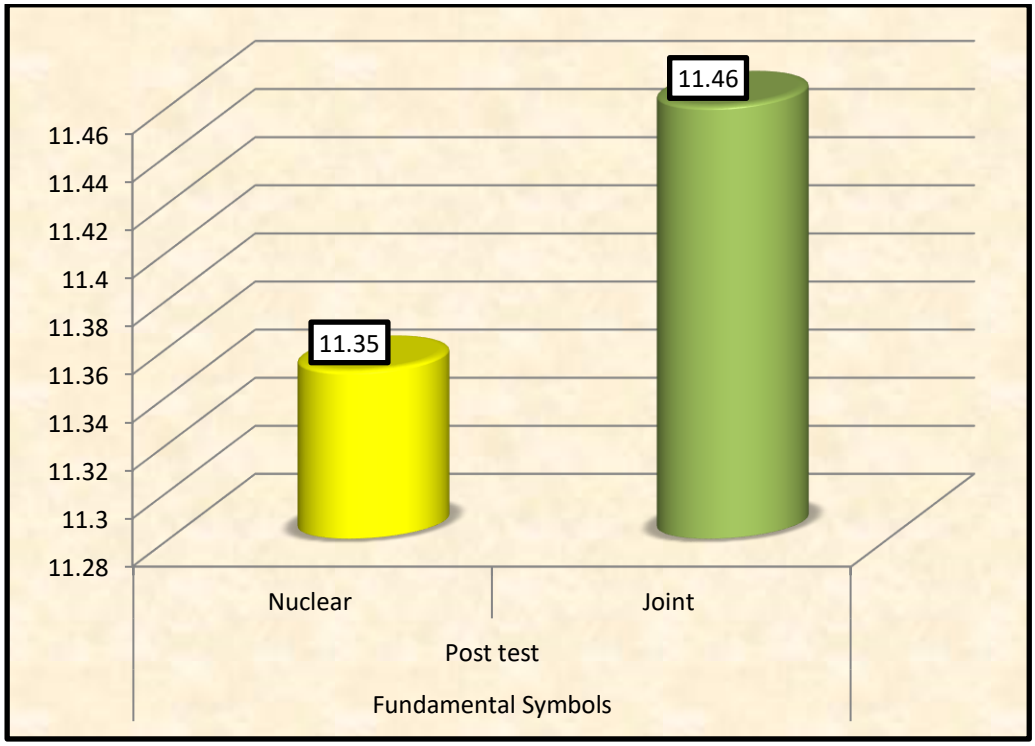
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Fundamental Symbols	Post test	Nuclear	17	11.35	1.22	28	-0.214^{NS}
		Joint	13	11.46	1.56		

NS- Not Significance

The above table revealed that the t- value of the students at the type of family namely nuclear and joint. These values are not significant with respect to learning Nemeth code in Fundamental Symbols among students with visual impairment. So, the stated hypothesis "there is no significant difference between the students with visual impairment based on their type of family in learning Nemeth code in Fundamental Symbols before and after intervention" is accepted .

FIGURE 4.6.5

Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Type of Family



4.6.6 Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Qualification of Parents

Table 4.6.6

Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Qualification of Parents

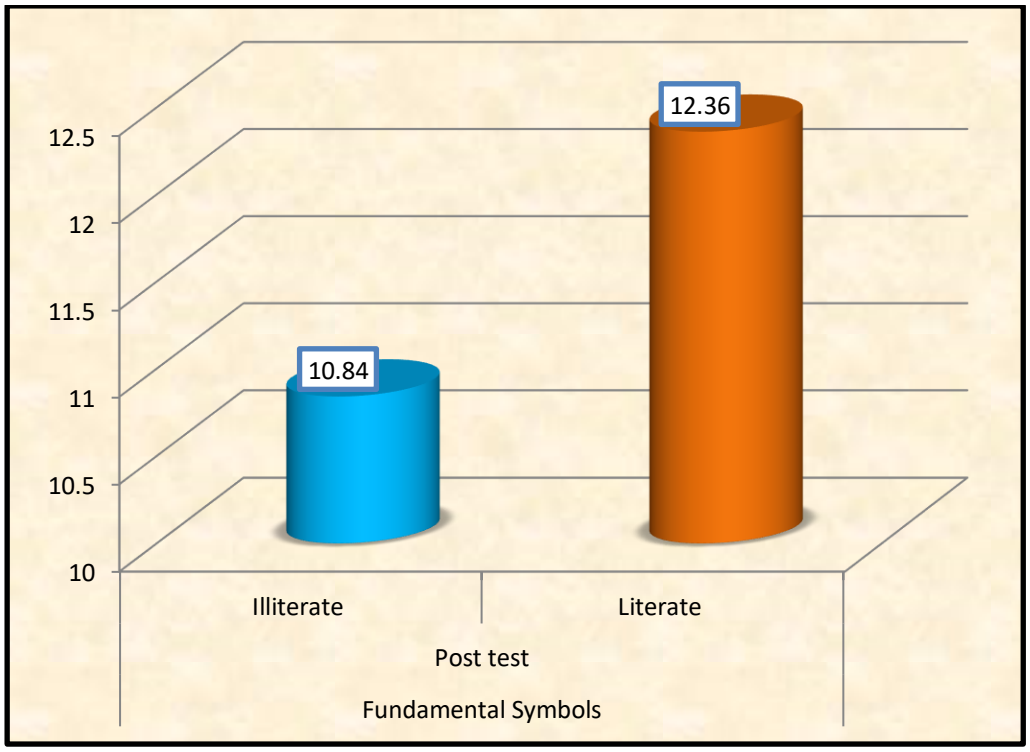
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Fundamental Symbols	Post test	Illiterate	19	10.84	1.21	28	-3.490**
		Literate	11	12.36	1.02		

**** Significance at 0.01 level**

It was observed that there is significant difference between theComparison of Post test Mean Scores of Learning Nemeth code in Fundamental Symbols with respect to Qualification of Parents. The value is significant at 0.01 level. Hence, the null hypothesis stated as "There is no significance difference between Comparisons of post test mean scores of the learning Nemeth code in Fundamental Symbols with respect to Qualification of Parents" is rejected. Hence it may be concluded that positive impact of the intervention.

FIGURE 4.6.6

Comparison ofPost test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Qualification of Parents



4.6.7 Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Braille skills

Table 4.6.7

Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Braille skills

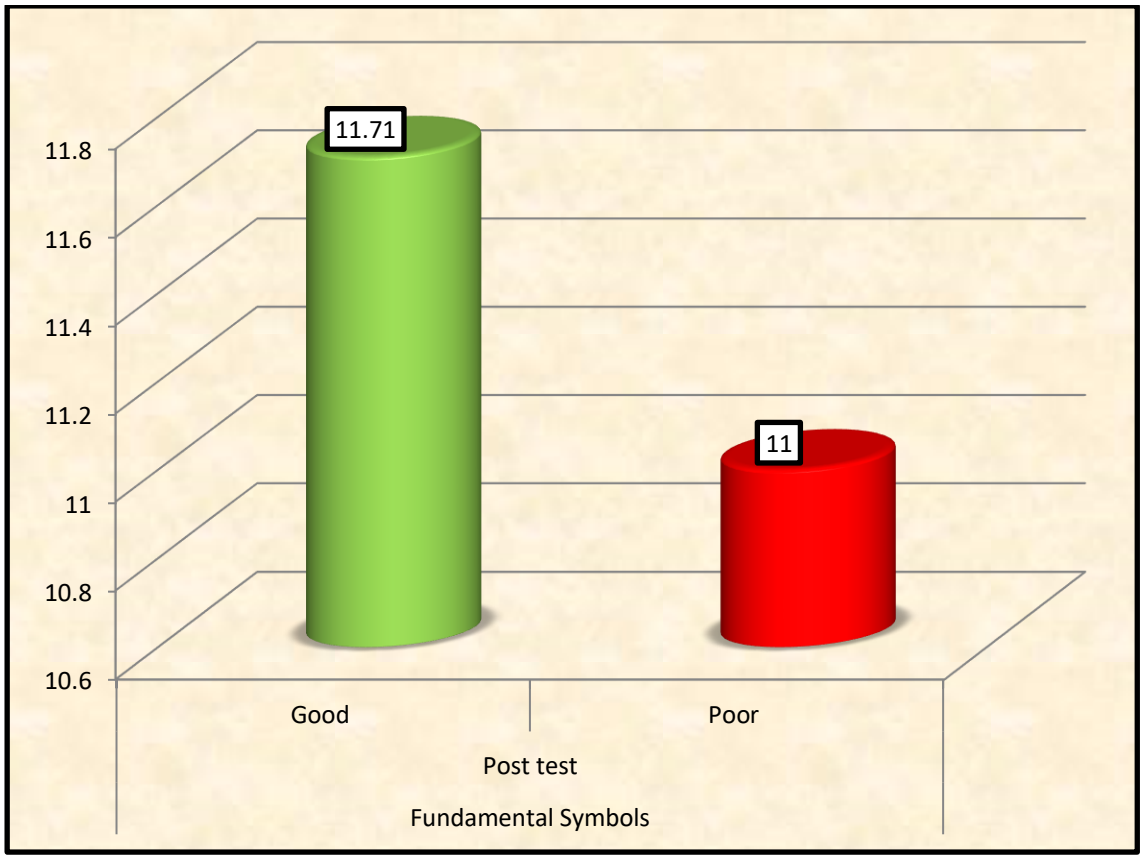
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Fundamental Symbols	Post test	Good	17	11.71	1.44	28	1.441^{NS}
		Poor	13	11.00	1.15		

NS- Not Significance

The above table revealed the t- value of the students based on their braille skill . These values are not significant with respect to learning Nemeth code in Fundamental Symbols among students with visual impairment. So, the stated hypothesis" there is no significant difference between the students with visual impairment based on their braille skill in terms of learning Nemeth code in Fundamental Symbols before and after intervention" is accepted

FIGURE 4.6.7

Comparison of Post test Mean Scores of Learning Nemeth Code in Fundamental Symbols with respect to Braille skills



4.7.0 COMPARISON POST TEST MEAN SCORES OF LEARNING NEMETH CODE IN SPECIAL CASES WITH RESPECT TO INDEPENDENT VARIABLES

4.7.1 Comparison of Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Standard

Table 4.7.1

Comparison of Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Standard

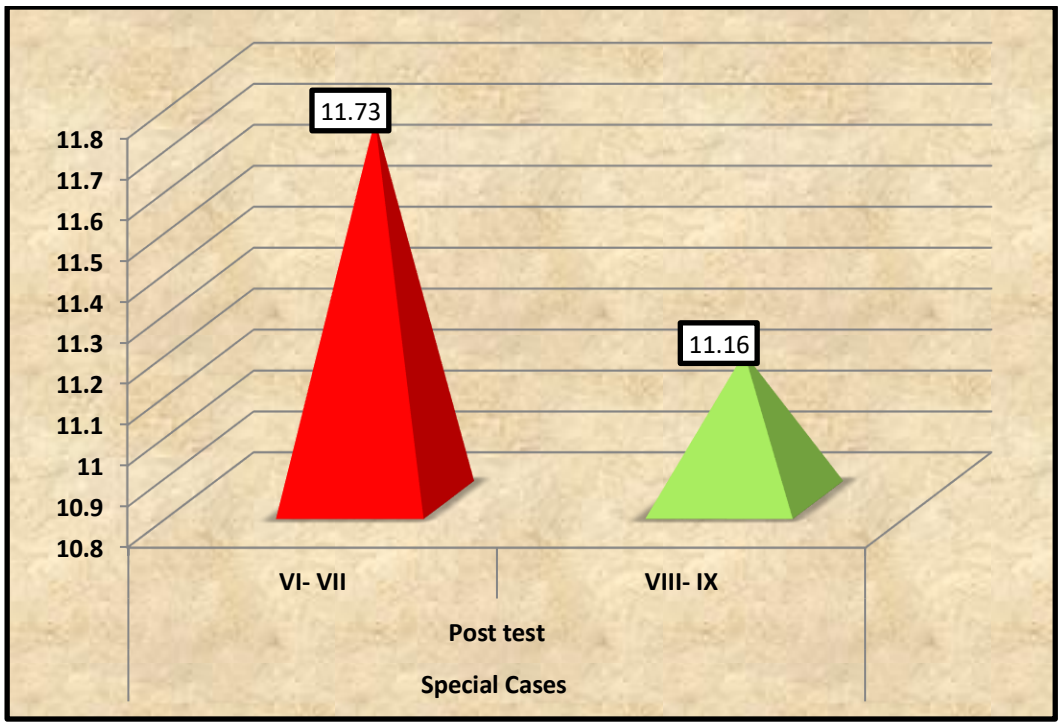
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Special Cases	Post test	VI- VII	11	11.73	1.34	28	1.164^{NS}
		VIII- IX	19	11.16	1.25		

NS- Not Significance

The above table revealed that the t- value of the students at the Standard namely VI to VII and VIII to IX. These values are not significant with respect to learning Nemeth code in Special cases among students with visual impairment. So, the stated hypothesis" There is no significant difference between the students with visual impairment based on their standard in terms of learning Nemeth code in Special cases before and after intervention" is accepted.

FIGURE 4.7.1

Comparison of Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Standard



4.7.2 Comparison of Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Onset of Disability

Table 4.7.2

Comparison of Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Onset of Disability

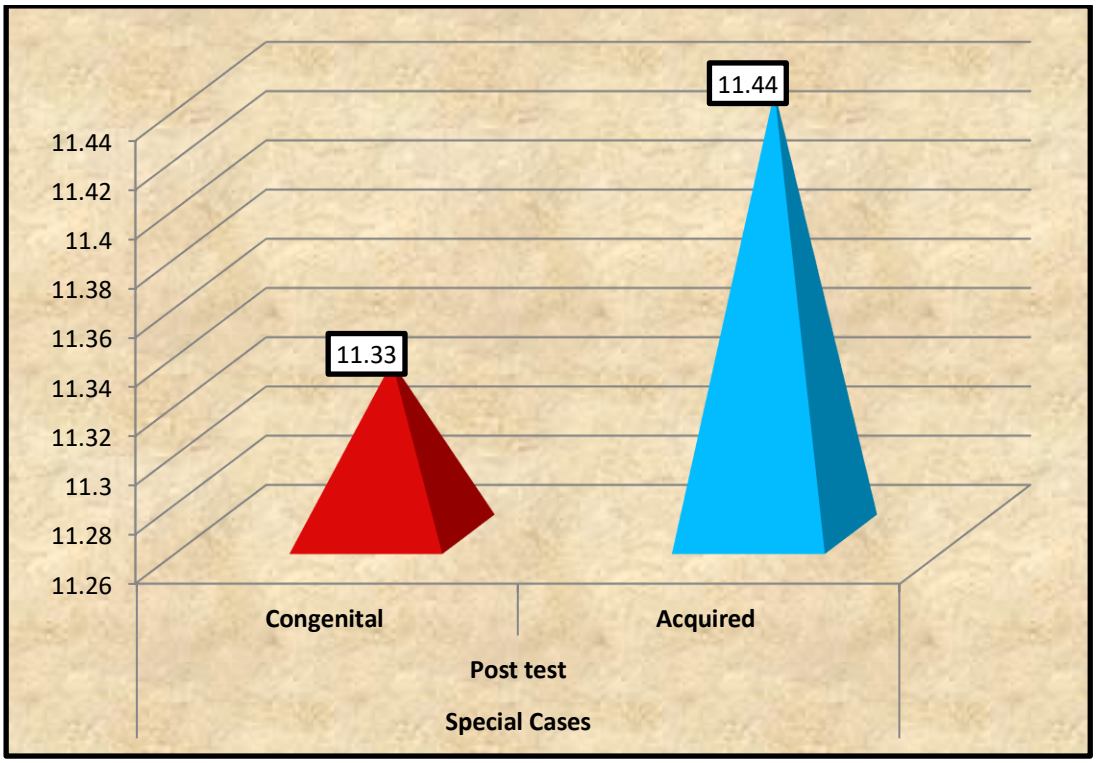
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Special Cases	Post test	Congenital	21	11.33	1.23	28	-0.211^{NS}
		Acquired	9	11.44	1.50		

NS- Not Significance

The above table shows that the t- value of the students at the onset of disability namely congenital and acquired. These values are not significant with respect to learning Nemeth code in Special Cases among students with visual impairment. So, the stated hypothesis" there is no significant difference between the students with visual impairment based on their onset of disability in terms of learning Nemeth code in Special Cases before and after intervention" is accepted.

FIGURE 4.7.2

Comparison of Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Onset of Disability



4.7.3 Comparison of Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Type of Disability

Table 4.7.3

Comparison ofPost test Mean Scores of Learning Nemeth Code in Special Cases with respect to Type of Disability

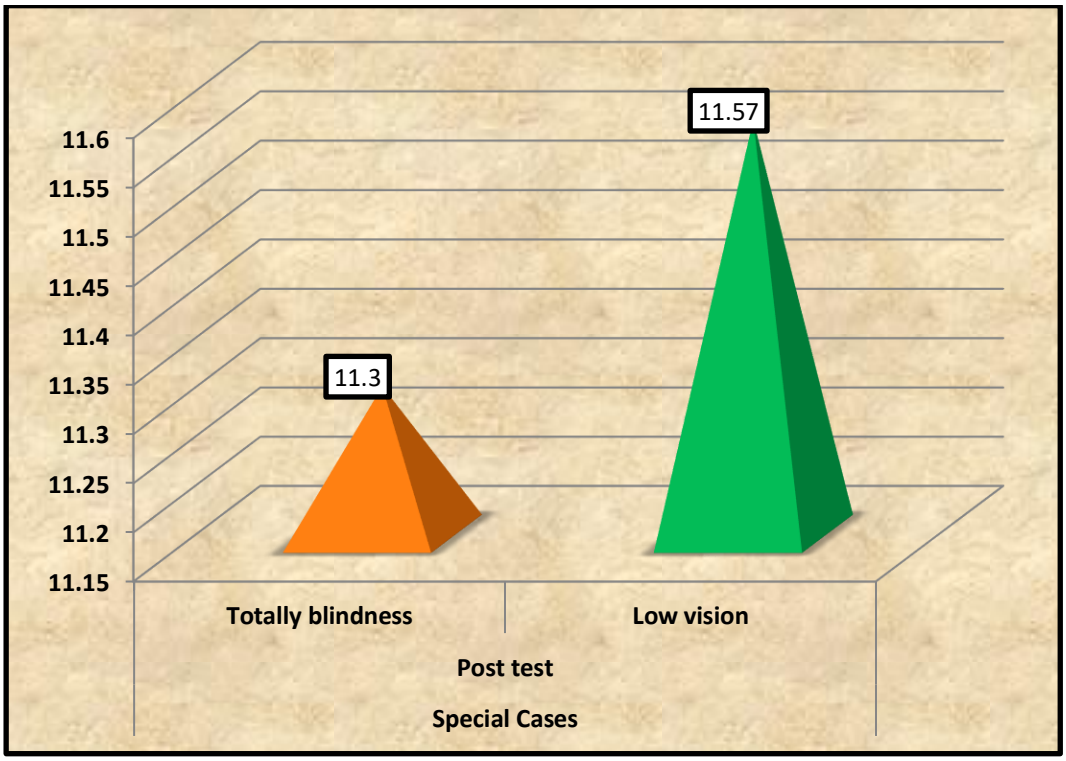
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Special Cases	Post test	Totally blindness	23	11.30	1.36	28	-0.470^{NS}
		Low vision	7	11.57	1.13		

NS- Not Significance

The above table revealed the t- value of the students based on their type of disability. These values are not significant with respect to learning Nemeth code in Special Cases among students with visual impairment. So, the stated hypothesis" there is no significant difference between the students with visual impairment based on their Type of disability in terms of Learning Nemeth code in Special Cases before and after intervention" is accepted.

FIGURE 4.7.3

Comparison ofPost test Mean Scores of Learning Nemeth Code in Special Cases with respect to Type of Disability



4.7.4 Comparison of Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Locality

Table 4.7.4

Comparison of Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Locality

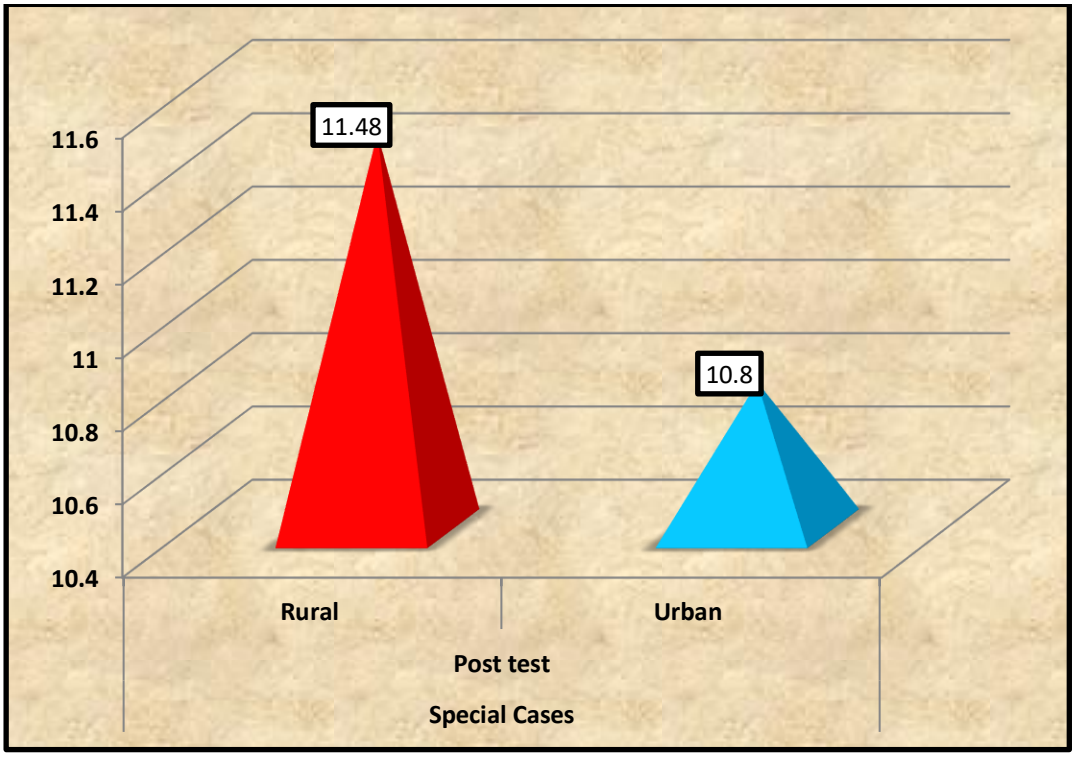
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Special Cases	Post test	Rural	25	11.48	1.35	28	1.071^{NS}
		Urban	5	10.80	0.83		

NS- Not Significance

It is evident from the table that the t- value of the students at the type of locality namely rural and urban. These values are not significant with respect to learning Nemeth code in Special Cases among students with visual impairment. So, the stated hypothesis" there is no significant difference between the students with visual impairment based on their locality in terms learning Nemeth code in Special cases before and after intervention" is accepted .

FIGURE 4.7.4

Comparison of Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Locality



4.7.5 Comparison of Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Type of Family

Table 4.7.5

Comparison of Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Type of Family

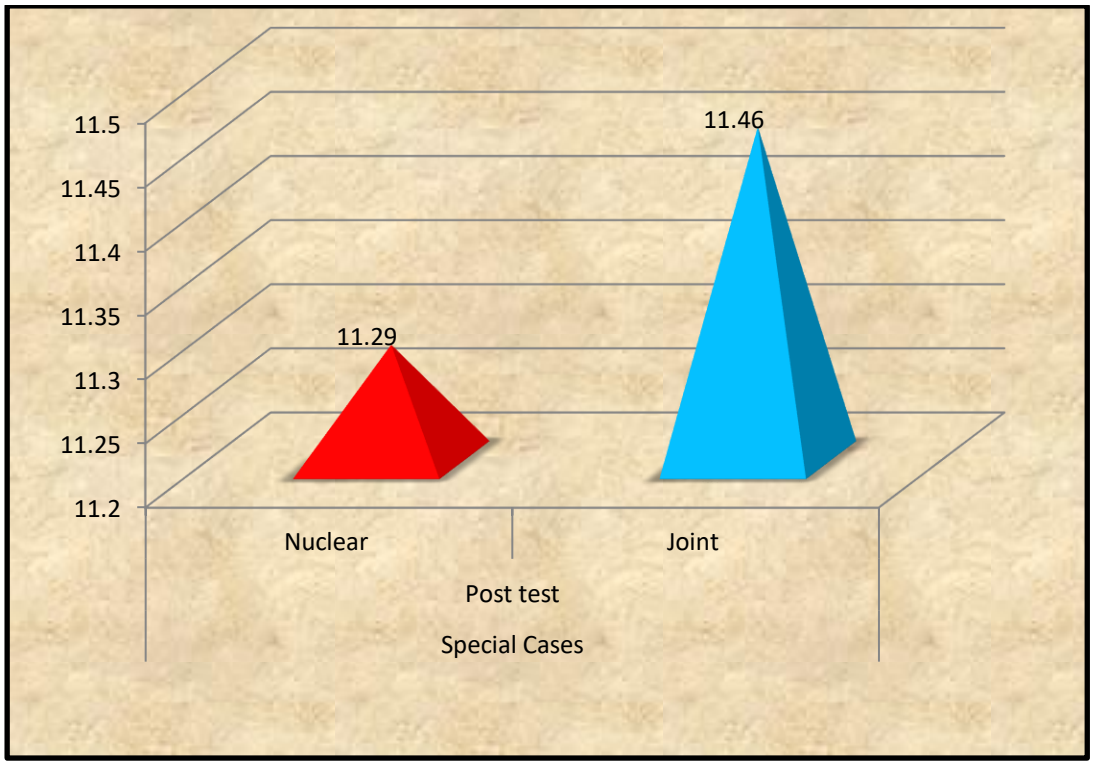
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Special Cases	Post test	Nuclear	17	11.29	1.10	28	-0.344^{NS}
		Joint	13	11.46	1.56		

NS- Not Significance

The above table reflects that the t- value of the students at the type of family namely nuclear and joint . These values are not significant with respect to learning Nemeth code in Special Cases among students with visual impairment. So, the stated hypothesis "there is no significant difference between the students with visual impairment based on their type of family in learning Nemeth code in Special Cases before and after intervention" is accepted .

FIGURE 4.7.5

Comparison ofPost test Mean Scores of Learning Nemeth Code in Special Cases with respect to Type of Family



4.7.6 Comparison Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Qualification of Parents

Table 4.7.6

Comparison Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Qualification of Parents

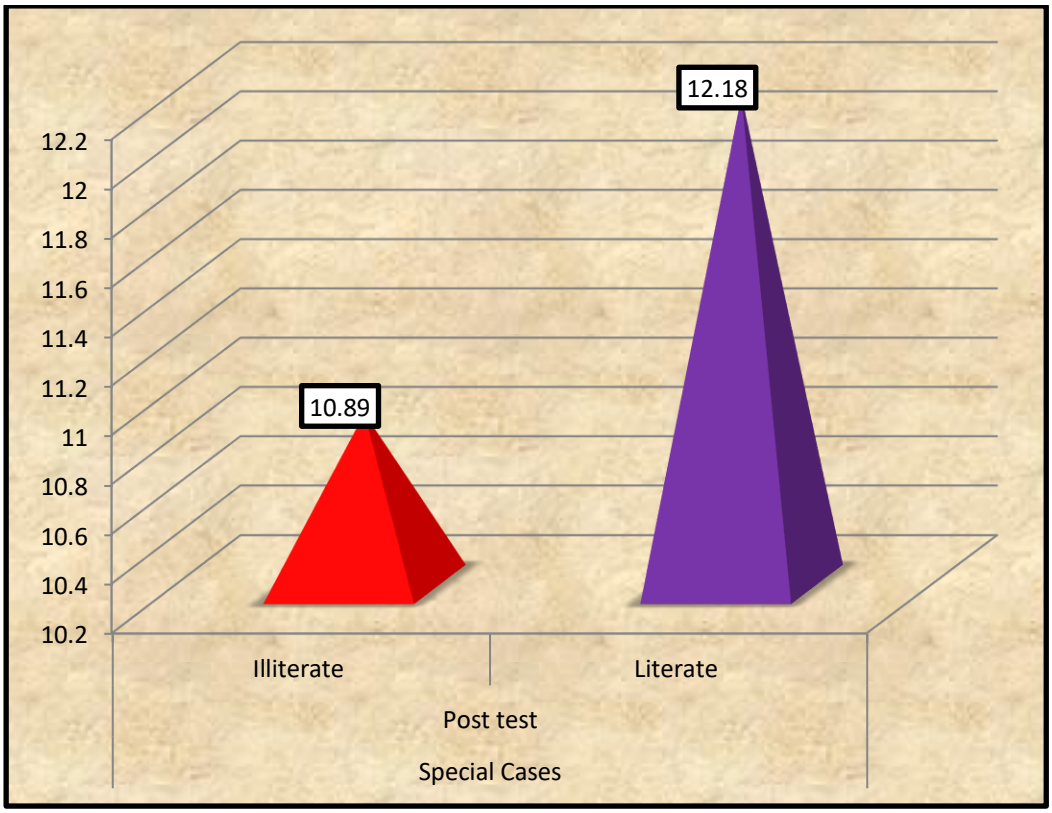
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Special Cases	Post test	Illiterate	19	10.89	0.99	28	-2.938^{NS}
		Literate	11	12.18	1.40		

NS- Not Significance

The above table revealed the t- value of the students based on their parents educational qualification . These values are not significant with respect to learning Nemeth code in Special Cases among students with visual impairment. So, the stated hypothesis "there is no significant difference between the students with visual impairment based on their parents educational qualification in to learning Nemeth code in Special Cases before and after intervention" is accepted

FIGURE 4.7.6

Comparison Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Qualification of Parents



4.7.7 Comparison Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Braille skills

Table 4.7.7

Comparison Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Braille skills

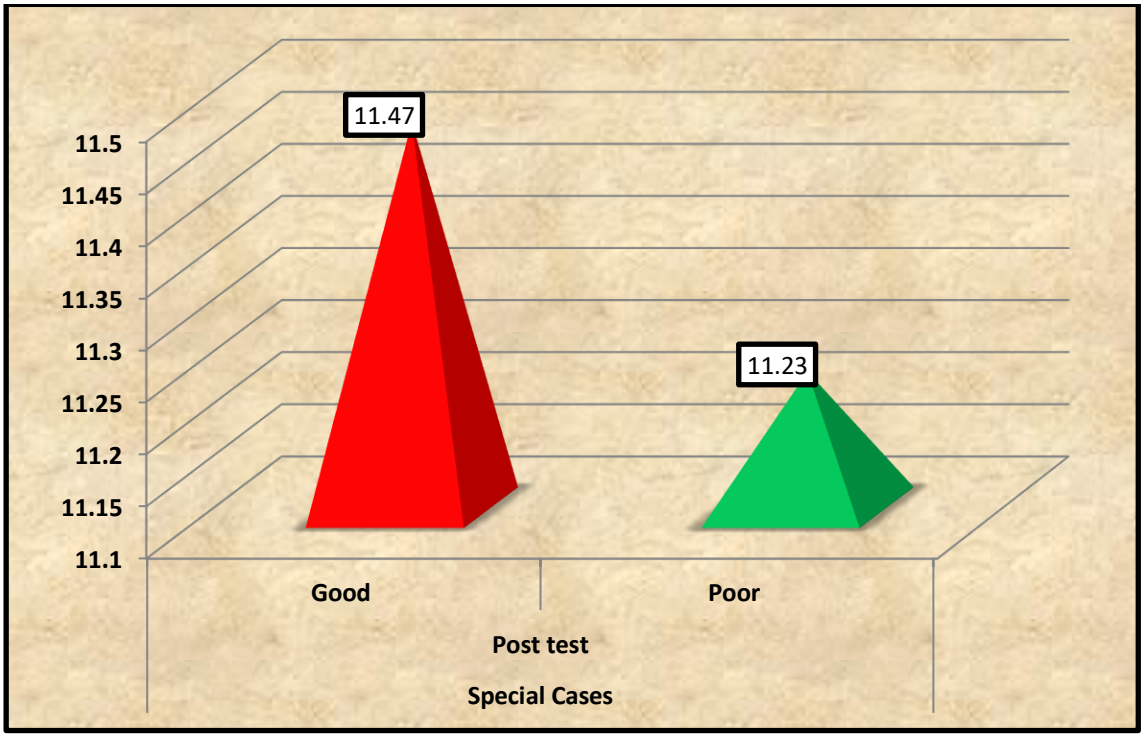
Particulars	Testing	Variables	N	Mean	SD	DF	t- values
Special Cases	Post test	Good	17	11.47	1.45	28	0.494*
		Poor	13	11.23	1.09		

***Significance at 0.05 Level**

It was observed that there is significant difference between the Comparison of post test mean scores of Braille skills. The t values is significant at 0.05 level. Hence, the null hypothesis stated as "There is no significance difference between Comparison of post test mean scores of the learning Nemeth code in Special Cases with respect to Braille skills" is rejected. Hence it may be concluded that positive impact of the intervention.

FIGURE 4.7.7

Comparison Post test Mean Scores of Learning Nemeth Code in Special Cases with respect to Braille skills



4.8.0 COMPARISON OF DOMAINS

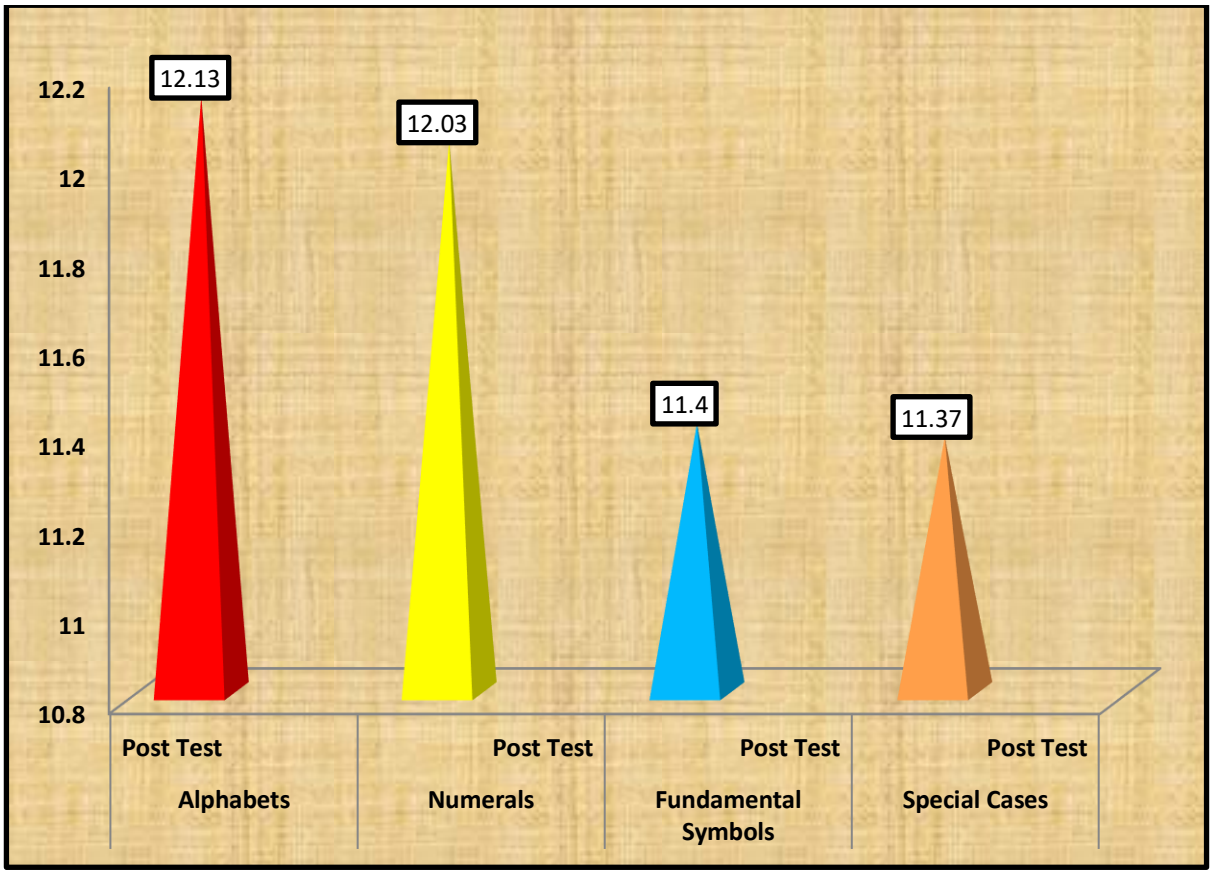
Table 4.8.0

DOMAIN	N	TESTING	DF	MEAN VALUE
Alphabets	30	Post Test	28	12.13
Numerals		Post Test		12.03
Fundamental Symbols		Post Test		11.40
Special Cases		Post Test		11.37

From the above table, while comparing the mean scores of post-test students acquired in each domain it is clear that students have given their best performance in Alphabets. The next domain Numerals in Nemeth code comes next after Alphabets it can be due to the some interconnection of Nemeth code for the two domains. Students given average performance in basic Fundamental Symbols and Special Cases.where the intervention can be given in more intense to make the students to reduce their difficulty level in particular domain.

FIGURE 4.8.0

Comparison of domains



SUMMARY AND CONCLUSION

CHAPTER V

SUMMARY AND CONCLUSION

5.0.0 INTRODUCTION

5.1.0 FINDINGS OF THE STUDY

5.2.0 SUGGESTION FOR FURTHER RESEARCH

5.3.0 RECOMMENDATIONS OF THE STUDY

5.4.0 CONCLUSION

CHAPTER V

SUMMARY AND CONCLUSION

5.0.0 INTRODUCTION

The purpose of the study was to find out the "Application of Basic Nemeth Code for Learning Mathematics among Visual Impairment". In first chapter, the need of the study, objectives of the study, scope of the study were described. The second chapter contained review related to the study. The third chapter explained the methodology of the study. The fourth chapter made a detailed analysis of the study. The result of the study is summarized in fifth chapter.

5.1.0 FINDINGS OF THE STUDY

- Out of 30 samples included in this study the majority of the samples were found to the total blindness.
- It was found that the standard of the selected samples, it was observed that 37 percent of the students were VI-VII standard, 63 percent of students were VIII-IX standard respectively.
- It was revealed that 77 percent of the selected samples were totally blindness and remaining 23 percent of the selected samples were low vision.
- It was observed that the locality of the selected samples 83 percent of the students were rural, 17 percent of students were urban respectively.
- It was found that 63 percent of the selected samples parents were illiterate and 37 percent of selected samples were literate.
- It was found that 70 percent of the selected samples comes under congenital, 30 percent of the selected samples comes under acquired.
- Analyzing the type of family of the selected samples, it was revealed that 57 percent of them were from nuclear family while 43 percent of them were from joint family.
- This study shows that that the Braille skills of the selected samples, 57 percent were good Braille skills and only 43 percent were poor Braille skills.
- There is a significance difference between Pre and Post test Mean Scores of the Selected Samples with respect to Learning Nemeth Code for Students with Visual Impairment before and after intervention.

- There is a significance difference between Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Alphabets before and after intervention
- There is a significance difference between Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Numerals before and after intervention
- There is a significance difference between Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Fundamental symbols before and after intervention
- There is a significance difference between Pre and Post test Mean Scores of the Students with Visual Impairment in Learning Nemeth Code with respect to Special cases before and after intervention
- There is a significance difference between Comparisons of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Locality after intervention.
- There is a significance difference between Comparisons of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Qualification of Parents after intervention.
- There is a significance difference between Comparisons of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Braille skills after intervention
- There is a significance difference between Comparison of Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Onset of Disability after intervention.
- There is a significance difference between Comparison of Post test Mean Scores of Learning Nemeth Code in Numerals with respect to Braille skills after intervention.
- There is a significance difference between Comparisons of Post test Mean Scores of Learning Nemeth code in Fundamental symbols with respect to Qualification of Parents after intervention.
- There is a significance difference between Comparison of Post test Mean Scores of Learning Nemeth Code in Special cases with respect to Braille skills after intervention.

- There is a no significance difference between Comparisons of Post test Mean Scores of Learning Nemeth code in Alphabets with respect to Standard, Type of Disability, Onset of Disability and Type of family.
- There is a no significance difference between Comparisons of Post test Mean Scores of Learning Nemeth code in Numerals with respect to Standard, Type of Disability, Type of family, Locality and Qualification of Parents.
- There is a no significance difference between Comparisons of Post test Mean Scores of Learning Nemeth code in Fundamental Symbols with respect to Standard, Type of Disability, Onset of Disability, Type of family, Locality and Braille skills.
- There is a no significance difference between Comparisons of Post test Mean Scores of Learning Nemeth code in Special Cases with respect to Standard, Type of Disability, Onset of Disability, Type of family, Locality and Qualifications of Parents.
- The results indicate that the Intervention Strategies was efficacious for the Students with Visual Impairment in learning Nemeth code.

5.2.0 SUGGESTION FOR FURTHER RESEARCH

The present study suggests researchers to investigate on

1. Further research may be carried out on more Intervention Strategies in Teaching and Nemeth code among Students with Visual Impairment in higher secondary schools and college levels.
2. Further study can be conducted with more number of samples so that more generalized results can be predicted
3. A longer period of Intervention can be studied with more samples for more reliability and effectiveness
4. Research may be carried out in other components of mathematics Nemeth code for Students with Visual Impairment at different levels.
5. Research may be carried out in various components of Nemeth code for Students with Visual Impairment at different levels.

5.3.0 RECOMMENDATIONS OF THE STUDY

The recommendations emerging out of the study are listed as follows:

- The study reveals that to provide good awareness and training use and learning Braille Nemeth code for children with visual impairment
- Encouraging them to use the Nemeth code in day to day mathematics classroom
- Training has to be given to students with visual impairment to use their remaining senses in learning effectively.
- Teachers should to concentrate in Teaching Braille Nemeth code to students with visual impairment as early as possible.

5.4.0 CONCLUSION

This study attempted to study the Application of Basic Nemeth code for Learning mathematics among Students with Visual Impairment. The result of this experimental study showed improvement in learning Braille Nemeth code after Intervention is given to the Students with Visual Impairment. To conclude the results and suggestions highlight that Braille Nemeth code played a very important role in academic achievement to the visually impaired.

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APPENDICES

APPENDIX 1

GENERAL INFORMATION

1. Student name :
2. Standard:
3. Age:
4. Name of the school:
5. Type of school :
6. DOB:
7. Gender :
8. Nature of disability:
9. Type of Disability
10. Percentage of the disability:
11. Address:
12. Locality :
13. Mother qualification:
14. Father qualification:
15. Father occupation:
16. Mother occupation:
17. Father income :
18. Mother income:

APPENDIX 2

NEMETH CODE

S.NO.	VARIABLES	RESPONSE	
		CORRECT (1)	INCORRECT (0)
ALPHABETS			
1.	a and b		
2.	c and d		
3.	e and f		
4.	g and h		
5.	i and j		
6.	k and l		
7.	m and n		
8.	o and p		
9.	q and r		
10.	s and t		
11.	u and v		
12.	w and x		
13.	y and z		
NUMERALS			
14.	Number indicator		
15.	0		
16.	1		
17.	2		
18.	3		
19.	4		
20.	5		
21.	6		
22.	7		
23.	8		

24.	**9**		
25.	**Π**		
26.	**Decimal point**		
FUNDAMENTAL SYMBOLS			
27.	+		
28.	**—**		
29.	×		
30.	÷		
31.	**.**		
32.	<		
33.	>		
34.	≤		
35.	≥		
36.	=		
37.	≠		
38.	≈		
39.	√		
SPECIAL CASES			
40.	**(**		
41.	**)**		
42.	**[**		
43.	**]**		
44.	**{**		
45.	**}**		
46.	**/**		
47.	**_**		
48.	!		
49.	**,**		
50.	**?**		
51.	**Σ**		
52.	**%**		