TO STUDY THE COGNITIVE CAPABILITIES OF PRESCHOOL CHILDREN WITH HEARING IMPAIRMENT AND ITS RELATION TO LEARNING OF PRE-ARITHMETIC SKILLS.

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A Dissertation Submitted in partial fulfillment of Master's Degree
(Master of Special Education-Hearing Impairment)
University of Mysore,
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ALL INDIA INSTITUTE OF SPEECH AND HEARING,
MANASAGANGOTHRI,
MYSORE- 570006.
APRIL-2008

DEDICATED

TO

MY BELOVED PARENTS,
BROTHER, SISTER

&

MY GUIDE

CERTIFICATE

This is to certify that this Dissertation entitled ***"To study the cognitive capabilities of preschool children with hearing impairment and its relation to learning of pre-arithmetic skills"*** is a bonafide work in part fulfillment for the degree of Master of special education (Hearing Impairment) of the student Registration No.07MSED03. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for the award of any other Diploma of Degree.

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April 2008.

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DECLARATION

This is to certify that this Dissertation entitled ***"To study the cognitive capabilities of preschool children with hearing impairment and its relation to learning of pre-arithmetic skills"*** is a bonafide work in part fulfillment for the degree of Master of special education (Hearing Impairment) of the student Registration No.07MSED03. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for the award of any other Diploma of Degree.

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Introduction

1.0 Introduction

"Education is the manifestation of perfection already in man."

- Swami Vivekananda

The 21st Century is striving for the development of the highest technological and informative abilities in order to convert the entire world into a global village. The progress of the nation in the world of today is more than ever before depending upon the quantity and equality of education received by its people.

The task of building an enlightened, strong and prosperous nation rests on the shoulders of its children who are to be cherished, nurtured and developed with tenderness and care. Education plays this important role and has thereby emerged as a natural characteristic of human societies. Education can be defined as the process of growth and development whereby an individual assimilates a body of knowledge, makes his own group of life ideals and develops the ability to use knowledge in the pursuit of these ideals.

Preschool education is the most important stage in school education because this is a stage when significant physical, cognitive, emotional & social developments take place. There has been a rapid and vast expansion of pre-school education in India in the recent years.

Nelson Mandela, the well-known statesmen, once said, "Education is the great engine to personal development. It is through education that the daughter of a patient can become a doctor, that the son of a mineworker can become the head of the mine that the child of a farm worker can become the president of a great nation." The truth of this statement can only be fully appreciated if one considers the enormous importance of preschool education. The famous Japanese violin teacher and educationist, Shinichi Suzuki, once expressed "The destiny of children lies in the hands of their parents. The parents largely determine the direction and the quality of this destiny— in the first seven years of the child's life."

There are indeed certain aspects of learning that can only be acquired effectively during the first seven years of life. Parents, who are desirous of offering their child an adequate preschool education, should therefore take care to concentrate on the development of cognitive skills.

1.1 Preschool Education

Preschool education is the provision of education for children before the commencement of statutory education, usually between the ages of two and six. Preschool is also known as nursery school, day care or kindergarten. Research shows that the first three years in brain development have serious implications for educational development. Generally the areas of development which preschool education covers are as follows

- Personal, social, emotional and cognitive development.
- Communication, including talking and listening.
- Knowledge and understanding of the world.
- Creative and aesthetic development.
- Physical development.
- Mathematical awareness and development.

1.2 Hearing Impairment

Hearing impairment leads to a handicapping situation, which inhibits the auditory stimuli being perceived by the brain. Due to this disability a child gets affected severely in acquiring language, social and academic skills. If the child is identified at an early age and fitted with the right kind of amplification device, they can acquire language, social and academic skills on par with their age mates. Various studies (Wood et al, 1993; Nunes & Moreno, 1998) revealed that children with hearing impairment could achieve on par with hearing peers.

Hearing impairment per se does not affect a person's intellectual capacity or ability to learn. However, children with hearing impairment generally require some form of special education services in order to receive an adequate education. Such services may include:

- Regular speech, language, and auditory training from a specialist;
- Amplification systems;
- Services of an interpreter for those students who use manual communication;
- Favorable seating in the class to facilitate speech reading;
- Captioned films/videos;
- Assistance of a note taker, who takes notes for the student with a hearing loss, so that the student can fully attend to instruction;
- Instruction for the teacher and peers in alternate communication methods
- Counseling.

Children with hearing impairment will find it difficult than children who have normal hearing to learn vocabulary, grammar, word order, idiomatic expressions, and other aspects of verbal communication.

1.2.1 Preschool Education for the Children with Hearing Impairment (CWHI)

Several preschool programs for children with hearing impairment have promoted a cognitive/linguistic approach to learning (Grammatico & Miller 1974; Stone 1980; Moeller and Mc Conkey 1984; Moeller, Obserger and Mordford 1986). In such an approach, language and thinking skills are emphasized in synchrony. Primary emphasis is placed on helping children construct relationships and develop representational skills on increasingly abstract levels. Justification for cognitively oriented approaches comes from:

- Recognition of the importance of the child's active, explorative role in learning -his need for opportunities to manipulate, create and notice relationship and to apply his knowledge to solving daily problems.
- Recognition of the importance of verbal reasoning and problem solving skills to future academic and social functioning.
- Recognition of the necessity of laying a foundation for verbal/conceptual reasoning and logical thought in the preschool years.

Preschool programs strive to provide the child access to communicative competence through comprehensive habilitation, including amplification, parent guidance, perceptual and cognitive skill development and aggressive language intervention. Curriculum materials from preschool have been successfully adapted for use with preschool children with hearing impairment in a self contained, experimental program (Moeller & Mc Conkey 1984, Moeller et al 1986). Results to date have been encouraging, particularly in the children's concept application, flexible and creative thinking, and spontaneous initiation of language. Considering points made earlier, cognitive/linguistic strategies also have the advantage of providing conversation that emerges from the child s perspectives and from his mental and physical manipulations.

Preschool is desirable for all the children, no doubt but it is necessary for disadvantaged and handicapped children. Preschool programs are important for children with hearing impairment. Equally important are programs for families of these children. Parents need to know how to help their child acquire language and communication skills, as well as a positive self-concept. They are primarily responsible for the child's integration into the family, neighborhoods, school and community. The training, that families require can best come from professionals at an infant or preschool program. They can help parents cope with a range of issues from understanding the social and language development of their child, which further favors academic performance

The preschool focuses on preparing the children with hearing impairment for integrated education through the following:

- Development of language through various methods and techniques of teaching.
- Maximum use of residual hearing.
- Development of speech.
- Development of reading and writing skills.
- Social, emotional, cognitive and overall development of the children.
- Empowering the parents to act as equal partners in the educational process.

1.2.2 The early intervention:

Hearing loss occurs along a broad continuum ranging in degree from slight to profound. Childhood hearing loss of any type and degree, if unmanaged, is likely to have a negative impact on the development of spoken and receptive language, the ability to read and write, and academic achievement. For example, a study of 1,218 children with minimal hearing loss showed that 37 percent had failed a grade. Similarly, studies have shown that children with unilateral hearing loss are ten times more likely than normally hearing children to fail a grade (Bess, Fred; Dodd-Murphy, Jeanne; Parker, Robert, 1998).

Children with hearing loss require support services in order to benefit maximally from a free and appropriate education. It is essential that they receive services from an audiologist, including management of their hearing aids, classroom listening devices, and listening environments. Poor listening conditions can further deteriorate the learning potential of a child with hearing loss.

National projects on prevention of communication disorders, mandates neonatal hearing-screening programs. These are changing the average age at identification from approximately three years to approximately three months. Research has shown that when appropriate hearing aids and early intervention are provided a child is likely to have age-appropriate normal language and learning milestones at preschool entry. In this light, the most important educational years are the child's very first years, when the family participates in parent-infant programme. Adding to the revolution are cochlear implants, which are being made available to younger children. These surgically implanted devices convert sound into electrical current, which then bypass much of the hearing mechanism to stimulate surviving nerve elements directly. The coded electrical current creates sensations, which the brain, with considerable listening training, can learn to interpret as sound. Research suggests that children who use cochlear implants surpass children with similar degrees of hearing loss who use hearing aids in the areas of speech recognition, speech production, language content and form, and reading (Flexer & Carol 1999).

Today, even infants can wear hearing aids and learning to take care of such equipment as an important part of their growth process. The need to use sophisticated equipment and incorporate it into their daily living need to begin early in life. Several researchers indicate that young children with hearing impairment are capable of attaining cognitively advanced levels of symbolic or dramatic play (Schirmer, 1989). Conducting valid cognitive assessments of children with hearing impairment has long been considered problematic. Barriers have included faulty theoretical assumptions, implicit biases, and methodological errors (Blennerhassett & Trexler, 1999; Chavaz, 1998; Krivitski, 2000).

1.3 Cognitive Development

Cognitive development is a continuous process that begins at birth. Cognition develops through social interaction around problem solving abilities. It increases when tasks are in child's zone of proximal development level where child can almost accomplish task independently. Thus cognitive development is the development of ways & capabilities of understanding one's world, representing it and dealing with it. It is therefore at the very core of one's functioning as a person. Cognitive development is an important aspect of overall child development.

Cognitive development involves progressive changes in children's perception, knowledge, understanding, reasoning & judgments. The term cognition or cognitive development is a highly generic term covering almost every aspect of behavior.

Dictionary of Psychological terms by English (1934) gives the following definition **"Cognition** - a generic term for any process where by an organism becomes aware of or obtains knowledge of an object."

Generally cognition refers to how we think, pay attention, remember, and learn. In the broadest sense, cognition involves all the mental process that result in knowing and in building knowledge. It includes perception, thinking, remembering, learning and problem solving.

Cognitive strategies are useful tools in assisting students with learning problems. The term cognitive strategies in its simplest form mean the use of the mind (cognition) to solve a problem or complete a task. Cognitive strategies may also be referred to as procedural facilitators (Bereiter & Scardamalic, 1987).

The child acquires most of its personal and social habits before the age of six years due to the plasticity of the brain. Bloom (1964) has analyzed research data on growth of intelligence. It has shows that 50% of the total intellectual development of the child is completed by the time a child is four years old. He opines that early environmental stimulation helps in cognitive development of the children.

Cognitive development implies the progressive changes and process, which goes on from birth in an individual. The development of concepts, perception, language, memory, reasoning, thinking, imagination and intelligence. Piaget asserts that all children progress through all the four stages in a fixed order. The three most important concepts cognitive development are cognitive structure, cognitive function and cognitive content. Infact, cognitive development is synonymous with organization and adaptation, the former making for integration, and the latter comprising of two principles, assimilation and accommodation (Piaget, 1985).

Jerome Bruner's (1990) theory of concept formation regards human brain as having three modes of representation. They are inactive, iconic and symbolic. Bruner emphasized the importance of structure in promoting cognitive learning. The learner develops understanding of concepts and principles. That is called "Discovery approach".

Schools foster cognitive development. Teachers don't just teach a list of facts; they teach children how to think. The interactions and talk that happens in a classroom are the raw material for a child's brain.

1.3.1 Four Cognitive Skills for Successful Learning

The word "cognition" is defined as "the act of knowing" or "knowledge." Cognitive skills therefore refer to those skills that make it possible for us to know. The following cognitive skills are the most important for children:

i. Concentration: Paying attention must be distinguished from concentration. The child must first be taught to focus his attention on something and to keep his attention focused on this something for some length of time.

ii. Perception: The terms "processing" and "perception" are often used interchangeably. Before one can learn anything, perception must take place, i.e. one has to become aware of it through one of the senses.

iii. Memory: A variety of memory problems are evidenced in the hearing impaired. Some major categories of memory receptive memory, sequential memory, rote memory, short-term memory and long-term memory.

iv. Logical thinking: Logical thinking is not a magical process or a matter of genetic endowment, but a learned mental process and it is a sequential thought. It is also an important foundational skill of math. "Learning mathematics is a highly sequential process," (Albrecht).

1.3.2 Development of cognitive capabilities among- Piaget's approach

Jean Piaget a Swiss Psychologist is the pioneer in giving the theory of cognitive development among children. Cognitive development implies the progressive changes and process, which goes on from birth in an individual. The development of concepts, perception, language, memory, reasoning, thinking, imagination and intelligence are given in his theory. Moreover, various dimensions of cognitive development are inter-related. Therefore, the cognitive development of the child includes the over all development of various abilities.

Piaget asserts that all children progress through all the four stages in a fixed order. According to his theory human intellect is constructed over time as the individual experience progressively more complex interaction with the environment. In Piaget's system two processes *"Organization"* and *"Adoption"* actively operate during each of the four stages. He divides cognitive development into four stages in order of their occurrence.

i. Sensory motor Stage (Birth to 2 Years): Cognition occurs primarily through the senses, manipulation, and actions. The child gradually learns to touch what he sees, and to look in the direction of sounds. Later the young child is able to present many well coordinated and smooth physical actions in dealing with the environment. The infant also begins to organize his environment collecting, arranging and moving things.

ii. Pre-operational Stage (2 to 7 Years): In this stage the child develops ways of representing events and objects through symbols, including verbal symbols of language. He can now think about things that are not immediately present. The reason of the child is based on intuition rather than systematic logic.

iii. Concrete operational Stage (7 to 11 Years): At this stage mental operations performed by the child are closely connected to concrete objects and actions. Logical thinking does occur, only if concrete objects are available or if past experiences are drawn upon.

iv. Formal operational Stage (12 to Adolescence): During this period the child becomes capable of applying logical thought to all classes of problems such as verbal problems, with the development of formal operations the child is capable of thinking logically. It implies that the capacity for fully logical thought is present once formal operations are developed. Young children who have reached the primary level of development may also be able to learn to recognize the geometric shapes of round, triangle, and square and then to distinguish among them. The child will probably also require many repeated experiences with each shape to grasp the concept and to assimilate or internalize it, making it part of his thinking processes.

1.3.3 Cognitive development of children with hearing impairment

The children with hearing impairment are not basically different in their innate psychological potentialities from the hearing child. However, it is essential for the parents and teachers of children with hearing impairment to have an insight in understanding the psychological factors that are intimately related with their academic and communication skills. There is no reason to suspect limited mental ability because of impaired hearing itself, unless it is coupled with some deterioration or malfunctioning of the brain, which may also occur in other disability conditions.

The mental growth of children with hearing impairment is different in many ways from that of the hearing child; nevertheless, there are also certain points of similarity between them; they have the same intellectual endowment and the same desire to communicate. They want to be like other people and they also possess the same feelings and emotions. The only difference is that they lack the ability to hear and consequently suffers from language handicap.

1.3.4 Cognitive development & implications for teaching

Children's cognitive development affects how they learn, understand, store knowledge, characterize and interpret information, see relationships between and among ideas retain and retrieve information, use prior knowledge to gain new knowledge, and utilize knowledge in functional contexts. It is very important, therefore, as Piaget (1964) stated, for teachers to understand that: "The goal in education is not to increase the amount of knowledge but to create the possibilities for a child to invent and discover."

Development of the cognitive process enables the child to deal with numerical concepts & deductive reasoning of mathematical thinking. Among the developmental pre-requisite are object permanency, seriation, classification and conservation of quantity (Piaget & Inhelder, 1969).

The child cannot accommodate the new information; learning will not occur in the absence of schemata (Tompkins & Horkisson, 1991). This has important implication for teachers of all children but especially for those who teach children with learning problems for various reasons including hearing impairment. Teachers should develop methods and materials that, on the one hand, will be sufficiently challenging to motivate students to activate their schemata and use their prior knowledge to gain new ideas but, on the other hand, are not so easy that they fail to provide the motivation needed to acquire new information. The process of cognitive development is not self-sustaining. It is maintained by meaningful activity within the child's environment.

1.4 Context, need and importance of the study

Though the all round development of an individual is the overall purpose of education, at present educators are more concerned about the cognitive development of the individual. Infact, society also respects "White collared men", men with "brain", men who are capable of acquiring, utilizing and creating knowledge than who work with their "muscles".

There have been several studies conducted to assess the cognitive abilities in children across different age groups especially for normal children (Padmini, 1983; Shobha, 2002; Culbertson and Gilbert, 1994) children with mental retardation and learning disabilities (Ramaa 1984, 1990; Nishi, 1988). Some attempts have been made to assess the cognitive abilities of children with hearing impairment also. However, there is no agreement on the type of assessment carried out for the purpose (Culbertson & Gilbert, 1994; Fawcett 1996, Krivitski 2000; Lauwerier , Chouly & Bailly, 2003). Hearing impairment is a great barrier to the normal development of language and cognition (Greenberg & Kusche, 1989). Hence there is a need to study the cognitive capabilities of pre-school children with hearing impairment. Since cognitive abilities have direct relation with maths (Piaget and Inhelder, 1969; Geary, 1993; Watson & Kidd, 2003), it is necessary to study the correlation of cognitive abilities & pre-arithmetic skills of CWHI at preschool level.

Keeping in mind the importance and significance of pre school education, there is a need to study

- > The cognitive abilities of children with hearing impairment attending preschool
- > The correlation of pre arithmetic skills of preschool children with their cognitive abilities
- > The cognitive abilities of children with hearing impairment in comparison with normal hearing children
- > The impact of intervention on the cognitive abilities of children with hearing impairment.

1.4.1 Statement of the problem

"To study the cognitive capabilities of preschool children with hearing impairment and its relation to learning of pre-arithmetic skills."

1.4.2 Objectives of the study

The present study proposes to the following objectives

- > To study the cognitive capabilities among preschool children with Hearing Impairment in the age groups 4-6 years in the following specific cognitive capabilities
  - o Length sedation
  - o Shape completion
  - o Action through signs.
  - o Classification of picture.
- > To examine the correlation of cognitive capabilities & pre-arithmetic skills of preschool children with hearing impairment in the age group of 4 - 6 years.

The following chapter discusses the review of literature related to the study.

Chapter-II

Review of Literature

2.0 Introduction

The review of related literature is an essential aspect of a research report. It enables the researcher to be in line of thinking and helps him to lay a sound foundation for the investigation. The investigator must know what sources are available in the field of inquiry, which of them is likely to be useful to his study and to make the research work perfect and unique one, it is very essential for the researcher to go through the literature. It helps the researcher to find out what is already known, what others have attempted to find out and keep track of the development.

The investigator reviewed the studies, which directly and indirectly related to the problem and are presented in his chapter. A summary of the findings of the study is discussed below under the following sections.

2.1 Studies related to cognitive abilities/development of CWHI.

2.2 Studies related to cognitive development/abilities and its relation with Mathematics / pre-arithmetic skills.

2.3 Studies related to fostering cognitive development/abilities.

2.4 Research related to Piagetian tasks with CWHI.

2.1 Cognitive abilities/development and Children with hearing impairment

Some of the researchers studied about the cognitive abilities of the children with hearing impairment. The findings, observations of the studies are discussed below.

Vernon (1969) reviewed a large number of studies and concluded that the deaf and hard of hearing children have essentially the same distribution of cognition /intelligence as the general population.

Furth (1964) reports that deaf child who has few verbal skills & generally do not learn a language until later life can perform cognitive tasks involving memory, reasoning & problem solving as well as hearing children. Furth (1966) concluded that logical, intelligent thinking does not need the support of a linguistic symbol system & intelligence is not dependent upon language, but language is dependent on the structure of intelligence. An overview of studies comparing the performance of deaf children with hearing children on tasks reflecting concept attainment indicates that deaf children perform as well as the hearing children during the earlier ages and stages of cognitive development.

Lennenberg (1964) reviewed the literature on cognitive, non-verbal abilities of deaf children. He observed, "On cognitive tasks it has been experimentally shown that even pre-school and pre-lingual deaf children perform no worse than hearing children.

Stone (1980) noted that deaf and hearing-impaired students had difficulties when undertaking sequencing tasks. Rittenhouse & Kenyon (1991) support and extend stone's conclusion about the cognitive difficulty of children with hearing impairment illustrating that difficulties in performance on sequencing and conservation tasks is not due to inferior cognitive abilities but rather a lack of experience.

Furth (1966), Brown & Edwards (1973) found that language development is very important for cognitive development, and there are indications that for the most part, children with hearing impairment develop normally cognitively.

Krivitski (2000) examined the performance of children with hearing-impairment and found that they are very good similar to hearing children on the Universal Nonverbal Intelligence Test (UNIT).

The study of the cognitive abilities of hearing-impaired children is important for both practical and theoretical reasons. Most studies show that deaf children are similar to normal children in virtually all aspects of cognitive function. Besides the degree of hearing loss and the age at onset of deafness, environmental factors (such as parental support and educational methods) seem to play an important role in the cognitive development and academic success of these children (Lauwerier, Chouly & Bailly, 2003). Research indicates that important relationships exist between cognitive processing and achievement. It also suggests that cognitive confusion is a major reason for early failure in school (Downing, 1972).

Piaget conceives of intelligence as an adaptive process. Adaptation in Piaget's terms, involves the establishment of equilibrium between the organism and its environment. Piaget's stages of development have been confirmed by other experiments also (Greenberg and Kusche, 1989 & Paul and Quigley, 1990). His theory is applicable to children with hearing impairment also (Quigley & Kretschmer, 1982).

Another challenge in evaluating cognitive abilities of children with hearing impairment lies in differentiating linguistic competence from other areas of cognitive functioning. One functional way to separate intellectual ability from language acquisition is to use language-reduced or nonverbal tests of intelligence.

On the basis of the above studies, cognitive abilities of hearing-impaired children are important for both practical and theoretical reasons. Most studies show that CWHI children are similar to hearing children in virtually all aspects of cognitive function. Some studies highlight the role of experience provided to CWHI to be acting on par with hearing children.

2.2 Cognitive abilities of children with hearing impairment and its relation to Mathematics/Pre-arithmetic skills

Many researchers found the lack of /delay in cognitive development as the cause for difficulties experienced in learning arithmetic. Some of the studies, which stressed the role of cognitive factors in learning of arithmetic, are given below. Some of the researchers studied about the cognitive abilities of the children with hearing impairment and its relation to learning of pre-arithmetic skills/Mathematics. The findings, observations and studies are discussed below.

Geary (1993) describes the functional arithmetic difficulties of student with math ability & demonstrates how cognitive deficits are associated with the development of arithmetic cognition.

Titus and Pau (1995) concluded in their studies that there is no significant cognitive basis for major differences in mathematical performance between hearing and hearing impaired students & that achievement differences that are observed are the result of a combination of linguistic and experiential delays of the children with hearing impairment.

Review of literature between 1980 and 2000 by Swanwick, Oddy and Roper (2005) indicates that Children with Hearing Impairment (CWHI) lag behind their hearing peers in mathematics achievement tests.

Standardized sensory, perceptual, linguistic, intellectual, and cognitive tests were administered to 470 children, approximately 96% of the students entering the first grade in the four elementary schools of Benton County, Indiana, over a 3-year period (1995-1997). The results of 36 tests and subtests administered to entering first graders were well described by a 4-factor solution. The strongest predictor of reading and mathematics grades was the visual cognition factor, followed by the verbal cognition factor. The speech-processing factor was the weakest predictor of academic achievement, accounting for less than 1% of the variance in reading achievement (Watson & Kidd, 2003).

In a study conducted by Yang and Shaftel (2005) investigated whether the mathematics achievement of students in special education can be used to identify those who share common cognitive skills that may not be in concordance with their disability labels. Latent class analysis of a comprehensive test of mathematics taken by fourth-grade students with various disabilities reveals that a model with 2 latent classes is adequate to characterize the latent structure of the data. A parallel relationship of response profiles across the 2 classes suggests differences in the levels of mathematical ability (quantitative), rather than differences in the type of mathematical ability (qualitative), between the 2 latent classes in terms of generic mathematical proficiency. Although a significant relationship exists between the identified latent classes and various disabilities, the analysis also found common mathematical problem-solving behaviors across disability categories.

Culbertson and Gilbert (1994) studied the academic achievement, cognitive ability, psyche-linguistic, and social skills of a group of 25 monaurally hearing-impaired children and compared their performance with 25 hearing children. Results indicated no significant differences between the two groups on cognitive or self-concept measures. The results of this study suggest that monaural deafness, especially when severe to profound, may be associated with cognitive and academic deficits, as well as secondary behavioral adjustment problems.

Trybus and Karchmer (1977) concluded that Children with hearing impairment generally perform at a much higher level on computational skills (Arithmetic) than on verbal problems.

Normal children hear mathematical talks from birth and most of them are involved in mathematical talk from early years, observed Gregory (1999). He explores the reasons like early incidental learning and reinforcement, which are limited for CWHI, because of which they underachieve in mathematics. Pau (1995) also observed that delay in early access to mathematical conversation as a contributing factor for the poor performance of CWHI in mathematics.

Hitch (1983) suggested a more specific focus on the experience of CWHI on spoken language and the consequences for the development of inner speech which is seen as a means of mediating the processing of numerical information.

The lack of auditory experience of CWHI might also affect short-term memory skills and account for slower response time in addition and subtraction tasks and their poor memory for digits (Epstein et al., 1994).

Nunes and Moreno (1998) identified one mathematical concept - additive composition - that is crucial to progress in mathematics, often mastered by children before they enter school or quite early on in their school lives, and that seems to create a significant obstacle for CWHI in their pursuit of learning mathematics.

Studies of mathematical achievement and understanding have generally concluded that there is no significant cognitive basis for major differences in mathematical performance between deaf and hearing students and that achievement differences that are observed are the result of combination of linguistic and experiential delays for the CWHI (Titus, 1995; Serrano Pau, 1995).

Meadow and Orlans (1980) in their study observed evidence to suggest that CWHI learn concepts in the same sequence and in the same manner as hearing children do. Their finding suggests that the mathematics reasoning is on par with normal hearing children. However they noticed that the learning process is slower among CWHI.

CWHI were better than the hearing children at reproducing from memory, arrays of objects presented visually. Because the size of the arrays did not require counting. They were no worse than hearing children at reproducing the arrays when the objects were presented in a temporal sequence (Zarfaty et al., 2004).

The challenges that CWHI encounter with regard to language/mathematical language were also evident during Ray's (2001) observations. It was apparent that the children had not understood concepts such as in front of, behind, under, same, different.

It is observed that 25% of children in regular educational stream perform below the expected level in mathematics, Gowramma (2005). There are various reasons for students in primary school level to lag behind the than just sensory impairment.

Kingma (1984) after the study of the performance of first graders in Piagetian tasks and initial arithmetic test predicted that out of the Piagetian task, sedation might serve as a valuable diagnostic instrument for some aspect of initial arithmetic.

Wallace and Mc Loughlia (1975) found that lack of readiness for learning arithmetic skills is a contributing factor for the difficultly to learn arithmetic.

Most studies show that CWHI are similar to hearing children in virtually all aspects of cognitive functions as well as mathematics skills, many studies also emphasize pronounced differences in their academic achievement. Some of the studies show that CWHI had low level of mathematic skills than hearing children, highlighting a delay due to language problem and lack of experience.

Some studies specifically report a lag in mathematics performance of CWHI when compared to their hearing peers. To throw more light on it, data regarding the grades in which they are studying and the type of mathematics problems were not available. As the complexity of the task increases and language of the test is high, CWHI may show delay.

2.3 Studies related to Fostering Cognitive Development

Some of the researchers studied about the fostering cognitive development of the hearing children and children with hearing impairment. The findings, observations and studies are discussed below.

When the primary school programs are revitalized with emphasis on optimum utilization and further development of the cognitive capabilities of children, among other dimensions of development the full potential, new partly dormant and waster, will be brought out in full force, suitably exercised and developed to the maximum extent, paving the way for the development of fully 'functioning individuals', moving towards and possibly attaining 'self-actualization'.

Padmini (1983), studied the cognitive development of 120 First Standard students from 5 Primary schools located in Mysore City by using Mysore Cognitive Capability Test (MCCT) an individual performance type test was used in both pretest and post test and concluded that the cognitive development effect by Socio-economic status, intelligence, institutional difference. And high cognitive capabilities might generally make for good academic achievement of the students, and vice versa. To this extent, cognitive development status can be useful predictor of academic achievement. Primary school programs emphasized on optimum utilization and further development of the cognitive abilities of children, among other dimensions of development.

Furth (1966), Brown and Edwards (1973) found that language development is very important for cognitive development, and there are indications that for the most part children with hearing impairment develop normally cognitively

Tompkins & Horkisson (1991) concluded in their studies, the child should be exposed to several environments then child can accommodate the new information with his cognitive abilities.

Readiness skills are essential for later academic progress in any subject. Cognitive capabilities are prerequisite to develop all the related pre academic skills.

The studies in this section show the importance of developing cognitive abilities, not undermining the role of environment.

2.4 Research on Piagetian Tasks with CWHI

Some of the researchers studied about the research on Piagetian tasks with CWHI. The findings, observations and studies are discussed below.

Quigley & Kretschmer (1982) stated, "It has not been clear to what extent children with hearing impairment can successfully complete various Piagetian Tasks". In general, there is widespread agreement that deaf children's performance in the sensori-motor stage is quantitatively and qualitatively similar to that of hearing children. Little research has been conducted on deaf children's performance on pre-operational tasks. The most interesting of these experiments were those conducted by Rittenhouse (1977) on conservation. Differences between deaf and hearing children have been observed near the end of this stage, for example, in the area of seriation - the ability to rank items in a particular order. For e.g. compared with age-peers, deaf children have problems with multiple seriation, transitivity, multiple classification, and conservation. Delays with conservation include the concept of number quantity, length, weight, area, and volume.

It should be emphasized that even with modification in direction and attempts to teach the task, there were still developmental delays. On some pre-operational and concrete operational tasks, deaf individuals performed as well as hearing. They performed only slightly poorer than hearing individuals on tasks requiring the use of simple probability predictions.

Among the limited number of studies in the literature comparing cognitive ability scores of hearing children versus children with hearing impairment, Bracken and McCallum (1998) compared Universal Nonverbal Intelligence Test (UNIT) scores for a sample of 106 hearing impaired individuals. UNIT mean score differences ranged from 3.50 (Abbreviated Battery) to 8.01 (Extended Battery). These differences are about a one-third standard deviation (in favor of the hearing examinees) and are considerably smaller than would be expected on language-loaded tests.

Krivitski (2000) examined whether children with hearing impairment performed similarly to hearing children on the UNIT. The author compiled a sample of hearing impaired students that matched the standardization sample of hearing children on age, gender, race/ethnicity, and parental education level. The results of the profile analysis found that deaf and hearing children display similar patterns of performance on the subtests of the UNIT.

According to Greenberg & Kusche (1989), Piagetian research suggests that deaf children tend to rely heavily on visual spatial processing and sometimes have difficulty with the simultaneous processing of multiple perspectives. For the average deaf does not appear to override visual perception until adolescence, while this same transition occurs between the ages of 5 & 7 for the average hearing child. As a result, the elementary school-age deaf child thinks predominantly in a preoperational manner in some areas, but processes information in a concrete operational way in others; processing differences, in turn, appear to affect the development of further concept formation.

CWHI perform on par with their hearing peers on most of the Piagetian tasks, although in certain higher cognitive tasks they face processing difficulties.

Chapter-III

Method

3.0 Introduction

In the previous chapter a review of research related to the objectives of the study has been made. Based on the review, hypotheses formulated in this study are justified.

The methodology adopted to achieve the objectives of the study is discussed in this chapter. This chapter includes an overview regarding the details about sample, procedure employed for collection of data and analysis of the data. This chapter also includes the details regarding the tools employed in the study.

3.1 Hypotheses

The present study verifies the following hypotheses.

1. There is a positive correlation between cognitive abilities and pre-arithmetic skills of children with hearing impairment in the age group 4-6 Years.

2. There is no significant difference between the scores of cognitive abilities of CWHI and normal hearing children.

3.2 Sample

Forty children with hearing impairment studying in All India Institute of Speech and Hearing (AIISH) pre-school (A preschool for children with communication disorders) and their age ranging from 4 to 6 years were selected. Children with any other significant associated disabilities were not included in the study.

Table 1: Distribution of sample by Gender and Age

Gender	Age		
	4-5 years	5-6 years	Total
Boys	11	12	23
Girls	04	13	17
Total	15	25	40

3.3 Tools used for the study

In order to achieve the objectives mentioned in the study, it was necessary to collect the data. To assess the cognitive capability of the pre-school CWHI, Padmini Cognitive Capability Test (PCCT) Pre-school Version-1 (Padmini 1983) was made use of. The adapted version of Grade Level Assessment Device-GLAD (Narayan, 1997) was used to assess the pre-arithmetic skills. Both these tools were readily available. PCCT is a standardized tool, which is valid and reliable. The standardized tool GLAD was adapted by the Department of Special Education, AIISH to assess the arithmetic readiness of children in the age group of 4-6 years. The details of the tools used for this purpose are given in the following sections.

3.3.1 Padmini Cognitive Capability Test (PCCT) Pre-school Version 1

A good tool had to be employed for collection of data on the cognitive ability status of the subjects. The selection of the tool for this purpose had to be guided by many important considerations. It must be based on a wide range of cognitive concepts and operations appropriate to the age level of pre-primary pupils. It should facilitate the measurement of cognitive capabilities of each child objectively and reliably yielding a total measure of the overall cognitive capability as an index of cognitive development status with their consideration, among others PCCT was selected for the study.

The basic assumption that the cognitive capabilities of children can be assessed and measured to yield scores on cognitive development status which are objective and reliable has led the authors to construct and standardize this test reconciling the psychometric approach and the Piagetian approach. The test covers a wide range of cognitive concepts appropriate to children of four to six years of age.

Padmini cognitive capability test has been developed and standardized by Padmini (1983), Department of studies in education, Mysore University. Padmini cognitive capability test, preschool version-1 consists of four tests as follows

Table 2: Details about PCCT subtasks and marks allotted

Task	Subtasks	Marks
1. Length seriation	**4**	20
2. Shape completion.	**2**	20
3. Action through signs	**2**	12
4. Classification of pictures	**4**	18

(Appendix - A)

3.3.2 Arithmetic Readiness Test (ART)

Arithmetic readiness test has been adapted by the Department of special education, AIISH. The readiness test is used to test / measure the pre-arithmetic skills of pre-school children in the age range of 4-6 years. (Appendix - B)

3.4 Procedure for Collection of data

This section gives an overview of the method of collection of data and techniques of analysis of the data to achieve the various objectives of the study. The data was collected on different aspects of cognitive capabilities and pre-arithmetic skills in a preschool for children with hearing impairment.

3.4.1 Administration of Padmini Cognitive Capabilities Test (PCCT)

As the PCCT was an individual performance readiness without time restriction each child had to be given all the tasks of the PCCT. The following steps were followed in collecting the data.

- Investigator got familiar regarding the administration of PCCT.
- Administrations of all tasks were carried out in a play way method as suggested in the manual.
- As the sub-tasks were graded investigators stopped at the particular level where the subject failed to complete the task.
- Each child was given instruction, in his or her own mother tongue - Kannada, Malayalam, Hindi and English.
- The PCCT was administered to a total number of 40 children in a pre-school for children with hearing impairment during the months of January and February 2008.
- Other relevant information was collected required for the analyses of the sample from the records of the respective subjects.

3.4.2 Administration of Arithmetic Readiness Test (ART)

As the ART was an individual performance readiness without time restriction each child had to be given test ART. The following steps were followed in collecting the data about pre-arithmetic skills.

- Administration of test was carried out in a play way method.
- Each child was given instruction, in his or her own mother tongue - Kannada, Malayalam, Hindi and English.
- The ART was administered to a total number of 40 children in a pre-school for children with hearing impairment during the months of January and February 2008.

3.5 Analysis of the data

At this stage the data were analyzed quantitatively. The scores of PCCT and ART were compared and tested for correlation. The mean performance of CWHI on all the four cognitive tasks assessed was compared with three groups of hearing children based on the available data (Shobha, 2002). The details are given in the following chapter.

Chapter-IV

Analysis & Interpretation of the data

4.0 Introduction

As mentioned in previous chapter quantitative analysis was done. The correlation of PCCT and ART were compared and tested for significance difference. The mean performance of CWHI with three groups of hearing children from an earlier study were compared and tested for significance. The details are discussed below.

4.1 Analysis of the data

Data was analyzed statistically to find the correlation between PCCT scores and ART scores. Further analysis aims at comparing the PCCT of CWHI and hearing children based on the data of Shobha (2002).

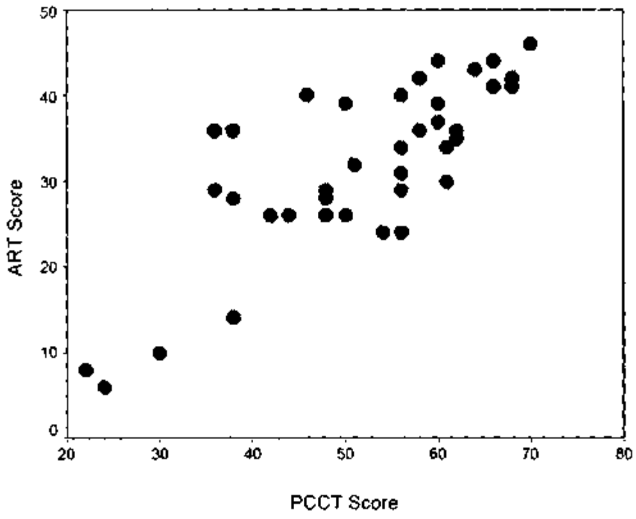
4.1.1 Correlation between PCCT and ART scores

Table3: Correlation between PCCT and ART scores

Correlation		PCCT score out of 70
ART score out of 46	Pearson Correlation	r = 0.796**

**. Correlation is significant at the 0.001 level.

Figure 1: Graph showing the correlation between PCCT and ART scores



The correlation r = 0.796 is significant at 0.001 level. This clearly indicates that there is a Positive correlation between PCCT scores and ART scores. Hence hypothesis no.l, There is a positive correlation between cognitive abilities and a pre-arithmetic skill of children with hearing impairment in the age group 4-6 Years is accepted. The graph clearly shows as cognitive scores improve arithmetic scores also improves.

4.1.2 Correlation between the scores of PCCT subtasks and ART

Table 4: Correlation between ART score and PCCT subtasks scores.

		PCCT subtasks Scores			
	Pearson Correlation	Shape Completion (20)	Length seriation (20)	Action through signs (12)	Classification of pictures (18)
ART score (46)		r = 0.817*	r = 0.735*	r = 0.586*	r = 0.748*

* Correlation is significant at the 0.001 level.

Figure 2: Graph showing the correlation between PCCT-Shape completion and ART scores.

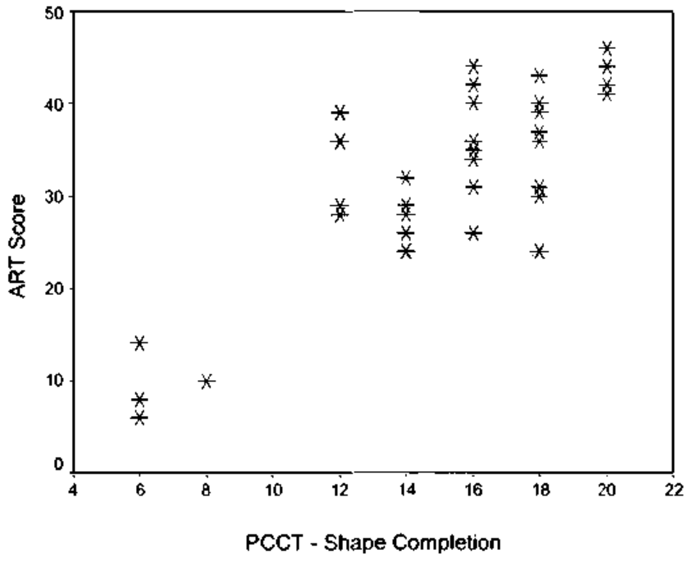


Figure 3: Graph showing the correlation between PCCT-Length sedation and ART scores.

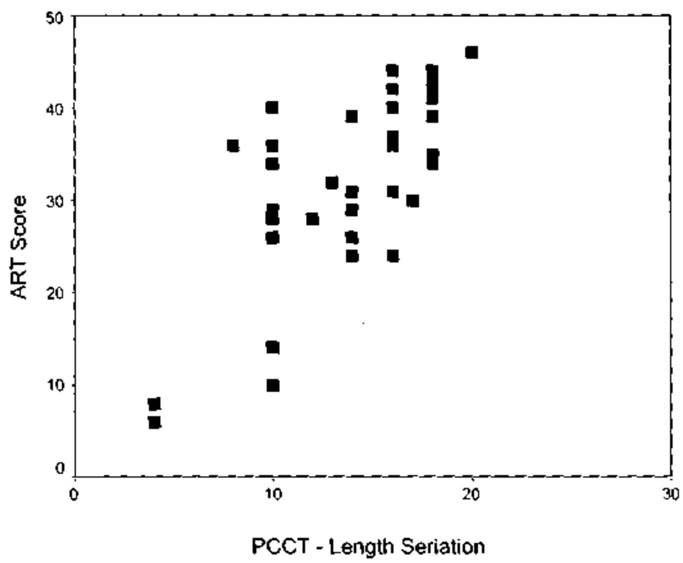


Figure 4: Graph showing the correlation between PCCT-Action through Signs and ART scores.

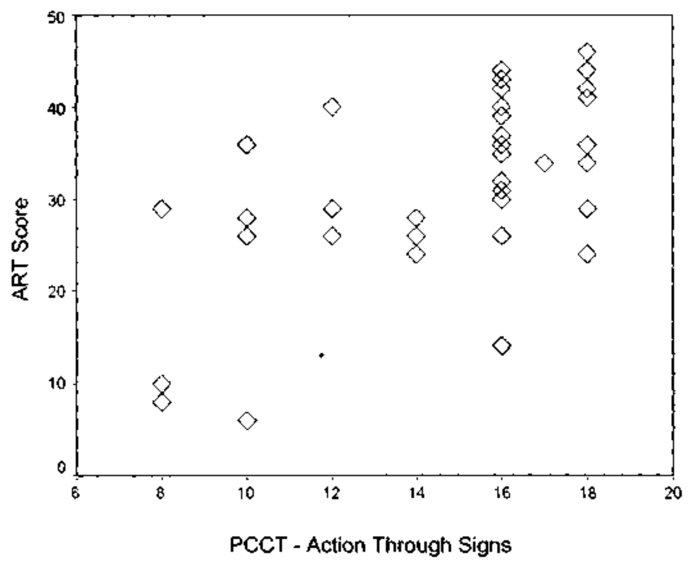
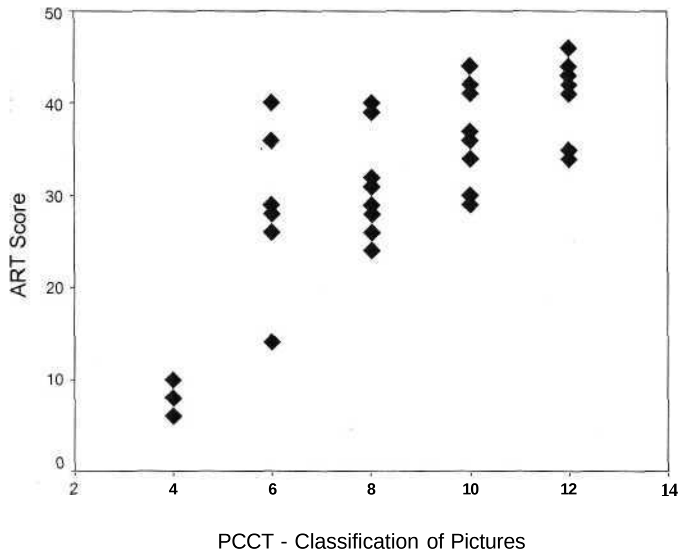


Figure 5: Graph showing the correlation between PCCT-Classification of Pictures and ART scores.



The correlations r = 0.817, r = 0.735, r = 0.586, r = 0.748 is significant at 0.001 level. This clearly indicates that there is a positive correlation between PCCT subtasks scores (Shape Completion, Length Seriation, Action through signs and Classification of Pictures) and ART scores. As the concerned cognitive ability improves arithmetic skills are also improves.

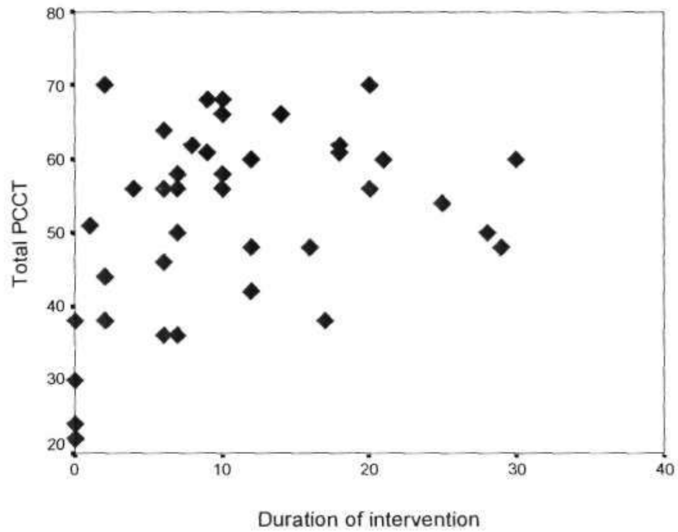
4.1.3 Correlation between the scores of PCCT score and duration of intervention of the CWHI

Table 5: Correlation between PCCT score and duration of intervention of the CWHI

Correlation		Duration of intervention
PCCT Score out of 70	Pearson Correlation	r = 0.351*

*. Correlation is significant at the 0.05 level.

Figure 6: Graph showing the correlation between PCCT score and duration of intervention.



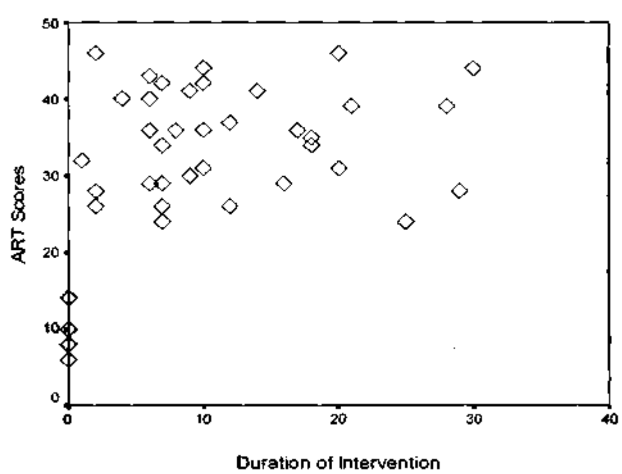
4.1.4 Correlation between the scores of ART score and duration of intervention of the CWHI

Table 6: Correlation between ART score and duration of intervention of the CWHI.

Correlation		Duration of intervention
ART score out of 46	Pearson Correlation	r = 0.367*

*. Correlation is significant at the 0.05 level.

Figure 7: Graph showing the correlation between ART score and duration of intervention.



The correlations r = 0.351, r = 0.367 are significant at 0.05 level. This clearly indicates that there is a Positive correlation between PCCT score, ART score and duration of intervention for CWHI. As the duration of intervention is more, the PCCT and ART score is high and vice-versa.

4.2 Comparing PCCT scores of CWHI with normal hearing children

The data collected in the present study was compared with the data collected by Shobha (2002) for normal hearing children in three different preschool setups. The table below gives the details.

Table 7: Comparison PCCT scores of CWHI with normal hearing children.

PCCT SCORES								
	CWHI		Montessori		Anganwadi		Kinder Garten	
	Mean	SD	Mean	t-ratio	Mean	t-ratio	Mean	t-ratio
1. Shape Completion	15.15	3.84	15.50	0.576	4.30	17.870*	10.78	7.197*
2. Length Sedation	13.95	4.01	16.80	4.499**	6.50	11.762*	11.75	3.473*
3. Action through sings	14.73	3.23	12.50	4.351*	3.95	21.168*	8.78	11.625*
4. Classification of Pictures.	8.50	2.47	11.30	7.169**	5.05	8.833*	10.75	5.760**

t-value significant at 0.01 level in favor CWHI
** t-value significant at 0.01 level in favor of normal hearing children.

No uniform trend is observed in the above table in favor of either CWHI or normal hearing children. Hence hypothesis no.2, "There is no significant difference between the scores of cognitive abilities of CWHI and normal hearing children" are accepted. However, the following observations are made.

- In the Shape completion task CWHI performed better than children attending Anganwadi and Kinder Garten. The t-ratio is not significant for CWHI and children attending Montessori.
- In the Length Seriation task CWHI performed better than children attending Anganwadi and Kinder Garten. Children attending Montessori have performed better than CWHI.
- In the Action through sings task CWHI performed better than children attending Montessori, Anganwadi and Kinder Garten.
- In the task of Classification of Pictures CWHI performed better than children attending Anganwadi. Children attending Montessori and Kindergarten have performed better than CWHI.

4.3 Result and discussion

- There is significant correlation between PCCT scores and ART scores of CWHI in the present study, as it is observed that the cognitive abilities improves arithmetic skills also improves. Similar trend is observed by Lauwerier, Chouly & Bailly, (2003); Watson & Kidd, (2003) & Culbertson and Gilbert (1994).
- It is noticed in the present study that as the four subtasks of the cognitive ability assessed in the study improves arithmetic skills also improves. This is indicated by the significant correlation for PCCT subtask scores and ART scores of CWHI in the present study.
- As the duration of intervention is more, the PCCT and ART score is high and vice-versa. So, as the duration of intervention increases CWHI perform better on cognitive as well as arithmetic tasks. Hitch, (1983); Epstein et al., (1994); Titus, (1995); Serrano Pau, (1995); Kingma, (1984) also observed the

importance of providing intervention to improve cognitive tasks. Bloom (1964) stresses on the early environmental stimulation for cognitive development.

> No uniform trend is observed in the study in favor of either CWHI or normal hearing children. However, the following observations are made which suggest the importance of enriched environment in preschool training to enhance cognitive abilities.

  - In the Shape completion task CWHI performed better than children attending Anganwadi and Kinder Garten.
  - In the Length Seriation task CWHI performed better than children attending Anganwadi and Kinder Garten.
  - In the Action through sings task CWHI performed better than children attending Montessori, Anganwadi and Kinder Garten.
  - In the task of Classification of Pictures CWHI performed better than children attending Anganwadi.

Several studies Lennenberg (1964), Krivitski (2000), Trybun and Karchmer (1977), Zarfaty et al., 2004, Meadow and Orlans (1980), Swanwick, Oddy and Roper, 2005, Schirmer, 2000, Padmini (1983), Tompkins and Horkisson, 1991) highlight the need for enriched environment, systematic and organized intervention in preschool, hands on experience to promote better cognitive abilities among children attending preschool. Furth (1966) observed that during the earlier years, CWHI and normal hearing children performed similarly on cognitive tasks, as it does not require the support of linguistic system. Stone (1980) noticed that difficulties of CWHI on certain cognitive tasks could be due to lack of experience.

Chapter-V

Summary & Conclusion

5.1 Major findings of the study & their interpretation

- The scores of PCCT and ART of CWHI in the present study are highly correlated. It is observed that as the cognitive abilities improve arithmetic skills also improves depending upon the environment provided.
- It is noticed in the present study that all the four subtasks namely length seriation, shape completion, action through signs, classification of pictures of the cognitive ability assessed have correlation with arithmetic skills.
- As the duration of intervention is more, the PCCT and ART score is high and vice-versa. So, as the duration of intervention increases CWHI perform better on cognitive as well as arithmetic tasks. This highlights the importance of providing early intervention to CWHI to enhance their cognitive abilities, as well as prearithmatic abilities.
- No uniform trend is observed in the study in favor of either CWHI or normal hearing children with reference to their performance on cognitive tasks. However, the following observations are made which suggest the importance of enriched environment in preschool training to enhance cognitive abilities.
  - In the Shape completion task CWHI performed better than children attending Anganwadi and Kinder Garten.
  - In the Length Seriation task CWHI performed better than children attending Anganwadi and Kinder Garten.
  - In the Action through sings task CWHI performed better than children attending Montessori, Anganwadi and Kinder Garten.
  - In the task of Classification of Pictures. CWHI performed better than children attending Anganwadi.

In the light of the above findings it can be suggested to provide enriched environment, systematic and organized intervention in preschool, hands on experience to promote better cognitive abilities among children attending preschool. These experiences help all the children irrespective of their disability to perform better academically.

Preschool children with significant hearing loss should be given special preliminary instruction. It gives the CWHI a chance to gain valuable school experience before undertaking a full school curriculum. Here they will be with their normal hearing peers learning to adjust to varied situations and sounds, acquiring habits of effective watching and listening, and developing healthy attitudes toward themselves and others. Enrollment in preschool also opens opportunities for parents to discuss with professional persons some of the problems their children especially those relating age appropriate development.

5.2 Educational implications

The findings of the present study depict a detailed picture of the current status of cognitive abilities and pre arithmetic skills of CWHI. Hence there is an enormous scope to identify the strengths and weakness of preschool CWHI. Educational implications of the study are as follows:

1. This study will give an insight into relationship between cognitive abilities of CWHI & its correlation in learning maths, which can be utilized in teaching of mathematics.
2. The findings will indicate the need to include activities to foster cognitive development in the pre-school curriculum for children with hearing impairment.

3. The findings suggest that cognitive development must be deliberately taken up for children with or without disabilities.
4. Curriculum is a tool to help teachers to focus on child development. So special attention can be given to develop cognitive abilities in the pre-school curriculum.
5. Specific activities can be suggested for teachers & parent's to enhance cognitive development in the early years of development.
6. With the help of the knowledge of cognitive development stages given by Piaget, the teacher can organize his/her teaching learning activities.
7. Social interactions have a great educational value for cognitive development. When children interact socially with peers they can know the right answer of a problem, hence they should be encouraged to interact with their age mates.
8. The children should be allowed to discover things on their own.

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Appendix-A

PADMINI COGNITIVE CAPABILITY TEST
(PRE-SCHOOL VERSION -1)

A) LENGTH SERIATION:

Materials:

a) 7 dolls graded in length.
b) 7 sticks graded in length.

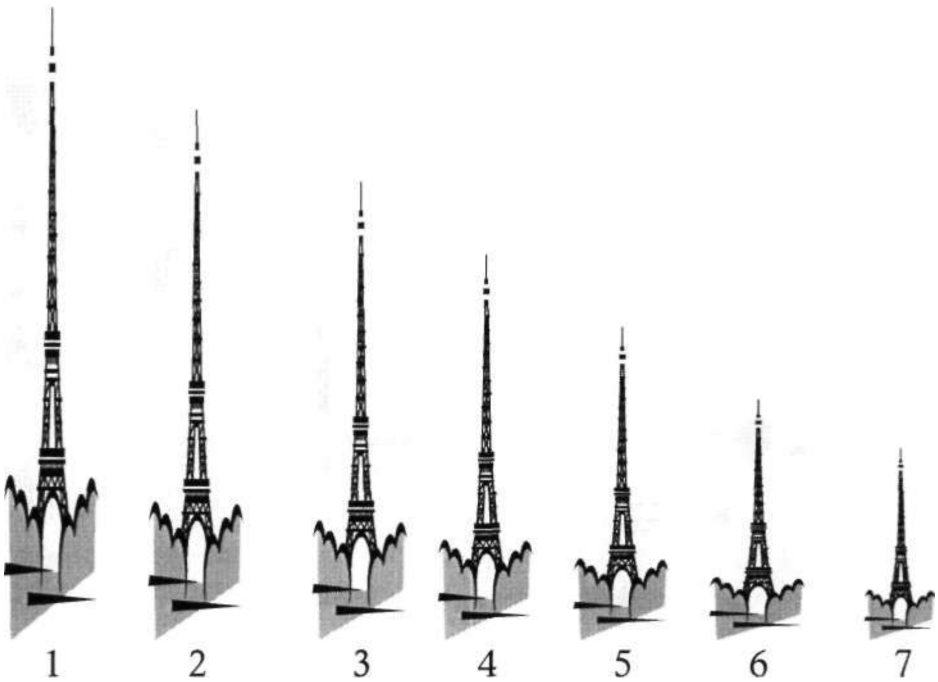
Task:

1. Given a set of (7) dolls of different heights, the child has to seriate them from the shortest to the longest (Vice-Versa).

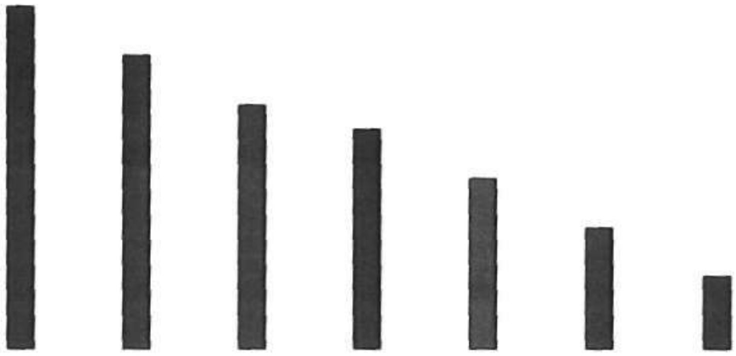
2. Given a set of (7) sticks of different lengths in jumbled array, the child has to seriate them in order of length.

3. Given sticks (2) of different lengths, the child has to insert them into the series formed in T2.

4. Given paired dolls and sticks, matching the dolls and sticks in the two series by length. The child has to point out the corresponding dolls for the selected sticks according to their original position when the doll series is spread out disturbing the alignment of the paired series.



7 sticks graded in length:

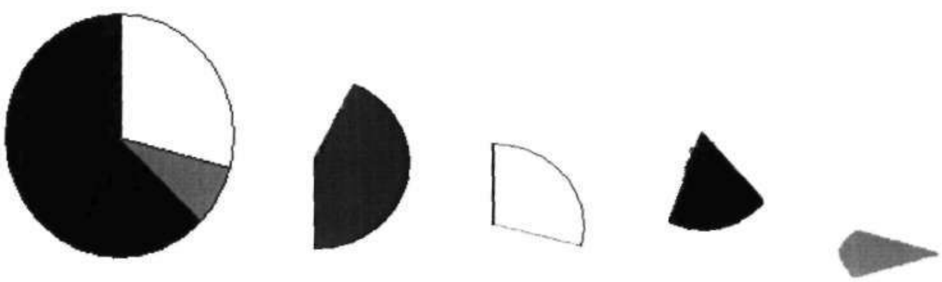


B) SHAPE COMPLETION:

Task I - CIRCLE
<u>A. Materials:</u>

a) Two circular cards with about 10 cm diameter. One model is divided four sectors in different colour and other into four corresponding pieces with the same colour as in the model.

b) Task:
Given a model and cut pieces of that shape, the child has to complete the shape with the cut pieces. Place the model Circular card in front of the sample, and lay down the four cut pieces too in a random order as shown in figure say "A card exactly like this (Point to the model) has been cut into these pieces (point to the pieces) see if you can arrange them together to make a whole one just like this". Remove the model, allows the child to construct the shape with the pieces. Observe if the child constructs the circle by memory (without the model to copy if the child hesitates or does not understand keep again the model demonstrate ones in front of the child, but do not describe. Say, "watch how I do this, now this is exactly like this". Scatter the cut pieces as before and ask the child to complete the shape, when child finishes the task ask "Is that all right? Is it over?"



SHAPE SOMPLETION (CIRCLE)	MAX. MARKS
1. Correct completion by memory	10
2. Correct completion with 1 mistake	08
3. Correct completion with model	06
4. Correct completion with model with 1 mistake	04
5. Correct completion without demonstration	02
6. Correct completion with demonstration	01

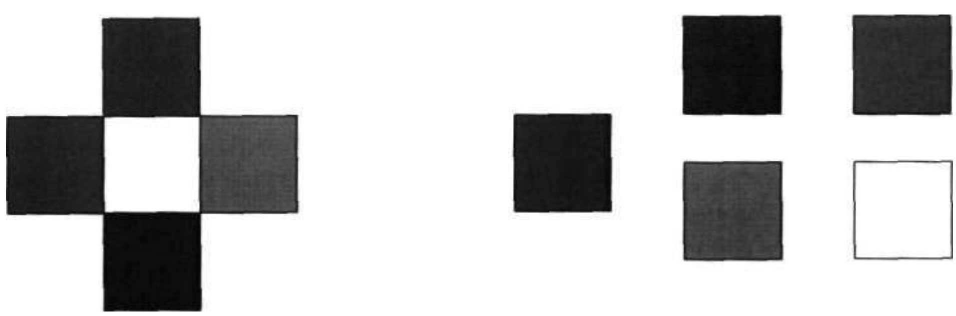
Task - 2: CROSS

Materials:

a) Two cross shaped cards one cut into five pieces and coloured as shown in the figure.

b) Task: Present the Cross shape to the child say "Have a good look so that you will remember the shape, the arrangement of the colour too".

Remove the cross shape and immediately present the five cut pieces in a random order or mixed way. Say "Put these pieces together to make a whole figure exactly like one you saw just now continue ask as in task-1. Circles observe the child's performance with memory, with model and with demonstration. When the child completes ask "Is it over? Is it alright?" all the child sufficient time for correction without any suggestion.



SCORING:

ACTION THROUGH SIGNS	MAX. MARKS
T1: All the 3 combinations are correctly coded each card 2 marks X 3 cards. If each two signs are correctly decoded one marks each.	**6** **3**
T2: If all the 4 designs are correctly decoded each card 3 marks X 2 cards. If atleast 3 signs are decoded correctly in the order of presentation.	**6** **4**
TOTAL	**12**

D) CLASSIFICATION OF PICTURES:

<u>Materials:</u>

A set of 16 pictures cards to from 4 sets as follows.

1) 4 Common fruits
2) 4 Vehicles
3) 4 Birds
4) 4 Animals.

Task:

Given a collection of pictures card, the child has to classify them intc required sets. Without any suggestion the child has to classify the sets. Th(child can label the classification. Any 3 meaningful sets can also be classified If the child fails to classify the required sets hint may be given for one set, bu the mark should not be given to the set which is shown by the examiner.

<u>SCORING:</u>

CLASSIFICATION OF PICTURES	MAX.MARKS
1. For correct classification into 4 sets (Without suggestion) Child can label the classification.	**16** **2**
2. For correct classification into any 3 meaningful sets. a) Birds and animals b) Fruits c) Vehicles	**12**
3. For correct classification - 3 sets (With hint for one set)	**12**
4. Each set 4 marks 1 to 2 (With or without suggestion) Sets are correctly decoded.	 **8**
5. Each set 3 marks if 3 cards are put together.	**3**
TOTAL	**18**

DEPARTMENT OF SPECIAL EDUCATION, AIISH

SCHOOL READINESS TOOL - II: PREARITHMETIC SKILLS

1. Count and Write:

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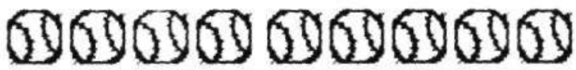 =

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2. Draw the number of objects against the number given:

   3 -

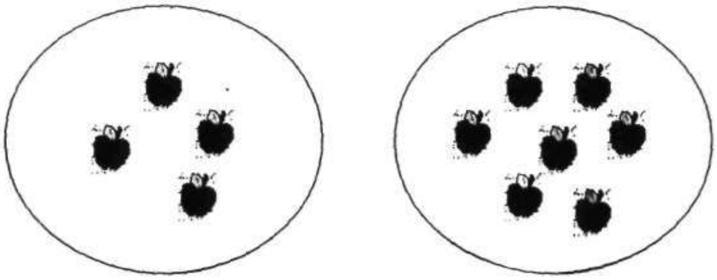
   4 -

   7 -

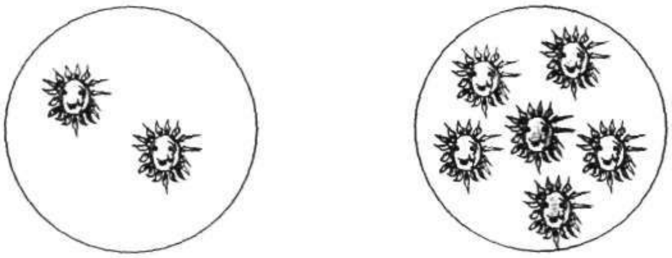
3. Match the *Number* to the *Word:*

1	Two
6	Nine
2	Six
9	One

4. Tick (✓) the set with more objects:



5. Tick (✓) the set with less objects:



6. Arrange the numbers in sequence (from 1 - 9):

7. Fill in the missing numbers:

   a._____, 2, ___

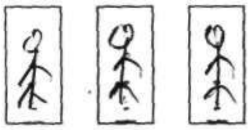
   b. 5,_____, 7

   c 4,_____, ___

8. Circle the bigger number:

a.	5	8	3
b.	2	6	9
c.	1	3	4

9. Circle the correct number:

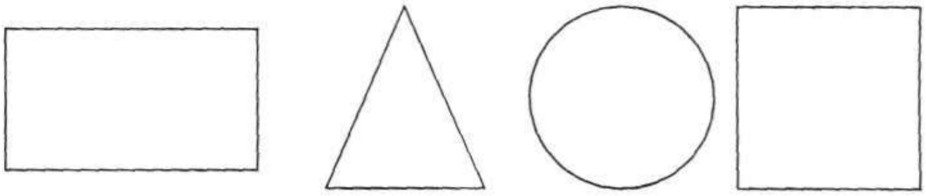
a.  5 7 3

b.  6 8 5

c.  1 2 4

10. Colour the shapes:

a. Colour the square blue
b. Colour the triangle yellow
c. Colour the circle green
d. Colour the rectangle pink



11. Tick the long object:

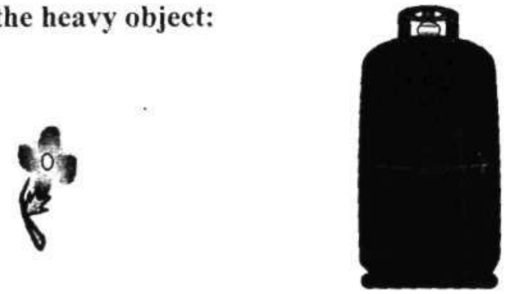
12. Tick the short object:

13. Tick the light object:

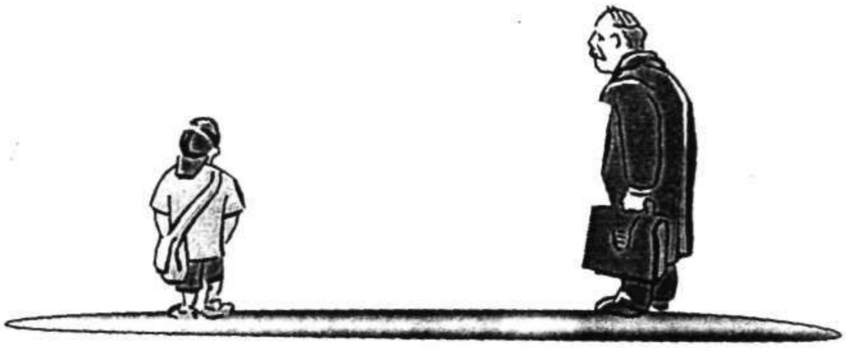
 

14. **Tick the heavy object:**



15. **Tick the tall one:**

16. **Tick the short one:**



17. **Solve:**

2	**3**	**4**	**3**
+ 1	**+ 2**	**- 2**	**- 1**
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Instructions:

a. Read out each question / item to the child
b. Child can respond orally or by pointing to appropriate pictures
c. Ifchild finds it difficult to understand any of (the problem, it could be explained with an example