

**SURVEY OF TEACHER COMPETENCIES FOR USE  
AND MAINTENANCE OF HEARING AIDS & ITS  
IMPLICATIONS IN LEARNING ENVIRONMENT**

K Kanaga Subramaniyam

Registration No. 13MSD002

A Dissertation Submitted in Part Fulfilment of  
Master's Degree in Special Education (Hearing Impairment),  
University of Mysore,  
Mysore.



**All India Institute of Speech and Hearing**

Manasagangothri, Mysore-570006

May 2014.

## **CERTIFICATE**

This is to certify that this dissertation entitled **“Survey of Teacher Competencies for Use and Maintenance of Hearing Aids & Its Implications in Learning Environment”** is the bonafide work submitted in part fulfilment of Master’s in Special Education (Hearing Impairment) of the student with Registration No: 13MSD002. 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 or Degree.

Mysore  
May 2014

**Prof. S. R. Savithri**  
**Director**  
**All India Institute of Speech and Hearing,**  
**Manasagangothri, Mysore- 570006.**

## **CERTIFICATE**

This is to certify that this dissertation entitled "**Survey of Teacher Competencies for Use and Maintenance of Hearing Aids & Its Implications in Learning Environment**" has been prepared under my supervision and guidance. It is also certified that this has not been submitted earlier in any other University for the award of any Diploma or Degree.

Co – Guide:

**Ms. N M Mamatha**

Lecturer in Audiology,

All India Institute of Speech and Hearing,  
Manasagangothri, Mysore - 570006.

Guide:

**Dr. G. Malar**

Reader in Special Education

All India Institute of Speech and Hearing,  
Manasagangothri, Mysore - 570006

Mysore

May 2014

## DECLARATION

This is to certify that this Master's dissertation entitled "**Survey of Teacher Competencies for Use and Maintenance of Hearing Aids & Its Implications in Learning Environment**" is the result of my own study under the guidance of Dr. G. Malar, Reader in Special Education, Department of Special Education and the co-guidance of Ms. N.M. Mamatha, Lecturer in Audiology, Department of Audiology, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier in any other University for the award of any Diploma or Degree.

Mysore  
13MSD002  
May 2014

Registration No.

## AKNOWLEDGEMNT

I would like to express my special thank to Dr. S. R. Savithiri, Director, All India Institute of Speech and Hearing for permitting me to carry out this dissertation.

I dedicated this dissertation to my **Amma and Appa**, who believes me and supporting throughout the life, without their love and affection it is not possible.

I would like to say **BIG THANKS** to God, because given a **BIG OPPURTUNITIES** to work dissertation under the guidance of Dr. G. Malar, Reader in Special Education And I learned as much as possible from you ma'am. When I started this course I felt very badly, how I can pass this whole year but now I feel very badly because this course is going to end but I want to learn many more things from you ma'am.

I would like to express my heartfelt thanks Ms. N. M. Mamatha Lecturer in Audiology, for your support and guidance in my dissertation as a co-guide.

Once again I would like to express my special thanks to Dr. S. Venkatesan Professor in Clinical Psychology, I had a grateful suggestions from you and am really proud to tell I am one your student.

I would like to thank my family, especially my mother and father for always believing me, for their continuous love and their supports in my decisions. Without whom I could not have made it here.

I would like to say **CHEERS** to my best friends **Karthikeyan, San Thala, Veeramani, Sathish, Parhiban, KumaranThalaiva, Dhivya**

## TABLE OF CONTENTS

<b>Chapter</b>	<b>Title</b>	<b>Page No.</b>
1	Introduction	01-10
2	Review of Literature	11-30
3	Method	31-40
4	Results Discussions	41-55
6	Summary and Conclusion	56-62
	References	i-v
	Appendix	vi-xvii

## LIST OF TABLES

<b>Table No.</b>	<b>Title</b>	<b>Page No.</b>
Table 4.1	Existing Status of Teacher Knowledge, Attitudes and Competencies	44
Table 4.2	Relationship Teachers Knowledge, Attitudes and Competencies with respect to Age, Educational Qualification, Level of Teaching and Professional Experience	47
Table 4.3	Comparison of Knowledge, Attitudes and Competencies between Male and Female Teachers	48
Table 4.4	Comparison of Knowledge, Attitudes and Competencies of Special and Regular Teachers	49
Table 4.5	Relationship of Teacher's Knowledge, Attitudes and Competencies with Children's Use of Hearing Aids and Communication Abilities	51
Table 4.6	Profile of Relationship with Teacher's Knowledge, Attitudes and Competencies and Resultant Use of Hearing Aid and Communication Abilities with School Performances of Children with Hearing Impairment	52
Table 4.7	Comparison of School Performances of Children Wearing Behind-The-Ear and Body-Level Hearing Aids	54

## LIST OF FIGURES

<b>Figure No.</b>	<b>Title</b>	<b>Page No.</b>
Figure 3.1	Profile of Teacher-Participants	33
Figure 3.2	Profile of Child-Participants	34
Figure 4.1	Existing Status of Teacher Knowledge, Attitudes and Competencies for Hearing Aids	46

# **Chapter I**

## ***INTRODUCTION***



## **CHAPTER I: INTRODUCTION**

“Hearing impairment is impairment in hearing that affects processing of linguistic information with or without amplification that ultimately affects a child’s educational performance adversely”

– Individuals with Disabilities Education Act (as qtd. in Heward, 2009).

### **1.1 Hearing Impairment, Implications in Children and Rehabilitation**

Hearing impairment is a dysfunction of the hearing sense that has adverse effect on the overall development of the child. The primary impact of loss in the sense of hearing is that it causes delay or deficiency in the development of receptive and expressive communication skills of a child, especially when acquired from birth. This primary impact on language and communication skill development in turn could lead to problems in academic learning and achievement, problems in vocational choices and placement and problems in social integration. However, early identification of the problem in children and appropriate aural intervention programmes are said to alleviate the problems in consequent language, cognitive and academic development of the children (ASHA, 1997-2014<sup>a</sup>).

Aural rehabilitation programmes are described as a process of identifying and diagnosing hearing loss in individuals, consequent fitment of appropriate amplification devices to aid the hearing ability in the individuals, and followed by

varied therapies to improve the listening, speech and language skills in the individuals. Prompt aural rehabilitation services are said to restore near normal communication and other related skills in young children. However, even in developed countries like the USA only 25% of needy individuals are said to have access to necessary aural rehabilitation services including amplification devices like hearing aids (ASHA, 1997-2014<sup>b</sup>). In developing countries like India evidences of aural rehabilitative practices are not widely available. But we could assume that availability might be still more scarce and adding to that there might be other problems like maintaining these devices and using them regularly.

## **1.2 Relevance of Hearing Aids for School Going Children with Hearing Impairment**

In case of young children, hearing loss occurring at birth or before two years of age may severely affect proper or adequate development of speech and language skills. This in turn might affect communication, socio-emotional development, education, employment, etc. Proper and appropriately fitted hearing aids can help children with hearing impairment learn good speech and language (Waldman & Roush, 2010).

According to Schow and Nerbonne (2013) hearing loss is considered to be an educationally significant disability. Unless immersed at home and at school in a signing environment, children learn language through the auditory system. If the auditory input is distorted or inconsistent, the child can experience a variety of difficulties in language development, such as reduced vocabulary development,

delayed syntax development, and inappropriate use of morphological markers and figurative speech (Lederberg & Prezbindowski, 2000, Kuntze, 1998, Paul, 1998, Musselman & Kircaal-Iftar, 1996 qtd. in Schow and Nerbonne, 2013)

In traditional learning environments in Indian schools, more than 80% of the instruction is through verbal mode, that is, listening and speaking and/or reading and writing. While the primary implication of hearing impairment is inability or difficulty in hearing, as a secondary fall out children fail or are slow to develop adequate speech and language skills. These in turn affect development of reading and writing skills in school age. Such children in typical learning environments find it difficult to gain from the instructional process that is primarily verbal in nature. In such instances, hearing aids will help them in (NEA, 2013):

- Understanding speech used by others
- Cutting out on background noise, and thus helping in better speech perception
- In self-monitoring of speech and correction leading to better expression of learnt information in the classroom
- In developing better reading and writing skills which in turn stem from better verbal communication skills
- In better participation in learning activities
- In improved interaction in the learning environment, thus leading to better social integration.

### **1.3 Optimal Use of Hearing Aid in Children with Hearing Impairment& Implications in Hearing Impairment**

Good amplification is a vital factor that determines the outcomes in rehabilitation of children with hearing impairment. It is the foundation on which aural habilitation is built. Hearing aids help child get maximum possible auditory inputs from the environment to enable him/her to learn speech and language by listening. It also indirectly helps the child to develop clear speech. However just fitting a hi-tech or costly hearing aid does not ensure better rehabilitation outcomes. In order to derive the maximum benefits from the hearing aids, they should be maintained and used properly. Adequate care and maintenance ensures that the hearing aids have a longer life. It also ensures that during their life, the hearing aids provide clear sound. Sound clarity can get distorted if the hearing aid is not functioning properly and consequently cuts down on all the above-mentioned benefits (Rangasayee, 2006).

Waldman and Roush (2010) further emphasise that “The amount of benefit from hearing aid use is determined by a variety of factors including the type of hearing loss, amount of hearing loss, and the clarity of amplified sound. The amount of time the equipment is used and the consistency of use are also important variables. Family members, teachers and caregivers play on important role when it comes to keeping things working properly.”

#### **1.4 Influence of Hearing Aid use in Learning Environments / Academic Learning**

As afore-mentioned Markides (1986) describes hearing impairment as a condition posing wide variety of problem in medical, developmental and educational nature in young children. The primary implication is evidenced as delayed and deficient development of speech in these children. According to Markides (1983) the secondary implications could be observed as deprivations in personal, social and educational development. In the learning environment, deficient speech-language in turn leads to poor reading and writing skills. Listening-speaking, along with reading-writing being the primary modes of transaction in traditional learning environments, the learning ability and academic achievement of learners with hearing loss are severely retarded. Educationists like Gary Bunch (1987) have generated evidences that suggested putting residual hearing to good use in the learning environment helps them to succeed in the learning environment.

Markides (1986) suggests that fitting of appropriate hearing aids and providing auditory training from a young age will help develop potentials of residual hearing. This is in turn might help in better adjustments and achievements in learning environment. However researchers like Pollack (1986) and Markides (1986) suggest that such advantages could be realised only when the hearing aids are consistently and properly used. They also report that even in developed countries like UK and US, this is an area that presents a very distributing picture.

## **1.5 Need for Study**

Regular and efficient use of hearing aids is a must for successful instruction in both special and inclusive classrooms. For proper maintenance of hearing aid in learning environments, the teachers' involvement is necessary. However it is doubtful, whether the teachers are aware of how to maintain the hearing aids or troubleshoot when there are problems. In most instances, segregated learning environments are also residential in nature. In such situations, the responsibility for use and maintenance of the hearing aids are entirely left to the young and ignorant learners. As discussed above, regular and proper use of hearing aids is essential for successful academic learning. In this background it is necessary to investigate what is the status of the knowledge and competencies among teacher for using, troubleshooting and maintaining the hearing aids in the learning environment. It is also necessary to investigate the use of hearing aids by learners with the hearing impairment and its implications in communication skill development and academic learning. The findings would lead to suggestions for better use and maintenance of hearing aids in instructional settings.

## **1.6 Aims and Objectives**

The major purpose of the study is to survey the status of the teachers' knowledge and competencies in use and maintenance of hearing aid in special and inclusive classrooms and its implications on academic learning in children with hearing impairment. The aim shall be realized through the following objectives:

- Development and administration of tools for identifying the teacher knowledge, attitudes and competencies in use and maintenance of hearing aid.
- Development and administration of checklist to collect data on regular use of hearing aids by learners with hearing impairment in classroom and their level of communication skills.
- Collecting data on school performances of learner with hearing loss – related to achievement in core-curricular areas, performance in co-curricular areas, and participation / integration in the social learning environment.
- Compilation and analysing the data with relevant statistical procedures to decipher the relationship of teacher knowledge, attitudes and competencies related to hearing aids with use of hearing aids and communication skill development in learner with hearing impairment and their ensuring performances in the learning environment.

## **1.7 Research Design & Hypotheses**

A survey type of research design was adapted with the following hypotheses for the study:

1. Educators in general will have
  - (a) Adequate knowledge
  - (b) Positive attitudes
  - (c) Necessary competencies – for optimal use, maintenance and trouble shooting of hearing aids worn by children with hearing impairment in the regular, as well as special classrooms

2. Specially trained educators working in segregated settings will have
  - (a) Increased knowledge
  - (b) More positive attitudes
  - (c) Better competencies for optimal use, maintenance and trouble shooting of hearing aids in comparison to mainstream educators without special training
  
3. Demographic status of the teachers like
  - (a) Age
  - (b) Educational status
  - (c) Years of professional experience
  - (d) Gender will have considerable influence on their knowledge, attitudes and competencies for use, maintenance and troubleshooting of hearing aids
  
4. Teachers knowledge, attitudes and practices will have considerable influence on the
  - (a) Regularity of wearing hearing aids
  - (b) Communication skill development
  - (c) Attainment in core-curricular subjects
  - (d) Participation in co-curricular activities
  - (e) Social integration in learning environment –in children with hearing impairment
  
5. The type of hearing aid worn by child with hearing impairment, regularity of use of hearing aid and consequent communication skill development will have significant influence on their school performances namely,



- (a) Attainment in core-curricular subjects
- (b) Participation in co-curricular activities
- (c) Social integration in the learning environment.

**Chapter II**  
*REVIEW*  
*OF*  
*LITERATURE*

## CHAPTER II: REVIEW OF LITERATURE

### 2.1 Hearing Impairment and Its Implications

Hearing loss is a decreased sensitivity in the ear. Depending on the severity of the loss, it could subdue the intensity of all environmental sounds, or prevent participation in verbal communication in the environment, or make it even difficult to detect loud warning signals in the environment, as the severity increases. Though there are no direct consequences on an individual's intelligence or capacity to learn, it could severely impede a young child's ability to learn in classroom environment, especially when occurring at birth. Some of the educational implications of the hearing loss are (School World, 2014):

- ***Mild hearing loss*** in child might prevent a child from accessing at least 25% of classroom conversation and instruction, and may also impede development of early reading skills.
- ***Moderate hearing loss*** might prevent a child from following at least 50 to 80% of classroom conversation and instruction. It may further result in misarticulations, restricted vocabulary, poor syntax and also accompanying difficulties in reading and writing.
- ***Severe hearing loss*** without amplification may severely restrict a child's spontaneous ability to develop all forms of verbal communication, both primary like listening and speaking, as well as secondary like reading and writing. With curtailed verbal communication skills, academic learning in all areas might also be severely restricted.
- ***Profound hearing loss*** with early and effective intervention with appropriate technology might totally prohibit a child from accessing and using all forms of

verbal communication or any type of sound signal in the environment. This would imply need for intervention and instruction through alternative modes of communication.

However all these problems could be resolved, and any child with hearing impairment could be helped to optimal development of verbal communication skills, as well as educational potentials through early detection of the problem and timely aural rehabilitation. The process of aural rehabilitation process has been detailed here in after.

## **2.2 Aural Rehabilitation for Children with Hearing Impairment**

Aural rehabilitation services for children are better called as “habilitative” rather than “rehabilitation”. The term focuses on restoring a skill that is lost. In children, the skill may not be there for the first place, so it has to be taught to the children with hearing impairment. Hence it is called as “habilitative” not “rehabilitative” (ASHA, 2014<sup>a</sup>).

The special or the specific services provided for the children should be based on the individual needs, chronological age of the child; the age of onset of hearing loss; the age at which hearing loss was discovered; the type of hearing loss; the degree of hearing loss; the extent of hearing loss and at which age the hearing aid was provided to the child. The aural rehabilitation plan also depends on the communication mode of the child like auditory- oral mode, total communication, sign language, cued speech and manually coded language (ASHA, 2014<sup>a</sup>).

The consequence of early identification and early use of amplification has shown dramatically positive effect on acquisition of language abilities of a child with hearing loss. The children identified by the age of 6 months can be expected to attain language development on a par with hearing peers (ASHA, 2014<sup>a</sup>).

Aural rehabilitation services for the children begin with diagnosis of the hearing loss and fitting with appropriate listening devices. Following which the child undergoes the following crucial steps.

### **2.2.1 Training to listen with Listening Devices**

This includes activities with different stages of auditory perception:

- Increase in awareness of sounds
- Identification of the sound
- Discrimination of the sound (sound discrimination)
- Comprehension of the sound
- Attach meaning to the sounds

This auditory training increases the child's ability to differentiate one word from other word and it also helps to use the residual hearing. Auditory perception also includes developing skills in hearing and hearing aids and assistive listening devices and how to handle easily, especially in difficult situations (ASHA, 2014<sup>a</sup>).

### **2.2.2 Using visual clues**

It includes using all kinds of visual clues which gives meaning to the message and speaker's facial expression, body language and the context of which the communication is taking place. It is beyond distinguishing sounds and word on the lips (ASHA, 2014<sup>a</sup>).

### **2.2.3 Improving speech**

Aural rehabilitation services also improve the speech of the children with hearing impairment. It involves the skill development in the ways of production of speech, voice quality, speech intelligibility, breath control, loudness and speech rhythm (ASHA, 2014<sup>a</sup>).

### **2.2.4 Developing language**

It develops the comprehension of the language (reception) and the expression of the language i.e. the usage of the language according to the developmental expectation. To improve the language for children with hearing impairment is a complex process involving the concepts, vocabulary, word knowledge, use in different social situations, narrative skills, expressions through writing, understanding the rules of the grammar and so on (ASHA, 2014<sup>a</sup>).

### **2.2.5 Managing communication**

This aspect of aural rehabilitation involves training for making the communication easier, modification of the situation, handling the communication breakdowns, developing assertiveness skills to use in different listening situations (ASHA, 2014<sup>a</sup>).

### **2.2.6 Managing hearing aids and assistive listening devices**

When the children are fitted with hearing in the early age, the care and management of the hearing aid will be done by the caregivers. The children also must participate in the care and management of the hearing aid as much as possible. As they grow and develop they have to take care of their hearing aid, adjusting the aid, cleaning the aid, ultimately taking over responsibility for making appointments with the service providers (ASHA, 2014<sup>a</sup>).

### **2.2.7 Educational Rehabilitation of Children with Hearing Impairment**

The **Individual with Disabilities Education Act** of the USA provides model of services for the children in the context of early intervention (ages birth to 3) and school services (ages 3 to 21). The two major dimensions of the educational rehabilitation, irrespective of the nature of educational settings are as follows (ASHA, 2014<sup>b</sup>):

- **Individualized Education Program (IEP)** has to be developed for providing services for the children with hearing impairment. It should be designed

- Providing **Least Restrictive Environment** where the learners with special needs have no barriers for access and full participation in educational facilities and activities of all nature. For a child with hearing impairment this might imply providing noise free, low reverberation, well-lighted environment with preferential seating arrangements that optimizes auditory and visual reception of speech.

### **2.3 Hearing Aids**

A hearing aid is an electronic device which amplifies sounds and helps individuals with hearing impairment to make best possible use of the residual hearing. The hearing aid magnifies sound vibrations entering the outer and middle ear and conveys to the inner ear. Depending on the size, position and technology, hearing aids are classified as body-worn, behind the ear, in the ear, in the canal, completely in the canal; analogue and digital; and so on. Irrespective of the type, every hearing aid is a miniature electronic amplifier system composed of three essential parts. A small microphone picks up the sound from the environment (acoustic energy) and changes it into electrical energy which is sent to the amplifier which increases the power of the electrical energy. A tiny loudspeaker or receiver changes this amplified electrical energy into acoustic energy. The receiver is connected to an ear mould that fits into the ear canal and conducts the amplified sound to the ear canal and the eardrum. Battery supply is necessary for electrical current that makes the aid function. Every



aid has a volume control on the outside of the case that can be turned to control the amplification of incoming sounds. Some aids also have an external tone control which is used to stress a certain range of frequencies or pitches for incoming sounds. Other aids have internal tone controls which have been preset for the user (Rangasayee, 2006; Armbruster, 1981).

According to Dillon (2001), hearing aids can be categorized in many ways. The simplest way to categorize them is by the place in which they are worn, which also implies what the size of the hearing aid is. The **body-worn aids** are typically about 60x40x15 mm (very approximately 2x2x0.5 inches). As implied by their name, they are worn somewhere on the body – in a pocket, in a pouch around the neck, or on the belt. They are connecting, via a cable containing two or three wires, to a receiver, from which the amplified sound emerges. The receiver usually plugs into an ear-mould custom-made for the individual's ear canal and concha.

The next smallest type of hearing aid is the **behind-the-ear (BTE)** hearing aid. These are also two-piece hearing aids. The microphone, receiver, and electronics are mounted in a characteristically banana shaped case, and the sound is conveyed via a tube to custom ear-mould.

The next smallest type is the **in-the-ear (ITE)** hearing aid. These vary in size from full concha styles that, as their name implies, fill the entire concha as well as about half the length of the ear canal. A smaller variation of ITE hearing aid is the half-concha or half-shell ITE, which fills only the lower half of the concha (the cavum) up to the crumelias. Another smaller variation is the low-profile ITE, which

does not extend outwards from the ear canal sufficiently to fill the concha. When the ITE hearing aid occupies a sufficiently small portion of the cavum concha, it is referred to as an in-the-canal (ITC) hearing aid. Contrary to the name, the aid does not fit entirely into the canal, but is partly visible outside.

Hearing aids that entirely fit within the canal are known as **completely-in-the-canal (CIC)** hearing aids. These hearing aids use components small enough that none of the hearing aid need protrude into the concha. Removing these hearing aids from the ear can be difficult, so often a small handle, similar to nylon fishing line with a small knob on the end, is attached to the hearing aid and this does extend into the concha. When the medial end of a CIC hearing aid is within a few millimetres of the eardrum, the CIC is referred to as ampere-tympanic CIC.

The last type of hearing aid is the spectacle or eyeglass aid. As the name suggests, these are a combination of spectacles and one or two hearing aids. There are actually two types of spectacle aids. In the first type, the side frame of the spectacles (the bow) contains all hearing aid components. These were the first type produced and were bulky in appearance. In current models, the part of the bow that fits behind the ear on a conventional pair of spectacles is sawn off, and a short adapter is glued on its place, attaches to this adapter and tube leads from the adapter to the ear. These are less conspicuous, and the frontal appearance is little different from the appearance of the spectacle alone.

All aspects of rehabilitation fitting of appropriate listening devices and optimal use of those devices is crucial for successful rehabilitation in children with hearing

impairment. Hearing aids are a common type of amplification device used for persons with hearing impaired. Hearing aids are primarily useful in improving the residual hearing and speech perception of individuals with hearing loss. It is more beneficial to persons with conductive hearing loss, where the problem occurs in the outer or middle ear. In case of sensory neural loss that results from damage to the small sensory cells in the inner ear (hair cells), the magnified sound vibrations are detected by the surviving hair cells and converted into neural signals that are passed along to the brain. The greater the damage to a person's hair cells, the more severe the hearing loss, and the greater the hearing aid amplification needed to make up the difference. However, there are practical limits to the amount of amplification a hearing aid can provide. In addition, if the inner ear is too damaged, even large vibrations will not be converted into neural signals. In this situation, a hearing aid would be ineffective (NIDCD, 2007)

### **2.3.1 Use of Hearing aids with Different Types of Hearing Loss**

- **Conductive Loss**

Often, the patient may choose to have a conductive loss corrected by medical and /or surgical intervention. When these approaches are unacceptable, due to extenuating circumstances or personal choice, good success can be generally expected with hearing aids. Because the loss of hearing is related mostly to a loss of loudness and not of speech recognition, the amplification provided by hearing aids is often sufficient to overcome the problems related to the hearing loss.

- **Sensory-Neural Loss**

Hearing aids are the primary rehabilitative means for this type of hearing loss, and it is to this type that most hearing instruments today are fitted. The prognosis for success varies dramatically, depending on the location (peripheral or central nervous system), degree of loss, and expectation of the patient. Prognosis is not as good as it is for conductive losses and is generally poorer when the loss extends to the central auditory nervous system (CANS).

### **2.3.2 Degree of Loss and Hearing aid Expectations**

Hearing classification by degree of loss is somewhat arbitrary and varies among authorities. The following levels are the author's and are based on the pure-tone average of 500, 1000 and 2000 Hz (Staab, 1996, 1999). A greater number of categories are identified at the milder levels than most other authors provide, allowing the hearing health care provider to more realistically identify the decisions that are becoming increasingly important to the fitting of hearing aids. A given hearing threshold may overlap several categories.

- **Near Normal/Borderline (<25 dB)**
  - Hearing almost everything well but may have to listen carefully in important listening situations
  - Might create some problems if communication is very important
  - May be more of a problem if hearing in the high frequencies (beyond those used in this average) is poor
  - Hearing handicap is questionable
  - Still, some believe a hearing aid is critical to their work or learning environment
  - Amplification, if accepted, will seldom involve more than part-time use
  - Not usual candidates for amplification

- **Mild Hearing Impairment (26-40 dB)**
  - Slight handicap for some significant for others
  - May have difficulty hearing faint or distance speech but it slightly to “get along” in most situations
  - Has difficulty hearing and understanding soft-spoken individuals including women and children
  - Has difficulty understanding in an all the environment
  - Sustained attention is frequently difficult
  - Speech and language are learned normally monitored by traditional auditory mechanism
  - May or may not need amplification
  - Most will find that hearing aids are too noisy unless
    - some type of open canal fitting is employed
    - some unique noise separation/cancellation approach is used
  - If hearing aids are worn the most likely are not worn constantly
  
- **Moderate Hearing Impairment (41-55 dB)**
  - Listening is a strain, and sustained attention is difficult
  - Has trouble hearing and understanding in ideal situations
  - Understands conversational speech at relatively close distances without great difficulty
  - Under normal conditions speech may have to be repeated often
  - Have substantial difficulty understanding in noisy conditions
  - Speech may show articulation problem (omission, substitution and distortions of speech sounds)
  - May benefit well from hearing aid use

- **Moderately severe hearing loss (56-70 dB)**
  - Understands conversational speech only if it is loud, in close proximity, or both
  - Considerable difficulty expected in group or noisy situations
  - Appears “not to pay attention”
  - Communicates with great difficulty under all conditions
  - Enough hearing is present to learn or maintain language and speech through the auditory feedback mechanism when amplification takes place
  - Excellent benefit from hearing instruments can be expected; may be the most successful users of hearing aids
  
- **Severe hearing impairment (71-90 dB)**
  - May hear sound or loud voice very close to the ear
  - Identifies environmental noises and may distinguish vowels but not consonants
  - Seems to be “ignoring” communication
  - Language and speech will not develop spontaneously in a youngster and may deteriorate significantly if the loss occurs over time, as with an adult
  - Hearing aids enable them to become relatively functional for ordinary purpose of life
  
- **Profound Hearing Impairment**
  - Does not rely on hearing as primary avenue of communication
  - Speech and language must both be developed through careful and extensive training because they cannot be learned by ear alone, even with amplification
  - Hearing levels in this category are often identified as being in the “deaf” range
  - Hearing aids are intended to allow the user to maintain contact with environment and to allow the utilization of any auditory clues that might be presented
  - Many do not utilize amplification but rely on manual communication

### 2.3.3 Factors Influencing Use and Benefits from Hearing Aids

- **Psychological aspects**

The attitude the patient takes towards the application of an aid or aids is of fundamental importance to the whole fitting process (Ballantyne, 1990).

- **Motivation and expectations**

The success of hearing aid fitting procedure will depend as much on the motivation and expectations of the patient as on the technical fitting of the aid itself (Ballantyne, 1990).

- **Motivation**

As for as motivation is concerned, two factors should be taken into consideration:

- The patient's own personal motivation
- The pressure exerted on the patient to seek help by relatives, friends, co-workers and professionals.

The interaction between these two factors must be understood by both the patient and the audiologist. The problems that the individual finds distressing or disabling should be discussed and defined. Hence, the patient should be allowed to express and analyse these feelings, since his attitude is very important for the acceptance and the effective use of the aid.

- **Expectations**

Expectation is a newer concept, but recently it has acquired credit as an important aspect of rehabilitation. During the initial fitting process, it is up to the

technician to make the hearing aid candidate aware not only of the potentials and benefits of the aid but also of its limitations and frustrations. Unrealistic expectation can lead to disappointment and rejection of the aid, and should therefore be minimized.

- **Counselling**

Counselling is also a fundamental part of the rehabilitation process. In this context it entails listening to and advising the patient as to problems and experiences arising from the hearing loss in order minimize disability and prevent handicap.

Ideally it should be carried out by an expert on communication problems such as a psychologist working in the field of sensory or auditory impairment. If this figure is not available the therapist/clinician can give basic advice but should seek training when appropriate.

## **2.4 Rehabilitation with Hearing aids**

Rehabilitation strategies for hearing impaired individual include the definition of goals, implementation of handling skills, and the creation of skills, all of which are used as a basis for the follow-up of the patient after application of the hearing aid/aids (Ballantyne, 1990).



- **Goal Planning**

Basically goal planning involves the definition of what specific listening or communication processes are important for the patient. In other words, which are the situations from which the patient feels excluded by his hearing impairment and which are important? What is significant for one person is not necessarily significant for another. This will depend on the subject's life style, needs and specific problems (Ballantyne, 1990).

Once the individual goals have been defined, a detailed scheme is drawn up defining each step to be taken in the rehabilitation process. Depending on the psychological make-up of each single patient, it follows that the more confidence boosting he needs, the smaller the steps will be, because each time the subject reaches a precise goal, he is compensated by a sense of achievement and is more willing to face the next challenge. Hence, as the rehabilitation proceeds, goals can also be modified according to the reactions of the patient (Ballantyne, 1990).

- **Handling skills**

It is important that when the patient is provided with the aid, he should be instructed as to how to fit the ear mould and how to manoeuvre the user controls. During the various assessment procedures the technician will have established the level of gain required for the single individual. The correct regulation of volume will have been calculated on the grounds of insertion gain and speech tests, and consequently the user will be advised as to the limits to be used in the various listening situations (Ballantyne, 1990).

- **Listening Tactics**

This is fairly new concept from a formal point of view, but it simply involves both the patient and close relatives aware of numerous, apparently insignificant details which can help everyday listening. These include:

- Speaking in front of hearing impaired person so as to favour the recognition of consonants via lip-reading
- Directing light onto the face of the speaker rather than on that of the listener
- When in a group situation, the hearing aid user should be placed in a strategic position so that the better ear is near the speaker or for example, at the head of the table at a dinner party.

All these tactics are part of the confidence boosting process which is fundamental for the acceptance of the aid by the patient and consequently for the minimizing of disability (Ballantyne, 1990).

## **2.5 Relevance of Hearing Aids for School Going Children with Hearing Impairment**

Because most academic success depends on a competent use of language, these deficits in a child's language development can have a direct effect on cognitive development and learning. Children with hearing loss have often been found to have low mathematics scores and reading levels (Moeller, 2007; Paul, 1998; Holt, 1995; Kelly, 1993; Davis, Shepard, Stelmachowitz, & Gogra, 1982 qtd. in Schow and Nerbonne, 2013). In the current modern world, our futures depend on the ability to acquire and use a broad information base; thus, children with hearing loss start out

with a marked disadvantage. Audiologic rehabilitative services are needed now more than ever to help children stay competitive in school and in the job market. For a young child this would involve determining hearing loss; arranging hearing aid evaluation; hearing aid orientation to caregivers and preschool educators; followed by monitoring of regular use and periodic evaluation. When the child enter school orientation to school teachers; arranging for necessary assistive listening devices in the classroom; and arranging and maintaining for re-evaluation have to be taken care-of (Schow and Nerbonne, 2013).

## **2.6 Optimal Use of Hearing Aids in Children with Hearing Impairment & Implications in Hearing Impairment**

According Waldman and Roush (2010) the important aspects in **maintaining hearing aid** in classrooms include checking and changing batteries regularly; listening check at the beginning of everyday; ensuring that volume control stays at proper setting; checking that ear moulds are snugly fitted and cleaned regularly to avoid feedback.

For optimum hearing aid performance and longevity, Hodgson (1981) further suggests avoidance of exposure to dust, dirt, heat, humidity or other moisture; avoidance of storing in hot place such as near a radiator or in front of a window where the sun shines directly on it; avoidance of hearing aid being exposed to hair spray; avoidance of dropping hearing aid; removal of batteries if the aid is to be unused for considerable time; cleaning of ear moulds regularly; keeping the aids out of reach of children and pets; avoidance of any fluids in an attempt to clean or repair the aid; and checking hearing aid frequently with audiologist for better performance.

Some of the frequent problems encountered by caregivers when using hearing aids with children are acoustic feedback due to ear moulds that are not properly fit leading to squealing; children frequently overgrowing the ear moulds in the growing years; obstruction of the moulds with wax; impacted earwax in the ear cord; improper setting of volume and tone controls; moisture problems like getting wet with hearing aids dropping in water, spilling liquid food over the aids, etc; hearing aids becoming an object for temper tantrum; and certain issues specific for Indian conditions like poor quality of freely distributed hearing aids and poor functioning of solar battery recharger.

Therefore along with proper maintenance, the hearing aid should be checked regularly to identify problems with the device. In case of problems/troubles when using hearing aids in the learning environment, caregivers (parents and teachers) should be aware of the tips for troubleshooting the most common issues with a hearing aid. The teachers will need basic instruction from the educational audiologist in this regard (Schafer & Sweeney, 2013).

Some of the frequently encountered problems for **troubleshooting** are provided by Doyle and Lind (1999). The most frequent problem is squealing of hearing aids. This may be due to ear moulds that are not fitted properly; obstruction of ear canal or casing/tubing of ear mould with wax; and hearing aid worn to full volume. Another common problem is hearing aid seeming to be dead. This might be due to flat battery, incorrectly inserted battery or corroded battery terminals. It might also be due to damaged microphone, amplifier, and/or receiver. Many a times, there

might be distorted or weak signals which may be due to run down batteries, incorrect tone setting, blockage in sound outlet, dirty controls or switching, and volume turned too high. Beyond these the hearing aid user might be unhappy with amplified sounds for which possible technical and non-technical causes have to be explored.

Apart from good maintenance and trouble shooting, **regular and proper use** of the hearing aids are imperative to ensure positive outcomes in children using the hearing aid. A child with hearing impairment could be accustomed to wearing and using hearing aids through the following steps (Searchwave, 2013)

- Wearing hearing aids in the home environment at first.
- Wearing hearing aids increasing the comfortable duration of time
- Accustomising the use of hearing aids during conversations.
- Practicing locating the source of the sounds by listening only.
- Progressively increasing tolerance for loud sounds.
- Learning to discriminate different speech sounds.
- Learning to listen and comprehend audio only materials without visual clues like ‘talking books’.
- Extending the number of persons in the conversational group.
- Gradual increase in the number of situations in which the hearing aids are used.
- Taking part in an organised course of aural rehabilitation with the audiologist to learn more about the maintenance and use of hearing aids.

# Chapter III

## *METHODS*

## **Chapter III: METHOD**

The present was a survey research to find out the knowledge, attitudes and competencies among regular and special educators for use and maintenance of hearing aid in special, as well as mainstream classrooms and its implication on academic learning of the children with hearing impairment. This chapter describes about the participants who were involved in the study, the tools that were developed and used in the survey, and the procedures that were followed in the process of collecting and analysing data.

### **3.1 PARTICIPANTS**

Two types of participants were involved include in the study. They were selected through purposive sampling to include as many participant from as many schools as possible. The two categories of participants included:

- Teachers handling children with hearing impairment in mainstream or segregated/ special schools
- Children with hearing impairment (henceforth mentioned as HI in this chapter) studying in mainstream or segregated/ special schools

#### **3.1.1 Teacher-Participants**

The investigator identified as many special schools and mainstream schools located in and around Mysore city which was the field of study. Teacher-participants included both specially trained and regular teachers handling children with hearing

impairment in these schools. In all, the survey included 41 teachers from segregated/ special schools and 37 teachers from mainstream schools. And illustrated profile of the 78 teacher-participants has been provided in Figure 3.1:

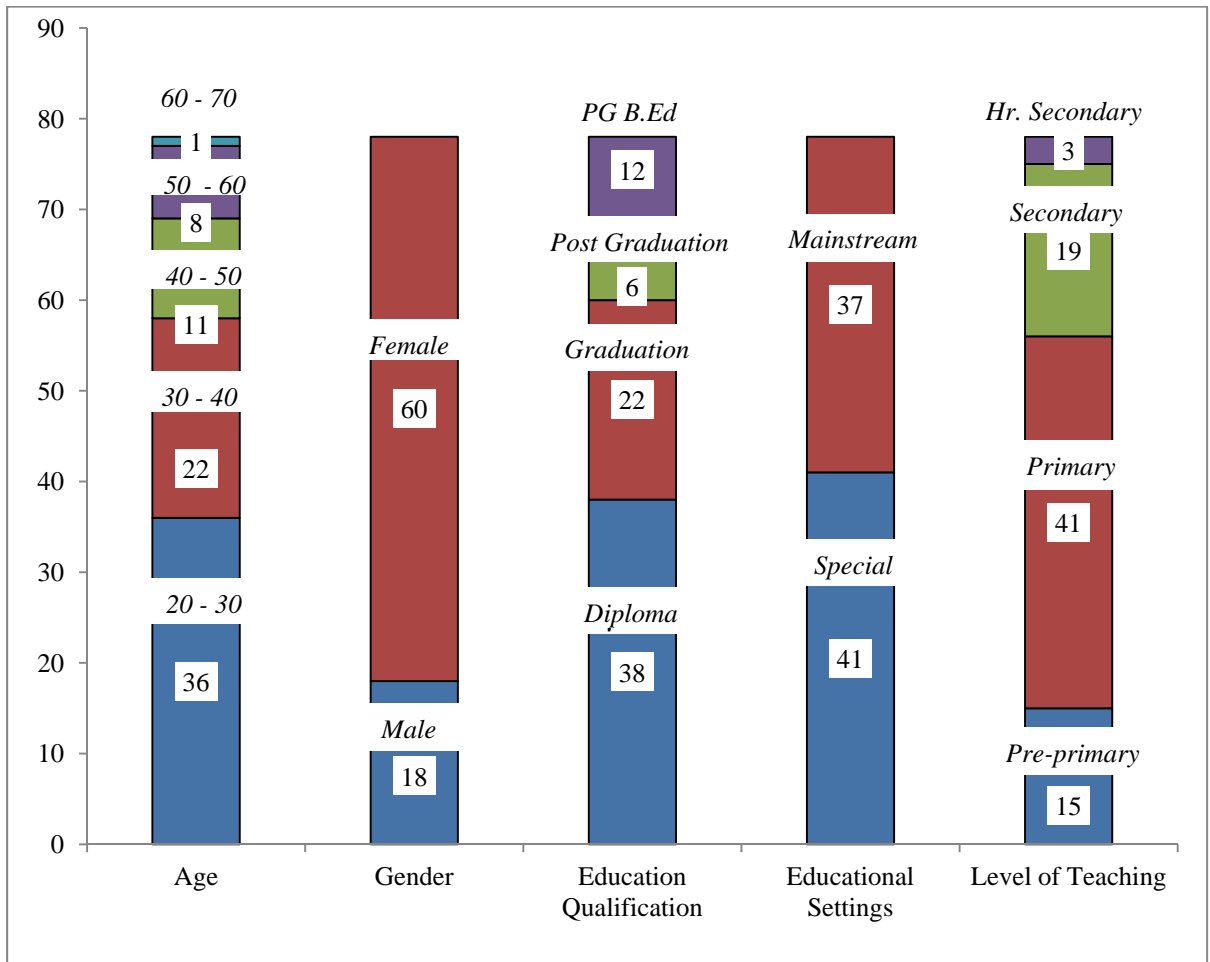


Figure 3.1: Profile of Teacher-Participants

From the above Figure 3.1, it is evident that majority of teacher participants were females, in the age group of 20 to 30 years, with under-graduate qualification , working in special schools at primary level.



### 3.1.2 Child-Participants

Children with HI from both special and mainstream schools were included in the study. These child-participants were selected from the schools and classes of the afore-mentioned teacher-participants. There were 78 child-participants in all according to one learner per teacher. Of the total 78 child-participants, 41 were from special, segregated schools and 37 were from mainstream schools. Their illustrated profile has been provided in figure 3.2

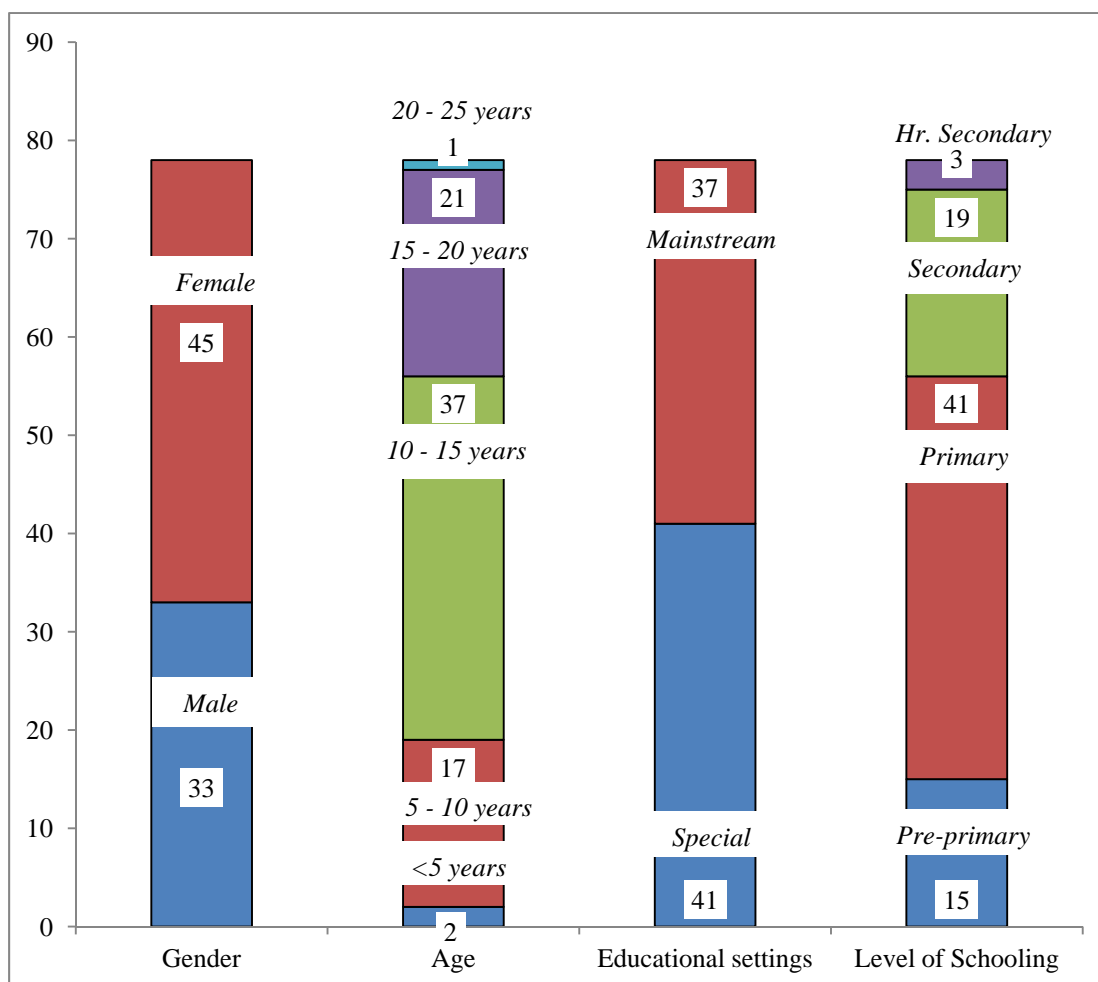


Figure 3.2: Profile of Child-Participants

From the above Figure 3.2, it is evident that majority of the child-participants were also females, in the age group of 10 to 15 years, studying in special schools at primary level.

## **3.2 Materials**

### **3.2.1 Tools for Collecting Data from Teacher-Participants**

For the purpose of collecting data the investigator developed 3 sets of tools for the teacher-participants which are as follows:

- *Written test for measuring teacher knowledge* in use, maintenance and trouble shooting of hearing aid. The tool consisted of 30 objective-type, that is, fill in the blanks items. Correct answers were accorded a score of 1 and wrong or no answers a score of 0. The maximum possible score was 30.
- *Attitudinal rating scale for appraising teacher attitudes* for use, maintenance and trouble shooting of hearing aids worn by learners in classroom. The tool consisted of 30 items with options of agreement and disagreement. An agreement for every positive statement was provided a score of '1' and disagreement a score of '0'. It was vice versa for negative statements, where agreement with negative statements was provided a score of '0' and disagreement was provided a score of '1'. The maximum possible score was 30.
- *Competency rating scale for self assessment of teacher abilities* to use, maintain and troubleshoot hearing aids used by learners in classroom. The tool consisted of 15 items rated on in 3-point scale of fully competent with

score '2'; partially competent with score '1'; and not at all competent with score '0'. The maximum possible score was 30.

Samples of the 3-sets of tools have been attached in Appendices I-A, I-B and I-C.

A Kannada version of the tool had been developed for use by teachers from schools with Kannada as medium of instruction. The same was subjected to another round of validation by special educational faculty with expertise in Kannada. The version of the tools have been annexed in Appendices II-A, II-B and II-C

### **3.2.2 Tools for Collecting Data on Child-Participants**

A separate proforma had been developed to collect data on the child-participants. It included information on:

- ***Regularity of use of hearing aids*** by the children rated on a 4-point rating scale of
  - Always / Often / Rarely / Never
- ***Communication skill development*** in terms of
  - Their ***aided hearing abilities*** that were informally assessed by conducting Lings' Six-Sound test from a distance of 1 meter from behind the child. And the responses were recorded on a 3-point grading of – Within Speech Spectrum / Partly Within Speech Spectrum / Outside Speech Spectrum
  - Informal assessment of ***language abilities*** based on classroom performances that were graded on 3-point rating scale as – grade/age

appropriate, delay of 1 or 2 grades/ years of age, and delay of more than grades/ years of age.

- *School Performances* in terms of
  - *Achievement in the core-curricular subjects* that were recorded as average percentage scores of the performances across the different tests and/or examinations conducted through the academic year.
  - *Participation in co-curricular activities* which were graded on a 5-point rating scale of Very Good, Good, Fair, Poor and Very poor with corresponding ratings of 5, 4, 3, 2 and 1, respectively.
  - *Social integration in learning environment* which was again rated on a 5-point rating scale of Most favourable, Favourable, Satisfactory, Nothing Mentionable, and Unfavourable with corresponding ratings of 5, 4, 3, 2 and 1, respectively.

The sample proforma has been attached in Appendix III.

### **3.3 Data Collection**

Data was collected from the teacher-participants through distribution of the 3 sets of tools individually for self-administration over a period of 1-week of time. The data about the child-participants were collected face-to-face from the concerned teachers using the above-mentioned proforma as an interview schedule; and also information were recorded on it real time following review of school records or actual testing of the child-participants.

### **3.4 Procedure**

The study was carried through the following steps:

#### **Phase 1: Development of Tools**

The tools were developed for collecting data on teacher knowledge, attitudes and competencies for use and maintenance of hearing aid in learning environment; and school performances of learners with hearing impairment from mainstream and special schools in terms of core-curricular achievement; co-curricular performances; and social integration of the children in the learning environment.

The tools were developed following thorough review of literature on hearing aids, their use, and maintenance and troubleshooting as well as public education brochures published by AIISH like (i) Adjustment to Amplification; (ii) Body Level Hearing aid and Care; (iii) Caring for Your Hearing aid Do's and Don'ts; (iv) Facts about Hearing Loss and Hearing aid; (v) Getting to Know Your Hearing aid; (vi) For the Person Using a Hearing aid; (vii) Correcting Simple Problems of Behind-the-Ear [BTE] Hearing Aid (AIISH, 2010)

#### **Phase 2: Validation of Developed Tools**

The developed formats for data collected were provided to five professionals from the field of audiology for validation based on the relevance of the test and rating scales; as well as the comprehensibility, simplicity of the language used. Items that had consent of 80% or more of the evaluators were retained in the tool. Also useful suggestions and corrections indicated by the evaluators were incorporated in the tool.

### **Phase 3: Collecting Data from Teacher-Participants**

Data from teacher-participants were collected by distribution of the printed tools for self administration. At the time of distribution the teachers were explained of the purpose of the study and procedure for recording their responses on the items of the 3-sets of tools. The responses on the tools were collected after a duration of 1 week.

### **Phase 4: Collecting Data on Learner-Participants**

Data on child-participants with regards to core-curricular achievements, co-curricular performances, and social integration in the learning environment were collected through face-to-face interviews with their teachers and/or caregivers as well as through review of relevant school records.

**Phase 5:** The compiled data were analyzed using appropriate statistical procedures.

## **3.5 Data Analyses**

The compiled data were analyzed through appropriate statistical measures. As the present study was survey type of research, the simple descriptive, variance and correlation statistical measures were used in analysing the data for –

- Existing knowledge, attitudes and competencies for use, maintenance and trouble shooting of hearing aids of learners with hearing impairment in the learning environment.

- Influence of teacher characteristics like age, gender, educational qualifications and professional experience on their knowledge, attitudes and competencies for use, maintenance and troubleshooting of hearing aids.
- Influence of nature of teacher training on knowledge, attitudes and competencies of teachers for use, maintenance and troubleshooting of hearing aids.
- Relationship of teacher knowledge, attitudes and competencies with child – participants’ regular use of hearing aids, communication abilities, and school performances related to core-curricular achievement, co-curricular participation and social integration in learning environment.
- Influence of type of hearing aids worn by children on their communication skills and school performances with regards to core-curricular achievement, co-curricular participation and social integration in learning environment.

The raw scores of the teacher-participants on the 3 sets of tools were converted into percentage scores for ease of analyses. The teacher attributes like age, gender, professional qualifications as well experience, as well as their existing status of knowledge, attitudes and competencies were considered as the independent variables for the study. Their influence on school performances of children with hearing impairment, namely the dependent variables of regular use of hearing aids, core-curricular achievement, co-curricular performances and social integration in the learning environment were investigated.

**Chapter IV**  
***RESULTS AND***  
***DISCUSSION***



## CHAPTER IV: RESULTS AND DISCUSSION

As mentioned herein before, the data collected through the course of the study were analysed using appropriate descriptive, correlation and variance measures to observe the existing status of mainstream and special school teachers' knowledge, attitudes and competencies for use, maintenance and troubleshooting of hearing in the classroom environments, and their influences on the communication abilities and school performances of their school wards with hearing impairment. Along with these, analyses were also carried with regards to influence various teacher attributes like age, gender, educational qualification, years of professional experience, nature of educational training, etc. Related results have been presented along with discussions in this chapter.

The data was analyzed with the following null hypotheses in perspective:

1. Educators in general will have
  - (a) No knowledge
  - (b) Neutral attitudes
  - (c) No competencies – for use, maintenance and trouble shooting of hearing aids worn by children with hearing impairment in the regular, as well as special classrooms
  
2. Specially trained educators working in segregated settings will have similar
  - (a) Knowledge
  - (b) Attitudes

- (c) Competencies for optimal use, maintenance and trouble shooting of hearing aids as of mainstream educators without special training
3. Demographic status of the teachers like
- (a) Age
  - (b) Educational status
  - (c) Years of professional experience
  - (d) Gender will have no influence on their knowledge, attitudes and competencies for use, maintenance and troubleshooting of hearing aids
4. Teachers knowledge, attitudes and practices will have no influence on the
- (a) Regularity of wearing hearing aids
  - (b) Communication skill development
  - (c) Attainment in core-curricular subjects
  - (d) Participation in co-curricular activities
  - (e) Social integration in learning environment –in children with hearing impairment
5. The type of hearing aid worn by child with hearing impairment, regularity of use of hearing aid and consequent communication skill development will have no influence on their school performances namely,
- (a) Attainment in core-curricular subjects
  - (b) Participation in co-curricular activities
  - (c) Social integration in the learning environment

#### 4.1 Existing Status of Teacher Knowledge, Attitudes and Competencies

For the purpose of deciphering existing status of knowledge, attitudes and competencies among teacher for use, maintenance and troubleshooting of hearing aids in the classroom environment; their performances on the knowledge test, attitudinal competency scales were subjected to descriptive measures like calculation of mean and standard deviations after conversion into percentage score. The results have been tabulated in Table 4.1

Table 4.1: Existing Status of Teacher Knowledge, Attitudes and Competencies

Aspects	Knowledge		Attitudes		Competences	
	Mean %	Standard Deviation %	Mean %	Standard Deviation %	Mean %	Standard Deviation %
General Awareness	51.79%	11.14	70.97%	13.09		
Use & Maintenance	56.27%	13.02	63.25%	10.59	55.29%	11.38
Trouble shooting	48.40%	15.95	73.48%	18.71	64.86%	17.71
<b>Total</b>	<b>52.15%</b>	<b>11.26</b>	<b>69.23%</b>	<b>11.59</b>	<b>60.07%</b>	<b>11.43</b>

From the above results it is evident that the participant-teachers have moderate knowledge in general about hearing aids as indicated by a overall score of 52.15% on a 30-item objective test. Similar findings of moderate knowledge among mainstream teachers for managing children with hearing impairment has been reported by Gangadharan (2009) in an extensive survey of 150 teachers in and around urban and rural environs of Mysore. Among the constituent aspects of knowledge on hearing aid, they were found to have relatively better knowledge about general management

of hearing aids (56.27%) compared to crises management aspects like troubleshooting (48.41%).

The aggregate attitudes of teachers from both special and mainstream schools were found to be positive as indicated by the score of 69.23% on an agreement-disagreement scale of 30 items. The participant-teachers seemed to have a more positive outlook towards their responsibilities as teacher for troubleshooting hearing aids (73.48%) and its positive benefits (70.97%), followed by positive outlook towards implications for regular maintenance and use (63.25%). However in this bipolar rating scale where score of below 50% would indicate negative attribute; score ranging between 63 and 73% imply only moderate positive attitudes.

Competencies of the teacher for general awareness, use, maintenance and troubleshooting of hearing aids were self-rated as a 3-point rating scale (fully competent, partially competent and not at all competent) constituted of 15 items. The average percentage score of 60.07% indicates that teachers considered themselves to have fairly moderate competencies for general awareness, use, maintenance and troubleshooting of hearing aids in learning environments. Among the component aspects of competencies, teacher reported themselves to be in possession of better skills for troubleshooting (64.86%) rather than daily maintenance and use (55.29%). The following Figure 4.1 illustrates the knowledge, attitudes and competencies of mainstream and special school teachers about hearing aids, their use, maintenance and troubleshooting.

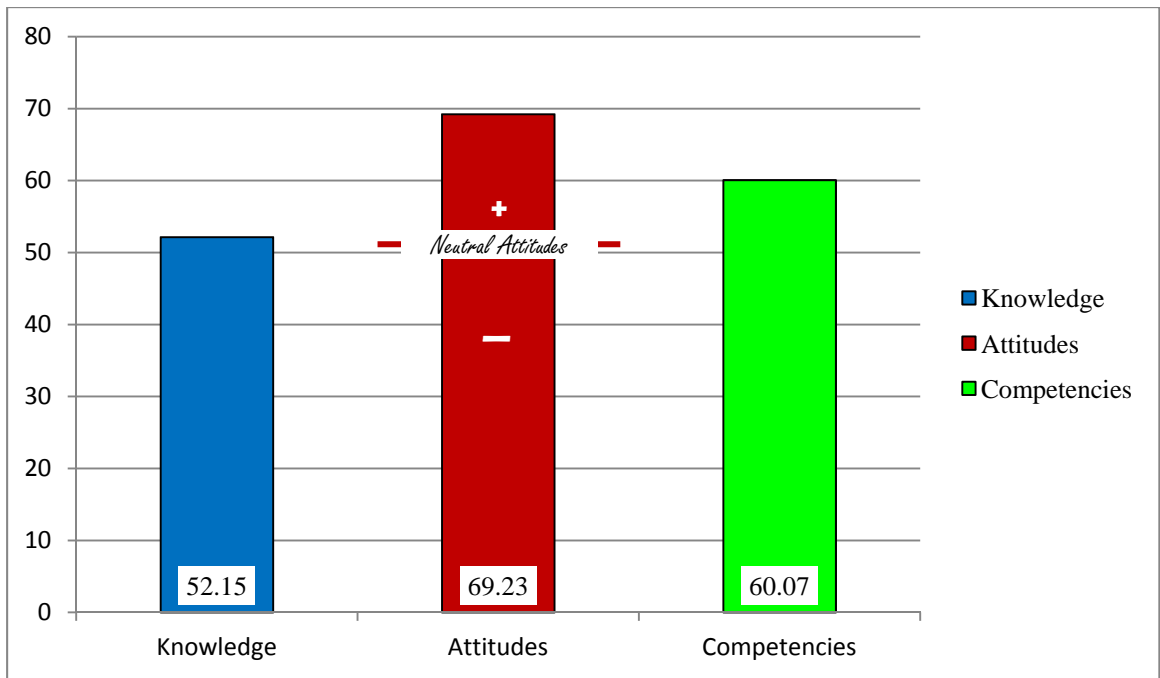


Figure 4.1: Existing Status of Teacher Knowledge, Attitudes & Competencies for Hearing Aids

From the figure it is evident that the teachers have moderate knowledge and fairly positive attitudes regarding hearing aids and their use, maintenance and troubleshooting in the classroom environments. However, they have self-reported to possess fairly good competencies for their use, maintenance and troubleshooting. This could imply that self reported competencies might not always imply actual ability status.

## 4.2 Influence of Teacher Attributes on Teacher Knowledge, Attitudes and Competencies

### 4.2.1 Influence of Teacher Attributes like Age, Educational Qualifications, Level of Teaching & Duration of Professional Experience

The next stage of the analyses was concerned about influence of teacher attributes like age, educational qualification, level of teaching and professional

experience on teacher knowledge, attitudes and competencies for general awareness, use and maintenance and troubleshooting of hearing aids. The correlation coefficients computed for these two sets of variables are presented in Table 4.2:

Table 4.2: Relationship Teachers knowledge, Attitude and Competencies with respect to Age, Educational Qualification, Level of Teaching and Professional Experience

<b>Teachers' Personal &amp; Professional Attributes Status of Teacher Capabilities</b>	<b>Age</b>	<b>Educational Qualification</b>	<b>Level of Teaching</b>	<b>Professional Experience</b>
<b>Knowledge</b>	+0.220	+0.238*	+0.172	+0.383**
<b>Attitude</b>	+0.288*	-0.022	-0.011	+0.296**
<b>Competencies</b>	-0.280	+0.278*	+0.096	-0.111

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001; no \* no statistical significance

From the above Table 4.2 it is evident that knowledge and attitudes of teachers improved considerably with age and duration of professional experience; but not competencies. Level of educational qualification and level of teaching were found to positively influence teacher knowledge and competencies, but not attitudes. This findings resounds earlier evidences (Gangadharan, 2009; Hanwi, 2003; Leyser et al., 1994) that reported disposition towards inclusive education improve with experience and age.

#### **4.2.2 Influence of Gender**

Comparison of overall knowledge, attitudes and competencies of hearing aids (in terms of percentage scores) of male and female teachers from special and mainstream school teachers of children with hearing impairment regarding general awareness, use, maintenance and troubleshooting of hearing aids has been presented in Table 4.3. There were 37 male and 41 female teachers who participated in the

study, and differences in this knowledge, attitudes and competency status were analysed by employing independent sample t-test:

Table 4.3: Comparison of Knowledge, Attitudes and competencies between Male and Female teachers (Represented in %)

Teacher Aspects	Gender	Mean %	Standard Deviation	Mean Difference %	t	Degrees of Freedom	Significance
Knowledge	Male	50.3	17.47	-2.41	-0.651	76	0.517
	Female	52.7	12.47				
Attitudes	Male	64.5	16.27	-6.15	-1.62	76	0.109
	Female	70.65	13.45				
Competencies	Male	60.14	15.41	0.09	0.024	76	0.981
	Female	60.05	13.31				

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001; no \* no statistical significance

Al-Zyoudi (2006, qtd. in Gangadharan, 2009) following a survey of 90 teachers in Jordan had reported findings very similar to this study, stating that there was little difference between the opinions of male and female teachers, with female teachers being more positive than male teachers. This study also reports female teachers having a slight advantage in knowledge and were found to possess more positive attitudes (70.65%). However, male teachers displayed marginally better competencies (60.14%).

#### 4.2.3 Influence of Nature of Teacher Education

Forty-one teachers from four special schools and 37 teachers from four mainstream schools participated in the study. It is essential to note here that all teachers from special schools had special educational training at diploma or graduate levels, while regular teachers from mainstream schools had undergone regular teacher

education. Analysis was carried out to investigate the differential influence of regular and special teacher education programmes on knowledge, attitudes and competencies for use of hearing aids. The comparative analysis was carried out employing independent sample t-test, and the results have been presented in Table 4.4:

Table 4.4: Comparison of Knowledge, Attitudes and competencies of Special and Regular Teachers

Teacher Status in Terms of	Nature of Setting	Mean %	Standard Deviation	Mean Difference %	t	Degree of Freedom	Significance
Knowledge	Special	58.04	13.19	12.42	4.461 ***	76	0.00
	Main-stream	45.62	11.16				
Attitudes	Special	77.26	9.3	16.93	6.468 ***	76	0.00
	Main-stream	60.33	13.6				
Competencies	Special	62.09	12.47	4.25	1.375	76	0.17
	Main-stream	57.83	14.81				

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001; no \* no statistical significance

Results presented on Table 4.4, indicate that specially trained teachers from special schools as expected were found better placed in terms of knowledge, attitudes and competencies of hearing aids with a mean advantages of 16.93%, 12.42% and 4.25%, respectively; especially with statistical significance (at 0.001 level) for knowledge and attitudes. This is no wonder as special educator training includes special components on use, maintenance and troubleshooting of hearing aids. However, it is of concern that even with such back up the mean knowledge scores is just a moderate 58% among the special educators; and their advantage in the area of competencies is insignificant with a mean difference of just 4.25%. These findings imply that special teacher education programmes have to further strengthen technology related components like use of hearing aids in the learning environments,



while regular teacher-trainees will be better prepared if they are exposed to aspects related to management of such components in mainstreaming learning environments.

### **4.3 Influence of Teacher Knowledge, Attitudes and Competencies on Children with Hearing Impairment**

The level of knowledge, attitudes and competencies of regular and special school teachers for use of hearing aids on the children with hearing impairment in terms of regular use of hearing aids, listening, speech and language abilities; as well as performances in school in terms of core-curricular achievement, co-curricular participation and social integration in learning environment were deliberated further.

#### **4.3.1 Influence of Teacher Knowledge, Attitudes and Competencies on Use of Hearing Aids and Development of Communication Skills in Children with Hearing Impairment**

Teacher knowledge, attitudes and competencies for use of hearing aids in terms of percentage scores were correlated with the children's regularity of use of hearing aids and level of communication abilities in terms of listening, speech and language skills. The regularity of use of hearing aids was rated on 4-point of scale of 'always' (with rating of 3), 'often' (with rating of 2), 'rarely' (with rating of 1) and 'never' (with rating of 0). Listening skills in terms of aided hearing abilities while wearing the hearing aids were rated for awareness of Lings 6-sound test 'within speech spectrum' (with rating of 3), 'partly within spectrum' (with rating of 2) and 'outside spectrum' (with rating of 1). Speech and language skills were rated on a 3-

point rating scale of ‘age appropriate development’ (with rating of 3), ‘development delayed by 1 or 2 years’ (with rating of 2), and ‘development with delay of more than 2 years’ (with rating of 1). The correlation coefficients have been presented in Table 4.5:

Table 4.5: Relationship of Teacher’s Knowledge, Attitudes and Competencies with Children’s Use of Hearing Aids and Communication Abilities

Correlation Coefficients		Teacher Status in Terms of		
		Knowledge	Attitudes	Competencies
Children with Hearing Impairment	Regular Use of Hearing Aids	0.439**	0.411**	0.38**
	Aided Listening Abilities	0.444**	0.118	0.27*
	Speech Language Abilities	0.345**	0.167	0.240*

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001; no \* no statistical significance

From results on Table 4.5, it is evident that teacher knowledge, attitudes and competencies for use of hearing aids had universal, positive influence on their classroom wards with relation to regular use of hearing aids, and consequent development in listening, speech and language skills. Concrete teacher capabilities in terms of knowledge and competencies had more significant influence (significant at 0.01 level and significant at 0.05 level, respectively in majority instances) than attitudes. However, positive attitudes among teachers are found to strongly influence regular use of hearing aids in children with hearing impairments in classrooms (significant at 0.01 level).

### 4.3.2 Influence of Teacher Knowledge, Attitudes and Competencies and Resultant Hearing Aid Use and Communication Abilities on School Performances of Children with Hearing Impairment

Table 4.6: Profile of Relationship with Teacher's Knowledge, Attitudes and Competencies and Resultant Use of Hearing Aid Use and Communication Abilities with School Performances of Children with Hearing Impairment

Correlation Coefficients		School Performances of Children with Hearing Impairment		
		Core-Curricular Achievement	Co-Curricular Participation	Social Integration
Child-related Variables	Regular Use of Hearing Aids	0.632**	0.598**	0.688**
	Aided Listening Abilities	0.210	0.341**	0.454**
	Speech Language Abilities	0.439**	0.468**	0.484**
Teacher-related Variables	Teacher Knowledge	0.296**	0.421**	0.402**
	Teacher Attitudes	0.245*	0.199*	0.206*
	Teacher Competencies	0.357**	0.466**	0.356**

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001; no \* no statistical significance

The results on Table 4.6 have highlighted the appreciable outcomes of regular use of hearing aids and consequent development of listening, speech and language skills in children with hearing impairment. Regular use of hearing aids, followed by good speech-language abilities are found to have all round, positive and significant influence on core curricular achievement, co-curricular participation and social integration in the learning environment (significant at 0.01 level). Aided listening abilities in children with hearing impairment have also related positive with all aspects of school performances but with reduced impact, especially in core-curricular achievement. These finding reinstate the established dictum that better verbal communication skills in children with hearing impairment enables better integration

and achievement in the learning environment, especially in the mainstreams of education (Harris & Moreno, 2006; Lewis, 1996; Moores & Meadows-Orlans, 1990; Geers & Moog, 1989).

Concerning the impact of teacher variables, the knowledge and competencies for use of hearing aids is found to exert uniform, positive and significant influence on core-curricular achievement, co-curricular participation and social integration in the learning environment (significant at 0.01 level). Positive attitudes of teachers towards hearing aids was also seen to influence positive school performances, however the reduced level of impact (significant at 0.05 level) could be due to the moderate attitudes that were observed among teachers.

#### **4.4 Influences on Type of Hearing Aid on School Performances of Children with Hearing Impairment**

Apart from probing into influences of teacher capabilities for use of hearing aids on regular use of hearing aids, communication abilities and school performances of children with hearing impairment; the investigator also attempted the study the influence of different types of hearing aids on their school performances. The children with hearing impairment had either worn body-level or behind-the-ear hearing aids. The variances in the school performances were analysed using independent sample t-test. The results have been tabulated in Table 4.7:

Table 4.7: Comparison of School Performances of Children Wearing Behind-the-Ear and Body-Level Hearing Aids

School Performances in Children	Types of Hearing Aids	Mean %	Standard Deviation	Mean Difference %	t	Degrees of Freedom	Significance
Core-Curricular Achievement	Body Level	71.1	9.28	2.66	1.230	74	0.458
	BTE	68.44	9.48				
Co-Curricular Participation	Body Level	73.71	18.00	2.98	0.747	74	0.223
	BTE	70.73	16.79				
Social Integration	Body Level	77.71	15.16	5.03	1.371	74	0.175
	BTE	72.68	16.59				

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001; no \* no statistical significance

Children wearing body-level hearing aids are found to fare marginally better in all three areas of school performances, namely, core-curricular achievement, co-curricular performances and social integration in the learning environment. However, the differences are not statistically significant.

#### 4.5 Inference

From the above analysis, it is evident that

- Null hypothesis (1 - a, b & c) are rejected, implying that the mainstream and special school teachers covered in the study had adequate knowledge, positive attitudes and adequate competencies for use and maintenance of hearing aids in classroom environment.
- Null hypothesis (2 – a, b & c) are rejected, implying that the specially trained teachers had better increased knowledge, more positive attitudes and better competencies for use, maintenance and troubleshooting of hearing aids

- Null hypothesis (3 – a, b, c & d) are rejected revealing that educational qualification and years of professional experience had positive influences on their knowledge, attitudes and competencies for use, maintenance and troubleshooting of hearing aids. And female teachers had better knowledge and attitudes, which male teachers had better competencies.
- Null hypothesis (4 – a, b, c, d & e) are rejected indicating that teachers knowledge, attitudes and practices significantly influenced regular use of hearing aids, better communication skill development, core-curricular achievement, co-curricular participation and social integration of children with hearing impairment in learning environment.
- Null hypothesis (5 – a, b & c) are rejected implying that the type of hearing aid worn by child with hearing impairment, regularity of use of hearing aid and consequent communication skill development in to a significantly influence their school performances for the better.

**Chapter – V**  
***SUMMARY AND***  
***CONCLUSION***

## CHAPTER V: SUMMARY AND CONCLUSION

In the field of education for children with hearing impairment, the teacher involvement is more for developing the educational process. This study was a survey type of research undertaken with the purpose of collecting information about capabilities teacher capabilities for use and maintenance of hearing aids and its implications on learning environment. The field of study covered 4 mainstream and 4 special schools in around Mysore city. Through purposive sampling as many teacher-participants and one child-participant per teacher were included in the study. Three sets of tools were developed for collecting data from the teacher-participants of the study. They were:

- Written test for measuring teacher knowledge about hearing aid
- Attitudinal rating scale for appraising teacher attitudes about hearing aid
- Competency rating scale for self assessment of teacher abilities for use of hearing aids

Further the study attempted to investigate the influence of teacher knowledge, attitudes and competencies for use of hearing aids on the school performances of their wards with hearing impaired in terms of achievement in the core-curricular subjects, participation in co-curricular activities and social integration in the learning environment. A separate proforma had been developed for this purpose. And it included information about

- Regularity of use of hearing aids
- Communication skill development
- School performances
  - Achievement in the core-curricular subjects



- Participation in co-curricular activities
- Social integration in learning environment

The data was collected from 37 mainstream and 41 special school teachers by distributing the tools for self administration. Then compiled data was analyzed using descriptive measures like mean and standard deviation for summarizing the personal and professional profile; and also their status of knowledge, attitudes and competencies of hearing aids. The data was further subjected to measures of correlation as well as variance in order to investigate the inference of teacher attributes on their knowledge, attitudes and competencies for hearing use; and the influence of these capabilities on the regular use of hearing aids, level of communication abilities and school performances of children with hearing impairment under their educational care. Influence of other independent variables like type of hearing aids was investigated in the study. The survey was carried out over 1 month's period of time at the end of the academic. Earlier the process of tool development and validation had consumed 2 months time.

## **5.1 Major Findings**

The investigation arrived at the following tentative findings

- Status of teachers knowledge, attitudes and competencies for general awareness, use and maintenance and troubleshooting of hearing aids
  - Teachers from both special and mainstream schools were found relatively better knowledge about general management of hearing aids (56.27%)

compared to crises management's aspects like troubleshooting (48.41%).

However, overall awareness levels were moderate.

- Teachers from both special and mainstream schools were found to possess fairly positive as indicated by the score of 69.23% on a bipolar rating scale for on general awareness, use and maintenance and troubleshooting of hearing aids.
- Teachers from both special and mainstream schools self-reported to have moderate competencies as indicated by the overall score of 60.07% for using and maintaining and troubleshooting of hearing aids. The participant-teachers showed better skills for troubleshooting (64.86%) rather than daily use and maintenance (55.29%).
- Influence teacher attributes like age, gender, educational qualification and professional experience on their capabilities for using hearing aids
  - Knowledge and attitudes of teachers improved considerable with age and years of experience but not competencies.
  - Level of educational qualification and level of teaching were found to positively influence teacher knowledge and competencies, but not attitudes.
  - Female teachers were found to possess better knowledge, attitudes and competencies to male contemporaries
- Influence of nature of professional training on attitudes, knowledge and competencies for use of hearing aids
  - Specially trained segregated school teachers were found better placed in terms of knowledge, attitudes and competencies for using hearing aids with a mean advantage of 16.93%, 12.42% and 4.25% respectively

- Influence of teacher capabilities for use of hearing aids on children with hearing impairment in terms regular use of hearing aids, communication abilities and other school performances
  - Better teacher capabilities was found to influence more regular use of hearing aids
  - Better capabilities was found to have significantly positive influence on the communication abilities
  - Better capabilities were found to influence better school performances in children with hearing impairment.
- Influence type and use of hearing aid and communication abilities in school performances in children with hearing impairment
  - Children wearing body-level hearing aids are found fare marginally better in all three areas of school performances, namely, core-curricular achievement, co-curricular participation and social integration than behind-the-ear hearing aids.
  - Body-level hearing aids related with better school performance
  - Regularity of use influences better performance
  - Better communication also positive influence on school performance but more so for core-curricular achievement, co-curricular participation and social integration

## **5.2 Limitations**

- The teacher-participants, especially from mainstream schools displayed non-committal participation resulting at times in vague, in accurate responses.

- The researcher led to rely on self-rating for teacher-competencies. A direct observation of actual practices could have resulted in more reliable information but was not possible due to time constraints.
- The data on listening and language abilities of the children with hearing impairment were also based teacher observations due to absence of clinical reports. The better could have provided more accurate information.

### **5.3 Implications**

The findings might be helpful in

- Creating awareness among school teachers, both regular and special about importance of purpose use of hearing aids in children with hearing impairment and their responsibilities towards teachers
- Motivating teachers both in mainstream and special schools to improve their knowledge and skills
- Influencing performances to improve teacher knowledge and skills for use and maintenance and troubleshooting of hearing aids

### **5.4 Recommendations**

- In future, further researcher could be undertaken to observe and report actual practical abilities of teachers for use of hearing aids in the classroom settings
- Investigate the impact of orientation, and/or training programmes to improve teacher capabilities for general awareness, use and maintenance and troubleshooting of hearing aids.

# ***REFERENCES***

## REFERENCES

- AIISH (2010). *Adjustment to Amplification*. Mysore: All India Institute of Speech and Hearing.
- AIISH (2010). *Body level hearing aid and care*. Mysore: All India Institute of Speech and Hearing.
- AIISH (2010). *Caring for your hearing aid Do's and Don'ts*. Mysore: All India Institute of Speech and Hearing.
- AIISH (2010). *Correcting simple problems of Behind-the-Ear [BTE] hearing aid*. Mysore: All India Institute of Speech and Hearing.
- AIISH (2010). *Facts about hearing loss and hearing aid*. Mysore: All India Institute of Speech and Hearing.
- AIISH (2010). *For the person using a hearing aid*. Mysore: All India Institute of Speech and Hearing.
- AIISH (2010). *Getting to know your hearing aid*. Mysore: All India Institute of Speech and Hearing.
- Al-Zyoudi, M (2006). Teachers attitudes inclusive education in jordanian schools. *International Journal of Special Education*. 1(2).
- American Speech Language Association – ASHA (2014<sup>a</sup>). *Audiologic rehabilitation*. Retrieved 19<sup>th</sup> April 2014 from <http://www.asha.org/public/hearing/Audiologic-Rehabilitation/>
- American Speech Language Association – ASHA (2014<sup>b</sup>). *Child audiologic rehabilitation*. Retrieved 19<sup>th</sup> April 2014 from [http://www.asha.org/public/hearing/treatment/child\\_aur\\_rehab.htm/](http://www.asha.org/public/hearing/treatment/child_aur_rehab.htm/)
- Armbruster, J. M. (1981). *How to get most out of your hearing aid*. Washington: Alexander Graham Bell association for the Deaf.
- Ballantyne, D. (1990). *Handbook of audiological techniques*. Britain: BPC Wheatons Ltd, Exeter.

Bunch, G. (1987). *Designing an integration rating guide*, *The volta review*, 89, 35 – 42.

Davis, Shepard, Stelmachowitz, & Gorga (1982). As cited in Schow, R. L., & Nerbonne, M. A. (2013). *Introduction to audiologic rehabilitation (6<sup>th</sup> edn)*. Boston, MA: Allyn and Boston.

Dillon, H. (2001). *Hearing aids*. Australia: Boomerang press.

Doyle, J., & Lind, C. (1999). *Practical audiology for speech-language therapists*. London: Whurr Publishers Ltd.

Gangadharan, B. (2009). Awareness, attitudes and competencies in mainstream educators for inclusive education of children with hearing impairment. *Unpublished M.S.Ed.(HI) Dissertation*, Submitted to All India Institute of Speech and Hearing, University of Mysore.

Geers, A. E , & Moog, J. (1989). Factors predictive of the developments of literacy in profoundly hearing-impaired children. *Journal of Speech and Hearing Disorders*, 52, 84–94

Harris, M., & Moreno, C. (2006). *Speech reading and learning to read: A comparison of 8-year-old profoundly deaf children with good and poor reading ability*. London: Oxford University Press.

Heward, W. L. (2009). *Exceptional children: An introduction to special education*. Upper Saddle River, N.J.: Pearson College Div.

Hodgson, W. R., & Skinner, P. H. (1981). *Hearing aid assessment and use in audiologic rehabilitation*. Baltimore: Williams & Wilkins.

Holt (1995). As cited in Schow, R. L., & Nerbonne, M. A. (2013). *Introduction to audiologic rehabilitation (6<sup>th</sup> edn)*. Boston, MA: Allyn and Boston.

Kelly (1993). As cited in Schow, R. L., & Nerbonne, M. A. (2013). *Introduction to audiologic rehabilitation (6<sup>th</sup> edn)*. Boston, MA: Allyn and Boston.

Kuntz (1998). Cited in Schow, R. L., & Nerbonne, M. A. (2013). *Introduction to audiologic rehabilitation (6<sup>th</sup> edn)*. Boston, MA: Allyn and Boston.

Lederberg & Prezbindowski (2000). Cited in Schow, R. L., & Nerbonne, M. A. (2013). *Introduction to audiologic rehabilitation (6<sup>th</sup> edn)*. Boston, MA: Allyn and Boston.

Lewis, S. (1996). The reading achievement of a group of severely and profoundly hearing impaired school leavers educated within a natural aural approach. *Journal of the British Association of Teachers of the Deaf*, 20, 1-7.

Markides, A. (1986). The use of residual hearing in the education of hearing-impaired – A historical perspective. *The Volta Review*. 88, 57 – 65.

Moeller (2007). As cited in Schow, R. L., & Nerbonne, M. A. (2013). *Introduction to audiologic rehabilitation (6<sup>th</sup> edn)*. Boston, MA: Allyn and Boston.

Moore, D. F., & Meadow-Orlans, K. M. (1990). *Education and development aspects of deafness*. Washington, DC: Gallaudet University Press.

Musselman & Kircaal-Iftar (1996). As cited in Schow, R. L., & Nerbonne, M. A. (2013). *Introduction to audiologic rehabilitation (6<sup>th</sup> edn)*. Boston, MA: Allyn and Boston.

National Institute on Deafness & Other Communication Disorder – NIDCD (2007). *Hearing aids*. Retrieved on 30<sup>th</sup> August 2013 from [www.nidcd.nih.gov/health/hearing/pages/hearingaid.aspx](http://www.nidcd.nih.gov/health/hearing/pages/hearingaid.aspx)

NEA (2013). *High-tech hearing aids can help you in the classroom*. Retrieved 30<sup>th</sup> August 2013 from [www.neamb.com/shopping-discounts/hearing-aids-in-the-classroom.htm](http://www.neamb.com/shopping-discounts/hearing-aids-in-the-classroom.htm)

Paul (1998). As cited in Schow, R. L., & Nerbonne, M. A. (2013). *Introduction to audiologic rehabilitation (6<sup>th</sup> edn)*. Boston, MA: Allyn and Boston.

Pollack (1986). As cited in Markides, A. (1986). The use of residual hearing in the education of hearing-impaired – A historical perspective. *The Volta Review*. 88, 57 – 65.



Rangasayee, R. (2006). *Introduction and Importance of Hearing aid*. New Delhi: Kanishikka Publishers.

Robert, E. S. (2000). *Textbook of Hearing aid amplification* (2<sup>nd</sup> ed.). California: Singular publishing group.

Schafer, E. C., & Sweeney, M. (2013). *A sound classroom environment*. Retrieved 1st September 2013 from <http://www.asha.org/Publications/leader/2012/120403/A-Sound-Classroom-Environment.htm#1>

Schow, R. L., & Nerbonne, M. A. (2013). *Introduction to audiologic rehabilitation* (6<sup>th</sup> edn). Boston, MA: Allyn and Boston.

Searchwave (2013). *Wearing and using of hearing aids*. Retrieved 30<sup>th</sup> August 2013 from [http://www.searchwave.com/learning\\_to\\_use\\_hearing\\_aids.html](http://www.searchwave.com/learning_to_use_hearing_aids.html).

School World (2014). *Educational implications of hearing loss*. Retrieved 3<sup>rd</sup> May 2014 from <http://bas.k12.mi.us/webpages/jkoeHN/index.cfm?subpage=1277214>

Staab, W. J. (1996). Selecting amplification system. In R. Sandlin (Ed.) *Hearing instrument science and fitting practices* (2<sup>nd</sup> ed.). Livonia, MI: National Institute for Hearing Instrument Studies. pp. 431-595.

Staab, W. J. (1999). *Hearing aids: A user's guide*. Phoenix, AZ: Wayne J. Staab. Pp. 30-31.

Waldman, D., & Roush, J. (2010). *Your child's hearing loss*. London: Plural Publishing.

# ***APPENDIX***

## APPENDIX I

### **Proforma for Appraising Teacher Competencies for Maintenance & Use of Hearing Aids in Educational Settings**

(Adapted from Anjana, C. R. (1998) Independent Project titled *Educating the Educators on Hearing Impairment*; and AIISH PEPs – *For the Persons Using Hearing Aid, Body Level Hearing Aid & Care, Correcting Simple Problems of Body-Level Hearing Aids and BTE's, Caring for Your Hearing Aid: Dos and Don'ts*)

Developed for Dissertation titled 'Survey of Teacher Competencies for Use and Maintenance of Hearing Aids & Its Implications in the Learning Environment' of M.S.Ed. (HI) 2013-14, AIISH, Mysore 570 006.

Student: Mr. K. Kanaga Subramaniyam  
M. Mamatha

Guides: Dr. G. Malar & Ms. N.

#### **DETAILS OF THE RESPONDENT**

**Name:**

**Age:**

**Gender:**

#### **Nature of Educational Setting**

Mainstream Set-up / Resource Room of Integrated Set-up / Special Segregated Set-up

#### **Level of Teaching**

Pre-primary / (Higher) Primary / Secondary / Hr.Secondary

**Educational Qualifications:**

**Years of Professional experience:**

**Duration of Exposure to Learners with Hearing Impairment:**

**Contact Address & Phone No.:**

I was explained the purpose and methods involved in this research. I am aware that my individual identity will not be revealed in the research report, and am willing to be a participant in the process.

**Signature of Respondent**

## APPENDIX I-A

Written test for measuring teacher knowledge – English Version

### A. Knowledge Questions

Answer the following:

#### A. General Awareness about Hearing Aids

1. \_\_\_\_\_ help the children to hear better when they wear it.
2. Hearing aids are electronic devices that \_\_\_\_\_ the sound for the listener.
3. \_\_\_\_\_ of the hearing aid picks up the sound from the environment.
4. The part of the hearing aid that converts amplified electrical signal back into sound signal is called as \_\_\_\_\_ .
5. \_\_\_\_\_ used with hearing aids may be made of soft or hard material.
6. The level of \_\_\_\_\_ should be checked before selecting a hearing aid.
7. An \_\_\_\_\_ should be consulted in selecting an appropriate hearing aid.
8. Early use of hearing aids helps children to develop better \_\_\_\_\_ skills
9. For better results, children with hearing impairment should wear hearing aids during all \_\_\_\_\_ hours.
10. \_\_\_\_\_ Audiogram provides information of how much a child is able to hear with hearing aids

#### B. Maintenance and Use Of Hearing Aids

11. Avoid wearing hearing aids during \_\_\_\_\_.
12. Volume control should be set at \_\_\_\_\_ of the maximum volume level.
13. \_\_\_\_\_ in the classroom can create disturbances while using hearing aids.
14. \_\_\_\_\_ is used to fit hearing aid into the external ear.
15. Ears have to be regularly cleaned to avoid \_\_\_\_\_ blocking the ear moulds.
16. Usually there are 3 positions, namely \_\_\_\_\_ in tone control of hearing aids
17. Hearing loss and hearing aids have to be evaluated at least once in a \_\_\_\_\_ to see if the aids are suitable for children
18. Ear moulds have to be cleaned regularly at least \_\_\_\_\_.
19. When not in use, \_\_\_\_\_ should be removed from hearing aids.
20. When not in use hearing aids should not be kept near \_\_\_\_\_ to avoid malfunctioning.
21. The cords of body-worn hearing aids should not be wrapped \_\_\_\_\_ around the aid when not in use.
22. Seating a child wearing hearing aid closer to the \_\_\_\_\_ will help in following instruction better without being disturbed with other noises

#### C. Trouble Shooting of Hearing Aids:

23. When hearing aids do not seem to work, the \_\_\_\_\_ should be checked first.
24. \_\_\_\_\_ battery contacts will also result in no sound in the hearing aid.
25. Sounds would be distorted because of collection of \_\_\_\_\_ in microphone.
26. \_\_\_\_\_ sound may be heard if ear moulds are not fitted properly, or are loose.
27. Loose connection or broken \_\_\_\_\_ may lead to break in sound signals.
28. Excessive collection of wax in the ear, may lead to \_\_\_\_\_.
29. \_\_\_\_\_ volume in the hearing aid could lead to sound leak and/or discomfort in the ear.
30. \_\_\_\_\_ test could be used to test the functioning of hearing aids in the classroom.

## APPENDIX I-B

Attitudinal rating scale for appraising teacher attitudes – English Version

### B. Attitudinal Statements

Indicate whether you agree or disagree with the following statements by inserting tick mark (✓) in appropriate columns:

<b>General Awareness about Hearing Aids</b>	<b>Agree</b>	<b>Disagree</b>
<ol style="list-style-type: none"> <li>1. Children with mild hearing loss do not need hearing aids.</li> <li>2. As a teacher it is my responsibility to see that children with hearing loss are wearing hearing aid during all instructional hours.</li> <li>3. Use of hearing aids will help to treat hearing loss in children.</li> <li>4. Children should avoid wearing hearing aids outside class hours as it may get damaged or wear out soon.</li> <li>5. All hearing aids are the same, parents could purchase any aid for their children of their convenience straight from any hearing aid shop.</li> <li>6. Microphone of the hearing aid is the important part that helps to receive sound signals; hence it should be protected with adequate space for sound signals to reach it.</li> <li>7. Ear moulds made of soft materials are suitable for children.</li> <li>8. Batteries need not be changed/charged regularly as it will be costly for parents.</li> <li>9. If the children with hearing impairment are fitted with suitable hearing aids early and used consistently, they would have better benefit from the aids.</li> <li>10. Hearing aids and ear moulds should not be exchanged between children even in emergencies.</li> <li>11. Children wearing hearing aids should be seated in the back of the classroom.</li> </ol>		
<b>Maintenance &amp; Use of Hearing Aids</b>		
<ol style="list-style-type: none"> <li>12. Hearing aid is a simple device and need not be cared much for.</li> <li>13. Orienting all children in the classroom about hearing aids will help avoid damaging of hearing aids due to curiosity.</li> <li>14. A teacher can do very little in controlling noises from inside or outside class room that disturbs children using hearing aids.</li> <li>15. Once prescribed, hearing aids and ear moulds need not be changed for a lifetime.</li> <li>16. Fitting two separate hearing aids for a child having loss in both the ears is unnecessary expenditure.</li> <li>17. Hearing aids should be set at maximum volume to help children hear better.</li> <li>18. Hearing aids are delicate devices, and care should be taken not to drop them.</li> <li>19. We need not worry about hearing aids being affected by natural elements like sun or rain.</li> <li>20. We should make children wear hearing aids regularly irrespective of problems like earache, or ear discharge.</li> </ol>		

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <ul style="list-style-type: none"> <li>21. Hearing aids should be regularly serviced, at least once in 6 months.</li> <li>22. Making separate harness for body-level hearing aids is unnecessary, they can be simply fitted in the pockets.</li> <li>23. Children can wear hearing aids even when participating in rough outdoor games.</li> <li>24. Avoid covering your face while speaking to a child using hearing aid, as it will reduce the clarity of speech.</li> </ul> |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

---

**Troubleshooting of Hearing Aids**

---

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <ul style="list-style-type: none"> <li>25. Every day at the beginning of class, teachers should check whether the hearing aids are functioning properly.</li> <li>26. If squealing sound comes from hearing aids worn by child with hearing loss, the only solution is to switch it off immediately.</li> <li>27. Blocked ear moulds of hearing aids may not affect children from hearing the sounds.</li> <li>28. In classroom situations, it does not matter whether the hearing aid is set at 'M' or 'T' positions.</li> <li>29. Regular use of hearing aids will help to improve attention in children with hearing impairment.</li> <li>30. It is responsibility of the regular teacher to have spare supplies of batteries and cords for hearing aids in the classroom.</li> </ul> |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
-

## APPENDIX I-C

Competency rating scale for self assessment of teacher abilities – English Version

### C. Competency Tasks

Indicate how competent you are in carrying out the following tasks in maintaining, using and troubleshooting hearing aids by inserting tick mark (✓) in appropriate columns:

Task	Fully competent	Partially competent	Not at all competent
1. I am able to test the functioning of hearing aids worn by children before the start of class everyday			
2. By seeing the aided audiogram I am able to understand how much a child wearing hearing aids could follow spoken information in the classroom			
3. I am able to ensure that children make proper use of hearing aids in the classroom			
4. I am able to check whether the hearing aid is set in correct volume settings			
5. I am able to check whether the tone controls are in prescribed position			
6. I am able to check whether batteries are placed correctly in the hearing aids			
7. I am able to check whether the cords of body-worn hearing aids are in good working condition			
[OR]			
I am able to check whether the tubing of the behind-the-ear hearing aids are intact			
8. I am able to check whether the moulds are clean and properly fitted			
9. I am able to replace defective cords in body worn hearing aids			
10. I maintain adequate stock of spare batteries, cords, etc. in the classroom always			
11. I am able to maintain low-noise environment in the classroom so that children get better benefits from hearing aids			
12. I am able to prevent the hearing aids getting damaged in the learning environment			
13. I am able to provide preferential seating for children wearing hearing aids so that they are able to hear most of the information spoken by the teacher in the classroom			
14. I am able to guide parents for proper use, maintenance and troubleshooting of hearing aids at home			
15. I am able to guide parents to hearing aid service centres if there are any repairs in hearing aids, or for general service			









	£ÉÆÄrPÉÆ¼ÄÄrªÀ CUÄvÄâ«®è.	
13	±ÄæªÄuÉÆÄÛPÀgÀtzÀ §UEÍ vÀgÀUÄwAiÄÄ°ègÄÄªÄ J-ÁèªÄÄPÄI½UÄÆ ¥ÄÆªÄðªÄiÄ»w ðÄqÄÄªÄÄÄzÄjAzÀ PÄÄvÄÆªÄÄ®çAzÁUÄÄªÄ°ÄªAiÄÄ£ÄÄß vÄqÉUÄIÖ- §°ÄÄzÄÄ.	
14	±Ä-ÁªÄvÁªÄgÀtzÀ°è EgÄÄªÄªÄ ±Ä§PªÄÄ ±ÄæªÄuÉÆÄÛPÀgÀtªÄ£ÄÄß zsÄj¹zÀªÄÄPÄI½UE vÉÆAzÄgÉªÄiÄqÄÄªÄÄzÄ£ÄÄßªPÄèPÄgÄÄ Äé®ªÄÄÄnÖUEªAiÄÄAwæ,Ä§°ÄÄzÄÄ.	
15	MªÉÄä ±ÄæªÄuÉÆÄÛPÀgÀtªÄÄvÄÄÜ Q«AiÄÄ CZÄÑ£ÄÄß RjÄç¹zÀªÉÄÄ-É EzÄ£ÄÄß fªÄªÄiÄ£ÄÄ«rÄ §zÄ-Á-Ä,ÄÄªÄ CUÄvÄâ«®è.	
16	JgÄqÄÆ Q«AiÄÄ®Æè ±ÄæªÄtzÉÆÄµÄ«gÄÄªÄªÄ ªÄÄPÄI½UE JgÄqÄÆ Q«UÄ½UÄÆ ¥ÄævÉÄÄPÄ ±ÄæªÄuÉÆÄÛPÀgÀtªAQ,ÄÄªÄÄzÄÄ C£ÄUÄvÄâªEZÄÑ.	
17	±ÄæªÄuÉÆÄÛPÀgÀtçAzÀªÄÄPÄI½UEªEZÄÄÑ -ÁªsªÁUÄªÉÄPÄzÄgÉ CzÄgÄ ±Ä§PzÄªÄÄIÖªÄ£ÄÄß UÄjµÄ× ¥ÄæªÄiÄtzÄ°è EqÄªÉÄPÄÄ.	
18	±ÄæªÄuÉÆÄÛPÀgÀtªÄÄªÆPÄëöªªÄzÄ ªÄzÄ£ÄÄªÄzÄÝjAzÀ CzÄ£ÄÄß ©Ä½,ÄzÄAvÉ PÄ¼Äf ªÄª,ÄªÉÄPÄÄ.	
19	£ÉÉ,ÄVðPÄ CA±ÄUÄ¼ÄzÄªÆAiÄÄð£Ä ±ÄR CxÄªÄ ªÄÄ¼É-ÄAzÄ ±ÄæªÄuÉÆÄÛPÀgÀtzÄªÉÄÄ-É DUÄªªÄ ¥ÄjµÄªÄÄUÄ¼Ä §UEÍ £ÄªÄª Aw,ÄªªÄ CUÄvÄâ«®è.	
20	Q« £ÉÆÄªÄÄ, Q«ªÉÆÄgÄÄ«PÉAiÄÄAvªªÄ ªªÄÄ,ÉÄUÄ¼Ä£ÄÄßªÉQI,ÄzÉªÄÄPÄI½UE ªAiÄÄªAvªªV ±ÄæªÄuÉÆÄÛPÀgÀtªÄ£ÄÄß ªPÄªÉÄPÄÄ.	
21	±ÄæªÄuÉÆÄÛPÀgÀtUÄ¼Ä£ÄÄß PÄªµÄ× DgÄÄ wAUÄ½UEªªÉÄªAiÄiÄzÄgÄÆ,Ä«ð,i/ jÆÉÄj ªÄiÄr,ÄªÉÄPÄÄ.	
22	zÉÄªªÄÄÄIÖzÄ°è zsÄj,ÄÄªÄ ±ÄæªÄuÉÆÄÛPÀgÀtPÉI ¥ÄævÉÄÄPÄªªzÄªªUÄ£ÄÄß §¼Ä,ÄªªÄ CUÄvÄâ«®è. CªÄªUÄ¼Ä£ÄÄß eÉÄ®£Ä°èªAUÉªªAQzÄgÉªPÄÄ.	
23	ªÄÄPÄI¼ÄÄ QæPÉmif£ÄAvªªªÉÆgÄAUÄt DIUÄ¼Ä°è ªsÄUÄªªªªªªªÄªªªAiÄÄzÄ°èªªª ±ÄæªÄuÉÆÄÛPÀgÀt zsÄj,Ä§ªÄzÄÄ.	
24	±ÄæªÄuÉÆÄÛPÀgÀt zsÄj,ÄÄªÄªÄÄPÄI¼Ä eÉÆvÉ ªÄiÄvÄ£ÄÄqÄÄªªUÄªÄÄªªÄÄÄRªÄ£ÄÄß ªÄÄªªÑPÉÆ¼ÄÄªªªÄzÄ£ÄÄßªÄiÄqÄªÄgÄzÄÄ. EzÄjAzÄªÄiÄw£ÄªÀµÀÖvÉ PÄrªÉÄAiÄiÄUÄªvÄÛzÉ.	
(E)	±ÄæªÄuÉÆÄÛPÀgÀtUÄ¼ÄªªªªÉÄUÄ¼ÄªªªÄuÉ §UEÍ	
25	ªPÄèPÄgÄÄ ¥Äæwç£Ä vÄgÀUÄwAiÄÄ DgÄÄªsÄzÄ°è ±ÄæªÄuÉÆÄÛPÀgÀtªÄÄªjAiÄiÄV PÉ®,Ä ªÄiÄqÄÄwÛzÉAiÉÄÄ E®èªÉÄ JA§ÄzÄ£ÄÄß ¥ÄjÄQè,ÄªÉÄPÄÄ.	
26	±ÄæªÄtzÉÆÄµÄ EgÄÄªªÄªÄªÄPÄI¼Ä ±ÄæªÄuÉÆÄÛPÀgÀtçAzÄ QÄgÄ®Æ ±Ä§P §gÄÄwÛzÄÝgÉ, ±ÄæªÄuÉÆÄÛPÀgÀtªÄ£ÄÄß vÄPÄèªªV (Dÿsi) §AziªÄiÄqÄÄªªªzÉÆAzÉÄ ¥ÄªªgÄªªVzÉ.	

27	<p>±ÀæªÀuÉÆÏÏÀPÀgÀt zšÀj¹zÀ ªÀÀPÀÌ¼À Q« CZÀÀÑ  UÀÀUÉÍ-ÀAzÀ §AzÁVzÀÝgÉ/ ªÀÀÀaÑzÀÝgÉ  CzÀjAzÀ ªÀÀPÀÌ¼UÉ ±À§P PÉÀ½¹PÉÆ¼Ài®À  AiÀiÁªÀÀzÉÃ vÉÆAzÀgÉAiÀiÁUÀªÀÀÀç®è.</p>	
28	<p>vÀgÀUÀwAiÀÀ ªÀAzÀ·sÀðzÀ°è  ±ÀæªÀuÉÆÏÏÀPÀgÀtªÀÀÀÀß ‘M’ CxÀªÀ ‘T’  AiÀiÁªÀÀzÉÃ ¹ÜwAiÀÀ- ÁèzÀgÀÆ  GYÀAiÉÆÏV, À§ªÀzÀÀ.</p>	
29	<p>±ÀæªÀuÉÆÏÏÀPÀgÀtªÀÀÀÀß ¥ÀæwªvÀª  ªAiÀÀªªvÀªV §¼À, ÀªªÀzÀjAzÀ  ±ÀæªÀtzÉÆÏµÀªªªª ªÀÀPÀÌ¼À°è UÀªÀÀÀÀ  ±ÀQÛAiÀÀÀÀß °ÉaÑ, À§ªÀzÀÀ.</p>	
30	<p>vÀgÀUÀwAiÀÀ°è °ÉaÑÀ ¥ÀæªÀiÀtzÀ°è  ±ÀæªÀuÉÆÏÏÀPÀgÀtzÀ ©r·sÁUÀUÀ¼ÀzÀ ªÀÀlj  ªÀÀvÀÀÛ vÀAw °ÉÆAzÀªªÀzÀÀ ²PÀëPÀgÀ  dªª·ÁÝjAiÀiÁVzÉ.</p>	





## APPENDIX III

### Student Profile

#### DETAILS OF THE STUDENT

Name : \_\_\_\_\_ Class :

Age : \_\_\_\_\_ DOB: \_\_\_\_\_ Gender :

**Nature of Educational Setting:** Mainstream Set-up / Special Segregated Set-up

**Type of Hearing Aid:**

**Regularity use of hearing aid:** Always / Often / Rarely / Never

#### A. COMMUNICATION SKILL:

**Aided Hearing Abilities:** Within Speech Spectrum / Partly Within Speech Spectrum / Outside Speech Spectrum

**Language Abilities:** Years Appropriate / Delay of 1 or 2 Years of Age / Delay of more than 2 years of Age

#### B. SCHOOL PERFORMANCE:

Percentage in Academic achievement

Language	Mathematics	EVS

Co-Curricular Participation

Very Poor	Poor	Fair	Good	Very Good

Social Integration

Unfavourable	Nothing Mentionable	Satisfactory	Favourable	Most Favourable