

EFFECT OF AUDITORY TRAINING ON READING COMPREHENSION OF CHILDREN WITH HEARING IMPAIRMENT IN ENUGU STATE

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The paper focused on the effect of auditory training on reading comprehension of children with hearing impairment in Enugu State. A total of 33 children with conductive, sensory neural and mixed hearing loss were sampled for the study in the two schools for the Deaf in Enugu State. The design employed for the study was a quasi experiment (pre-test and post-test design) with all the subjects exposed to training. The instrument used for data collection was Reading Comprehension Test (RCT) and validated by experts in the education of children with hearing impairment. Two research questions and two hypotheses were formulated to guide the study. Mean and standard deviation were used to answer the research questions while Analysis of covariance (ANCOVA) was used to analyze the hypotheses at 0.05 level of significance. The finding of the study showed that all the children with hearing impairment exposed to reading comprehension through the use of auditory training achieved a measure of reading. Gender does not influence the mean reading achievement of children with hearing impairment. Conclusions and recommendations were also made.

Introduction

It is very discouraging to review literature on reading comprehension achievement of children with hearing impairment (CHI). This is because the results of a number of studies collected vividly explain the devastating effects the above assertion has on children with hearing impairment. The first effect according to Davis and Hardick (1986) in Ugwuanyi (2009) is that the reading levels of these children fall far below the norms for normally hearing children regardless of the age of the subject involved in the studies. The second effect according to the authors is that reading skills in these children slowly increase between ages of 8 and 14 years, there is a leveling off of achievement in the early teens though the minimal growth in reading achievement occurs beyond age of 13 and so on. This is off course, is dictated by the level of language development acquired in the early childhood.

Reading is a linguistic skill that is entirely based on several years of language experience. A normal child performs well in reading tasks as a result of his well developed language skills that were acquired through several years of auditory information with linguistic codes. Reading tasks for such a child is simple and possible because he is able to pair his visual stimuli with his previous language experience acquired through undisturbed auditory system. For a child with hearing impairment, learning to read may be possible through two possible means. That is learning speech or words and formulating signs for words, ideas and concepts contained in the text and reading at the same time. This according to Ugwuanyi and Onu (2011) makes these children's reading very slow and it presents difficulty to the readers who have to either finger spell or sign words or sentences and articulate such words before acquiring information from the text. It is possible that before they (the readers) could get to the end of the text, they may have forgotten not only the signs but the important information contained in the text. This according to Ugwuanyi (2009) makes their comprehension rate to be very slow that result in poor achievement in schools especially language related tasks.

From the foregoing, reading can be perceived as the key to further language development and it is essential to academic success. It is generally believed that the development of good reading skills is dependent on the development of good language skills. The two skills complement each other because under optimal condition both are sequentially learned. Obviously, children with hearing impairment do

not exhibit sufficient knowledge of language to insure a basis for a normal development of reading skills. These children like their normal peers are expected to learn to read without extensive experience with basic psycholinguistic skills and to use reading as a means of increasing linguistic knowledge from childhood. With the above facts in mind, it would be unwise to expect these children to be able to perform well in reading tasks like their peers.

Tye-Murray, Spencer and Woodsworth (1995) reported the reading comprehension achievement scores of 29 children with hearing impairment. The findings of the study revealed a depressing performance in reading. In another study conducted by Hassahan and Kauffman (1997) in which they compared the reading comprehension of 15 hard of hearing and 15 with severe to profound hearing loss, the study reported a reduced reading performance. Kirk reported in Abang (2005) that the language development of 26 children in America with cochlear implant were from 2 months to 5 years retarded in speech and language. More recent estimates of reading comprehension achievement are reported by Ugwuanyi (2009) for 35 children with hearing impairment in Enugu State Nigeria. The author reported that the reading comprehension achievements of these were below frustration levels. Ugwuanyi and Onu (2011) reported for 40 pupils with hearing loss on reading comprehension achievement using American and local sign language models in Enugu State – Nigeria, revealed poor performance especially for those exposed to American sign language mode. Ugwuanyi, Onu, Eskay, Obiyo and Igbo (2012) reported the effect of remedial reading instruction on word recognition for inclusive education in Nigeria for 20 pupils with reading disability in Nsukka, Enugu State. Their data revealed mean difference in remedial reading instruction on word recognition.

Depressing as these findings are, there is clear evidence that reading comprehension achievement test scores overestimate the actual psycholinguistic functioning level of CHI. Children with hearing impairment are those in which the sense of hearing is defective that makes the awareness of sound impossible to hear. Their inability to hear sound well enough affect their reading ability. There is no doubt that the social and personality of these children would also be affected. It must be emphasized that reading is the basis of all academic subjects within the educational setting and as such constitutes the fulcrum on which academic performance pivot. Yet a large number of children with learning problems especially those with hearing loss are finding it difficult to read resulting in poor achievement in schools.

However, literature evidence advocates that teaching skills such as auditory training facilitates the acquisition, interaction and recalling information and therefore, improves reading comprehension among CHI. Auditory Training (AT) means teaching children listening skills. Children with hearing impairment need to develop skills in using auditory information to acquire language. Apart from reading, these children need to learn to use auditory skills to be able to perform a variety of functions such as safety travels, reaching out, identifying people, as well as communication. Durkel (2013) emphasized that auditory skills development, just like visual skills, requires well-thought-out instruction that is provided regularly and consistently throughout the child's school career. This is because a child requires a unique blend of abilities in the areas of hearing, thinking, visual and communication to enable him do well in his chosen career.

The American Speech – Language – Hearing Association (2005) explains that auditory training uses electronically modified music and language to stimulate the auditory pathways and enhance auditory mental plasticity to assist and enhance auditory processing ability. Devices such as hearing aids or cochlear implant are useful and make auditory training possible, their fitting hearing aids or cochlear implant are quickly followed with auditory training which may require the use of total communication (TC) and other communication techniques to receive language because inserting implant is not enough to learn language. Bellis, (2004) perceives auditory training as teaching the brain to listen by providing auditory stimuli and coaching that help one learn to identify and distinguish among or between sources. The goal of auditory training according to Durkel (2012) is to help a student discriminate sounds in order to gain meaning from the sounds he hears. This implies helping the child to use speech and using speech requires that such child would be able to make very fine discriminations of pitch of each sound, loudness and timing. To be able to do this, the child requires to hear the speech of others well enough to imitate it and hear his own speech well enough to monitor its intelligibility. A child monitors his speech and makes appropriate fine discriminations when he receives appropriate verbal response. We should have this in mind that auditory training is about teaching a child to make appropriate fine and gross discriminations of sounds. A fine discrimination is the ability of the child to distinguish between sounds 'r' like the first sound in 'run' and 'f' in *fun*, *good* and *food*, *sun* and *fun* while gross discrimination of sounds is the ability of the child to recognize absolute quiet from very loud sound as in the car horns, motorcycle horns

honking, and gun shots. Apart from recognizing the above sounds as signaling danger other sounds like knock at the door or door bell ringing, telephone ringing and alarm clock or town cries and morning criers are all have meaning in our world today. Also, the sounds of music, rocking of keys, crying, siren, ticking of wall clock, bouncing a ball and banging are all used in auditory training and these can be tied to real life situation and functional activities for the child anywhere.

Recently, a good number of studies that investigated the efficacy of auditory training on reading comprehension achievement of CHI have been reported. For instance Battin, Young and Buins (2000) examined the clinical files of 15 children diagnosed with central auditory processing disorder and subjected to fast forward (FFW) language. Their findings showed that children's language acquisition increased significantly after training. Tallah (2000) examined 51 children diagnosed with Auditory Processing Disorder (APD) using tests of their choice, revealed significant improvement on standardized language measures after training. Wartz and Hall (2002) reported from four case studies of children aged 8 to 12 with APD. The children exposed to auditory training using FFW. The studies revealed an improved measures of receptive language and phonological awareness but not in expressive languages. Hook, Macaruso and Jones (2001) exposed children who had poor reading skills to FFW, observed some gains in the children. Pokorni, Worthington and Jamison (2004) treated children with reading and language difficulties using FFW, Earobics and the Lindamood Phonemic Sequencing Program (LIPS). The findings showed that the Earobics and Lips groups improved significantly on some phonemic awareness measures whereas the FFW group did not. The problem of this study is that no studies exist that have dealt with the effect of auditory training on reading comprehension of children with hearing impairment in Enugu State in Enugu. The study also sought whether there was difference in the use of AT to acquire language by gender.

To guide the present study properly, two research questions and two hypotheses were raised thus:

1. To what extent do the mean achievement scores in reading comprehension of CHI depend on the use of AT?
2. What is the interaction effect of gender and AT in the mean achievement scores in reading comprehension of CHI?

The two null hypotheses tested at 0.05 level of significance are:

- H₀₁: There is no significant difference in the mean achievement scores in reading comprehension of CHI who were exposed to AT.
- H₀₂: There is no significant interaction effect of gender and treatments on the reading comprehension of CHI as measured by their pre-test and post-test achievement scores on Reading Comprehension Test (RCT).

Method

Design of the Study

This study adopted a quasi experimental design which sought to determine the effect of experimental groups receiving treatment on AT. It is a pre-test and post-test design with all the children exposed to treatment using AT on reading comprehension of CHI.

Area of the Study

The study was conducted in Awgu and Enugu Education Zones of Enugu State. The Awgu and Enugu Education Zones were chosen because two primary schools for deaf are located in the zones.

Population

A total of all 33 children with hearing impairment in primary 5 classes in Enugu State primary school for the deaf. 17 children from primary school for the deaf from Oji (Awgu Zone) and 16 children from primary school for the deaf in Ogbete (Enugu Zone) were brought together for training in Enugu.

Sample and Sampling Technique

The sample for the study were 33 children with hearing impairment in primary 5 classes in the two primary schools for the deaf in Enugu State, 24 of the children were males while 9 were females. In their case files, 11 children had conductive hearing loss, 12 had sensory ineural hearing loss while 10 of them had mixed hearing loss. Because the population size was small and manageable, the entire population was used as the sample.

Procedure

The Ling Six Sounds Test was presented to the respondents voiced in the trainer phrase, say it again. The Ling Six Sounds Test is used purposely to ascertain the children ability to discriminate speech sounds. The six sounds were used because they have both low and high frequency speech. The six sounds used in the study were the sounds of *a* as in *bark*, *u* as in *moon*, *e* as in *we*, *week*, *sh* as in *short*, *shoe*, *s* as in *soon*, *sun*, *suck* and *m* as in *mock*, *mother* and *mom*. 12 words were practiced each day for two weeks. The children were divided into three groups for practice. Each group was given words to practice under the guidance of the researcher and three research assistants. All the words selected for practice were taken from the passages used for the actual reading. All the words were repeated for five times daily and voiced in sequential order by the trainers. The words were voiced in a normal conversational manner in frequencies of 500H₂, 1000H₂ and 2000 H₂. Repeated or say again trials occur until the respondents acknowledge understanding of the words and able to differentiate between sounds of words taught.

The actual teaching of reading comprehension began. The importance of the teaching was to ascertain if the children treated with words from the passages would comprehend texts and solve their reading problems more effectively. The researcher was not involved rather the three research assistants who were regular teachers in each of the two schools used. Before the actual study, a pretest was conducted in which Reading Comprehension Test (RCT) was administered to the subjects in the three groups. After the teaching, a post-test of RCT was administered to the three groups. The teaching was conducted in the classrooms and it was held in evening time.

Method of Analysis

The research questions stated for the study were answered through mean and standard deviation while Analysis of Covariance (ANCOVA) was used to test the hypotheses stated for the study.

Results

Research Question 1

To what extent do the mean achievement scores on reading comprehension of CHI depend on the use of AT?

Table 1. CHI Pre-Test and Post-Test Mean Scores and Standard Deviation on Reading Using AT

Experimental Groups	Pre-test	Post-test	Mean Gain Score
Group 1: Mean	6.35	12.67	5.22
N	11	11	
Standard deviation	2.44	0.78	
Group 2: Mean	6.04	13.70	7.66
N	11	11	
Standard deviation	2.50	2.25	
Groups 3: Mean	6.61	14.74	8.13
N	11	11	
Standard Deviation	2.10	2.61	
Total Mean	5.94	13.31	
N	33	33	
Standard Deviation	2.35	2.35	7.35

Note. N = 33

Table 1 above shows that CHI exposed to AT in group one had a pre-test score of 6.35 with a standard deviation of 2.44 while the post-test mean and standard deviation scores were 12.57 and 0.78. The mean gain between pre-test and post-test was 5.22. For group two, the pre-test mean score was 6.04 and a standard deviation of 2.50. While the post-test mean score was 13.70 and a standard deviation of 2.25, the gain score was 7.66. For group three, the pre-test mean score was 6.61 and a standard deviation of 2.10 while the post-test score was 14.74 and a standard deviation of 2.61. They had a mean gain score of 8.13. The results clearly showed that the three group exposed to reading comprehension through the use of AT had slight mean difference. A corresponding hypothesis to further answer this research question one is:

Ho₁: There was no statistically significant difference in the mean achievement scores on reading comprehension of CHI who were exposed to AT. This implied that all the

CHI exposed to reading through the use of AT achieved a measure of reading comprehension. The hypothesis that there is no statistically significant difference is therefore upheld.

Research Question 2

What is the interaction effect of gender and AT on reading comprehension post-test mean achievement scores of CHI?

Table 2: The Post-Test Mean Scores and Standard Deviation of Male and Female Children in Post-Test Mean Achievement Scores in RCT (Treatment X Gender Level)

Experimental Groups	Mean	Standard Deviation	N
Gender			
Group 1: Male	12.25	1.83	8
Female	11.50	1.29	3
Total	10.67	1.72	11
Group 2: Male	14.38	2.39	8
Female	12.50	1.92	3
Total	13.75	2.34	11
Group 3: Male	16.75	2.23	8
Female	13.79	1.00	3
Total	15.73	2.61	11
Total: Male	13.79	3.44	24
Female	12.27	1.49	9
Total	13.31	3.03	33

Results in Table 2 reveal that male children in group one exposed to AT had a lower post-test mean achievement score of 12.25 and a standard deviation of 1.83 than males with 14.35 and 2.39 in mean achievement score and standard deviation in group two. In group three males with a pretest score of 16.75 and standard deviation of 2.23, a little bit above the other groups for females, 11.50 and 1.29 for post-test mean scores and standard deviation lower than those in the other two groups with 12.50 and 1.92 and 13.00 and 1.00 post-test mean scores and standard deviation respectively.

A corresponding hypothesis to further explain research question two is:

There is no statistically significant interaction effect of gender and treatment on reading comprehension of CHI as measured by their post-test mean achievement score on the Reading Comprehension Test (RCT). The analysis showed there was a significant interaction. Therefore, the hypothesis of no interaction effect was rejected.

Discussion

The result of the study showed that the use of AT has a statistically significant effect on reading comprehension achievement of children with hearing impairment. Each group exposed to reading using AT performed well in reading comprehension. This result is in with some earlier findings on the efficacy of auditory training with respect to reading comprehension by CHI. Studies carried out by Tallah (2000), Battin, Young and Bums (2000), and Durkel (2013) provide empirical supports for the findings of the present study. The study carried out by Tallah (2000) conformed that using AT in reading had significant improvement on children's reading comprehension. This is because according to Battin, Young and Bums (2000) children's language acquisition increased significantly after training. For Durkel (2013) AT enable children discriminate sound in order to gain meaning from what they hear.

The findings of the study further revealed that there was a significant interaction effect of treatment and gender on reading comprehension achievement of CHI. The results of the study confirmed that findings made by Wertz and Hall (2002) who revealed significant improvement on reading comprehension of both genders.

Conclusions

From the results of the study, the following conclusions were drawn:

- (1) Teaching through the use of AT facilitated the reading comprehension achievement of children with hearing impairment.
- (2) AT would enable CHI to achieve better in reading and other related school subjects.
- (3) The interaction effect of gender and treatment on reading comprehension of CHI was significant. This implies that both genders achieved equally in reading comprehension.

Recommendations

Based on the findings of the study, the following recommendations were made.

1. Teachers of CHI should be able to use AT to teach the children reading.
2. Institutions that prepare teachers should incorporate in their course contents or units training in auditory training so as to expose both in-service teachers and regular teachers to this technique necessary for auditory training skills.
3. All the children with hearing impairment should be exposed to AT skills, it would improve their reading abilities significantly. It would also help them in reading and understanding other school subjects without much difficulty.

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