EFFECT OF ADAPTED TEACHING AIDS IN IMPROVING SCIENCE CONCEPTS AMONG CHILDREN WITH HEARING IMPAIRMENT

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Abstract : The purpose of this study was an attempt to find out the Effect of adapted teaching aids in improving the science concepts among Children with Hearing Impairment. The study was an experimental method using Pre-test and Post-test Design with the sample of 24 students studying from 6th standard to 8th standard in special school for the deaf and the sample was selected through purposive sampling method. The adapted teaching aids in science concepts were developed by the researcher and taught with them to see the effect on experimental group and control group taught with traditional teaching aids. The data obtained after the instruction was analyzed by Mann Whitney U test. Analysis reveals that the Children with Hearing Impairment in experimental group had improved better in Post test scores than Pre- test score compared to control group. As per the result of the study it is understood that the adapted teaching aids for science concepts have improved the scientific knowledge of Children with Hearing Impairment. It was also found that the Children with Hearing Impairment successfully performed knowledge and skill based experiments independently.

Index Terms - **Adapted teaching aids, Children with Hearing Impairment, Science concept.**

I. INTRODUCTION

Hearing impairment is a generic term referring to any organic hearing problem regardless of etiology or degree. It is a deviation or change for the worse in either structure or function which usually outside the range of normal. Children with hearing loss have difficulty with all areas of academic achievement, especially reading and mathematical concepts. Science (from Latin scientia, meaning "knowledge") is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe [12].

Education of Children With Hearing Impairment : The general/normal children can be getting knowledge through education automatically, but in case of hearing impairment child it can't be possible to acquiring knowledge automatically due to their problem in hearing and speaking. Education is not a privilege, but the basic rights of mankind. Education has a major role in every individual's life. The Hearing Impaired children have difficulty to meet their education due to their disability. They can be establishing for getting their education in different educational centre/school. Such as special school, integrated school, inclusive school, etc [13].

Effect of Hearing Impairment on educational development : Children with hearing loss have difficulty with all areas of academic achievement, especially reading and mathematical concepts. Children with mild to moderate hearing losses, on average, achieve one to four grade levels lower than their peers with normal hearing, unless appropriate management occurs. Children with severe to profound hearing loss usually achieve skills no higher than the third- or fourth-grade level, unless appropriate educational intervention occurs early. The gap in academic achievement between children with normal hearing and those with hearing loss usually widens as they progress through school. The level of achievement is related to parental involvement and the quantity, quality, and timing of the support services children receive [12].

Science education for Hearing Impaired children : Many people believe that the children with hearing impairment cannot learn science. But there is so many scholars who all are deaf got the achievement in the field of learning science subject. It is not essential to omit the science subject from the educational curriculum of CWH problems. Now a days the technology has developed by which an individual without understanding of science concept cannot be imagined whether he/she is hearing impairment or any other disability. Science instruction depends on both hearing and visual instruction, students with hearing impairment may not have difficulty in vision but may have difficulty in constructing abstract concepts because of the lack of hearing input. They need mostly visual, auditory and hand on experience to learn science. To have an understanding of an object, CWHI need to see and read it and this can take longer foe students with hearing impairment than it is for hard of hearing student. They need more visual clues /inputs, which have teacher's major responsibility in providing needs. Various concepts in science can be taught through adapted teaching aids [2].

Adapted teaching aids : A major component of adaptation for Hearing Impaired child is picture. Visual information can be using for adaptations and also visual information useful for general studies in the form of the visual or picture books. The book should be colour full and attractive. Flash card, word chart, picture chart, visual aid and equipment's can be using at the time of learning science for HI student. Adapted teaching aid means the nature of special approaches and presentation / performance style that should be required for providing the appropriate learning experience by which the CWHI can be learn without any barrier in regular class room. It means the adapted teaching aid is fast catching on in the education of hearing impaired children. The use of appropriate teaching aid can be applying the innovative ideas and creativity of the teacher can make learning interesting in classroom. It is a process of the making necessary changes such as duplication, modification, substitution, omission without changing the instructional objectives.

Rationale of the study : Science surrounds us. It is everywhere in our daily lives-all day. Every day, Science as a learning platform to provide programs and the role an understanding of science and the role and impact it has in our lives. Active, hands-on/minds-on experiences, as well as research and problem-solving opportunities, build an understanding of what it means to know science. Doing science develops our ability to ask questions, collect information, organize and test our ideas, problem-solve and apply what we learn. Even more, science is a platform for building confidence, developing communication skills, and making sense of the world around us. Science is inclusive; science education develops confidence and positive self-image for all learners, regardless of culture, gender, race, social class or religious beliefs. Science develops literacy skills such as integral to doing knowing science. Reading, writing, listening and speaking are most essential skills which are comprehending and communicating scientific issues and ideas. Science develops numeracy skills such as sorting and classifying, estimating and counting, measuring, graphing, collecting data and analysing are frequently used when doing science. Even though CWHI use many adapted teaching aids to learn science, they learn only theoretical part of it when compared to the practical aspects. In the field of educating students with hearing impairment mostly agree that the method followed for instructing hard of hearing children can also be applied for students with hearing impairment [10].

[9] conducted a study "effectiveness of adapted experimental aids on learning science for students with visual impairment. The sample comprises up 30 students. An experimental method using pre and post-test design with control group and both dependent and independent variables was used in the study. The tools used for the study questionnaire, rating scale used as per statistical analysis. The result indicated that the visual impairment child had improved in learning skills as well as concept based experiments in all the subject areas of science (7th, 8th, 9th standard).

[14] conducted the study of the "effect of curriculum adaptation in learning biological science at secondary level students with hearing impairment". The sample comprises up 67 children, out of which 44 are boys and 23 are girls studying in 8th class and the research design selected for study is quasi-experimental design with one group pre and post-test. The tools used for this study is teacher made test for pre and post-test. As per statistical analysis it has concluded that adapted curriculum was positively affect learning of biological science in secondary level.

Objectives of the Study
- To develop adapted materials and aids for CWHI in learning science concept.
- To facilitate the developed aids and materials for CWHI in learning science concepts.
- To find out the effect of adapted teaching aids in improving the science concepts among CWHI.

Hypotheses of the Study
- H1 : There will be no significant difference between pre and post test scores of control group
- H2 : There will be no significant difference between pre and post test scores of experimental group

II. METHODOLOGY
The investigator adopted experimental method using pre- test and post- test design to study the Effect of adapted teaching aids on improving the science concepts among CWHI. The sample consisted of 24 students with hearing impairment studying 6th, 7th, and 8th standard selected for the study by using purposive sampling method under non-probability technique, and divided into two groups as experimental (12) and control group (12) based on the pre-test scores of TMT developed by the researcher. The researcher has developed a tool named as TMT to find out the effectiveness of the developed adapted teaching aids in science concepts.

Data collection procedure : The sample for present study was selected purposively from special and inclusive schools. The researcher got consent from the selected sample and heads of the institutions to gather relevant data. To clear the doubts to the students with hearing impairment on science concept, sign language interpretation service also provided.

III. DATA ANALYSIS AND DISCUSSION
The data has been analysed based on the variables set for the study. The data was quantitatively analyzed with the use of percentage (%), mean scores, standard deviation and Mann-Whitney "U" test.

H1 : There will be no significance different between pre and post test scores of control group.
To finding out if there is no significant difference in between pre-test and post-test scores of control group improving science concept among CWHI, the researcher used Mann-Whitney "U"- test to compare pre-test and post test scores of control group.

Table 1 : Mean, SD, Mann-Whitney value and Level of significance value of Pre-test and Post-test in control group

Mean, Std. Deviations, Mann-Whitney value and Level of significance							
Control Group	N	Mean	Std. Deviation	Mean Rank	Sum of Ranks	Mann- Whitney U	Sig. (2- tailed)
Pre-Test	12	6.66	1.30	8.5	80	0.000	1.00
Post-Test	12	12.00	1.70	9.00	144		

The above table describes the analysis of pre-test and post-test mean scores in control group. The pre and post-test mean and SD were 6.66, 1.30, 12.00, and 1.17 of control group. The mean rank and sum of ranks were 8.5, 80, 9.00, and 144 of control group respectively. The Mann- Whitney U test was applied to find out whether the pre-test and post- tests mean scores differ significantly in control group. The calculated Mann-Whitney U value is 0.000 with the significance level of 0.05 and significant value is 1.000. The Mann Whitney U value with 12 degrees of freedom at the significance level of .05 is 37.since the calculated Mann Whitney U value (0.000) is less than the table Mann Whitney U value (37). Hence the null hypothesis can be rejected and alternate hypothesis can be accepted. Thus there is a significance difference between pre-test and post-test in control group.

H2 : There will be no significance different between pre and post test scores of experimental group.
To finding out if there is no significant difference in between pre-test and post-test scores of control group improving science concept among CWHI, the researcher used Mann-Whitney "U"- test to compare pre-test and post test scores of experimental group.

Table 2 : Mean, SD, Mann-Whitney value and Level of significance value of pre-test and Post-test in Experimental group

Mean, Std. Deviations, Mann-Whitney value and Level of significance							
Exp. Group	N	Mean	Std. Deviation	Mean Rank	Sum of Ranks	Mann- Whitney U	Sig. (2- tailed)
Pre-Test	12	8.08	2.35	3.5	97	0.000	0.317
Post-Test	12	13.25	1.71	6.5	159		

The above table describes the analysis of pre-test and post-test mean scores in experimental group. The pre and post-test mean and SD were 8.08, 2.35, 13.25 and 1.71 of experimental group. The mean rank and sum of ranks were 3.5, 97, 6.5, and 159 of experimental group respectively. The Mann- Whitney U test was applied to find out whether the pre-test and post- tests mean scores differ significantly in experimental group. The calculated Mann-Whitney U value is 0.000 with the significance level of 0.05 and significant value is 0.317. The Mann Whitney U value with 12 degrees of freedom at the significance level of .05 is 37.since the calculated Mann Whitney U value (0.000) is less than the table Mann Whitney U value (37). Hence the null hypothesis can be rejected and alternate hypothesis can be accepted. Thus there is a significance difference between pre-test and post-test in experimental group.
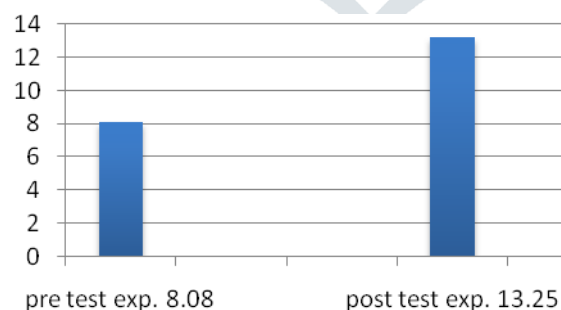

Figure - 1: Mean value of Pre and Post- test of experimental group

IV. MAJOR FINDINGS OF THE STUDY
- The result of analysis showed that there is no much significant difference between the Pre and Post- test scores among the control group in learning skill based and concept based experiments in science subject. It shows that the CWHI in control group had improved in post test scores than pre- test scores but not much difference found.
- The result of analysis showed that there is a significant difference between the Pre and Post- test scores among the experimental group in learning skill based and concept based experiments in science subject. It shows that the CWHI in experimental group had improved in post test scores then pre test scores. Hence it resulted that the adapted teaching aids

of teaching science showed the improvement in science concept among CWHI. The same results have been observed by [14].

- So, it is inferred that adapted teaching aids have impact on teaching science concepts among CWHI.

V. CONCLUSION

Science subject is one of the major subjects in school curriculum which consist of more practical oriented experiments. Hence science seems to be complicated subject for CWHI. More adaptation has to be made in order to make the CWHI to understand the concept of science experiments. Using of adapted teaching aids for children's with hearing impaired, they will be able to understand the concept of particular science subject without any confusion. The CWHI will get the clear information about science subject. By using adapted teaching aids CWHI can realize the nature and impact of science. So, it is recommended to use adapted teaching learning material as much as possible to teach science concepts to Children with Hearing Impairment.

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