Student Research at AIISH

A compendium of research articles based on postgraduate dissertations at the All India Institute of Speech and Hearing, Mysuru

Vol.13

Part - C

Special Education

Editors

S. R. Savithri

G. Malar

All India Institute of Speech and Hearing

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FOREWORD

The All India Institute of Speech and Hearing, Mysuru is bringing out the thirteenth volume of the full length articles based on the dissertation work done by our post graduate students in part fulfilment of their PG degrees in Audiology (Part A), Speech-Language Pathology (Part B) and Special Education (Part C) during the year 2014-15. M.S.Ed. (HI) programme had seven candidates enrolled in the year 2014-15.

The articles focus on diverse issues pertinent to the contemporary field of special education for individuals with hearing impairment. They report valuable evidences necessary for implementing effective instruction across educational life of a child with hearing impairment right from preschool preparation to post-school transition. They also shed light on other aspects of import like impact of early communicational skill development on learning, teacher capabilities, and adequacy of learning environs among others.

The titles of these articles are the titles of dissertations submitted to University of Mysore. The first authors are the M.S.Ed. (HI) students of 2014-15 batch and the second authors are their respective guides who are the faculty of AIISH. The guides have edited the papers submitted by their respective student/s to bring them to the present form.

This volume will be uploaded to AIISH Digital Library portal for use by one and all, like all the other in-house publications of AIISH. You may please visit our websites www.aiishmysore.in or aiish.ac.in for the same. You are also requested to e-mail your valuable feedback about this volume to director@aiishmysore.in with the subject 'Students Research Volume XIII – 2014-15: Part C'.

Prof. S. R. Savithri
Director

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Survey of Competency of Special Educators in Accessing and Interpreting Information from Clinical Reports

Radhakrishnan, K. V.[1], Odunavar, S. N.[2], & Mamatha, N. M.[3]

Abstract

Special education is instruction that is specially designed, keeping in mind unique needs and individual differences of differently-able learners (IDEA, 2004). Providing this involves a multidisciplinary team consisting of various professionals among whom special educators play a very crucial role. They determine the eligibility of a student for receiving special educational services. For this they compile information about the child with clinical reports serving as an important tool by providing information about the case history, diagnosis of the disability, results of medical tests, etc. The current study was conducted to check the competency of special educators in accessing and interpreting the information from clinical reports. It was carried out by taking two groups of special educators, one group (21) from All India Institute of Speech and Hearing (henceforth referred to as AIISH), Mysuru and another group of special educators (25) from eight other institutions in Mysuru. A validated questionnaire was prepared based on the clinical reports of communication disorders which included the domains of audiology, speech-language pathology, clinical psychology and general information, and was administered on the special educators. The results indicated that special educators from AIISH scored significantly higher than special educators from other institutions. It was seen that special educators from other institutions fared poorly across all domains of clinical reports especially in general information. It was concluded that the probable reason for the better performance of AIISH special educators could be due to following multidisciplinary approach for providing special educational services, continuous interaction with other professionals while discussing different cases and their clinical reports, and thus learning functional utility of clinical reports.

Keywords: special education, clinical reports, interpretation, special educators

Introduction

Special educators are professionals who teach students with special needs keeping in mind that the instruction should address their individual differences and requirements. Successful rehabilitation of children with special needs (henceforth referred to as CWSN) requires a multi-disciplinary approach involving various professionals like clinical psychologists, audiologists, speech-language pathologists, paediatricians, and special educators among others; who are crucial for catering to rehabilitation needs arising out of communication disorders. They determine whether the child is eligible to receive special education services available for them. Then rehabilitative plans such as Individualized Education Program (IEP) or Curriculum Support Services (CSS), etc. are planned (Information from Department of Special Education, AIISH, Mysuru, 2014; AASEP, 2006; Toth, 1999). To provide an effective plan, the assessment of the child's abilities across various domains should be accurate and for this clinical reports and medical records are imperative tools. Clinical reports provide details of the identity, current condition, case history, type and severity of the disorder, referrals and recommendations made by various professionals, etc.; which in turn provide an insight to a special educator about the child's present condition and gives an idea of further intervention required to help the child's progress. Thus it is important for a special educator to have a good understanding of the content of the clinical reports, and also have the ability to form appropriate reason to back their decisions on the basis of the information deduced from the medical reports (Salvia, Ysseldyke, & Bolt, 2009).

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This study was aimed towards measuring the competency of special educators in accessing and interpreting the information from clinical reports. Based on the results it was deduced whether there was judicious use of the information provided in the clinical reports. In case it was found that there were discrepancies in the use of information from clinical reports, then the reasons behind it and solutions for same have been discussed.

Method

The method of this study was broadly divided into four phases:

Phase I: Selection of participants – special educators

Phase II: Preparation of material – questionnaire

Phase III: Administration of questionnaire and collection of data

Phase IV: Analysis of data

Phase I: Selection of participants – special educators

Two groups of special educators were taken for the study which consisted of 21 special educators from AIISH Preschool and 25 special educators from eight schools for CWSN in Mysuru. All the special educators had minimum qualification of at least one-year diploma course related to special education and minimum work experience of at least two years. Purposive sampling technique was used for selection of special educators.

Phase II: Preparation of material – questionnaire

In order to find the competency of special educators in interpreting information from clinical reports, a questionnaire was developed on the domains of basic terms used in clinical reports especially from the summary report based on provisional diagnosis reported in the clinical reports and their inference. This report is exchanged among professionals when writing referrals. The questions were based on the domains of audiology, speech language pathology, clinical psychology and general information. The development of the questionnaire underwent the following stages –

(1) preparation of tentative questionnaire; (2) validation of questionnaire by experts; (3) carrying out pilot study; and (4) finalization of questionnaire.

In the first stage a tentative questionnaire was prepared with questions based on basic terms used in provisional diagnosis and their interpretation. Around 25 summary reports of CWSN with disabilities like hearing impairment, cerebral palsy, mental retardation and multiple disabilities were studied and most common terms used were noted down. Objective type questions based on these terms and their inferences were prepared with the answer key and scoring pattern.

In the second stage, the tentative questionnaire was then given for validation to a team of experts for their opinions, corrections and suggestions. The experts were individuals who had completed their doctoral studies in their respective fields and are working as faculty in AIISH, Mysuru in the departments of Audiology, Speech Language Pathology, Clinical Psychology and Special Education. They were provided with the questionnaire and were asked to give their suggestions to correct the mistakes and improve the questionnaire. A total of eight faculty, i.e., two from each department were given the questionnaire for validation. Once the corrections and suggestions were received, they were incorporated and the modified questionnaire was presented again to the same members and finalized for conducting pilot study.

In the third stage, a pilot study was conducted on five students doing special education courses in AIISH, Mysuru. The age range of the special educator-trainees for pilot study was around 21-23 years. It was observed that it took around 15 minutes to answer the questionnaire and five minutes for evaluation. The average score of the students was around 65%.

In the fourth stage the questionnaire was finalized. It had twenty questions of three types, which were of ‘multiple-choice’, ‘true or false’ and ‘arrange the following’ type questions. There were 13 ‘multiple choice’ questions having four options and the special educators were instructed to tick only one answer among the four. There were four ‘true or false’ questions and the special educators were given a statement and were instructed to tick whether the statement was true or false. There were

three 'arrange the following' questions and the special educators were given a set of steps of procedure and were instructed to assign numbers in ascending order of the steps.

The finalized scoring pattern consisted of all questions having one mark each and thus the questionnaire consisted of total 20 marks. For every correct answer one mark was awarded and no mark was assigned for wrong answers. In arrange the following questions; half mark was awarded if there was a mismatch or interchange in only one step.

Phase III: Administration of questionnaire and collection of data

The questionnaire was administered to the special educators in the form of a test. There was no time limit for completion of the test, but it was observed that it took an average of 15 to 20 minutes for completion of the test. The answers were scored and entered into separate columns for special educators of AIISH and special educators of other institutions.

Phase IV: Analysis of data

A total of 46 special educators participated in the survey out which 21 were from AIISH, Mysuru and 25 were from eight other special schools in Mysuru. Each correct response was scored one, and wrong or un-attempted answer was scored zero. Half mark was given in arrange the following question if there was mix-up in only one step. Greater marks in test indicated better awareness level of the special educators about information in clinical reports and their interpretation, and vice versa. The obtained data was statistically analysed using SPSS (Statistical Package for Social Sciences) software version 17.0.

Results and Discussion

The aim of the present study was to investigate the competency of special educators in accessing and interpreting information from clinical reports. To fulfil the aim of the study, the questionnaire developed by the researchers was administered on 46 individuals from AIISH and other special schools in Mysuru. The analyses of responses obtained from the special educators on awareness about the information found in clinical reports and their inferences were done using the afore-mentioned statistical software.

The analysis commenced with administering Shapiro-Wilks test and results showed that the scores of both groups followed a normal distribution curve. It was then followed by descriptive statistical analysis to compute the mean and standard deviation of the data obtained from both groups; and independent two-sample t-test to determine whether mean scores of the two groups of special educators were significantly different from each other.

Comparison of performances of special educators of AIISH and other institutions

The special educators of the survey were in two groups, 21 special educators from AIISH special preschool and 25 special educators from eight other special schools in Mysuru. Figure 1 gives the information about results obtained by special educators from AIISH and other institutions who participated in the survey.

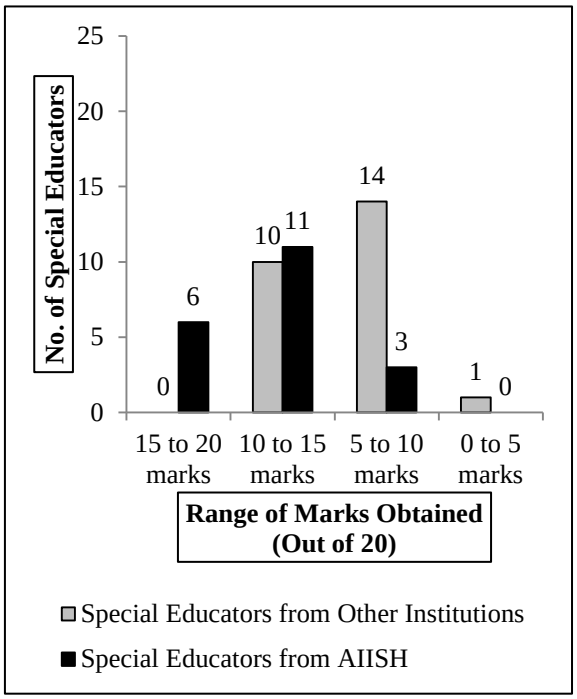

Figure 1. Marks obtained by special educators of AIISH and other institutions.

As it can be seen from the figure 1, majority of AIISH special educators scored in the range of 10-15 marks while majority of special educators of other institutions scored in the range of 5-10 marks. It was seen that the highest score obtained among the AIISH special

educators was 18 and the lowest score was seven. The highest score obtained among special educators from other institutions was 14 and the lowest score was four.

Descriptive comparison of performances of special educators

The performance of the special educators of AIISH and other institutions based on the results obtained by administering the questionnaire was assessed using descriptive statistics and the results are shown in table 1.

Table 1. *Mean scores of special educators of AIISH and other institutions*

Group of Special Educators	N	Mean	Std. Deviation
AIISH	21	13.90	3.04
Other Institutions	25	9.64	2.54

In table 1, it is observed that there is a difference of 4.26 among the means of both groups, which is about 21.3%. It is seen that AIISH special educators have scored more than special educators of other institutions. To verify further whether the advantage was significant, independent two-sample t-test was administered.

Inferential comparison of the performances of the special educators

An independent two-sample t-test was used to compare the scores of the special educators from AIISH and other institutions. The results are shown in table 2.

Table 2. *Comparison of performances of special educators of AIISH and other institutions*

Group of Special Educators	N	Mean	Std. deviation	t (df 44)	p value
AIISH	21	13.90	3.04	5.17	0.00*
Other Institutions	25	9.64	2.54		

* Significant at 0.01 level

From table 2 it is seen that there is significant difference ($p < 0.01$) between the results of both groups, and special educators of AIISH have scored significantly higher than the special educators of other institutions. Hence, it is evident that AIISH special educators were better competent when compared with special educators from other institutions in accessing and interpreting information from clinical reports.

To further emphasize the areas where the special educators performed poorly, a domain-wise analysis was conducted. The questionnaire included questions having components from four domains which were related to audiology, speech-language pathology, psychology and general. The general components consisted of knowledge about referrals to other professionals, purpose of summary report and choosing a mode of communication for children with communication disorders. There were eight components from audiology, four from speech-language pathology, five from psychology and three were general. The comparative performances of special educators of AIISH and other institutions in the different domains are shown in figure 2.

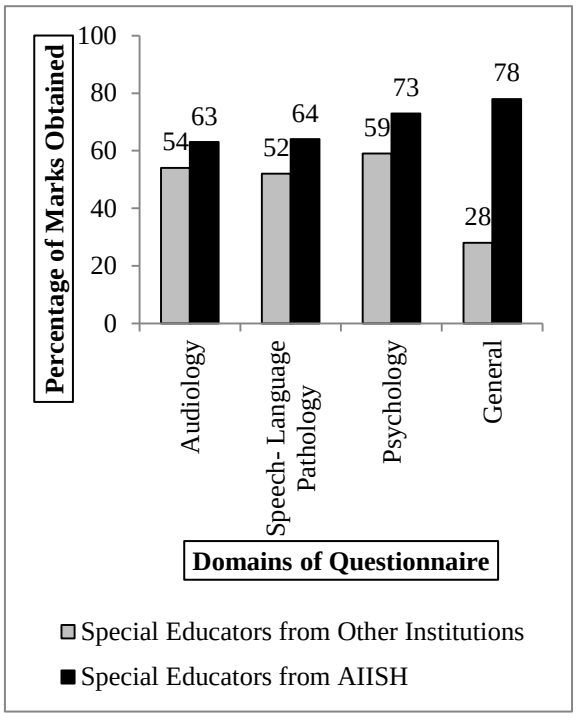

Figure 2. Comparison of performances across different domains.

It is seen from figure 2 that AIISH special educators have scored comparatively high on all the domains, especially in the general section. It is also seen that the special educators from

other institutions have scored considerably well in components related to psychology, but they have scored low in the general domain. Some of the reasons which may explain the results obtained are that the rehabilitative services provided at AIISH are multidisciplinary in nature, where there is an effective collaboration among special educators and other professionals like audiologists, speech-language pathologists, clinical psychologists, etc. There is constant exchange of information among these professionals regarding various cases where they discuss findings of various clinical assessments like audiological, speech and language evaluation, psychological assessment, etc. There are regular follow up sessions after every six months. All this information is treated with high level of importance while deciding the eligibility of child to enter preschool setup and receive special education. The clinical reports are also referred while making periodical educational goals, plans, and carrying out evaluation, and while promoting a child to a higher-ability group. Thus we see that special educators of AIISH are exposed to functional usage of clinical reports on a regular basis.

Whereas the special educators of other institutions although providing rehabilitative services have lesser exposure to multidisciplinary team approach, and thus lack functional understanding of clinical reports and the use of referrals. It is seen that the practice of referring clinical reports for eligibility, planning and evaluation of special educational services may not be followed strictly. During the data collection period, the researchers could perceive that many special educators from other institutions reported difficulty in understanding information in English language. But it is a fact that clinical reports provided by majority of healthcare institutions and professionals are in English language. It was also observed that many times children were admitted in the special school setup with the screening level evaluation and not diagnostic evaluation which is officially recommended. Thus the opportunity to refer a detailed clinical report is considerably less for the special educators of other institutions.

The above revelations led to the insight that if special educators from other institutions are provided an opportunity to work in a multidisciplinary team for rehabilitative services along with substantial amount of exposure to clinical reports they might perform on par with special educators of AIISH. Care should be taken to ensure that the information given in clinical reports are provided either in simplified English or in the regional languages so that it is easily understood by the special educators everywhere. The researchers recommend for further improvement through measures like – conducting enrichment programs regarding importance of clinical reports, how to access and interpret the information in them, and apply it in the process of delivering special educational services; conducting orientation programs for special educators regarding importance of multidisciplinary approach and how to consult other professionals of multidisciplinary team; and developing a simple manual translated into different regional languages including a glossary of the technical terms used in clinical reports and how to interpret them. This will serve as a ready reference to special educators when they need to comprehend information provided in clinical reports.

Conclusions

Clinical reports are an important tool for assessment as they provide a whole range of information which are exchanged among special educators and other multidisciplinary team members while deciding eligibility, forming goals, executing plans and evaluation of performance. Hence the present study was conducted with the aim of checking the competency of special educators in accessing and interpreting information from clinical reports. From the results, it was seen that AIISH special educators scored better across all domains compared to other special educators. It was deduced that this could be because of the higher exposure to multidisciplinary approach and functional use of clinical records by AIISH special educators.

The findings of this study further imply that there is an impending need for obligatory implementation of multidisciplinary approach to provide special educational services in all institutions; while enhancing functional exposure and use of clinical reports to special educators of other institutions in Mysuru and elsewhere. In the process it is necessary to

address the issue of language barrier in accessing and interpreting clinical reports by special educators teaching in regional languages across the country.

Acknowledgements

The authors express their sincere thanks to Dr. S. R. Savithri, Director, AIISH for providing them the opportunity to carry out this study. They are grateful to Dr. C. D. Santosha for his valuable inputs and guidance in carrying out the statistical analysis. They are thankful to all the students of AIISH, special educators of AIISH Preschool and other institutions who participated in the survey. They wish to thank the staff of Departments of Clinical Services and Electronics, and Library and Information Centre for their support; and everybody who has directly or indirectly helped them in conducting this study.

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A Survey of Teachers' Knowledge about Hearing Impairment and Referral Services

Lakshmi Prabha, J. K.[1], & Palnaty, V.[2]

Abstract

The concept of education has changed over the time for children with hearing impairment. The trend at present is to include children with hearing impairment alongside typically developing children and modify the schools to suit the individual requirements. If children with hearing impairment have to be educated, either teachers' in general schools should be equipped to teach them or at least should be able to refer them to an appropriate referral center. The current study aimed to explore knowledge about hearing impairment, referrals and training among general school teachers in Ooty, Nilgiris district, Tamil Nadu. A twenty-item questionnaire was developed by the researchers based on the earlier literature which can be administered in about 10-15 minutes. It was designed to elicit information about knowledge of referrals and training related to hearing impairment. Convenience sampling technique was used to select the sample. The study included 100 general teachers of both genders from varied backgrounds like government, private and aided schools; educational qualification; and years of work experience. The results indicated that general teachers are in support of educating children with hearing impairment in general schools and consider making appropriate referrals as their responsibility. However, due to lack of training and skills, not all teachers are confident in teaching children with hearing impairment. The study emphasizes that in order to promote inclusive education, it is necessary to facilitate knowledge and skills in general school teachers to handle children with hearing impairment.

Keywords: children with hearing impairment, referral service center, general teachers, inclusive education

Introduction

Education plays an important role in shaping one's life. It is a process of discovering new things to increase the knowledge. It helps one to adapt to ever changing world and to grow both personally and socially. It helps one to contribute productively to the society. In this context, education is important for all children irrespective of their ability, disability, gender, caste, etc. Government policies, like free and compulsory education for children in age group 6-14 years according Right to Education Act (2009), emphasize provision of education to all children. This holds true for children with special needs such as children with hearing impairment, mental retardation, cerebral palsy, visual impairment, and other disabilities. Education is even more important for these children as it helps them to overcome the challenges arising out of their disabilities.

In olden days, education for children with hearing impairment (henceforth referred to as HI) was generally neglected. However, major scientific as well as socio-political changes around the world brought in gradual changes in the attitude towards them and slowly the society started realizing the importance of educating them. Hence, initiatives were taken to educationally rehabilitate them. Since 1960's there had been efforts to integrate them in mainstream schools as a stepping stone towards later social integration. The trend at present is to include children with HI or any other disability in general schools and modify schools to suit the individual requirements of these special children.

Inclusive education not only benefits children with special needs but all other children in the classroom. It allows them to develop individual strengths, work on individualised goals while participating in the life of the classroom with other students of their own age, to learn and accept individual differences. An essential component for success in inclusive education is the general teachers' knowledge, awareness and confidence to handle the children with special needs. Understanding the implicit and explicit

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characteristics in teachers is an important precursor for improving teaching practices for children with special needs (Levins, Bornholt, & Lennon, 2005).

Need and importance of the study

In formal setups, teachers are the professionals who disseminate the knowledge in schools. They are the key members available on a large scale to impart education. If a child with HI has to benefit, either teachers in general schools should teach them through effective means, or at least they should refer the child with HI to appropriate rehabilitation centers. This would enable children to progress and develop faster. The efficiency with which a teacher can refer a child with HI depends on whether he or she has knowledge about where or to whom children with HI should be referred to. Some of the other factors include previous experience related to children with HI, exposure during teacher training to handle children with HI and the belief that even children with HI can be educated. Due to lack of awareness, not all the teachers are comfortable in referring child with HI. Keeping this in view, the researchers were interested to know as to how many of the teachers are aware about the factors mentioned and have knowledge regarding rehabilitation centers involved in delivering interventional services to children with HI in their surroundings.

The ease with which teachers can make referrals will help children with HI in availing appropriate special educational support services as early as possible without any wastage of time. Contemporary research on teachers' knowledge has focused only on teachers' responses to the inclusion of children with HI in general schools. However, there has been little available research evidence examining teachers' fundamental knowledge about referrals to be made. Therefore, the present study is taken up to explore teachers' knowledge about HI and relevant referral services.

Objectives of the study

The objectives of the study were to – (1) explore teachers' knowledge about HI; (2) find the differences between male and female teachers' knowledge about HI; (3) find the differences among government, private and aided school teachers' knowledge about HI; (4) find the differences between graduate and postgraduate teachers' knowledge about HI; (5) find the differences between teachers' knowledge about HI based on their years of work experience; (6) find out teachers' knowledge about referral services for children with HI; and (7) explore the details of training received in HI by teachers.

Operational definition

***Referral service centers*:** In the present study, this term refers to any hospitals, early intervention centers, special schools, local hearing clinics, and government and non-government organizations working for the rehabilitation of children with HI.

Method

Participants

As per 2014 statistics and information available at the Department of Education of Nilgiris district in the south-Indian state of Tamil Nadu, there were a total of 124 schools and in Ooty block there were 51 schools. This information was collected by one of the researchers personally. Among these 51 schools, 10 schools were selected based on convenience sampling. All the teachers in ten schools were included as samples for the study.

Table 1. *Number of teachers working in the selected schools*

Identification Number of Selected Schools	Number of Teachers from Each School
1	8
2	7
3	9
4	8
5	17
6	16
7	8
8	9
9	4
10	14
Total	100

Number of teachers from each school who participated in the study has been presented in

the table 1. In total, 100 teachers working in 10 selected schools in Ooty Block, Nilgiris district participated in the study.

Tool

For the purpose of collecting necessary data the researchers had developed a questionnaire consisting of four domains namely demographics, knowledge, referral and training. Number of questions under each domain has been given in table 2

Table 2. *Domains and number of questions*

S. No	Domains	No. of Questions
1	Demographics	3
2	Knowledge	7
3	Referrals	5
4	Training	5
	Total	20

The questions in the questionnaire were of two types – qualitative and quantitative. All the questions under Demographics, Referrals and Training domains were qualitative in nature, i.e., there were no correct or incorrect answers for them, but were included to gather information. However, knowledge domain consisted of seven questions which were quantitative in nature, i.e., the responses could be categorized either as correct or incorrect answers.

Procedure

The study was conducted in two phases. First phase included preparing the questionnaire and second phase included administering the questionnaire on teachers.

Phase 1

In the first phase, the framework for the questionnaire was designed so as to measure knowledge in various domains through different questions under each domain. The domains were selected based on relevant literature and purpose of the present study. Then questions were framed under each domain based on the information reviewed from relevant literature. The developed questionnaire was given to 10 experts to validate the questions. Based on the suggestions given by the experts necessary modifications were done and the final version of the questionnaire was prepared.

Phase 2

The study was conducted in Ooty, Tamil Nadu. Ten general schools from Ooty were selected based on convenience sampling method. The researchers approached the principals of 10 schools, seeking permission to conduct the study by explaining the importance of the study. Accordingly, a convenient date and time was fixed for administering the questionnaire on teachers. As per the appointment given by the principals of the respective schools, one of the researchers visited each school to administer the questionnaire. Number of questionnaires given to each school varied as number of teachers working in each school was different. In total, 100 questionnaires were given to 100 teachers in all selected 10 general schools and the filled in questionnaires were collected back in person.

Analysis

The questionnaire developed for the present study consisted of four domains namely demographics, knowledge, referral and training. Among these four domains, knowledge domain consisted of seven questions which was analyzed quantitatively, i.e., for every correct answer a score of '1' was given and for every incorrect answer/no response, a score of '0' was given. For remaining domains, responses of each question were qualitatively analyzed and percentages of valid responses for each question were cumulated and have been discussed with reference to appropriate literature.

Results and Discussion

Demographics

Demographic details of the teachers were analyzed based on type of school in which they are working, educational qualification of the teachers and years of work experience. Among 10 general schools selected, two were government schools, three were aided schools and the remaining five were private schools. Among 100 teachers, 26 teachers were from government setup, 34 were from aided schools and the remaining 40 teachers were working in private schools. Majority of the teachers, i.e.,

73% were post graduates, 26% of teachers were graduates, and only one teacher was diploma holder. Forty-one percent of teachers had less than or equal to five years of work experience, 25% between six and 10 years, 10% between 11 and 15 years, and 23% had more than 15 years of experience. Hence, teachers having less than or equal to five years of work experience are more in number in the present study.

Knowledge

The first objective was to explore teachers' knowledge about HI. It was found that 47% of the teachers' responses were correct while 53% of their responses were wrong indicating lack of adequate knowledge about HI among the teachers as shown in figure 1.

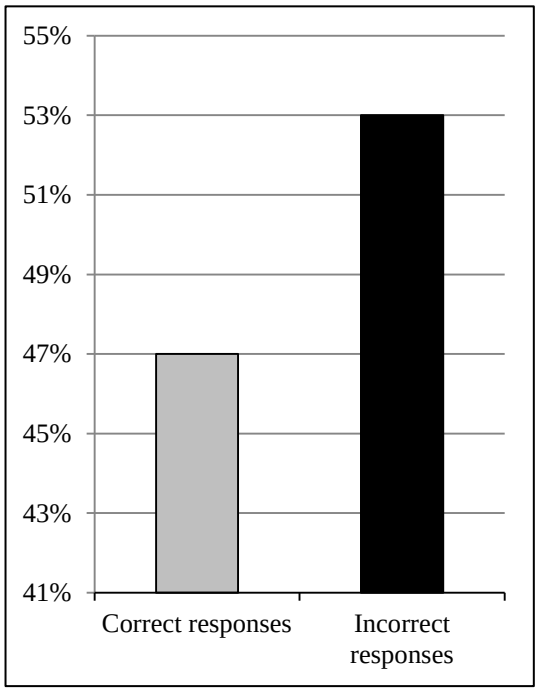

Figure 1. Teachers' responses in the knowledge domain.

Majority of them were aware about the basic problems with respect to HI. Despite lack of knowledge about HI, teachers were positive about children with HI being educated in general schools.

This finding is in accordance with the findings of Gangadharan and Malar (2010) which revealed that mainstream teachers did not have adequate knowledge to handle children with HI. Similar results were reported by Brophy and Whittindham (2013); and Dapudong (2014).

Gender differences

The second objective of the study was to find the differences between male and female teachers' knowledge about HI. Percentage scores were calculated in order to find out the differences between the scores of male and female teachers. As per the percentage scores, correct responses given by the female teachers (49%) was more as compared to the male teachers (44%) as shown in the figure 2.

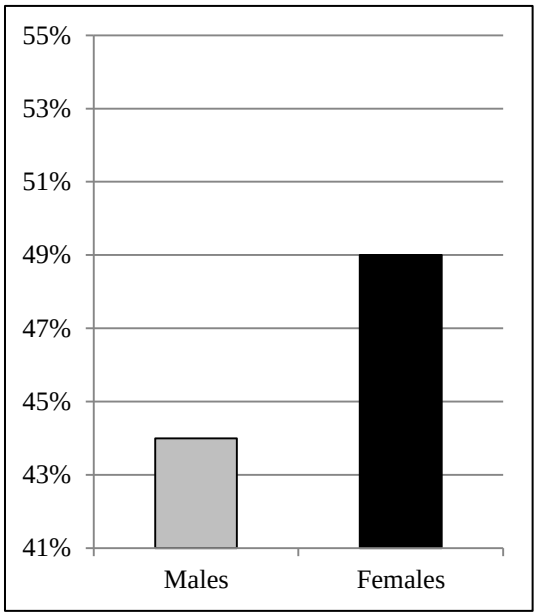

Figure 2. Percentage of correct responses given by males and females.

Similar results were obtained by Prakash (2012) that female teachers show more positive attitudes than male teachers towards inclusive education. Bhe-pajoh (1992); Leyser, Kapperman and Keller (1994); Zyoudi, Sartwai and Dodin (2011) also revealed that female teachers expressed more positive attitudes than male teachers.

School setup

The third objective of the study was to find the differences among government, private and aided school teachers' knowledge about HI. In the present study as per the percentage scores, private school teachers have better knowledge (47%) about HI than the government (40%) and aided school (45%) teachers as shown in the figure 3.

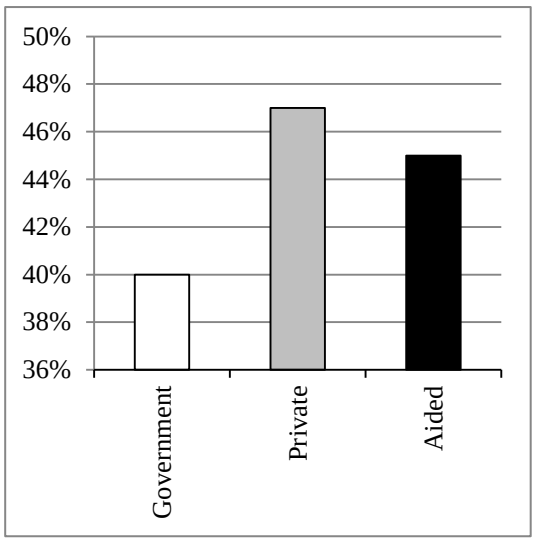

Figure 3. Percentage of correct responses given by government, private and aided school teachers.

Bansal (2013) who investigated the attitudes of teachers towards inclusive education had also reported that private school teachers were more positive towards inclusive education than government school teachers.

Educational qualification

The fourth objective was to find the differences between graduate and postgraduate teachers' knowledge about HI. Percentage of correct responses given by the teachers who were graduates was more than the teachers who were postgraduates as depicted in the figure 4.

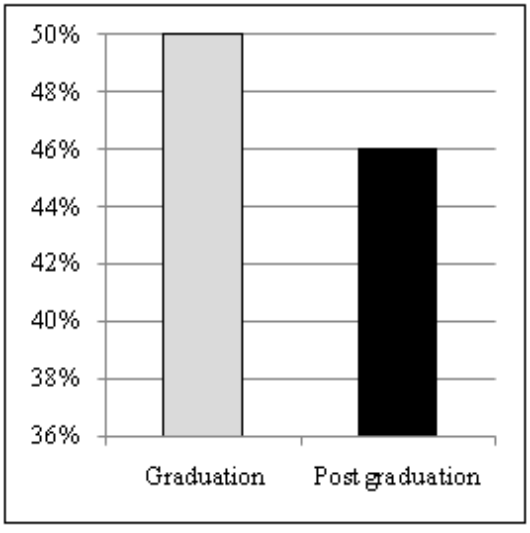

Figure 4. Percentage of correct responses given by graduate and post-graduate teachers.

The results imply that graduate teachers had more knowledge as compared to postgraduate teachers. Similar results were obtained by Avramidis, Bayliss and Burden (2000); and Stoler, (1992) that individuals with higher educational qualification were less positive towards inclusion.

Years of work experience

The fifth objective was to find the differences between teachers' knowledge about HI based on the years of work experience. Teachers were divided into four groups based on their years of work experience: five years or less; 6-10 years; 11-15 years, and more than 15 years. Teachers having 11-15 years of work experience were found to have better knowledge about HI as compared to their counterparts as seen in the figure 5. This finding was supported by the findings of Prakash (2012) which revealed that teachers having increased number of years of work experience are found to be more positive towards inclusion as compared to teachers having less years of work experience.

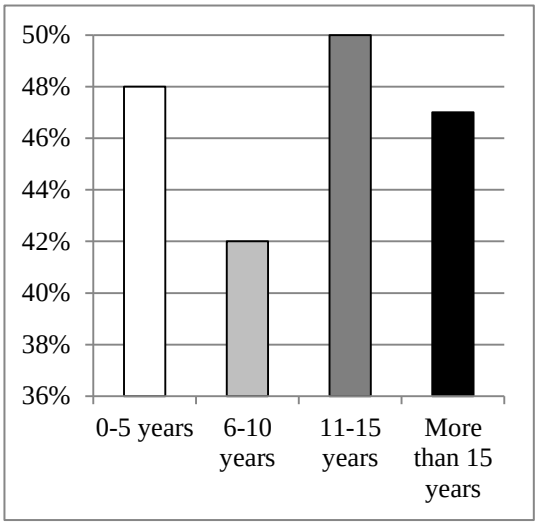

Figure 5. Percentage of correct responses given by teachers with varied years of work experience.

Referrals

The sixth objective of the study was to find out teachers' knowledge about referral services for children with HI. Seventy-five percentage of teachers responded that none of them have a child with hearing loss studying in their schools. Remaining 25% of teachers responded as having children with HI in their schools.

These teachers are from government and aided schools. None of the children with HI were admitted in private schools. It is apparent that children with HI are mostly being enrolled in government and aided schools.

Majority of the teachers, i.e., 74 teachers felt it was their responsibility to refer a child with hearing loss to appropriate service centers which reveals the concern of teachers for children with HI. Everling (2013) also reported that teachers have positive attitudes and concerns about inclusive education.

Majority of the teachers in the present study were aware about nearby referral service centres for children with HI. Despite teachers being aware about referral service centres, 91% of teachers had never referred any child with HI as several of them never had children with HI in their classes. This might be due to many reasons such as parents of children with HI not being aware that these children can also be educated in general schools; children with HI might not have been trained to get admission directly into general schools; and teachers not being aware that as per government policy these children have to be given admission in general schools.

Training

In the present study more than 75% of teachers had not received any fundamental training to handle children with HI. Deluca, Tramontano and Kett (2014) reported that teachers were positive, but they lacked necessary training to handle children with special needs and there is a need for training. Keith and Ross (1997) also highlighted the need for adequate training and support for teachers to implement inclusive education.

Ninety-five percentage of teachers expressed their need for training. Johnson (1996) also emphasized that teachers are enthusiastic about their participation in inclusion process, but lack of training do not allow them to participate in inclusion. Nayak's (2008) findings also revealed that teachers are ready to face challenges in inclusive setups. Among 95% of teachers, 33% of teachers wanted to be trained by the experts in the field of HI during vacation in their own schools. Among 100 teachers, only seven teachers expressed more specific interest in learning and indicated areas in which they required training with respect to children with HI. This is in accordance with the opinion expressed by Loreman, Earle, Sharma and Forlin (2007) that teachers have more positive attitudes towards inclusive education and were more convinced about implementing inclusive practices, but on the other hand they were less concerned about practicing inclusion. There might be many reasons such as lack of relevant pre-service and in-service training, misconceptions of teachers about the educational placement of children with HI, lack of confidence of teachers to handle the children, no extra incentives, severity of the problem, and increase in workload among others.

Conclusions

The findings of the present study suggest that teachers are in support of educating children with HI in general schools. They are also aware of the problems of children with HI. Teachers have knowledge to make appropriate referrals. However, due to lack of training and skills not all teachers are confident in teaching children with HI. It is suggested in future, that similar studies can be extended to all the regions in Nilgiris district and elsewhere to generalize the findings. A survey of other stakeholders' knowledge about HI such as school administrators, parents, etc. can also be taken up.

Acknowledgement

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Survey of Accessibility to Students with Hearing Impairment in Inclusive Educational Set-Ups

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Abstract

Successful inclusive schools provide a unified educational system in which general and special climates work collaboratively to provide comprehensive and integrated services to all students. As with any innovation or educational reform effort, the successful inclusion of students with hearing impairment requires fundamental changes in the physical environment of the schools and in the behaviour of teachers. The present study was evaluative in nature investigating the range of accessibility for students with hearing impairment in inclusive schools. The actual survey endeavoured to find out whether physical environment and teacher behaviours were conducive to accessibility of students with hearing impairment in five inclusive schools. The researchers prepared a checklist including aspects related to these areas of accessibility, and had it validated by five experts. After obtaining the permission from concerned authorities, one of the researchers visited the schools in person and gathered data using the checklist in each school through real time observation of five different class periods of five teachers in each school. Following collection of data, appropriate analysis had been carried out. The findings of the study indicated that accessibility to students with hearing impairment were not optimal in terms of physical environment and teachers' behaviour, both of which are considered as essential contributors towards full participation and better education.

Keywords: students with hearing impairment, inclusive educational set-up, accessibility

Introduction

The contemporary vision of Indian educational system is to provide quality education for all with special focus on marginalized and disadvantaged groups. The underpinnings of these focus themes are founded on a right-based and learner-centric approach. The goals of education are same for all children provided that these goals are balanced and brought in harmony with the individual needs. Inclusion implies the process of educating children with special educational need alongside their peers in mainstream schools (N.C.F., 2005). Schools can provide good education to all pupils irrespective of their varying abilities. All children are to be treated with respect and ensured equal opportunities to learn together.

There are several studies which have addressed the question of whether special education efforts meet the needs of children with disabilities and comply with the conviction of inclusion, full participation, and citizenship (Thompson, Lyons, & Timmons, 2014; Ainscow & Miles, 2008). It has been advocated that student with disabilities learn alongside their age appropriate peers in general education classroom with appropriate aids and services (Gilhool, 1989). Inclusion requires that teachers, parents, and children be prepared for innovation (Peck et al., 1989). These preparations include not only making environmental modifications to ensure that programs are physically accessible to children with disabilities, but also enhancing all participants' knowledge about children with special needs, implementing appropriate instructional strategies, and developing positive attitudes towards inclusion (Dinnebeil et al., 1998; Irwin et al., 2000). However inclusive education is in a greater crisis than integrated education in terms of school related accessibility. Different kinds of barriers to accessibility may prevent participation of students with hearing impairment (henceforth referred to as HI) in spectrum of activities that go on in the school. The school is a highly complex environment. Its many variables which are directly or indirectly responsible for making education inaccessible to children with HI, and which in turn affect their participation have been discussed herein after (Hull & Dilka, 1984).

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School environment

Classroom environment: Classroom acoustics is crucial for children with HI. Noise levels in each classroom should be kept as low as is practically feasible. There is definitely no elementary school class where no noise is present. For the child with HI, even with the utilization of personal amplification, the effects of these conditions are even more distressing.

It is important to keep in mind the boundaries of personal hearing aids. All sounds are amplified, thus ruling out the child with HI from sorting out the significant from the insignificant. Teachers should be aware that hearing aids do not correct a hearing loss but only assist in improving awareness or discrimination. The presence of excessive noise often counteracts the benefits of these interventions.

Communication: Most children with HI are more dependent on speech reading skill. The success of speech reading is based on the principle of redundancy. Speech reading cannot be absolute. There are many more speech movements per second than that which the eye is capable of perceiving. In addition, many speech movements can confuse a child and certainly affect the accuracy of comprehension.

Reverberation: This refers to the continuance, or persistence, of sound waves within a room as they are reflected off from surfaces in the classroom.

Seating arrangement to children with HI: The importance of preferential seating cannot be underestimated. The seating placement of a child with HI certainly depends in part on the type of hearing loss, but it is also important to look at classroom format and activity.

Need for the study

After reviewing literature related to physical environment and teacher behaviours that directly influence physical and instructional accessibility to children with HI; the researchers felt need for carrying out a study to find out level of accessibility to children with HI in inclusive schools. Thus a *survey of accessibility to students with HI in inclusive educational set-ups* was undertaken.

Objectives of the study

This study proposed to carry out a sample survey in selected primary schools of inclusive nature in the city of Mysuru in order to physically investigate the nature of accessibility in the selected schools. This primary purpose was achieved through the realization of the following objectives – development and/or adaptation of tool for carrying out survey of accessibility of primary schools of inclusive nature, conducting access audit of the specified features in the selected schools, compilation of report on the accessible nature of the selected schools, and drafting recommendations for improving existing conditions.

Method

The present research was a survey of accessibility to students with HI in inclusive educational set-ups. An attempt has been made to examine the accessibility features available at inclusive schools.

Participants

Researchers selected five inclusive schools which included both government and aided schools covered under the SSA program. The five schools were selected through purposive sampling to include schools where children with HI were studying along with typically developing children. For the purpose of identification without revealing the identity, each inclusive school has been named as inclusive school 1, inclusive school 2, inclusive school 3, inclusive school 4 and inclusive school 5, respectively. Further in each school, five different teachers had their class periods observed thus accounting to 25 teacher-participants in all. The teachers' classroom behaviours in the respective schools were observed across five different instructional sessions, apart from physical verification of accessibility features in the learning environment.

Material

To achieve the purpose of any research, selection and/or development of appropriate tool is considered as a factor of prime importance. In the process of carrying out the present study, review of literature revealed

scarce availability of standardised tools that cater to the requirements of the current study. Most of the available tools were teacher/researcher-made tests. Hence, relevant material were reviewed to develop a tool that meets the purpose of investigation (Manoj, 1997; Rachala & Palnaty, 2015). The ultimate checklist that evolved intended to study physical features in the learning environment, as well as observe instructional and communicational behaviours of teachers towards children with HI in the classroom context. The checklist thus developed was provided to five expert rehabilitators in the field of HI for validation. Items that received consent from 80% or more of the evaluators were retained, while their suggestions for improvement of other items were incorporated.

The final checklist included two parts, Part A on physical environmental features with 13 items and Part B on teacher behaviours with 15 items, thus accounting to a total of 28 items. The checklist included both conducive or positive, and non-conducive or negative indicators.

Separate scoring checklists were prepared for parts A and B. Each item on the checklist thus prepared was marked yes/no on the scoring checklist by the researchers based on personal observation as to whether the particular physical feature or teacher behaviour was present or absent in the classroom. In case of observation of positive behaviour or feature, a score of 1 was awarded for 'yes' and 0 for 'no'. It was vice-versa for negative behaviours or features.

Procedure

The investigation began with development of the afore-mentioned tool. The researchers approached the head teachers of the respective schools in person and requested written permission for conducting the survey without disturbing the instructional process in the schools. In the process, they had distributed copies of the tool for data collection and explained the intended purpose and process of the study. One of the researchers personally observed five instructional sessions of five different teachers in each school to record presence or absence of specified communicational and instructional behaviours in the teacher.

Simultaneously, she also noted down the accessibility features as well as barriers in the physical learning environment. The recordings of the researcher for each school were compiled separately for further analysis.

Data analysis

From the data thus collected using the checklist, the cumulative percentage score was compiled for each school across 25 sessions. Along with overall scores for each school, separate percentage scores were also computed for recordings related to physical environment, as well as teacher behaviours. These percentage scores were further subjected to appropriate descriptive, as well as inferential statistical analyses.

Results and Discussion

Descriptive analysis

The first leg of analysis was descriptive in nature, where the mean scores, as well as medians on the accessibility checklist for each school was computed along with standard deviation and compared across the schools. The comparisons were separately carried out for accessibility features in physical environment, as well as teacher behaviours. The results have been tabulated in table 1, followed by graphical representation in figure 1.

Table 1. *Case summaries of accessibility levels in the five schools*

Feature	School	N	Mean	SD	Median
Physical Accessibility	1	5	53.85	5.44	53.85
	2	5	58.46	11.67	61.54
	3	5	61.54	12.16	61.54
	4	5	46.15	0.00	46.15
	5	5	44.62	10.03	46.15
	Aggregate	25	52.92	10.72	53.85
Communica-tional & Instructional Accessibility	1	5	72.00	15.20	73.33
	2	5	84.00	3.65	86.67
	3	5	81.33	16.60	86.67
	4	5	70.67	8.94	66.67
	5	5	73.33	12.47	73.33
	Aggregate	25	76.27	12.48	80.00

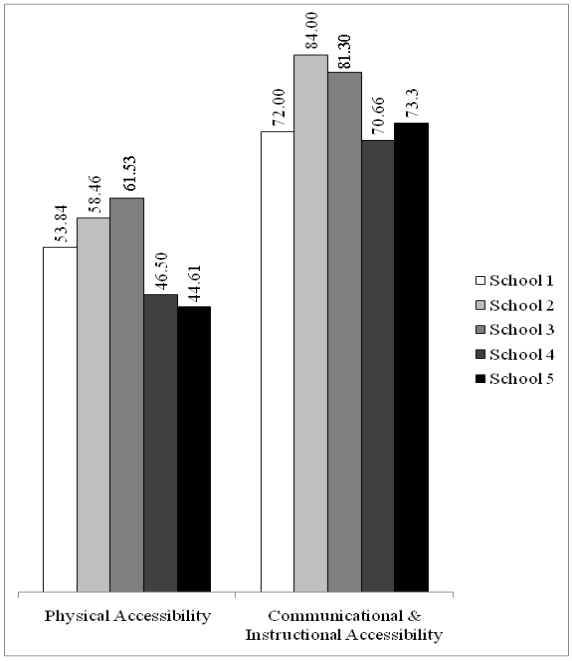

Figure1. Mean percentage scores of five schools on accessibility checklist.

Five inclusive schools were compared, and in all five schools the accessibility for children with HI was not optimal in terms of physical environment, as well as teachers' behaviours. The checklist pointed out both strengths and weaknesses in the physical environment and teachers' behaviours. On comparison of all five schools in terms of mean scores on physical environment which was an essential component for accessibility, it was found that no school had complete accessibility according to data gathered on the checklist. School 3 was better in terms of physical environment than other schools with a mean score of 61.54%. Schools 4 and 5 which are placed lowest in the rank order have mean scores below 50% indicating need for improvement of physical conditions in inclusive schools. Earlier researchers like Brackett (1990) have also arrived at similar conclusions and have lent constructive recommendations for improving the situations. According to them, there was an obvious correlation between lighting and speech reading ability. They suggest use of overhead lights along with natural lighting, so as to supply sufficient light, but without being too bright as to cause shadows or a glare. If lighting comes primarily from one of the classroom walls, the teacher should arrange the setting in such a way that the light comes from behind the children and falls on the teacher's face. The teacher should be careful not to stand near a window in bright sunlight because it often casts a shadow on the face. The teacher should also be aware of the effects of changes in lighting throughout the day and make appropriate adjustments (Brackett, 1990)

Researchers (Northern & Down, 2002) also suggest that whenever possible, a circular class arrangement could be utilized that allows for better peer monitoring. Although usually there is a little that a teacher can do to change the construction of the room, controlling some of the adverse effects is possible. Hard surfaces, such as glass, wood floors, and blank boards reflect sound back and forth from each surface with a time differential. This will cause the student with HI to pick up echoes of several different words at the same time (Flexer, 1994). This could be avoided by replacing or covering such sound-reflecting surfaces with absorbent material.

The next stage of analysis explores teacher-behaviours in the five selected schools, which was another essential component for accessibility. The teacher behaviours towards children with HI were found to be better in the schools surveyed, even though no school had optimal accessibility both in terms of communicational and instructional processes. School 2 fared comparatively better in terms of teachers' behaviours than the others schools with a mean score of 84%. However, it was reassuring to note that the overall mean scores of all the five schools for accessibility in terms of teachers' behaviours (76.27%) were considerably better than accessibility in terms of physical environment (52.92%). Earlier researchers had insisted that inclusion requires teachers, parents, and children be prepared for innovation (Peck et al., 1989). These preparations include not only making environmental modification for ensuring that programs are physically accessible to children with disabilities, but also enhancing knowledge about children with special needs and appropriate instructional strategies, and developing positive attitudes towards inclusion among all stakeholders (Irwin, Lero, & Brophy, 2000; Dinnebeil et al., 1998).

Inferential analysis

In the second leg of analysis, the data was subjected to inferential analysis with use of

Kruskal-Wallis Test, a non-parametric measure, because of the small sample size in terms of number of schools which was the grouping variable.

Table 2. *Comparison of accessibility features among the schools*

	Physical Accessibility	Communicational & Instructional Accessibility
Chi-Square	9.317	6.933
df	4	4
Asymp. Sig.	0.054	0.139

The resultant Chi-square of 9.317 for variances in physical environment showed that there is no significant difference among the five inclusive schools (p = 0.054). Similarly there was no significant difference among teacher-behaviours in each of the five schools as indicated by Chi-square results of 6.933 with a p value of 0.139.

Conclusions

To conclude, School 3 had more conducive physical environment to facilitate inclusion of children with HI, while teachers in School 2 displayed more accommodative behaviours in the process of instructing learners with HI. On the whole, teacher-behaviours in the schools were found to be more facilitative than physical conditions. This might imply that positive initiatives for promoting inclusive education are evident in the behaviours of teachers, and that in the course of time this might in turn bring about necessary changes in the physical settings also.

Many students with HI are unable to access mainstream schools and appropriate educational programmes because of barriers in the physical environment and non-conducive behaviours of the teachers. In most of these contexts, HI is perceived as a disability rather than as a condition leading to special needs. If a child cannot hear a lesson because of any one or more reasons related to physical environment, they may not understand the content and have no scope for learning. To aggravate the problem, teachers are not capable of modifying teaching methods, strategies, and most important of all their attitudes and behaviours towards students with HI. They may not be able to communicate with or instruct children with HI at the same pace as the rest of the class. When parents witness such wear and tear with no hope of school and professional supports, they seek special school services and may have to travel several kilometres to avail these services. Sadly for many students with HI this also happens to be the journey to low educational attainment and at times the view of leaving schools becomes palpable.

Such adverse fallouts could be avoided if, as suggested by literature, successful inclusive schools provide a unified educational system in which general and special climates work collaboratively to provide comprehensive and integrated services to all students. As with any effort for innovation or educational reform, successful inclusion of children with HI also requires fundamental change in the physical environment of the schools, and in the attitudes and behaviours of teachers. The inclusion of students with HI in the inclusive schools can be possible only when the accessibility factors are well taken care of.

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Relationship between Aided Audiological Abilities and Academic Achievement of Children with Hearing Impairment

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Abstract

"*Aided audiogram" is one of the effective subjective methods carried out before beginning any academic activity for children with hearing impairment. Accordingly, early intervention services or preschool services for children with hearing impairment are designed to use available abilities such as listening, speech perception and communication for their holistic development as a prerequisite for academic achievement. Hence, this study was planned to find the relationship between aided audiological abilities and academic achievement, in terms of pre-academic, language and cognitive skills of children with hearing impairment. A time series research design had been used having 20 children with hearing impairment as participants who were placed in third year of the preschool training programme at the All India Institute of Speech and Hearing (henceforth referred as AIISH) in the academic year of June 2014 to April 2015 which included two academic terms. The results of descriptive analyses of the data on aided hearing abilities and preschool performances over the two academic terms revealed that all children covered in the survey had adequate aided hearing abilities and achieved appreciable academic attainment in the core areas of preschool training, namely, pre-academic, language and cognitive skills. However, when the two variables of aided hearing abilities and preschool performances were correlated by computing Pearson's correlation coefficient, the relationship was predominantly negative, especially between aided hearing abilities and pre-academic skills. The intensity of relationship were also mostly insignificant; except for low frequency sound stimuli at 1 kHz and 500 Hz together in around three instances and Ling's test sounds /a, i, u, s, ʃ/ together in around 12 instances. The findings might imply need for enhanced synchrony between therapeutic intervention for communication skills and preschool training for pre-academic skills in young children with hearing impairment.*

Keywords: pre-academic performance, aided audiological abilities, preschool training, children with hearing impairment

Introduction

Hearing impairment (henceforth referred to as HI) is a generic term indicating severity of hearing loss ranging from mild to profound. Impairment in hearing that does not entirely prevent practical communication by speech is called as hard of hearing (Brill, McNeil, & Newman, 1986). It is essential to choose a hearing aid that will suit an individual's hearing loss. Various procedures are used for hearing aid selection, and one such procedure is "Aided Audiogram". Aided audiogram is one where child's sound field thresholds at different frequencies are obtained with the hearing aid switched "ON". This aided audiogram information helps to select a suitable hearing aid for a child with HI. The basic goal of hearing aid fitting is to enable perception of speech signal by a child with HI. The difference between the unaided and aided thresholds can provide information about benefit obtained from a hearing aid. This information is very useful in selecting a suitable hearing aid which will enable perception of speech signal which is the primary goal of hearing aid fitting in children with HI.

Aided hearing ability can also be considered as a good indicator of classroom learning achievement. Aided audiogram within speech spectrum implies ability to follow verbal transactions in the classroom environment. In mainstream classrooms, verbal communication serves as the primary mode of instruction. Thus a child with HI, with aided audiogram within speech spectrum, will be in a better position to follow and benefit from instructional transactions. The overall average intensity of a speech signal is approximately 65 dB SPL as

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measured at one-meter distance from a speaker (Yathiraj, 2016). The speech spectrum varies with respect to diverse frequencies of varied speech sounds.

Need for the study

Thus it could be assumed that "aided audiogram" should be one of the effective subjective methods carried out before beginning any academic activity for the child with HI. The aided audiological abilities extend a supportive base for further development of speech, language and communication; which in turn form the foundation for the academic achievement of any child, especially those with communication disorders like HI. Hence, early identification and intervention has a positive impact on all aspects of rehabilitation, especially education for young children with hearing loss. Given appropriate access to audiological and early intervention services, many children have the potential to follow a typical developmental trajectory (Robbins et al., 2004).

Without availability of such services, even children with minimal sensorineural hearing loss (MSHL) were found to fail at least one grade. Further, children with MSHL exhibited significantly greater dysfunction than children with normal hearing on several subtests including behaviour, energy, stress, social support and self-esteem (Bess, Dodd-Murphy, & Parker, 1998).

Taking into consideration these consequences, early intervention services or preschool services for children with HI are designed to use available listening abilities, speech perception abilities and communicating abilities for their elemental development, which in turn serves as stimulant for academic achievement. Aided audiogram is a primary indicator of listening abilities, which have significant impact on the overall development of children for a considerable duration during the growing years.

There are very less information available in the literature about the influence of aided abilities on preschool performances of children with HI. Hence the present study was planned to investigate the "Relationship between Aided Audiological Abilities and Academic Achievement of Children with HI".

Aim of the study

The purpose of the study was to explore the nature of relationship between aided audio-logical abilities and academic achievement of preschool children with HI.

Objectives of the study

To be more specific, the study involved investigation of the relationship of aided audiological abilities in terms of aided thresholds at 500 Hz, 1 kHz, 2 kHz and 4 kHz; thresholds for identification of Ling's sounds /a, i, u, s, ʃ, m/; and speech identification scores or speech detection thresholds with preschool performances in the areas of pre-academic, language and cognitive skills.

Method

The present study focused on the relationship between aided audiological abilities and preschool performances of children with HI during preschool years. Hence, as per the requirement of the study, the following method was adopted.

Research design

The present study probed the preschool performances of children with HI over two consecutive academic terms, as well as the aided audiological evaluation of those children during these terms. It further investigated the relationship between both the variables over the observed period of time. Hence, a time series descriptive research design was adopted.

Participants

Children with HI selected for the study were availing preschool training in three different languages (Kannada, Malayalam and Hindi) from AIISH preschool since three years. These children at the time of data collection were placed in the third phase of training during the academic year 2014-15, that is, from June 2014 to April 2015. Purposive sampling technique was used to identify children in the age range of five to six years. Of the 27 children with HI identified accordingly, two each receiving preschool training with Malayalam and Hindi languages as medium of instruction could not be considered, as they had not completed the

stipulated three years of preschool training. Three other children with Kannada language as medium of instruction had temporarily discontinued services during the period of investigation for the purpose of undergoing cochlear implant surgery, thus excluding themselves from the survey. Ultimately 20 children with HI were included in this study.

Procedure

Researchers sought prior permission from the Head of the Department of Clinical Services at AIISH to personally note down information about aided audiological abilities and speech identification scores of each child. These information were obtained across two consecutive terms from June 2014 to April 2015 from their respective case files. Aided audiological abilities with their own hearing aids were obtained through the aided audiograms for the two terms ending in December 2014 and April 2015. The two terms had six and five months of duration, respectively prior to the testing of aided listening abilities. Permission was also sought from the Head of the Department of Special Education at AIISH to collect details about performance of each child in the three curricular areas of pre-academic, language and cognitive skills. These performances were noted during the term-end examination of two terms concluding in December 2014 and April 2015 from the concerned class teachers.

Data analysis

The study focused on investigating the relationship between the various parameters of aided audiological abilities like pure/warble tones as well as speech sounds, and preschool performances of the children with HI. In order to find this, Pearson's product moment correlation was used for analysis. Relationship between performances in the different academic skills such as pre-academic, language and cognitive skills, and aided audiological ability levels as well as speech identification scores for both the ears of each child were analysed. Since it was a time series study, the correlation was separately computed for two different terms of preschool training.

The details obtained about children with respect to both audiological abilities and preschool performances were subjected to statistical analysis using the Statistical Package for Social Sciences (SPSS version 17.0). The statistical analyses carried out with the obtained data included descriptive computation of mean and standard deviation for preschool performances and aided audiological abilities; and Pearson's correlation coefficient computed to find the relation between preschool performances and aided audiological abilities.

Results and Discussion

Aided audiological abilities provide the base for further development in terms of speech, language and communication in children with HI, which in turn serve as the foundation for academic learning in children. The present study aimed to investigate the nature of relationship between the preschool performances of children with HI and their aided audiological abilities, because effective learning is supported by integrated use of all the five senses, among which hearing and vision are the most crucial. The descriptive data compiled from the two sets of variables namely, preschool performances of children with HI and their aided audiological abilities have been presented and discussed herein after.

Academic performances of children with hearing impairment

The mean and standard deviation (SD) of the preschool performances (in pre-academic, language and cognitive skills) of children with HI for the two academic terms culminating in December 2014 and April 2015 have been presented in table 1.

Table 1. *Scores obtained in preschool term-end examination by children with HI*

Skill Areas	N	Mean % Scores	Standard Deviation
Term1			
Pre-academics	20	85.30	14.36
Language	20	87.25	9.26
Cognitive	20	84.90	13.67
Term 2			
Pre-academics	20	87.90	11.26
Language	20	88.15	11.97
Cognitive	20	83.45	12.23

As it is evident from results displayed in table 1, the preschool performances of children with

HI were observed to be very good for all the three skills with a mean percentage of around 85%. It is also seen that there was not much difference between performances in all the three skills across the two terms.

Aided audiological abilities of children with hearing impairment

The mean and standard deviation of aided audiological abilities (in terms of intensity thresholds for 500 Hz, 1 kHz, 2 kHz and 4 kHz) for both the ears for terms ending December 2014 and April 2015 have been given in table 2.

Table 2. *Aided hearing abilities for different frequencies in children with HI*

Terms	Frequency	N	Mean Aided Thresholds	SD
	Right Ear			
Term1	500Hz	20	41.50	9.33
	1kHz	20	46.50	10.77
	2kHz	20	50.00	11.00
	4kHz	20	55.50	14.40
Term2	500Hz	20	41.00	8.97
	1kHz	20	43.50	9.47
	2kHz	20	46.75	10.16
	4kHz	20	55.00	12.35
	Left Ear			
Term1	500Hz	20	38.50	8.28
	1kHz	20	42.25	8.95
	2kHz	20	48.50	8.59
	4kHz	20	54.00	11.42
Term2	500Hz	20	43.00	9.37
	1kHz	20	44.50	11.68
	2kHz	20	50.00	13.47
	4kHz	20	57.00	14.54

As it can be observed from the results presented in table 2, the overall aided thresholds were noticed to be within speech spectrum for both right and left ears for both the terms. The aided thresholds for low frequency stimuli at 500Hz and 1 kHz were found to be better compared to 2 kHz and 4 kHz for both the ears during both terms ranging between 38.50 dB to 44.50 dB. Nevertheless, the mean threshold for 2 kHz was found to have improved from 50.00 dB in the right ear to 46.75 dB over the second term; but increased from 48.50 dB in the left ear in the first term to 50.00 dB in the second term. The threshold for stimuli of 4 kHz was 55 dB in the right ear across the two terms, while it increased from 54.00 dB in the first term to 57 dB in the second term in the left ear.

Table 3. *Aided hearing abilities for identifying Ling's sounds in children with HI*

Terms	Speech Sounds	N	Mean Aided Thresholds	SD
	Right Ear			
Term 1	/a/	18	34.16	6.24
	/i/	18	40.00	7.47
	/u/	18	38.61	8.54
	/s/	18	50.00	9.23
	/ʃ/	18	51.66	7.66
	/m/	18	42.77	8.61
Term 2	/a/	20	35.50	9.02
	/i/	20	38.75	9.30
	/u/	20	38.25	7.65
	/s/	20	51.25	13.26
	/ʃ/	20	52.00	13.80
	/m/	20	45.50	11.57
	Left Ear			
Term 1	/a/	18	33.61	7.63
	/i/	18	39.16	9.11
	/u/	18	38.61	8.36
	/s/	18	48.88	10.22
	/ʃ/	18	48.61	9.82
	/m/	18	42.22	9.27
Term 2	/a/	19	35.78	11.69
	/i/	19	41.05	13.07
	/u/	19	40.26	12.63
	/s/	19	50.52	10.91
	/ʃ/	19	51.05	12.97
	/m/	18	46.11	11.95

As depicted in the table 3, the aided Ling's sounds identification was found to be within the speech spectrum for all the sounds. However, the thresholds for sounds /a, i, u, m/ were observed to be better, i.e., the responses were obtained at lower intensity level compared to high frequency sounds /s/ and /ʃ/ in both the ears during both the terms. Details of aided hearing abilities for identifying Ling's sounds were not available for two children either in one or both ears thus leading to variance in the sample size (N) across the terms and ears.

Speech identification scores of children with hearing impairment

The speech identification responses in closed set condition and speech detection thresholds for both the ears of children with HI for terms

ending in December 2014 and April 2015 have been displayed in table 4.

Table 4. *Speech identification scores and speech detection thresholds of children with HI*

Terms	N	Mean	SD
Right Ear			
Term1			
SIS	6	18.66	3.32
SDT	14	45.00	4.02
Term 2			
SIS	11	18.09	3.50
SDT	9	40.00	3.40
Left Ear			
Term1			
SIS	5	18.80	3.49
SDT	15	40.00	3.60
Term 2			
SIS	9	15.55	5.63
SDT	11	40.00	3.30

As it can be noted from table 4, the speech identification scores were available for only six children for right ear and five children for left ear in first term, and for 11 and nine children for the right and left ears, respectively in the second term. The speech identification scores were found to be good (18/25) i.e. above 72% for right ear for first and second terms and for the left ear during first term. However, it was found to be 15/25 (60%) for the left ear during second term. For children whom speech identification scores could not be obtained, speech detection thresholds were obtained and it was found to be within speech spectrum for both ears during both the terms. Thus the preliminary descriptive summary of the data collected led to the impression that the preschool children with HI under study had aided hearing abilities within spectrum and commendable preschool performances. This in turn led to the assumption that as hearing ability is a basic requirement for day-to-day classroom activities including learning; good aided hearing abilities might have led to substantial academic attainment. However, it is also possible that better preschool performances might be due to the compounding effect of other contributing factors like the progressively graded training process implemented for young children with communication disorders in the Department of Special Education at AIISH commencing right from infancy through individualised Parent Infant Programme (PIP), followed by parallel teaching in a group setting for toddlers through the Preschool Parent Empowerment Programme (PPEP), and finally culminating in small group instruction through Preschool Training Programme (Information from Department of Special Education, AIISH, Mysuru, 2014). Constituent features of these programmes like pedagogic techniques employed by teachers, augmentative home training by caregivers, and use of enabling assistive technology could also have contributed to the creditable developments (Chatterjee & Mishra, 2004). So the researchers decided to confirm the relationship between aided hearing abilities and preschool performances through inferential statistical measures.

Relationship between performances in preschool and aided audiological abilities

In order to see if there were any correlation existent between preschool performances in the areas of pre-academic, language and cognitive skills and aided audiological abilities in terms of thresholds at 500 kHz, 1 kHz, 2 kHz and 4 kHz for both the ears; two-tailed Pearson's correlation coefficient had been computed. The results have been given in table 5.

Table 5. *Correlation between preschool performances and aided audiological abilities across two terms*

Frequency / Term	500 Hz	1 kHz	2 kHz	4 kHz
Pre-Academic Skills				
	Right Ear			
Term 1	-0.05	-0.05	-0.05	0.00
Term 2	-0.46	-0.63	-0.39	-0.03
	Left Ear			
Term 1	-0.31	-0.31	-0.28	-0.17
Term 2	-0.13	-0.31	-0.22	0.03
Language Skills				
	Right Ear			
Term1	0.29	0.18	0.35	0.36
Term 2	-0.43	-0.45*	-0.32	-0.18
	Left Ear			
Term1	-0.14	0.04	0.05	0.26
Term 2	-0.26	-0.16	-0.11	-0.04
Cognitive Skills				
	Right Ear			
Term1	0.01	0.09	0.16	0.06
Term 2	-0.53*	-0.50*	-0.31	0.05
	Left Ear			
Term1	-0.08	-0.05	0.05	0.02
Term 2	-0.13	-0.12	-0.24	-0.02

*Significant at 0.05 level

Analysis of the relationship between aided pure/warble tone thresholds and preschool performances of the selected children with HI drew predominantly negative correlations in 67% of the instances, that too at statistically significant level in three instances in the second term for language and cognitive skills. This was a surprising outcome considering the fact that all children with HI had displayed good learning achievement, as well as aided hearing thresholds within speech spectrum as evinced from results presented in tables 1 and 2. Specifically in the context of pre-academic skills, in 88% (14/16) of the instances, the correlations were negative. They were of low intensity (0% to 31%) in the first term, and increased to include moderately intense correlations (46% to 63%) in the second term, especially for the right ear, yet inverse in nature.

With regards to performance in language arts, the relationship with aided hearing thresholds were slightly better with positive relationships being reported in 44% of the instances, especially in the first term. However, the correlation turned out to be entirely negative in second term. The intensity of relationship ranged between moderate 45% and negligible 4%. In terms of cognitive skills, the relationships were predominantly negative in 56% of the instances. The highest intense relationship was 53%, nevertheless negative.

These findings were unexpected considering the fact that overall preschool performances as well as aided hearing thresholds were reported to be satisfactory in all children with HI included in the study. The depreciating trend in relationship was more striking in the end-term of preschool training. These results could indicate the possibility that at the time of preparing for transition from preschool to school, there might have been added thrust on reading and writing skills considered as vital for survival in school, to the detriment of verbal communication skills.

The next step of analysis involved correlating thresholds for identification of Ling's sounds /a, i, u, s, ʃ, m/ separately for the two ears with preschool performances in pre-academic, language and cognitive skills by computing Pearson's correlation coefficients for the two sets of variables across the two terms. The results have been presented in table 6.

Table 6. *Correlation between aided thresholds for identification of Ling's sounds and preschool performances*

Speech Sounds \ Skill Areas	Pre-Academic	Language	Cognitive
Term1			
	Right Ear		
/a/	-0.58*	0.02	-0.53*
/i/	-0.47*	0.13	-0.33
/u/	-0.24	0.31	-0.10
/s/	-0.20	0.48*	0.01
/ʃ/	-0.25	0.34	-0.00
/m/	-0.40	0.25	-0.07
	Left Ear		
/a/	-0.42	0.09	-0.20
/i/	-0.45	0.35	-0.09
/u/	-0.38	0.23	-0.20
/s/	-0.19	0.48*	0.11
/ʃ/	-0.13	0.57*	0.23
/m/	-0.19	0.26	0.04
Term 2			
	Right Ear		
/a/	-0.46*	-0.35	-0.33
/i/	-0.54*	-0.34	-0.33
/u/	-0.53*	-0.39	-0.25
/s/	-0.34	-0.24	-0.37
/ʃ/	-0.24	-0.25	-0.28
/m/	-0.30	-0.39	0.05
	Left Ear		
/a/	-0.31	-0.45*	-0.38
/i/	-0.21	-0.43	-0.21
/u/	-0.25	-0.40	-0.26
/s/	-0.48*	-0.58*	-0.37
/ʃ/	-0.14	-0.31	-0.13
/m/	-0.18	-0.36	-0.19

*Significant at 0.05 level

The results in table 6 reveal predominantly weak and mixed relationship between aided listening abilities for the Ling's six sounds and preschool performances. Both in the penultimate and culminate terms of preschool training, pre-academic performances in literacy and numeracy skills demonstrate persistent inverse correlation with speech sound thresholds for Ling's sounds that too at statistically significant levels ($p < 0.05$) for vowels /a, i/ in the right ear across the two terms and /u/ in the right ear during the second

term. Thresholds for high frequency consonant /s/ also correlated negatively and significantly with scores in pre-academic skills during the even term. These findings might suggest indifference towards exercising verbal competencies while imparting training in these skill areas. Even age-old pedagogical approaches for young children with hearing impairment (Harris, 1963) emphasise on the fact that emergent literacy skills evolve from fluent oral skills which in turn cascade into skills for oral reading and reading comprehension later.

It is comforting to note that the performance in language arts have correlated positively with aided identification of Ling's sounds in the penultimate term of preschool leaving stage ending in December 2014, especially at statistically significant levels for high frequency consonant sounds /s, ʃ/, which are considered to be difficult to perceive but critical for understanding verbal communication.

However, the comfort turns to concern when all correlations in the culminate term ending in April 2015 were invariably negative, that too at statistically significant levels in two instances for both low frequency /a/ and high frequency /s/ sounds in the left ear. The general panicking observed among caregivers in preparing children to undertake annual preschool examination and school readiness evaluations seems to have resulted in undue emphasis on the written versions of assessment over oral rendition.

The indifferent trend of relationship continues between performances in cognitive skills, as well as aided thresholds for Ling's sounds in the penultimate odd term where only four coefficients out of 16 are reported to be positive, one in the right ear and three in the left ear. These correlations are also weak with 20% or less concurrence. Among the negative correlations, the coefficient is statistically significant for vowel /a/ in the right ear. The correlations in the culminate term are predominantly negative, but for the lone exception of /m/ in the right ear with a low concurrence of 5%.

Better relation in the right ear could be due to the reason that speech sounds are processed through the left hemisphere which is primarily responsible for language processing. Nevertheless no relationship of statistical significance could be observed. These results might indicate lack of coherent focus on verbal communication skills when promoting cognitive skills which are more concerned with ability for logical reasoning, memory, and problem solving among others.

The evidences generated in this study imply alienation of verbal communication skills from coherent development along with abilities for thinking, reading and writing. Conclusive decisions could not be arrived through the meagre data collected through this survey. However, the issue warrants closer scrutiny and follow up.

Conclusions

The purpose of the study was to find how the aided audiological abilities are helpful in academic achievement of children with HI. General overview of the data compiled point to the fact that the participant children had displayed creditable performances in all the three core skills, viz., pre-academic skills, language skills and cognitive skills, while the aided hearing thresholds were within spectrum. Superficially this implies that aided hearing ability extends a positive influence on performance at preschool in formal tests, as well as in day to day classroom activities.

However closer scrutiny of the data employing inferential statistical measures revealed that overriding emphasis on training in literacy and numeracy skills might have led to less than adequate focus on developing listening, speech and language skills. Nevertheless caregivers and educators should be ever conscious that verbal communication is a crucial prerequisite for ensuring consistent, all round development in children with communication disorders like HI, including meaningful literacy and numeracy skills.

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Effectiveness of Teaching-Learning Material in Instruction of Environmental Science to Primary School Children with Hearing Impairment

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Abstract

Teachers have to make learning meaningful and interesting, create learning environments that are relevant to the children, meet their individual needs and encourage learning in holistic, equitable and culturally sensitive way. Children with hearing impairment find it difficult to understand verbal mode of discourse in the classroom. Environmental science is a subject which involves abstract concepts, and teaching-learning material will help render these difficult concepts easy to understand. In this study the researchers had used different types of teaching-learning material such as charts, flash cards, models, real objects and multimedia, etc. to teach the concept of "Food for Health" in the instruction of environmental science. The reported study involved a true experimental design of randomly selected control and experimental groups containing 30 students of 4th class in the age group of 9 to 11 years as subjects. The main objectives of the study were to develop appropriate teaching-learning material for instruction in "Food for Health" and investigate the efficacy of the developed material. Following collection of pre and post-test data, relevant statistical procedures were employed to compare the results of control group with experimental group. The findings of the study revealed that there was a significant improvement in the post-test performance of experimental group in comparison with control group; and this might have been due to the use of teaching-learning material in the instructional process.

Keywords: children with hearing impairment, teaching-learning material, environmental science

"The teacher is a compass that activates the magnets of curiosity, knowledge and wisdom in the pupils" – *Ever Garrison*

Introduction

According to PWD Act (1995, as quoted in Rangasayee, 2008), "Hearing impairment means loss of 60 dB or more in the better ear in the conversational range of frequencies (250 Hz to 4 KHz)". WHO (2002, as quoted in Rangasayee, 2008) reports that hearing impairment is a sensory impairment; it affects hearing sense and has profound impact on their functional, socio-emotional, and economic skills". This impairment will create a gap between hearing children and children with hearing impairment (henceforth referred to as HI) in the process of learning.

Children with HI and curricular learning

There are different types of core subjects available in the school and children should read all these subjects, i.e., languages, mathematics, sciences, etc. Science subject is more methodical and technical in nature. It involves systematic enquiry, analysis of problems, creation of ideas, and their evaluation and modification. It helps the students to comprehend the world around them. Usage of traditional methods for the instruction of these core subjects may not be so effective to bring better results. Other reasons like irrelevant curriculum, improper teaching of abstract concepts, higher level of language usage, irregular coordination between time and instruction, etc. may lead to poor performances of school children with HI.

Importance of environmental science

According to Iowa State University (2010) environmental science is an academic field that integrates knowledge about physical, biological, social and modern technological world around us. It is important for all students and makes them to experience, enjoy and examine the wonders of natural and manmade world around them. Environmental science helps students to develop curiosity and provide opportunities to improve their observational skills, as well as thinking and reasoning skills. It helps to acquire

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knowledge about the world around them and create interest to learn science. It creates awareness and helps students understand about aspects of healthy life such as healthy eating, personal hygiene, substance use and abuse, etc. It helps them to acquire knowledge about how their bodies function and the changes they experience over the years of human growth. It provides the exposure of other concepts which are not encountered in other sciences such as growth and development, diversity and change, interdependence and classification, natural selection and evolution, etc. It makes students aware that they are part of the diversity of living things. It develops personal values and sense of responsibility with regard to living organisms and their environment.

Academic achievement of children with HI

HI is a sensory impairment. Because of the loss of hearing, individuals with HI may not be able to communicate with other people; due to this they may not be able to develop their language. The impairment not only affects functional, physical and emotional skills; but it also affects educational achievement, leading to educational handicap. Myklebust (1960) said "that hearing is a pervasive thing. Impairment which is caused before language development affects the entire personality not just the hearing part. Children with HI see and sense their environment differently than the hearing children, thereby altering their reactions and personality".

Importance of teaching-learning material

Pathak (1994) indicated in his book named 'Teaching Skills' that most of the children learn up to 73% through visual mode, 15% through auditory mode, 6% through touch, 3% through smell and 3% through taste. If we combine two modes of senses, then the process of learning will be more effective. This information suggests that multisensory teaching-learning material play an important role in teaching-learning process.

Howard Gardner (1983) indicates that there are eight different types of intelligence, which helps learners to gain knowledge. As we know that no two individuals are same, everybody have their own way of learning. Intelligence plays an important role in learning, which helps children to learn better. To conclude, information reviewed in the course of this study emphasise that multisensory teaching-learning material help to compliment learning in the instance of diverse types of intelligence and learning styles.

Benefits of teaching-learning material

Teaching-learning material entices students and grasps their attention for an extended duration. It attracts the students towards learning. It makes students to understand difficult concepts in a simple manner. It improves the academic performance of students. It creates collaboration between students and teachers. It maintains the teaching learning process in a smoother way. It is useful for both children and teachers. It transfers the information in an interesting way. It acts like a reward for learners to perform better in academics. Giving learners an opportunity to select their choice of learning material boosts their performance in examination. It reduces the psychological stress of children by simplifying the teaching learning process. It enhances the methods of teaching. Thus selection of appropriate teaching-learning material is important for better understanding of the subject and to sustain interest among the learners.

Need for the study

As mentioned afore, teachers have to make learning meaningful and interesting, create learning environments that are relevant to the children, meet their individual needs, and encourage learning in holistic, equitable and culturally sensitive way. Children with HI find it difficult to understand verbal mode of instruction and interaction in the classroom. Teaching-learning material helps students to learn meaningfully, removing the barriers of learning. Taking this into consideration, a need was felt to undertake a study to investigate the effectiveness of teaching-learning material in instruction of environmental science to primary school children with HI.

Statement of the problem

This research proposed to undertake an experiment with selected teaching-learning material in instruction of environmental science

and evaluate their effectiveness on performance of children with HI in primary school.

Objectives of the study

The research was conducted to fulfil the objectives of developing appropriate teaching-learning material to reinforce already learnt concept of "Food for Health" in the subject of environmental science; and investigate the efficacy of the developed teaching-learning material.

Method

Participants

The present study adopted a pure experimental research design involving both children with HI, as well as typically developing children. A total of 30 children were selected for the present study from a group of 160 children. Out of 30 children, 10 were children with HI and the other 20 were typically developing children in the age group of nine to 11 years. All the children who were involved in the study were 4th class students. Students were selected based on their level of hearing and their socio economic status, i.e., children with moderate to profound hearing loss with average intelligence and no other additional impairments, and from lower to middle economic status were selected for the present study. Their typically developing peers shared the same criteria, except for hearing loss. Through randomization 15 children each were assigned to the control and experimental groups even before pre-interventional testing. Each group consisted of five children with HI along with 10 typically developing peers.

Material

Two types of material were developed and used in the process of the study. They were teaching-learning material to experiment with and the pre-post test material to evaluate the effectiveness of the teaching-learning material.

Test material: Researchers had developed one test module for the purpose of assessing pre and post intervention performances of children who participated in the study. The concept of "Food for Health" had been selected from the environmental science curricula of 4th class for the instruction of experimental group. Based on the concept, test material had been developed in Kannada. The material included different types of questions like short answers, reasoning, matching, fill in the blanks, etc.

Teaching-learning material: Along with the test material, appropriate and relevant teaching-learning material were also collected and/or developed by the researchers. They had developed five types of teaching-learning material, i.e., flash cards, charts, models, real objects, and computer-based multimedia for the purpose of teaching children who were involved in the study.

Validation of developed material: After the preparation of test material and teaching-learning material, they were evaluated by five experts from the field of special education and suggested improvisations were incorporated in the material. Following the validation fresh set of material were prepared for testing and instruction.

Procedure

The study was carried out in five stages:

Stage 1: Collection/development of test material and teaching-learning material.

Stage 2: Validation of developed test material and teaching-learning material by experts.

Stage 3: Administering the developed test material to determine baseline knowledge in selected environmental science concept.

Stage 4: Interventional instruction using the collected/developed teaching-learning material through 10 sessions.

Stage 5: Post-test using the developed test material to assess impact of teaching-learning material.

Data collection

A pre-test was conducted with the help of developed test material, for both experimental and control groups to evaluate the baseline knowledge of the children in the concept of "Food for Health" in the subject of environmental science. The pre-test results of experimental group helped to determine the teaching technique for instruction in the selected environmental science topic. This was followed by intervention, where the experimental group was exposed to instruction using appropriate and relevant teaching-

learning material, i.e., flash cards, charts, models, real objects and multimedia. Instruction was carried out through 10 sessions of one hour duration for 15 children of the experimental group. Ongoing evaluation was also done using teaching-learning material like models, flash cards, etc. In the process of instruction, children with HI were provided individual assistance whenever and wherever necessary. The instruction was followed by another round of testing to measure their post-intervention performances. Meanwhile the children in the control group were not exposed to any kind of instruction, but were only subjected to pre and post-tests along with the children from the experimental group.

Statistical treatment

Analysis was done with the help of appropriate statistical methods to find out the results. Following test of normality, t-test had been employed as an inferential measure to compare the performances of experimental and control groups.

Results and Discussion

As a preliminary measure of analyzing results, data of pre-test performances were compiled and tabulated. The details of performances of children in control and experimental groups have been provided in table 1.

Table 1. *Performance of children with and without hearing impairment in the pre-test*

Child Identity	Marks Scored out of 20	Child Identity	Marks Scored out of 20
Experimental Group		Control Group	
Child 1	8	Child 16	6.5
Child 2	4	Child 17	5.5
Child 3	7	Child 18	9
Child 4	6.5	Child 19	7
Child 5	7	Child 20	5
Child 6	8.5	Child 21	6.5
Child 7	8	Child 22	6
Child 8	7	Child 23	9
Child 9	7	Child 24	6.5
Child 10	7	Child 25	7
Child 11	6	Child 26	8
Child 12	8	Child 27	8
Child 13	10	Child 28	5
Child 14	7	Child 29	6
Child 15	10	Child 30	6

Results depicted in table 1 contain the pre-test scores of children who were later randomly assigned to experimental and control groups.
The results show that the performances of the children were very moderate in the pre-test in the concept of "Food for Health" in environmental science subject. The scores were almost similar for all the participant students with the average score of experimental group being 37% and that of control group around 34%.

The 15 children who were selected for experimental group were exposed to experimental teaching-learning material for the concept of "Food for Health" in environmental science, for 10 sessions with duration of 1 hour each. Following instruction using teaching-learning material to the experimental group, post-test was administered for experimental, as well as control groups in order to compare the results and to evaluate the effectiveness of the developed teaching-learning material. Post-test performances of the two groups have been compiled and presented in table 2.

Table 2. *Performance of children of experimental and control groups in the post-test*

Child Identity	Marks Scored out of 20	Child Identity	Marks Scored out of 20
Experimental Group		Control Group	
Child 1	15	Child 16	9
Child 2	16.5	Child 17	5.5
Child 3	15	Child 18	9
Child 4	17	Child 19	6
Child 5	17	Child 20	5
Child 6	16	Child 21	6
Child 7	15.5	Child 22	6.5
Child 8	15.5	Child 23	8
Child 9	13	Child 24	6.5
Child 10	13	Child 25	8.5
Child 11	16.5	Child 26	7
Child 12	18.5	Child 27	8.5
Child 13	17.5	Child 28	7
Child 14	17.5	Child 29	7
Child 15	19.5	Child 30	6

Following survey of individual performances, mean performances of both the groups were compared to evaluate the effectiveness of teaching-learning material in the instructional process. Results have been portrayed in figure 1.

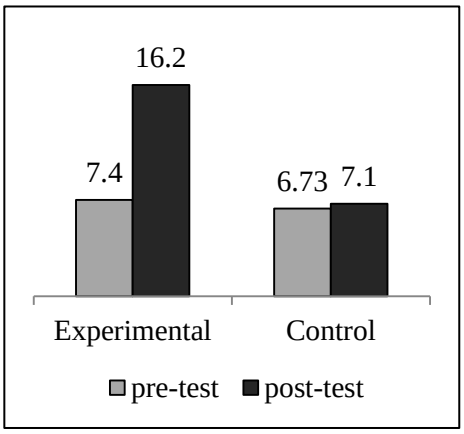

Figure 1. Mean pre and post-test performances of experimental and control groups.

The above bar diagram in figure 1 contains the results of pre and post-tests of control and experimental groups. It shows that there was an improvement in both the groups. But, experimental group came up with better advancement when compared with the control group. This was due to the effect of teaching-learning material which was used with the experimental group in the process of instruction about "Food for Health" in the subject of environmental science.

Inferential statistics

The data which was obtained from the pre and post-tests were analyzed employing appropriate statistical methods for both the control and experimental groups. Test of normality and t-test of paired samples was done for both experimental and control groups. Initially Shapiro-Wilk's test for normality was performed on the pre and post-test data of the control group, results of which are presented in table 3.

Table 3. *Normality test reports of pre and post-test performances of control group*

Tests of Normality			
Test	Shapiro-Wilk		
	Statistic	N	Significance
Pre-test	0.925	15	0.228
Post-test	0.888	15	0.062

Significant values were greater than 0.05. Hence, it was assured that both pre and post-test data were normally distributed. So, paired t-test was administered to compare pre and post-test performances of control group. The results have been presented in table 4.

Table 4. *T-test results comparing pre and post-test performances of control group*

Paired Samples Statistics			
Test	Mean	N	SD
Pre	6.7333	15	1.27988
Post	7.1000	15	1.19821
Paired Samples Test			
Comparison	t	df	Sig.
Pre – Post	-1.319	14	0.208

Results displayed in table 4 show that the value of t (14) = 1.319 ($p > 0.05$). There is no significant improvement from pre-test to post-test performances in the control group, as evident from the paired t-test results. The second stage of the analysis involved similar treatment of the data derived from the experimental group. The results have been presented in tables 5 and 6.

Table 5. *Normality test reports of pre and post-test performances of experimental group*

Tests of Normality			
Test	Shapiro-Wilk		
	Statistic	N	Sig.
Pre-test	0.911	15	0.141
Post-test	0.964	15	0.767

As per results displayed in table 5, Shapiro-Wilk test of normality resulted in insignificant values that were greater than 0.05. Thus indicating that both the pre and post-test data were normally distributed. So, paired t-test was administered to compare pre and post-test data of experimental group.

Table 6. *T-test results comparing pre and post-test performances of experimental group*

Paired Samples Statistics			
Test	Mean	N	SD
Pre-test	7.4000	15	1.49045
Post-test	16.2000	15	1.80079
Paired Samples Test			
Comparison	t	df	Sig.
pre – post-test	-17.701	14	0.000

Results in table 6 show that the value of t (14) = 17.701 ($p < 0.05$). There was a significant improvement from pre-test to post-test, as evident from paired t-test results.

Comparison of pre and post-test data of both control and experimental groups provide evidence to the improvement in performance in both the groups. But, the progress was statistically substantial in the post-test performance of experimental group. This proves that the teaching-learning material were effective in the instructional process. The above results support the studies of Gilder (1985, quoted in Pathak, 2012) and Edgerman (1989, quoted in Pathak, 2012) who said that the augmentation of instruction with multisensory information makes learning effective.

Conclusions

Thus to conclude, data analysis revealed that there was considerable improvement in the post-test performance of the experimental group when compared with the control group, due to the use of teaching-learning material in the instructional process. The results of inferential statistics, i.e., t-test results and the mean difference in pre-post scores were better for the experimental group when compared with the control group. This proves that the teaching-learning material were effective in the instruction of environmental science subject. This result supports the studies of Howard Gardner (1983), who described multiple intelligences in children, which help them to gain knowledge through diverse ways. They include linguistic intelligence, logical-mathematical intelligence, spatial intelligence, bodily-kinaesthetic intelligence, music intelligence, interpersonal intelligence, intrapersonal intelligence, and naturalistic intelligence. Howard (1983) further stated that all children are not same. They learn in their own way or style, which differs from one individual to another individual. Consequently, in the present study, researchers had used different types of material like charts which served as visual source of information and multimedia which rendered information through multiple modalities like visual as well as auditory and helped the children to learn and perform better. Researchers also used real objects and models which served as tactile-kinaesthetic as well as visual source of information. The material helped all students by reaching through their different learning styles through different sensory modalities. It created a stimulated environment in the teaching and learning process. To conclude, the results of the investigation highlight the significant improvement in performances of the experimental group who learnt with use of didactic aids when compared with the control group, thus drawing out the need for using multisensory teaching-learning material in the process of instruction for children with special needs.

Acknowledgements

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Development of Screening Checklist for Post School Transition of Indian Adolescents with Hearing Impairment

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Abstract

Adolescence, a crucial stage in human life, is a stepping stone to adult life. Presence of disabilities disrupts smooth transition during the stage, thus necessitating special rehabilitation help. Rehabilitation commences with assessing readiness in differently-able adolescents to face adulthood responsibilities. Such organised assessment and follow-up rehabilitation has been an integral part of services organised for individuals with developmental disabilities. However, as hearing impairment is a hidden disability, the apparent physical wellbeing in individuals with hearing impairment camouflages difficulties faced in the transitional process thus leading to negligent attention being devoted to it as part of holistic rehabilitation efforts. This research attempted to develop a screening checklist for assessing readiness for post-school transition in adolescents with hearing impairment. The focus of the tool was to gauge skills for independent and community living, academic attainment, and employability; apart from vocational awareness and inclinations. The purpose was to derive useful information that will provide directions for further gainful rehabilitation. The checklist was validated by six experts in clinical psychology and special education, pilot tested with three adolescents with hearing impairment, followed by detailed field trials with 49 typically developing adolescents and 36 adolescents with hearing impairment. The results proved the checklist's validity in terms of content, convergence and criterion; and reliability in terms of stability, equivalence and internal consistency. Comparison of functioning of adolescents with hearing impairment with their typically developing peers revealed that they had significant deficits in the areas of community living skills, academic attainment and study skills, and employability. Nevertheless, they fared better in terms of independent living skills.

Keywords: hearing-impairment, adolescence, post-school, transition, checklist

Introduction

Adolescence is a crucial stage in the life of any individual, closely related with teenage. This period necessitates special attention and protection for concerned individuals. They undergo rapid physical and psychological development and changes, which affects their emotional stability as well as physical and mental ability. Guidance and active support during this phase helps them in smooth transition into adulthood (Christie & Viner, 2005).

Deprivations and deviations in individuals in the form diseases and disabilities are said to create severe hassles during this crucial transition period (UNICEF, 2009). ASHA (1997-2014) reports that presence of disabilities like hearing loss manifests into secondary problems in social functioning and self-reliance during adolescence. Young persons with hearing impairment (henceforth referred as HI) are said to be deprived of constructive support, which in turn leads to myriad problems in terms of lack of realistic perceptions and self-acceptance, inadequate utilisation of educational and training opportunities, and ultimately resulting in deplorable levels of productivity and poor quality of life (Hallahan, Kaufman, & Pullen, 2009; Rangasayee, 2008; Punch, Hyde, & Creed, 2004).

Therefore it is necessary that programmes for educational habilitation of these individuals should extend beyond academic training to preparation for life after school in terms of independent living skills, community living skills and employability. However, assessment and planning for comprehensive post-school transition are rarely heard of even in the mainstreams of education, other than a few exceptions of career guidance measures.

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Need for the study

In the field of special education, comprehensive post-school transitional preparation are practically non-existent for learners with hidden needs like HI, as lack of visible deficiencies in physical health and functioning overshadow the practical implications of communication problems in daily living. There are several reports of pre-vocational preparation of learners with HI in the school leaving stage. However, they rarely take into account the personal interests and preferences of the learners, or pay attention to their preparation for independent and community living.

In this background, it is essential in the first instance to develop a teacher-administrable screening checklist for assessing readiness for post-school transition in adolescents with HI. Development and regular use of such a tool by teachers managing differently-able adolescents will help them in understanding the needs for post-school preparation in their wards, as well as induce them to capacitate themselves to provide necessary counselling and guidance.

Purpose of the study

The objective of the research was to develop a comprehensive screening checklist for appraising preparedness for post-school transition in adolescents with HI. And compare their development with that of their typically developing peers.

Method

Participants

A total of 85 adolescents with and without HI from 13 states across the country and one neighbouring south-Asian country participated in the research. The 85 participants included 36 adolescents with hearing loss and 49 of their typically developing peers. The group of typically developing adolescents in turn comprised of 20 individuals in the early stage of adolescence that is, aged between 14+ to 17 years; and 29 of them from the late stage of adolescence, that is, aged between 17+ to 21 years. Similarly, the group of adolescents with HI comprised of 16 in the stage of early adolescence and 20 from the stage of late adolescence. Three of the samples from late adolescence with HI were part of the pilot study and were not considered in the later data analysis.

Typically developing adolescents in the specified age range, without any significant disability and who were participating in formal educational or training programmes were included in the research. For adolescents with HI, chronological age within the specified age range, participation in formal educational or training programme and hearing loss of 60 dB or more in the better ear were the criteria for being included in the research. However, adolescents with any other additional disabling condition other than HI were excluded.

Apart from the adolescents, data was also collected from 13 children in late childhood for the purpose of determining the criterion validity of the test. The criteria for selecting these child participants were that they should be from the age range of 6+ to 12 years, attending formal educational programmes and without any significant disability.

Material

To begin with 20 different checklists / tests related to job awareness, interest, preference and aptitudes, learning style and personality type; as well as inventories of typical development and differential abilities had been perused in the process of constructing the items for the screening checklist intended to be developed through this research. Consequently a screening checklist to appraise the adequacy of life skill development, vocational awareness and inclinations in adolescents with HI was developed

Constituents of the screening checklist: The constituents of the screening checklist developed through the reported research could be broadly demarcated into three parts with nine sub-sections in all. The first part concerned with gathering demographic details; while the second checked with the adequacy of development of the adolescents under scrutiny in the areas of – independent living skills, community living skills, academic and study skills and employability with 24, 36, 25 and 28 items, respectively.

The third part dealt with appraisal of vocational awareness and inclinations of the adolescents through illustrated and written tests of 12 and 25 items; as well as choices made on inventories of 54 personal characteristics, 25 core curricular subjects and 27 co-curricular activities. The inventories on personal characteristics, core curricular subjects and co-curricular activities, as well as tests on vocational awareness were in turn related to 12 groups of occupations, namely, agriculture and animal husbandry, artistic and creative, construction and manufacturing, education and training, hospitality and tourism, human services, management and marketing, medical and health sciences, office work, public safety and security, science and technology, and transport and logistics.

However, for the ease of the user, delineations have been made in the screening tool pertaining to the introductory section on demographic details, followed by Part I/A with four sections on developmental appraisal and one section on inventory of personal characteristics, which are to be filled in by a caregiver or significant other who is well aware of the adolescent.

Part II/B consists of three sections administered directly on adolescents under examination. These include a combined inventory of core-curricular subjects, as well co-curricular activities that are to be chosen by the adolescents according to their preferences; as well as two sections including objective type illustrated and written tests which have to be taken by the adolescents.

Administration of the screening checklist: As mentioned herein before, the demographic information is to be provided by any of the primary caregivers, or significant other who is an adult and is well familiar with the adolescent. They are also to appraise the adolescent under scrutiny on the items pertaining to independent living skills, community living skills, academic skills, and employability and score them on a 3-point rating scale of 2, 1 and 0 for complete independent functioning, partly independent functioning and lack of competency / total dependency, respectively. The domain-wise sub-total scores could be considered to indicate level of development in the particular sphere.

Among the personal characteristics listed in the inventory, the caregiver / significant other has to mark five qualities that best describe the adolescent; and from the list of core curricular subjects and co-curricular activities, the adolescents themselves have to choose three each that they like the best. Moreover the adolescents have to complete 12 illustrated matching items, as well as 25 multiple choice items pertaining to the different groups of occupations mentioned herein before.

The adolescents' responses to the illustrated and written test items were awarded a score of 1 for correct answers and 0 for incorrect or no answer. The summary of scores was computed to gauge their level of awareness about the different occupational groups. The personal characteristics that were assigned to the adolescents by the caregivers / significant others, and their own choices of core curricular subjects and co-curricular activities were taken as indicators towards their vocational inclinations.

The final version of the screening checklist included a manual for administration and scoring. It divulged details about the process of administering the checklist and scoring, as well as interpreting scores with the help of normative data indicating satisfactory functioning in each of the developmental domain. The normal patterns of development were conceived by determining 95% confidence interval from the scores of typically developing adolescents, and presented separately for the early and late phases of adolescence. Developmental scores between the upper and lower bounds were considered to indicate normal range of development. This apart, the checklist also accommodated a table of indicators to vocational inclinations based on personal characteristics, core curricular and co-curricular choices, and pattern of performance on the objective-type tests.

Procedure

The research was carried out in two phases. The first phase included compilation and/or construction of checklist and test items, and consequent validation by six experts from the fields of clinical psychology and special education. This was followed by a pilot study carried out with three adolescents with HI (who

were not included in the final data collection). The second phase involved data collection with 49 typically developing adolescents, 33 adolescents with HI, as well 13 typically developing children in the late phase of childhood.

Data collection and analysis

As mentioned afore, information on the checklist was collected from both adolescents themselves, as well as their caregivers / significant others. Repeat data was collected on 10 typically developing adolescents after a gap of 2 weeks for the purpose of determining test-retest reliability, and for the purpose of determining inter-rater reliability the test was self-administered by another 10 of the typically developing adolescents. Statistical measures like those for central tendencies, deviances, correlation and variances were made use of in the process of data analyses. Necessary statistical analyses were carried out using the Statistical Package for Social Sciences (SPSS) versions 17 and 21.

As mentioned before, following field trials with typically developing adolescents and children for the purpose of determining norms, validity and reliability; the checklist was field tested with adolescents with HI. The patterns of development of typically developing adolescents and adolescents with HI were subjected to comparative analysis taking into consideration the presence of HI as the independent variable, while investigating its effect on the dependent variables of life, academic and vocational skill development.

Results and Discussion

The major purpose of the current research was to develop a screening checklist to test adequacy of development in life skills, academic and study skills, as well as employability in adolescents with HI. So the primary focus of data analyses and consequent inferences was on the adequacy of the checklist in terms of its validity and reliability. Besides determining its norms, validity and reliability; efforts were also made to appraise the comparative development of life skills, academic attainment, and vocational awareness and inclinations among typically developing adolescents and their peers with HI.

Norms for the checklist

The checklist covered four major areas of adolescent development, namely – independent living, community living, academic and study skills, as well as employability. Each of these domains had 24, 36, 25 and 28 items with a maximum possible score of 48, 72, 50 and 56 respectively. The overall number of items were 113 and maximum score 226. The normal range of development in these domains was arrived at by computing the confidence interval of the scores of typically developing adolescents. Scores within the bounds of interval indicated typical development. And scores above the upper bounds could be considered to indicate highly satisfactory development, while those below the lower bounds implied need for improvement.

Adequacy of the screening checklist

The adequacy of the screening checklist for post school transition in Indian adolescents with HI was determined by checking for its validity and reliability. Guidelines for developing tests and assessment material (Cohen, Manion, & Morrison, 2011; Pandya, 2011; Linn, 1990) report that the process begins with item construction after review of appropriate literature followed by item-analysis for determining difficulty and discriminatory indices of each item. However, item analysis does not apply to inventories, opinionnaires, rating scales or checklists. Authentic tools are to be verified for their validity and reliability also. The major types of validity are content validity, construct validity, convergent and discriminant validity, concurrent validity, predictive validity, criterion-related validity, cultural validity and consequential validity. Reliability is generally verified in terms of stability, equivalence and internal consistency.

Validity of the screening checklist: In order to determine the validity of the screening checklist three measures were under taken, namely, verification of content validity by experts, as well as determination of construct validity (in terms of convergence) and criterion validity.

Content validation is to verify whether all constituent domains in the area of testing are adequately represented in the assessment material (Cohen, Manion, & Morrison, 2011).

Content validation of the reported screening checklist was carried out by six experts three each from the fields of special education and clinical psychology, respectively. All items had received consent from not less than 80% of the evaluators (that, is five out of the six evaluators).

Convergent validity demonstrates that component constructs or factors of the assessment material are related to each other and are unifocal in nature (Cohen, Manion, & Morrison, 2011). The convergent validity was confirmed with high, positive correlation between results on all component domains of development with over all development, except for independent living skills which was also positive though moderate in extent. However in all instances, the relationship between the constructs and with the sum total was positive and statistically significant ($p < 0.001$).

The purpose of this tool was to determine whether an adolescent had age-appropriate development. Therefore the criteria for evaluation could be taken to distinguish individuals from different stages of development. Hence, in order to determine the *criterion validity* of the screening checklist, it was verified whether the checklist was able to clearly distinguish between individuals from adolescence phase and those from childhood phase. As mentioned afore, development of 17 individuals in late adolescence was compared to 13 individuals in late childhood using the checklist. The results elicited significant differences ($p < 0.001$) in all domains of development with overall mean difference of approximately 37%, thus ensuring the criterion validity of the checklist.

Reliability of the screening checklist: Three types of reliability, namely, stability in terms of its dependability over time, equivalence among different evaluators and internal consistency among the constituent items of the screening checklist were verified through various measures in this research.

The *stability* of developed checklist was verified in terms of reliability over test–retest condition. For the purpose, after the first round of administration, it was re-administered to 10 randomly selected typically developing participants after two weeks' duration. There was a perfect correlation of 1.00 between test–retest results ($p < 0.001$) in all individual domains of development, as well as overall development. The reliability in terms of *internal consistency* was verified through the split half method. Correlation of 0.88 ($p < 0.001$) between the sum of odd and even items established the internal consistency of the test and the unidirectional purpose of its constituent items.

Reliability in terms of *equivalence* was verified through inter-rater reliability. The checklist was self-administered by 10 randomly selected typically developing adolescents in the later phase; apart from administration by a significant other (who was very familiar with the adolescents). Inter–rater correlation of 0.95 for overall development, and 1.00 for domains of independent living skills, academic and study skills, and employability ($p < 0.001$) was observed. However, in the domain of community living skills the inter–rater correlation was 0.15 ($p = 1.33$). As suggested by other researchers (Manning, 2007), this could be because adolescents may not have realistic perception of their own social behaviours. Therefore for practical purposes it is advisable to avoid self-administration.

Comparison of typically developing adolescents and adolescents with HI

The development of adolescents with HI were compared with their typically developing peers in order to find out if there were any differences in the patterns of development, levels of vocational awareness and trends of vocational inclinations. The overall developmental scores of adolescents with HI and their typically developing peers, as well their scores in individual domains of development have been presented in table 1.

General overview of the results create a positive impression about the development in typically developing adolescents with advantage in all most all areas, except in the domain of independent living. A mean difference of 25.85 could be observed between raw scores for overall development obtained by typically developing adolescents and adolescents with HI with advantage to the former group. However, the difference is statistically insignificant.

Table 1. *Comparison of typically developing adolescents and adolescents with HI*

Developmental Domains	Typically Developing Adolescents			Adolescents with Hearing Impairment			|Z|
	Mean	SD	Median	Mean	SD	Median	
Independent Living Skills	41.50	7.89	48	43.00	2.34	44	0.65
Community Living Skills	63.65	6.69	69	51.94	6.13	54	4.28***
Academic Performance & Study Skills	45.75	4.77	50	34.81	4.50	36	4.50***
Employability	50.25	6.15	54	45.50	7.28	48	2.31*
Overall Performance	201.10	22.49	218	175.25	17.38	184	3.26

Note: *** $p < 0.001$; ** $p < 0.01$, * $p < 0.05$, No* – no statistical significance

Comparative development in terms of independent living skills: Comparative development of adolescents with and without HI in areas of self-care, safety, management of living environment and time are presented in figure 1.

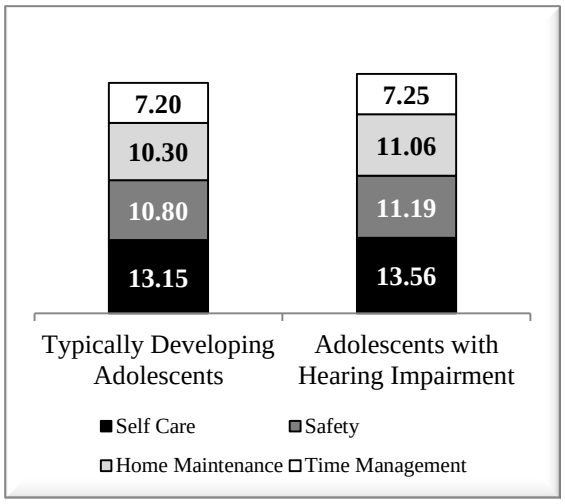

Figure 1. Comparison of development of independent living skills.

As depicted in figure 1, adolescents with HI did not seem to have problems with personal care, maintenance and security. In fact they were found to be marginally better than their typically developing peers, even though the advantage was minimal (with mean difference of 1.5%) and statistically insignificant.

Researchers like Butterfield (1986) have also reported that children with HI are in no way inferior to typically developing children in physical growth and personal maintenance. However as observed in table 1, a higher median of 48 among the typically developing adolescents compared to 44 of adolescents with HI may imply more uniform pattern of development across the former group.

Comparative development in terms of community living skills: However when it comes to community living skills, adolescents with HI were found to be placed much behind their typically developing peers, as is evident from results presented in table 1 and figure 2.

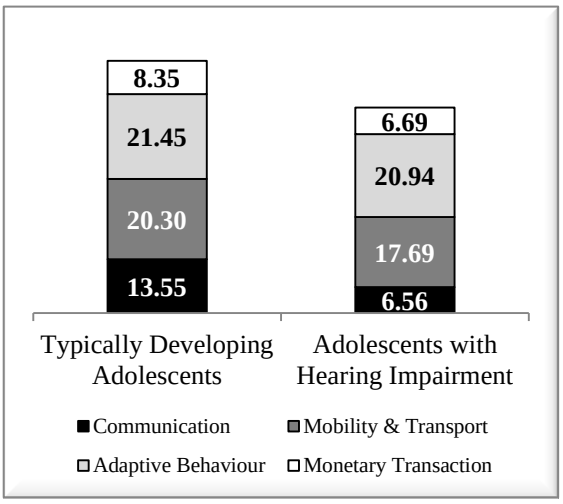

Figure 2. Comparison of development of community living skills.

The mean difference and statistical significance was the highest in this domain. Significant deficits in communication skills ($|z| = 5.40$, $p < 0.001$) seem to have led to problems in independent mobility in unfamiliar places ($|z| = 2.45$, $p < 0.01$), and conducting monetary transactions in the social environment ($|z| = 2.66$, $p < 0.01$). Skills for behavioural adaptations among adolescents with HI in the social environment were also not favourable; however the lacuna was not significant.

Ultimately, all these have resulted in overall, significant deficit in the domain of community living skills ($|z| = 4.28$, $p < 0.001$) as depicted in table 1. Researchers like White and White (1987) have similarly highlighted the adverse impact of early deprivation in receptive and expressive communication skills on all domains of human functioning.

Comparative development in terms of academic attainment and study skills: Adverse impact of presence of HI was found to reflect maximum in the area of academic and study skills ($|z| = 4.50$, $p < 0.001$) with substantial deficits in all areas – study skills ($|z| = 4.57$, $p < 0.001$), functional literacy ($|z| = 4.41$, $p < 0.001$) and computer literacy ($|z| = 2.28$, $p < 0.01$). Thus, affecting overall academic attainment and efficiency of study skills in adolescents with HI. This finding reiterates evidences generated over the years by several researchers like Quigley and Kretschemer (1982); Bloom and Lahey (1978); Gibson and Levin (1975) regarding HI leading to language deficiencies and defective development of reading and writing skills. Literacy and numeracy being the fundamental academic skills, they are found to result in inadequacies in all areas of learning as depicted in figure 3.

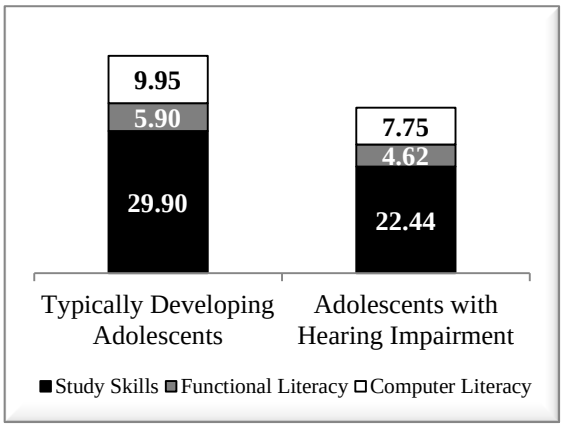

Figure 3. Comparison of academic and study skills.

Comparative development in terms of employability: Development of skills leading to employability, like readiness for work and work place behaviours, was also found to be considerably affected in adolescents with HI. From the results displayed in table 1 and figure 4, they were found to be trailing significantly behind their typically developing peers in their readiness for work ($|z| = 2.81$, $p < 0.01$).

Earlier evidences (Rangasayee, 2008) also point to similar revelations with less than 5% of the population with HI in India being endowed with constructive post-school opportunities. Reichman and Jacoby (n.d.) of Laurent Clerc National Deaf Education Centre of Gallaudet University suggest that work place exposure and development of life skills which is necessary for augmentation of job opportunities is lacking in individuals with HI.

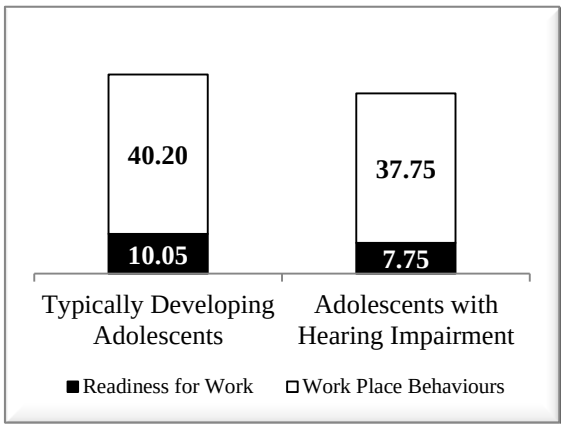

Figure 4. Comparison of employability.

Comparison of vocational awareness: Awareness about different types of jobs was assessed through the performances of the adolescents in the multiple-choice and illustrated tests for checking their knowledge and awareness about the 12 vocational groups mentioned afore when describing the constituents of the screening checklist under the method of study. The results in terms of their percentage scores in the test have been presented in figure 5.

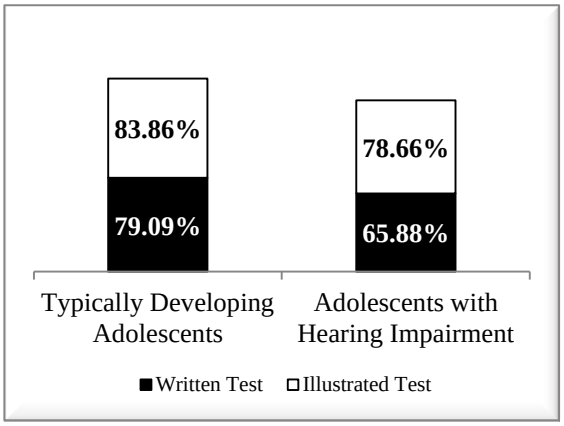

Figure 5. Comparison of vocational awareness.

The results highlight prevalence of better awareness among typically developing adolescents with a gross advantage of 18.13%.

Adolescents of both groups have performed better on the illustrated test compared to the written objective-type test, especially those with HI. Further scrutiny of the data revealed that during the transition from early to late of phase of adolescence, adolescents with HI have made more drastic advancements in their awareness. The results depicted in figure 6 show that typically developing adolescents' gross advantage of 27.43 in the early phase over their peers with HI reduces to 8.87 in the later phase. This might be because most adolescents with HI are in sheltered residential set-ups in the early phase and move out to mainstream set-ups in their late adolescence which might have led to wider exposure and increased awareness. Also the transition between secondary to post-secondary education marks the beginning of making choices related to later vocations, and having undergone this process during their transition from early to late adolescence would have led to added knowledge. Though an advantageous trend over the ages was noticed in both the groups of adolescents with and without hearing loss, it is more substantial in the former group.

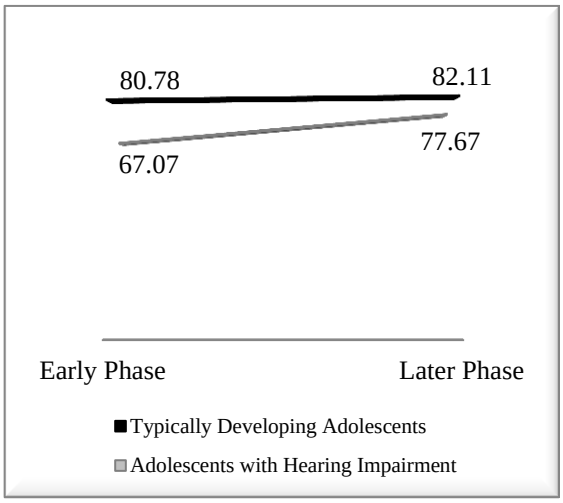

Figure 6. Comparison of vocational awareness.

Comparison of vocational inclinations: Inclinations of the participant adolescents towards different types of occupations were considered to manifest in their personal qualities, choice of core-curricular subjects and co-curricular activities. As implied by personal characteristics and co-curricular choices, typically developing adolescents seemed prone to choose jobs associated with fiscal and social implications, while their peers with HI showed inclinations towards rudimentary jobs in the field of human and public services. In terms of core-curricular choices, both the groups seem to have chosen conventional subjects like mathematics and sciences that point to inclinations towards jobs in the field of science and technology.

Conclusions

In the contemporary field of educational habilitation for the differently-able, emphasis is on including them in the general stream of education with the ultimate purpose of helping them to successfully integrate in the society. The realisation of this objective does not materialise from just physically placing children with special needs in mainstream schools, but necessitates providing them an education that prepares them for harmonious life in the society. Especially, in the school leaving stage when they get ready to transit from sheltered childhood life and face the rigours of adult life outside school, there should be focused efforts to prepare them for the responsibilities of mainstream life. The first step in this direction is to assess the level of life skill development in the individual learners in order to identify areas of lacunae and then plan and implement necessary remedial measures.

The checklist developed through the reported research will be helpful in appraising life skill development in adolescents with HI in the areas of – independent living skills, community living skills, academic and study skills, and employability. These apart it will also be useful to gauge vocational awareness and inclinations in the adolescents under scrutiny and guide them towards a productive career. The developed tool had been field tested with limited population. Undertaking a large scale research will help to standardise it further. Extensive surveys using the tool may help in identifying general developmental trends, especially lacunae among adolescents with HI. This in turn could lead to designing and implementing need-based intervention in future.

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The authors thank Prof. S. R. Savithri, Director, AIISH for permitting and endorsing the research. They are thankful to Dr. N. Swapna, Head of the Department of Special Education at AIISH, as well as heads of the all the

educational and training institutions of the participant adolescents for their support. They owe special thanks to Dr. M. S. Vasanthalakshmi, Reader in Biostatistics at AIISH for her guidance and support in carrying out the statistical analyses. They thank all professionals who had helped in the validating the tool. They are immensely thankful to all adolescents with and without HI whose support and cooperation had helped in the accomplishment of this research.

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Study of Influence of Co-Curricular Training in Visual Arts on Development of Pre-Academic Skills in Preschool Children with Hearing Impairment

Singh, T.[1], & Malar, G.[2]

Abstract

This study attempted to investigate the impact of visual arts training as part of co-curriculum on pre-academic skill development in preschool children with hearing impairment. The intention was realised through a true experimental research including six preschool children with hearing impairment in the age range of three to five years. The six participant children with hearing impairment (N = 6) were randomly assigned to experimental and control groups, three to each group. The children of the experimental group were trained in seven types of visual arts activities through 15 sessions of 45 minutes each. The intervention was preceded and followed by testing using specially developed material for assessing pre-reading, pre-writing and pre-number skills in both control and experimental groups. The gain scores computed by deducing the pre-test scores from post-test scores were used to evaluate the impact of visual arts training on pre-academic skill development. The results of the study drew out the overall, positive and significant impact of visual arts training on pre-academic skill development. Among the component skills, pre-reading skill development stood to gain more significantly than pre-writing and pre-number skills.

Keywords: co-curriculum, visual-arts, pre-schoolers, hearing-impairment, pre-academics

Introduction

ASHA (1981) describes hearing loss as deviation or deficiency in the auditory structure or function, outside the range of normal hearing abilities. And this in turn is said to affect an individual's communicative performance in activities of daily life. Especially, if the loss occurs during early growing years, the impact is more severe. The effect reflects on five major areas of life, namely, language development, learning ability and characteristics, vocational choices, personal self-concept, and social development; as sense of hearing is critical for development in all these areas (ASHA, 1997-2014).

NCHAM (1999-2014) insists that preschool training for school readiness is an essential component of early training programmes for children with hearing impairment (henceforth referred to as HI). Preschool training for young children with HI includes core components like training in cognitive, language and (pre)academic skills along with training in co-curricular areas like physical exercises and games, performing arts and visual arts.

Co-curricular activities are activities allied to core-curricular training, offering various developmental benefits to children, like physical, psychological, social, educational, recreational, cultural, academic and vocational values among others (Ahmad, 2011). They might be helpful in imparting early training to young children with special needs in an enjoyable way.

Visual arts training involve work done by hands and appreciated by eyes. At the level of early childhood education, it involves activities like drawing, colouring, printmaking, paper craft, clay work, construction work, and work with fabrics, fibres, and a variety of other material. (Malar, Asha, & Asha, 2013). Training in visual arts helps to strengthen fine motor skills, promote visual learning, and develop eye-hand coordination. Hence, visual arts training can be considered as a useful tool for enhancing pre-academic learning which are built upon these foundational skills (Swaminathan & Daniel, 2004).

Need for the study

In general practice, co-curricular training like visual arts is found to be a neglected aspect among school curricula. There are several reasons that have led to such negligence. The

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foremost being the educational tradition of giving secondary importance to co-curricular training next only to core-curricular learning, being ignorant of its contributory nature to the latter, and lack of trained expertise to creatively exploit the avenues offered by co-curricular activities like visual arts, so as to enhance development in various core-curricular areas. Last but not the least, wide-spread misconception that children with special needs like those with HI will find it difficult to participate, or will waste valuable therapeutic or learning time by participating in co-curricular training. In this background, the investigators felt that it was essential to generate concrete evidences regarding the possible influence of training in visual arts on development of pre-academic skills in preschool children with HI.

Purpose of the study

The major aim of the study was to investigate the influence of selected visual arts activities on pre-academic skill development in preschool children with HI. This purpose was realised through – selection of specific activities in visual arts training that is appropriate for preschool-age children and relevant to pre-academic skill training; implementation of intervention with the selected visual arts activities in preschool children with HI; construction of appropriate test material for analysing the pre-post developmental differences in pre-academic skills; and appraisal of the impact of visual arts training on pre-academic skill development.

Method

A true experimental research design was adopted in the process of investigating the influence of selected visual arts activities on pre-academic skill development in preschool children with HI.

Participants

Eight children were identified for the study, out of whom six children were found eligible according to the inclusion criteria of – chronological age within three to five years, hearing loss of 60 dB or more in the better ear, and participation in special preschool training programmes including pre-academic skills in the curricula. Children with any additional disability other than HI were excluded. On the whole, there were three boy and three girl-participants. Three of the selected children were in the age range of 3+ to 4 years and the other three were in age range of 4+ to 5 years. The six children were randomly assigned to control and experimental groups, three to a group.

Material

Two types of material were used in the study. One was test-material developed for assessing the pre and post interventional status of participant children in pre-academic skills, and another was intervention material to train the children in visual arts.

Test material: The investigators had developed exclusive test material for the purpose of assessing the pre and post interventional status of participant children in pre-academic skills. The test items were developed with the training manual for pre-academic skills published at All India Institute of Speech and Hearing (henceforth referred to as AIISH) as basis (Malar, 2012). The test material consisted of three major sections, namely, pre-reading, pre-writing and pre-number skills with a total of 68 types of tasks and 150 test items against a score of 200. The pre-reading and pre-writing tasks together accounted for 100 marks; while pre-number items carried another 100 marks.

The test material was subjected to content validation by five experts in the field of early childhood special education. Only items that received 80% or more consent were retained, and suggestions of the expert evaluators for improvisation were also incorporated. The researchers had further translated the material into the instructional language of the participant-children, that is, Hindi. The Hindi version of the test material was again validated by two expert special educators with mastery in the language. A parallel version of the test was developed for post-test purposes in order to rule out influence of repeated exposure on the performance of the participants.

Training material: The second type of material was developed for the purpose of interventional training. The activities that were selected for intervention were: *Drawing Task* – completion of dotted picture of house; *Colouring Task* –

colouring the picture of house drawn previously; *Printmaking Task* – designing a flower bouquet using vegetables and thumb prints; *Paper Craft* – collage work of a fish using coloured bits of paper; *Clay Work* – involving rolling activities to make letters; flower, etc.; *Construction Work* – of making photo-frames with craft sticks, decorated with buttons, craft paper, etc. and holding the corresponding child's photo; and *Work with Various Kinds of Material* – making scenery with pulses, cereals and powders. The activities were selected from the training module in visual arts (Malar, Asha, & Asha, 2013) from the Manual for Adapted Co-Curricular Activities developed at AIISH.

Procedure

The experimental study was carried out through two major stages, including development and/or compilation of necessary material and carrying out the interventional experiment. Each of the stage had constituent steps which have been described in detail.

Stage I: Development and/or compilation of necessary test and training material

Step 1: Construction of two parallel sets of test material in the areas of pre-reading, pre-writing and pre-number skills.

Step 2: Validation of test items by expert special educators in the field of early childhood special education for HI.

Step 3: Selection of appropriate training activities from a published module of visual arts training and collection of raw material necessary for imparting training in the selected activities.

Stage II: Interventional experiment using visual art training activities

Step 1: Administration of pre-test for pre-academic skills on child-participants of the control and experimental groups on one-to-one basis.

Step 2: Implementation of visual arts training in seven activities through a period 15 sessions of 45 minutes each. Approximately, two sessions were spent on training child-participants of the experimental group in each of the activity (except paper craft, which took three sessions to complete).

Step 3: Administration of post-test for pre-academic skills on the child-participants of the control and experimental groups on one-to-one basis.

Step 4: Exposure in selected visual arts activities for child-participants of control group on ethical grounds so that no participant is denied exposure to any beneficial or constructive experience.

Data collection and analysis

Pre-testing of child-participants of both experimental and control groups was carried out on one-to-one basis through sessions of one hour duration. The intervention through visual art training was carried out as a group activity in the experimental group of three child-participants. The training sessions had been video recorded. Post-testing in pre-academic skills was again carried out on individual basis. The pre and post-test performances in the pre-reading, pre-writing and pre-number skills were recorded as responses on worksheets and scored later.

The raw scores of the child-participants were converted into percentage scores so as to enable ease of computation and comparison. Further, by finding the difference between post and pre-test performances, the gain percentage score of each child-participant of both control and experimental groups were calculated for aggregate performance, as well as in the three individual domains of pre-academic skills. Calculation of the gain scores helped in ruling out the interference of baseline differences among child-participants when analysing the influence of visual arts training.

The gain scores of the control and experimental groups were compared using non-parametric measures of variance in order to assess the nature and extent of influence of training in visual arts on pre-academic skill development. Apart from descriptive measures, non-parametric processes had been employed as the sample size was too small to exhibit normal distribution.

Results and Discussion

The researchers commenced analysis by comparing the mean difference in the gain scores of the participants belonging to the

control and experimental groups in order to observe the impact of visual arts training on component domains of pre-academic skill development. The observations have been reported herein after.

Impact on pre-reading skills

As per results depicted in figure 1, there was an advantage of 5.28% scores in pre-reading skill development influenced by exposure to visual arts training.

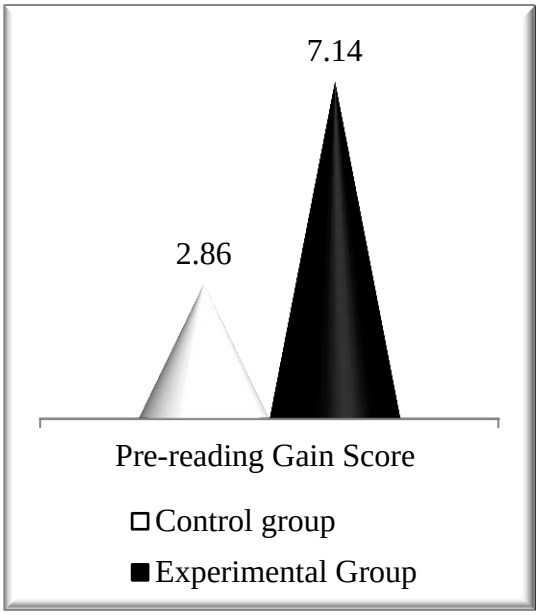

Figure 1. Advance in pre-reading skills following visual arts training.

According to Deasy and Stevenson (2002) art activities are a great way to promote literacy and language development. They further said that children who draw pictures of stories they have read were found to improve their reading comprehension, and are also motivated to read new material. Deasy (2003) had also elaborated on specific types of artistic training that promote and complement training in basic reading skills.

Impact on pre-writing skills

As demonstrated by results depicted in the following figure 2, the experimental group had again demonstrated an advantage of 5.55 % in the area of pre-writing skills, and this was the highest among the three constituent areas of pre-academic skills. Thus endorsing previous evidences (Einarsdottir, Dockett, & Perry, 2009) of positive impact of training in visual arts activities like drawing that enhance development of writing skills in young children.

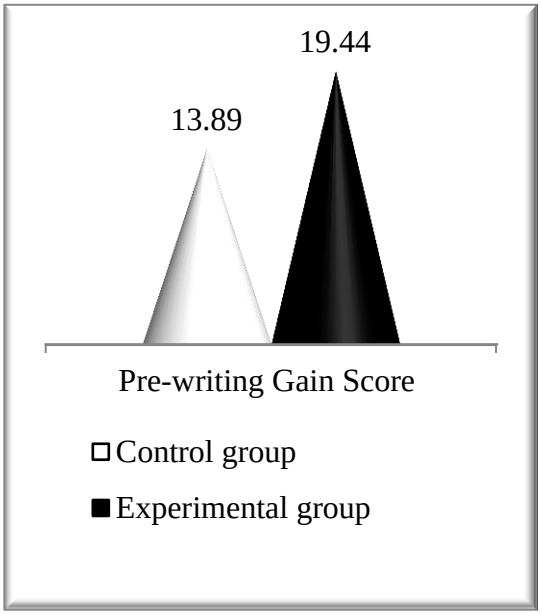

Figure 2. Advance in pre-writing skills following visual arts training.

Einarsdottir, Dockett and Perry (2009) had generated evidences that drawing helps children to develop their ability for future writing skills. Therefore, they suggest that drawing should be considered as an important activity in preschool, as it promotes fine motor development, which in turn is a precursor to writing. The use of scribbles, lines, and shapes are all drawing activities that help children to prepare for formal reading and writing in school (Kellogg, 1970). Kress, (1997) further stressed that drawing is the early form of writing by children. However, Goodnow (1997) cautioned against the perspective of drawing as only a pre-writing skill, which will undermine its creative and cognitive implications.

Impact on pre-number skills

Results depicted in figure 3 imply that visual arts training had a positive effect on pre-number skill development, even though less in magnitude (3.77%). Baker (2013) states that involvement in art work from an early stage, influences children to develop their intellectual capacities optimally so as perform better in intellectually challenging core subjects like mathematics.

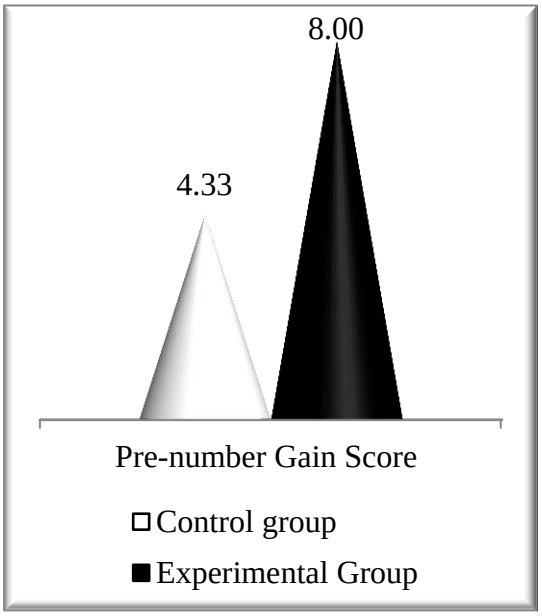

Figure 3. Advance in pre-number skills following visual arts training.

Carla Farsi (quoted in *Early Childhood News*, 1989), a Professor of Mathematics at the University of Colorado recommends to teachers to look at arts through the lens of mathematics. She says that maths is not just a subject of numbers and logics, but also of structures and shapes which in turn forms the core of visual arts products. She further suggests that in the process of creating a visual art, learners would be introduced to count categories and sequence the raw material like beads, sequins, etc; which will in turn supplement maths learning. Thus visual arts was found exerting influence on cognitive development related to numeracy, beyond visual skills required for reading and motor skill required for writing which are directly related to the process of art making.

Overall impact of visual arts training

Although descriptive overview of results highlighted the overall positive impact of training in visual arts on development of pre-academic skills in children with HI, the researchers had further carried out inferential statistical analysis to conclusively determine the impact of visual art training on pre-academic skill development.

Due to the small size of the sample, the non-parametric measure of Mann-Whitney U Test had been employed for the purpose. The results have been displayed in table 1.

Table 1. *Mann-Whitney U test of gain scores of experimental and control groups*

Skills	Groups	Mean %	SD	Mean Difference %	|Z|
Pre-reading	Experiment	7.14	2.47	5.28	1.99*
	Control	2.86	1.43		
Pre-writing	Experiment	19.44	6.74	5.55	1.11
	Control	13.89	5.85		
Pre-number	Experiment	8.00	2.65	3.77	1.11
	Control	4.333	4.62		
Overall	Experiment	9.42	0.63	4.17	1.96*
	Control	5.25	3.47		

Note: * $p < 0.05$

The impact of visual arts training was positive and significant on overall pre-academic skill development with mean difference of 4.17% ($p < 0.05$) in gain scores. The impact was statistically significant (mean gain 5.28 %; $p < 0.05$) for visual tasks involved in pre-reading skills. However, the mean gain was the highest (5.55%) for visual-motor tasks involved in pre-writing skills even though statistically insignificant. Development in pre-number skills received least gain; nevertheless there was an average advance of 3.77%.

Generally, visual arts training is considered to originate from sensory appreciation of visual forms and progress through motor tasks to accomplish those forms, and culminate in cognitive and affective competencies related to analysis and appreciation. Hence, the short duration of training was found to exert rudimentary effect on visual and motor skills. Extended training can be expected to wield more intense influence on motor tasks related to writing and cognitive tasks related to numeracy and logical thinking as well.

Influence of other developmental variables

The present study took into consideration only the supplementary effect of visual arts training

on development of pre-academic skills; whereas prior evidences have also pointed to influence of other factors like age and gender on academic attainment in children with or without special needs (Roberts, Jurgens, & Burchinal 2005; La Paro & Pianta, 2002). In order to verify whether other factors like age, gender and speech-language development were complementing development of pre-academic skill development in the participant children; further deliberations were carried out by analysing the mean pre-test performances of the participant-children belonging to both experimental and control groups on the basis of these attributes.

***Influence of gender*:** Figure 4 depicts the comparison between the percentage scores of girls and boys with HI undergoing special preschool training. As per the results, boys were found to marginally outperform girls with an overall advantage of 10%. However, the differences were not statistically significant. Duncan and Claessens (2007) also report that there are not much significant differences between boys and girls in pre-academic achievement. However, these findings override traditional perceptions that girls perform better in academic learning.

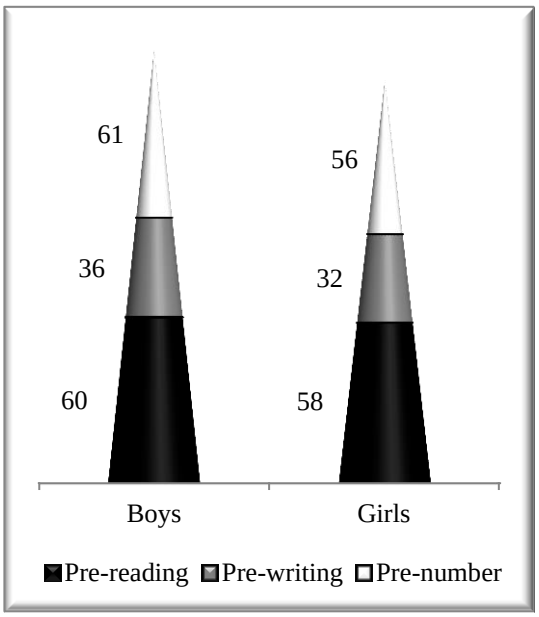

Figure 4. Influence of gender on pre-academic skill development.

Influence of age: The following figure 5 illustrates the comparative performances (in terms of percentage scores) of children of age groups 3+ to 4 years and 4+ to 5 years.

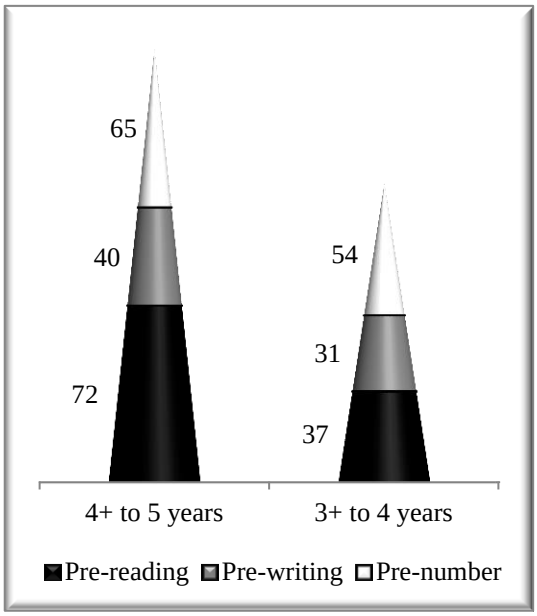

Figure 5. Influence of age on pre-academic skill development.

As evident from the figure, older children had shown better development of pre-academic skills with a mean difference of nearly 18%, making evident the substantial influence of age on pre-academic skill development. Crosser (1991), Kinard and Reinherz (1986), and La Paro and Pianta (2002) have proved through their researches that older children with age appropriate placement were doing better academically than their younger peers.

Influence of language ability: Earlier research (Roberts, Jurgens, & Burchinal, 2005) has provided evidence of positive influence of language on pre-academic skill development. Hence, performances of children with differing levels of language development were investigated. Based on clinical diagnostic reports, children were bifurcated into those with age-appropriate or below-age development for comparison.

The results presented in figure 6 make obvious the fact that children with age appropriate language development were faring better in pre-academic skills with a mean advantage of 13%. There are ample evidences to support this finding from researchers like Catts and Kamhi (2005); Nathan et al. (2004); and Catts, Fey and Tomblin (2002) who had drawn out the strong

relationship of development of communication and language skills, to academic achievement at school entry level.

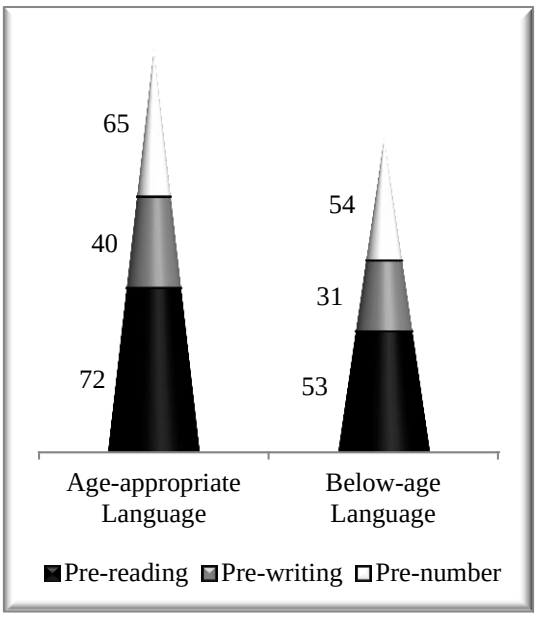

Figure 6. Influence of language development on pre-academic skill development.

Conclusions

Thus to conclude, training in visual arts as part of co-curricular training was found to exert positive influence on pre-academic skill development in young preschool children with special needs like HI. The impact percolated into all domains of pre-academic skills, especially evident with more intensity in the area of pre-reading and pre-writing skills. Apart from exposure to visual arts, other factors like gender, age and speech-language development were also found influencing pre-academic skill development. Older children, especially boys with age appropriate speech-language development were performing better.

The above-discussed findings may be helpful in convincing special and mainstream early childhood educators regarding beneficial employment of various co-curricular activities to promote academic learning in young children with or without special needs. The interventional procedures detailed in the study might also lend useful information to educators about specific visual art activities that will be helpful in stimulating development of pre-reading, pre-writing and pre-number skills.

Further researches can be undertaken on a large scale including more number of subjects, with diverse kinds of differential abilities and covering wider geographical areas. Efforts to develop practical kits for visual arts training, especially focusing on different core-curricular areas will be useful to practising educators.

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The authors express their gratitude to Prof. S. R. Savithri, Director, AIISH for endorsing the endeavour. They are thankful to Dr. Swapna, N., Head of the Department of Special Education for the permission and support extended to carry out the research at the Department. They express their sincere thanks to Dr. M. S. Vasanthalakshmi for her guidance and support in statistical analyses. They are appreciative of the supportive roles played by special educators Dr. Kadambari Naniwadekar and Mr. Murshidul Alam in the venture. They thank the heads and staff of the Academic Section, and Library and Information Centre at AIISH for the infrastructural and procedural supports. They are thankful to all child-participants and their caregivers for their consent and cooperation.

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