© Journal of the Indian Academy of Applied Psychology
Jan 2017, Vol. 43, No. 1, 59 - 66

Mechanical Comprehension Ability in Children with Learning Disabilities and Hearing Impairments - A Comparative Study

G.Y. Yashodharakumar, S. Venkatesan
All India Institute of Speech & Hearing, Mysore

Lancy D'Souza
Maharaja's College, Mysore

The children with learning disability (LD) are presumed to processes information differently in contrast to their unaffected peers. Mechanical comprehension is the ability to perceive and understand the relationship of physical forces and mechanical elements in practical situations. This study uses a 'Test of Mechanical Comprehension, Form S (Bennett, 2008) under two conditions, viz., stipulated and extended time conditions to examine whether children with LD exhibit better mechanical comprehension compared to those with Hearing Impairments (HI). By recruiting a purposive sample of 60 regular or special school students of 30 each with LD and HI in the age range of 14-16 years, the obtained data was analysed using, both, descriptive and inferential statistics. Results show that subjects with LD have significantly higher percentile scores on mechanical comprehension compared to those with HI spread over both the tested conditions. The implications of these findings for placing children with LD under a tailor made curriculum that enhances their prowess and gives opportunities for building mechanical comprehension abilities are discussed so as to transform their disadvantage into an advantage.

Keywords: Mechanical comprehension, Aptitude, Learning disabilities, Hearing impairment, Speed power tests

Learning Disability (LD), or Specific Learning Disability (Sp. LD) is currently classified as "Specific Developmental Disorders of Scholastic Skills" (ICD-10 Code: F81; World Health Organization, 2016). These children experience difficulties with reading, writing, spelling and/or arithmetic. Gillam and Johnston (1992) reported that the adults with this disability are likely to be unemployed and socially isolated. They are presumed to process information differently contrasting their unaffected peers. On the other hand, students with Hearing Impairment (HI) tend to perform low in their academics.

Freeman (1965) has explained aptitude as a mixture of characteristics, indicative of an individual's capacity to acquire some specific knowledge (with training), skills or set of organized responses, such as the ability to speak a language, to become a musician, and/or to do mechanical work. Apart from the several in the list of aptitudes, mechanical comprehension is the ability to perceive and comprehend the relationship of fundamental physical forces and mechanical elements in practical situations (Bennett, 1940), such as, working of gearwheel, lever and movement processing. This comprehension involves constructing an internal representation of an operation of the machine as described in the text. When a subject reads a text, s/he looks over a diagram. A diagram represents the configuration of the mechanical system. Research indicates that mechanical ability includes general reasoning skills and specific knowledge of machines (Hegarty, Just & Morrison, 1988). This ability plays a significant role in training programs or in performing jobs that require the understanding and application of mechanical principles. The person who scores high in mechanical comprehension tends to learn readily the principles involved in the operation and repair of complex devices. State regulations, at least in the west, advocate identification of processing strength and weaknesses of children

with special needs before optimizing on the former (Flanagan, Fiorello & Ortiz 2010).

The Bennett Mechanical Comprehension Test (Bennett, 1969) is deemed as one of the best specific aptitude test to profile and compare the strengths of individuals with special needs. Preparing students with disabilities, especially those with LD, for school-to-work transition and post school life requires systematic and comprehensive vocational assessment covering not only their academic skills; but also, their aptitude, interests, communication, social and interpersonal skills. Far more gifted children suffer from LD than one realizes. When gifts and handicaps co-exist in one individual, they often mask each other so that the student may appear "average" or even an "underachiever" (Nielsen, 2002; Silverman, 1989). For example, children with LD have been shown to excel in music (Overy, 2003). This is despite their apparent timing difficulties in the domains of language, perception, cognition, and motor control (Overy, Nicolson, Fawcett, & Clarke, 2003). Likewise, it is found that based on Armed Services Vocational Aptitude Battery, about 29.2 % of students with LD qualified for enlistment into the Army based on requirements for high school graduates, while another 16.7% qualified based on non-high school graduate requirements. Between the forces, based on high school graduate requirements, 33.3% qualified for Marine Corps, 37.5% qualified for Navy, and 4.2% qualified for Air Force. The vocational areas, in which the students qualified frequently, were: Skilled Technical, Clerical, Combat Arms, Machine-Vehicle Operators, Food Service, and General Maintenance (Harnden, Meyen, Alley & Deshler, 1980). All this points towards the need, value and importance of aptitude testing for these children to enable them in their career education, guidance, and development (Lindstrom & Benz, 2002; Mori, 1980).

The scenario and situation is not dissimilar for students who are deaf (Akamatsu, Mayer & Hardy-Braz, 2008). Studies have explored aptitude related preferences or otherwise in such clinical populations by covering areas like music (Darrow, 1987), mechanical reasoning (Myklebust, 1946), communication and reasoning (Arnold & Walter, 1979). Of immediate interest and relevance is the attempt to address visuo-spatial learning strategies used by students with HI in their application to modern networking systems (Long & Aldersley, 1984). As noted, '...mathematics and science require skills in logical thinking, consideration of evidence, categorical thinking, manipulation of information, hypothesis generation, hypothesis testing, and argumentation, which are all highly symbolic and language laded activities, some of which are learned incidentally by normally hearing children before they even enter school' (Akamatsu, Mayer & Hardy-Braz, 2008; p. 131). If such barriers are eliminated, there is no reason to doubt why even students with HI cannot successfully participate in the ongoing rage for applying information technology (Swanwick, Oddy & Roper, 2005). Several aptitude tests are available with focus on measuring specific segments of aptitude. More specifically, tools measuring mechanical aptitude include: Wiesen Test of Mechanical Aptitude (WTMA), Ramsay Mechanical Aptitude Test (RMAT), Stenquist Mechanical Assembly Test (SMAT), DAT Mechanical Reasoning Exam (DAT-MRE), Aviation Selection Test Battery-Mechanical Comprehension Test (ASTB-MCT), Amtrak Mechanical Aptitude Test (AMAT), DuPont Mechanical Aptitude Test (DMAT) and others (Enger, Plake & Impara, 2001; McElwee, 1932).

As the foregoing review suggests, available information on mechanical aptitude of individuals with LD and HI is unexplored. This gives sufficient reason, rationale, need and justification to explore the nature, spread and extent of mechanical aptitude among individuals with special needs. Do such students have better or equal aptitude compared to their peers affected by other disabilities or even their unaffected peers? Are there any modifications or adaptations, such as, extended time or use of amanuensis that may be needed during aptitude testing of students with special needs? Would there be differences in the test performance between the uses of instruments that measure speed instead of power? Going by these research questions, the general aim of this study was to examine the mechanical comprehension among subjects with LD and HI. More specifically, it was the objective to compare mechanical

comprehension among subjects with LD and HI within as well as between the stipulated and extended testing time conditions.

Hypothesis

H01: There will be no difference between subjects with LD and HI in their mechanical comprehension within the stipulated test time condition.

H02: There will be no difference between subjects with LD and HI in their mechanical comprehension during the extended test time condition.

Method

An exploratory two-group cross sectional comparison design is used in this study on a purposive sample of 60 students attending regular/special schools while falling under the matched age range of 14-16 years for both children with LD as well as HI, respectively (Table 1).

Operational Definitions

'Learning disability is diagnosed by different yardsticks based on the theoretical paradigm, upon which it is based. Wherein discrepancy criteria is invoked, as in this study, a child showing a lag in reading, writing, spelling and/or arithmetic, more than two grades despite average to superior general and social intelligence as assessed on standardised tests of intelligence and achievement is termed as LD. This academic discrepancy should not be due to insufficient school exposure, inadequate sensory and bodily health, or because the student is a first generation learner, or has suffered any social and emotional abuse, insult, neglect, disadvantage, poor teaching, frequent change of school, curriculum or medium of instruction, bad home environment or faulty school policies, which can explain the poor academic level. The problem is also not attributable to the meddling presence of a troublesome peer group, abrupt weaning of academic support by a previously doting parent once the child reaches middle or high school (Venkatesan, 2012; 2010).

Hearing impairment as defined in this study covered a loss of 60 decibels (db) or more based on audiological evaluation of better ear for conversational range of frequencies. It covers all types of hearing loss including conductive-hearing loss, sensory-neural hearing loss, mixed hearing loss, central auditory disorder and retro-cochlear pathology. The term mechanical reasoning and/or comprehension as targeted in this study refer to the ability to understand basic mechanical principles of machinery, tools, and motion.

Participants

The participants included in this study were all subjected to individualized diagnostic screening and assessment by members of a multi-disciplinary team at a national level institute, which offers consultancy and is reckoned as the official agency for certifying cases of children with clinical conditions, such as, HI and LD. The choice of the different standardized measures of intelligence and grade level achievement tests varied with the child being tested. However, the two grade discrepancy criterion was maintained across all subjects with LD. The period of study extended between 1st October, 2015 and 31st January, 2016.

Measures

The Bennett Mechanical Comprehension Test, Form S (Bennett, 2008), used to collect data, is a paper-pencil test consisting of 68 items, which are illustrations of simple, frequently encountered mechanisms in nature. For each item, the examinee needs to read a simple question about an illustration, examine the illustration, and choose the best answer for the question from among the three alternatives. Items require reasoning rather than special knowledge. For example, based on a pictorially presented mechanical situation, the subject should be able to answer 'in which direction

Table 1. Mean Age of Selected Sample and Results if Independent Samples of 't' Test

Group	Number	Age range	Mean Age	SD	Probability
LD	30	14-16 years	15.16	0.647	t: 1.35; df: 58; p: 0.183
HI	30	14-16 years	14.93	0.691	

a paddle will turn (A or B), when the handle is moved in the direction as indicated by an arrow. Sometimes, items requiring fault diagnosis is also incorporated-although such items are absent in BMCT. Those who do well in this test are presumed to find it easy to learn how to repair and operate complex devices. Occupations, such as, carpentry, mechanics, engineering, electrician, physics, chemistry, and machine operator are among those that require mechanical reasoning aptitude.

For manual scoring, both, 'right' and 'wrong' key templates is used. Each correct response is given one credit score. The final or total raw score equals the number of correct responses minus one-half the number of wrong responses convertible into percentile ranks. It is reported that approximately 99.5 % of the words in the BMCT giving directions and exercises are on a "fairly easy" range or below the sixth grade reading level similar to reading levels in popular fiction books or magazines. The manual for BMCT presents split-half reliability coefficients of .81 to .93, with a median of .86.

Procedure

The respondents from both the groups were administered BMCT individually. In order to ease test administration, the items were also simultaneously written or read in regional language. This was done by using reverse translation techniques between two mutually blinded examiners. The researcher explained any test question where clarification was sought by the examinees. The help of sign language experts was used wherever needed while communicating to subjects with HI.

The data was collected under two conditions: (1) Stipulated Time (30 minutes as prescribed in Test Manual); and, (2) Extended Time (beyond 30 minutes to maximum of 60 minutes). Each subject was instructed to mark on a response sheet. The 30 minute stipulated time deadline was indicated by an alarm before allowing the subjects to proceed with the extended time. All testing conditions, preparation for administration of the paper-and-pencil test, and stipulated accommodations for examinees with disabilities as given in the manual were scrupulously followed. For scoring, hand scoring templates were used. Informed consent was taken in the tradition of adhering to the ethical guidelines as mandated for undertaking such studies in the investigating institution. Data were analysed using both descriptive (Mean, SD, N) and inferential statistics (independent samples of 't' test) using SPSS package.

Results

The results of the study pertaining to mechanical comprehension scores are presented sequentially as obtained for performance within the stipulated time limit by overall sample (N: 60) as well as by the individual groups of subjects with HI (N: 30) and LD (N: 30), respectively (Table 2). This is followed by reporting the scores attained by the same subjects under the condition of extended time limits (Table 3).

Table 2. Mechanical Comprehension Scores of HI and LD during Stipulated Time Condition and Results of Independent Samples of 't' Test

Group	N	Mean Percentile Score	SD	Probability
HI	30	12.56	10.32	t: 6.55; df: 58; p: <0.0001
LD	30	30.50	10.85	
Overall	60	21.56	5.73	

Table 3. Mechanical Comprehension Scores of HI and LD Groups during Extended Time Condition and Results of Independent Samples of 't' Test

Group	N	Mean Percentile Score	SD	Probability
HI	30	25.33	15.20	t: 8.33; df: 58; p: <0.0001
LD	30	57.33	14.54	
Overall	60	41.33	21.85	

For overall sample (N: 60), the mean percentile score for mechanical comprehension is 21.56 (SD: 5.73). This is interpreted as both the groups' together stand at the 22nd position out of 100 in mechanical comprehension. Between the groups, students with LD appear to score almost double and significantly higher percentile score for mechanical comprehension (N: 30; Mean: 30.50; SD: 10.85) compared to subjects with HI (N: 30; Mean: 12.56; SD: 10.32; p:<0.0001). However, the subjects with LD did not achieve the minimum qualifying percentile of 36.9 (Bennett, 2008) within the stipulated or allotted time limit for normal academic high school students.

Under extended time limits of another 30 minutes, it is seen that students with LD once again scored significantly higher percentile scores (N: 30; Mean: 57.33; SD: 14.54) compared to subjects with HI (N: 30; Mean: 25.33; SD: 15.20; p:<0.0001). When the time limits for test performance are extended, it is also seen that the performance of students with LD and their mean percentile score on mechanical comprehension becomes at par with normal subjects. This is not so in the case of subjects with HI. Thus, the finding that there is a significant difference between the subjects with LD and HI in their mechanical comprehension within the stipulated test time condition as well as under the extended test time condition rejects both the first (H01) and second (H02) hypothesis. The findings are represented graphically in figure one.

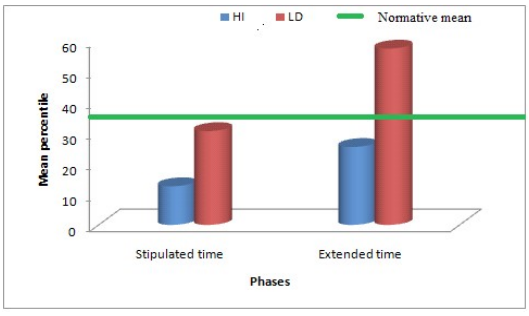

Figure1. Comparative mean percentile scores mechanical comprehension between students with LD and HI for stipulated and extended time conditions

Discussion

In the absence of available literature on mechanical comprehension among individuals with special needs, the findings of this study throws open new vistas for fresh empirical research along these lines. Gersten, Fuchs, Williams, and Baker (2001) hinted that children with LD have difficulties in comprehending text based test instructions, which could partly explain their inferior performance under timed constraints. This suggests that modified procedures of test administration, such as, use of amanuensis, orally or pantomime assisted accompanying test instructions, model based, computer animation or graphics user inter-phased and extended time limits may be required for respondents with special needs. While text comprehension and/or time constraints did not appear to tell so much about the respondents with HI, it was probably more to do with their relatively lower mechanical comprehension abilities than their counterparts with LD.

In the second condition of the extended time, subjects with LD improved their performance by almost a double as well as it came closer to norms of age matching the unaffected or typical students. Considering the disability of an individual, reasonable modification can be done to take the test comfortably (Society for Industrial and Organizational Psychology, 2003). The interpretive data on individuals with disability who got reasonable accommodations are not available at present (Bennett, 2008). As it appears, they might be processing the visual-spatial information in an unusual manner, when given the allowance of extra time, albeit as a superior ability (Hooper & Willis, 1989; Riccio & Hynd, 1996). In a similar study, scores on timed and untimed editions of Scholastic Aptitude Test (SAT) for students with various disabilities were recorded to investigate the effects of extra time on their test performance. Of the approximately 1800 students that studied, 79 percent were learning disabled. It was found that the performance improved with extended time. The increase was greater than that for non-handicapped students tested with the extra time. The average gains over the scores earned in a timed administration were generally between 30-38 points on the SAT after the growth in the

student's ability, practice effects, and errors of measurement were taken into account. About one in seven gained over 100 points, between 3-7 percent decreased by at least 50 points. Score gains increased as time spent on the test increased, suggesting that the additional time is needed to reduce the effects of the impairment in the examinees (Centra, 1986). Visuo-spatial ability has been found to be highly correlated with mechanical ability (Bennett, 1969). This finding is supported particularly in case of individuals with dyslexia, who are said to have superior global visual-spatial processing abilities (Von-Karolyi, Winner, Gray & Sherman, 2003). Children with LD have difficulty in both literal and interpretive comprehension skills, which lead them to take more time to decode a word that affects their ability to derive meaning (Nakra, 1996). In a study by Cawthon, S. (2009) teachers reported about the lack of knowledge on how to assess and accommodate students who are deaf. Keeping this as a foundation we can reason out for a better performance from LD subjects in the extended time period session. Whereas, the condition of hearing impairment may act as a barrier in acquiring new knowledge from external world, which may further lead to poor performance of HI subjects as compared to LD subjects, which needs further exploration.

Limitations

Although, the present study has roped into its ambit, an investigation into the possible influence of independent variables like gender, domicile, years of hearing-aid use, schooling type (special/ regular) and socio economic status, which could also probably provide some explanation for the poor performance of students with HI on mechanical comprehension tasks, it becomes a promising area for future research to explore.

In sum, Subjects with LD are found to possess significantly higher mechanical comprehension as compared to the age matched subjects with HI;

An extended time period condition is needed and justified for respondents with special needs, especially those with LD, in order to elicit the best performance on aptitude test tasks;

Modified procedures of test administration, such as, use of amanuensis, orally or pantomime assisted accompanying test instructions, model based, computer animation or graphics user inter-phased and extended time limits may be required for respondents with special needs.

The subtype of LD, percentage of hearing loss in HI group, school curriculum followed in both the group itself may influence the results, which needs to be explored.

Implications

Students with LD can be placed under tailor made and individual curriculum contents, which facilitates or fosters their already available aptitude for mechanical comprehension to transform their disadvantage into an advantage;

More detailed examination and aptitude profiling of students with HI is required to secure a better understanding of their strengths and/or weaknesses;

Tutorial based aptitude facilitation intervention programs need to be devised or empirically tried out on pupils with special needs to make avenues for their appropriate career choice, guidance and education; and,

The paradox of ability in disability, especially for students with LD, opens new avenues for fresh empirical studies along these lines.

Conclusion

Linking disability to talent casts disability condition is far more optimistic than linking it to a deficit only. The children with LD performed better than HI group in an extended time period condition where modified procedures of test administration incorporated. With this finding we can conclude providing an extra time may help individuals to perform at their maximum potentials. Also, findings suggest that there is a need for tailor-made curriculum for children with disabilities, so that they can learn and perform better.

References

Akamatsu, C. T., Mayer, C., & Hardy-Braz, S. (2008). Why considerations of verbal aptitude are important in education of deaf and hard of hearing students. In: M. Marscharak & P.C. Hauser. (Eds.), *Deaf cognition: Foundations and outcomes.* (pp. 131-170). New York: Oxford University Press.

Arnold, P., & Walter, G. (1979). Communication and reasoning skills of deaf and hearing signers. *Perceptual and Motor Skills, 49*(2), 192-194. doi:10.2466/pms.1979.49.1.192.

Bennett, G. K. (1940). *Manual of the Test of Mechanical Comprehension,* Form AA. San Antonio, USA: The Psychological Corporation.

Bennett, G. K. (1969). *Manual for the Bennett Mechanical Comprehension Test,* Forms S and T. San Antonio: The Psychological Corporation.

Bennett, G.K. (2008). *Bennett Mechanical Comprehension Test Forms S and T*. San Antonio, USA: Pearson.

Cawthon, S. (2009). Professional Development for Teachers of Students Who Are Deaf or Hard of Hearing: Facing the Assessment Challenge. *American Annals of the Deaf, 154*(1), 50-61. doi:10.1353/aad.0.0073.

Centra, J. A. (1986). Handicapped student performance on the Scholastic Aptitude Test. *Journal of Learning Disabilities, 19*(6), 324-327.

Darrow, A. N. (1987). An investigative study: The effect of Hearing impairment on musical aptitude. *Journal of Music Therapy, 24*(2), 88-96. doi: 10.1093/JMT/24.2.88.

Enger, J., Plake, B. S., & Impara, J. C. (2001). *Review of the Wiesen Test of Mechanical Aptitude.* The 14th Mental measurements yearbook. Lincoln, NE.

Flanagan, D., Fiorello, C., & Ortiz, S. (2010). Enhancing practice through application of Cattell-Horn-Carroll theory and research: A "third method" approach to specific learning disability identification. *Psychology in Schools, 47*(7), 739–760.

Freeman, F. S. (1965). *The theory and practice of psychological testing*. (3rd Ed), New Delhi: Oxford and I B H Publishers.

Gersten, R., Fuchs, L. S., Williams, J.P., & Baker, S. (2001). Teaching reading comprehension strategies to students with learning disabilities: A review of the research. *Review of Educational Research, 71*, 279-320 doi:10.3102/00346543071002279.

Gillam, R. B., & Johnston, J. R. (1992). Spoken and written language relationships in language/learning-impaired and normally achieving school-age children. *Journal of Speech, Language, and Hearing Research, 35*(6), 1303-1315.

Harnden, G. M., Meyen, E. L., Alley, G. R., & Deshler, D. D. (1980). *Performance of learning disabled high school students on the Armed Services Vocational Aptitude Battery.* Retrieved from https://kuscholarworks.ku.edu/handle/1808/16295 on 25.3.2016

Hegarty, M., Just, M., & Morrison, I. (1988). Mental models of mechanical systems: Individual differences in qualitative and quantitative reasoning. *Cognitive Psychology, 20*(2), 191-236. doi:10.1016/0010-0285-(88)90019-9.

Hooper, S. R., & Willis, W. G. (1989). *Learning disability sub typing: Neuropsychological foundations, conceptual models, and issues in clinical differentiation.* New York: Springer-Verlag.

Lindstrom, L. E., & Benz, M. R. (2002). Phases of career development: Case studies of young women with learning disabilities. *Exceptional Children, 69*(1), 67-83. doi:10.1177/001440290206900105.

Long, G., & Aldersley, S. (1984). *Networking: Applications with hearing impaired students.* In: C. D. Holley & D. F. Dansereau. (Eds.), Spatial Learning Strategies: techniques, applications, and related issues. (pp.109-126). Florida: Academic Press.

McElwee, E. W. (1932). Standardization of the Stenquist Mechanical Assembly Test Series III. *Journal of Educational Psychology, 23*(6) 451-454. doi:10.1037/h0071233.

Mori, A. A. (1980). Career Education for the learning disabled: where are we now? *Learning Disability Quarterly, 3*(1), 91-101. doi:10.2307/1510430.

Myklebust, H. R. (1946). A study of the usefulness of objective measures of mechanical aptitude in guidance programs for the hypacousic. *American Annals of Deaf, 91*, 123.

Nakra, O. (1996). *Children and Learning difficulties.* New Delhi: Allied.

Nielsen, M. E. (2002). Gifted students with learning disabilities: recommendations for identification and programming. *Exceptionality: A Special Education Journal, 10*(2), 93-111. doi:10.1207/S15327035EX1002_4.

Overy, K. (2003). Dyslexia and Music. *Annals of the New York Academy of Sciences, 999*, 497–505. doi:10.1196/annals.1284.060.

Overy, K., Nicolson, R. I., Fawcett, A. J., & Clarke, E. F. (2003). Dyslexia and music: measuring musical timing skills. *Dyslexia, 9*, 18–36. doi:10.1002/dys.233.

Riccio, C. A., & Hynd, G. W. (1996). Neuroanatomical and neurophysiological aspects of dyslexia. T*opics in Language Disorders, 16*(2) 1–13.

Silverman, L. K. (1989). Invisible gifts, invisible handicaps. *Roeper Review, 12*(1), 37-42. doi:10.1080/02783198909553228.

Society for Industrial and Organizational Psychology, (2003). *Principles for the validation and use of personnel selection procedures* (4th Ed.). Bowling Green, OH: The Society.

Swanwick, R., Oddy, A., & Roper, T. (2005). Mathematics and deaf children: an exploration of barriers to success. *Deafness & Education International, 7*(1), 1-21. doi:10.1179/14631505790560446.

Venkatesan, S. (2010). *Academic problems in school children: Training manual*. Bangalore: Sarva Siksha Abhiyaan. Mysore: All India Institute of Speech and Hearing.

Venkatesan, S. (2012). The enigma of diagnosis by exclusion: A field study on children frequently mistaken for learning disability in India. *Disabilities and Impairments, 26*(1), 5-16.

Von-Karolyi, C., Winner, E., Gray, W., & Sherman, G. F. (2003). Dyslexia linked to talent: Global visual-spatial ability. *Brain and language, 85*(3), 427-431.

World Health Organization, (2016). *International statistical classification of diseases and health related problems*, 10th revision, Geneva: World Health Organization. Retrieved from http://apps.who.int/classifications/icd10/browse/2016/en#/F80-F89

Manuscript submitted on May 13, 2016

Final revision received on August 7, 2016

Accepted on August 20, 2016

Acknowledgments: The present study was possible by the cooperation of the following individuals and organizations: Dr. S. R. Savithri, Director, All India Institute of Speech and Hearing, Manasagangotri, Mysore, Karnataka; All participants of present study and their parents; Ms. Preethi Thomas, Speech-Language Pathologist Gr I, All India Institute of Speech and Hearing, Manasagangotri, Mysore, Karnataka; and Ms. Suchetha, Lecturer, JSS polytechnic for the differently-abled, Mysore, Karnataka, Government School for Deaf, Tilak Nagar, Mysore, Karnataka, and other nearby schools in Mysore.

Note: This paper has been presented during the 25th Silver Jubilee Convention of National Academy of Psychology (NAOP) event during February, 2015 at the University of Allahabad, Allahabad.

Conflict of interest: Nil

G.Y. Yashodharakumar, (Corresponding author), Clinical Psychologist-Grade II, Dept. of Clinical Psychology, All India Institute of Speech and Hearing, Manasagangotri, Mysore - 570006. Email: yash.gy@gmail.com

S. Venkatesan, Professor & Head, Dept. of Clinical Psychology, All India Institute of Speech and Hearing, Manasagangotri, Mysore: 570006. Email: psyconindia@gmail.com

Lancy D'Souza, Associate Professor, Dept. of Psychology, Maharaja's college, University of Mysore, Mysore, India. Email: lancyd@ymail.com