CHAPTER VII
DISCUSSION

7.0 Introduction

After surveying the literature and the available tool, the researcher identified learning difficulty especially early learning difficulty as an important parameter and went ahead with the development of a new measure. All the prerequisites for the development of the new test measure were attained. The aim of this study is to develop a measure to identify school children of the age of 4-5 years who were at risk of developing learning difficulty later on.

Existing tools which were already available were looked at and suitably modified and adapted keeping in mind the age of the children and the utility of the tests in the Indian context. The following tools were looked at The Stanford-Binet Intelligence Scale Fourth Edition (SB: FE), Malin's Intelligence Scale for Indian Children, Indian adaptation of WISC [MISIC], Comprehensive test of non verbal intelligence (C-TONI-2), Comprehensive test of phonological processing (C-TOPP), Test of phonological awareness (TOPAS), Lindamood Auditory Conceptualization Test (LAC-3) and NIMHANS Index of SLD TEST (NIMHANS -SLD) (as explained in Chapter II- Methodology I).

After identification of the available tests, their utility in the Indian context is looked at and adaptation and construction of items is done. Broadly, the test consists of four major dimensions. The following dimensions adapted from the existing test were used and adapted accordingly in our test (Chapter II -Methodology I)

- Attention (adapted from NIMHANS – SLD index)
- Phonemic decoding skills (adapted from CTOPP, TOPAS, LAC-3)
- Auditory processing skills (adapted from LAC-3, NIMHANS index of SLD)
- Visual-spatial motor skills (adapted from NIMHANS index of SLD, CTONI 2, MISIC)

Once the tool is developed a pilot study is conducted and necessary modifications were made in the age group criteria as children who were between three and four years of age were unable to successfully perform Phonemic awareness, rhyming words and blending in phonemic awareness test, auditory processing skills in Auditory memory test and Spatial orientation test, Visual organization, Visual motor skills, Picture sequence, Story sequence in visual spatial tests in English language. Therefore, the age group is narrowed down to 4-5

years of age. The numbers of subtests were increased in blending, rhyming, spatial orientation, picture sequence and story sequence tests to prevent chance error. Along with this the teachers were given a semi structured teacher's rating scale on similar criteria of performance of children in the classroom. The criteria were based on visual motor skills, auditory behavior, auditory discrimination, auditory memory, verbal expression and attention. Three hundred fifty eight children were retained for the final study after screening them using the inclusion and exclusion criteria. There were 207 boys and 151 girls who were tested with the newly developed measure. After a period of six months children who were completing five years of test were subjected to NIMHANS SLD including those children who were identified as learning disabled by our newly developed tool. The total number of tests were 29 with each test subdivided into subsets.

7.1 Standardization of The Constructed Measure

The results were compared with the newly developed tool and the teachers rating scale to find the degree of correlation. Also, correlation is calculated with the new measure and the NIMHANS –SLD. Item analysis is done to look for appropriateness of the tests. Item difficulty is maintained in such a way so that 60% of the children were able to clear the items correctly.

Attention test comprised of cancelling or striking of black and white picture of spoons and forks given to the children. They were asked to cancel only the spoons.

To find out the reliability of the constructed test, internal consistency of all the subtests is found out by using Cronbach alpha. Table 4.1 shows that Cronbach alpha for visual processing skills which consisted of three tests (visual discrimination test 1, visual discrimination test 2 and visual memory) shows that internal consistency is highly reliable and internally consistent. As we can see form the table 4.1 the spatial orientation test had three tests (spatial orientation test 1, spatial orientation test 2 and spatial orientation test3) and the Cronbach alpha for internal consistency and reliability is found to be significant.

Cronbach alpha is calculated to look for internal consistency of directionality which consisted of two tests (top and bottom & left and right test) and is found to be reliable and consistent.

Visual organization consisted of test of proximity, test of similarity, closure tests and synthesis and analysis test. Internal consistency calculating Cronbach alpha is consistent and reliable.

Visual motor skill test 1, visual motor skill test 2 and visual motor skill test 3 comprised the visual motor skills. Cronbach alpha as shown in table 4.1 is found to highly consistent and reliable.

To test auditory processing skills- auditory memory and auditory discrimination ability is assessed and to find the reliability and internal consistency Cronbach alpha is calculated which is 0.7403 (shown in table 4.1) – highly consistent and reliable.

Language skills were tested with receptive language test and expressive language test .For testing internal consistency Cronbach alpha is used and is found to be 0.6548 which is consistent and reliable.

To test the visual spatial motor skills picture sequencing and story sequencing skills were tested. To test the reliability and internal consistency of these items Cronbach alpha is found out which is 0.7303, as seen in table 4.1 which implies that the items in the subtests are highly internally consistent.

Phonemic awareness skill I is tested using phonemic awareness test, letter and beginning test, and letter and phonemic match. The Cronbach alpha for measuring internal consistency is found to be 0.7780 which is highly consistent and reliable
(Table 4.1)

To test phonemic decoding skills rhyming and blending words were tested. The internal consistency is found to be 0.7381 using Cronbach alpha which is consistent and reliable as shown in table 4.1

Rapid naming test is tested where children had to name 23 pictures placed in a sequence as fast as possible. Children with difficulty in learning took longer to complete the sequence and also made errors in naming them as we can see from the table 1. It highly correlated with other variables and thus is found to be consistent.
Age norms and percentile norms were graphed and plotted as shown in chapter 5.

7.2 Validation of the Constructed Measure

The constructed measure was validated for the content validity by finding out the correlation between the dimensions of the constructed measure with the teacher's rating scale on those dimensions. The predictive validity of the test was found out by correlating the test score with that of the NIMHANS –SLD which was administered on the students after a gap of six months i.e. completion of five years. The developed test used most of the parameters being used in the NIMHANS specific learning difficulty index except the ones which are not applicable for the lower age group. The parameters used were simpler in formats and tests compatible with the age group (4-5 years) on whom the test is administered.

7.2.1 *Content validity* - To find out whether the measure developed is valid in its content, it is correlated with the teacher's questionnaire which is based on difficulties noticed by teachers in a classroom setting. It is hypothesized that there will be significant correlation between the test scores on the developed test and the ratings of the teacher. The findings support the hypotheses. An evaluation is made of the linear relationship between the observations of the teacher and the researcher's test by using Pearson's correlation coefficient (table 4.2) which indicates a statistically significant linear relationship between them. This implies that the developed test were content valid.

7.2.2 *Predictive validity*- To find out whether the newly developed measure was able to really predict in true sense that if a child identified as having learning difficulty by the new test really had learning difficulty even after passage of time. NIMHANS-SLD was used after a period of six months on children who completed five years of age. It was hypothesized that there will be significant correlation between the test scores on the developed test and the existing test(NIMHANS- SLD) to measure learning difficulty which was administered after six months. An evaluation was made of the linear relationship between the observations of the NIMHANS -SLD and the researcher's test by using Pearson's correlation coefficient (table 4.3) which indicated a statistically significant linear relationship between them. The predictive validity of the test was established by this significant high correlation between the test score of the researcher's test and NIMHANS test.

7.2.3 *Discriminant analysis* – For further verification of the validity of the constructed test, a discriminant analysis was performed. The purpose was to see whether the constructed test

clearly differentiates children with and without the risk of learning difficulty. Univariate ANOVAs revealed that the children with and without learning difficulty differed significantly on each of the thirty predictor variable. A single discriminant function was calculated. The value of this function was significantly different for the children with and without learning difficulty. 86.6% of children were correctly classified as having learning difficulty.

7.3 Difference between the profile of children with and without learning difficulty

There is significant difference in the test scores of normal children and children identified as having learning difficulties when tested by the new measure in phonemic decoding skills, auditory processing skill and visual-spatial motor skill. Children without learning difficulty have a limited range of mean in all the tests below 1 whereas children with learning difficulty had a greater degree of fluctuation in the range of mean in all the tests. Profile graph clearly differentiates children with and without learning difficulty. Children without learning difficulty have a mean score which is consistent within a limited way. Thus, there is a significant difference in the test scores of children with and without learning difficulty as hypothesized.

7.4 Difference in the test scores of children with learning difficulty and children without learning difficulty

It is hypothesized that there would be significant difference in the test scores of normal children and children identified as having learning difficulties when tested by the new measure in phonemic decoding skills, auditory processing skill and visual-spatial motor skill Studies supporting our views "Phonological awareness at 3.5 years is predicted by early language skills (e.g., verbal comprehension, vocabulary, and inflectional skills) assessed between 14 and 26 months of age. The group difference in phonological awareness remained significant even when both early language and concurrently assessed language skills were controlled for. This study supports the importance of assessing emerging phonological awareness skills in association with risk for dyslexia (Puolakanaho et al, 2004)." Strong predictors of reading in kindergarten were phonological awareness and rapid naming skill (Snowling, 2000). Very young children with high visual spatial difficulties have been found to have language difficulties (Von Karolyi & Winner, 2004). Our findings support the

hypothesis. All the above parameters of tool construction, hypothesis, methodology and analysis have been discussed in details in their respective chapters.

7.5 Classification of children into groups using the potential discriminating ability of the constructed measure: further way to validation

Children can be divided into two groups as having difficulties in visual spatial ability or phonemic decoding skills or auditory discriminating abilities and strength in one or the other field. Some were having difficulty in both the areas. Thus, the remediation strategy can be planned accordingly taking into consideration the strength or the deficit.

Compensation model proposes that individuals with dyslexia have deficit in one area and it is balanced by skill enhancement in another area. These models suggest that dyslexia is not a pathological condition but insist that it is a distinct style of processing that have some adaptive value. These models hypothesize that individuals with dyslexia have absolute strength in one or more visual spatial areas(Geshwind & Galaburda, 1985).

The reason may be that our study group comprises of very young children where the skills have not developed to the optimum level. Therefore, to classify them as visual and auditory learners becomes difficult.

Although literature shows children identified into auditory and visual learners, the trend shown by the children with risk of learning difficulty in our study do not confirm to that. Children show difficulty in both visual and auditory areas of learning.

7.6 Limitations:

1. The children taken in this research study were limited to the age group of 4-5 years. Children of younger age group were not able to attempt the entire test adequately. It is desirable that a test suitable modified or developed can be planned to identify children at a much younger age to catch them really young.

2. The researcher had taken children from in and around a particular place and therefore did not have a very diverse sample. The newly formed tool should be tested on a diverse sample to testify and validate our study further. Geographical diversity and diverse groups to validate the tool should be considered for example rural and urban, low and high socioeconomic group, English medium and vernacular medium sample etc.

3. These children did not converse in English (English is the second language) at home so explaining some of the concepts is difficult and is found difficult by these children. To explain the concept local vernacular language is used.

4. The length of the time required to complete the test is long(45 to 60 minutes), so some of the children lost interest and the test had to be completed in more than one session in spite of the researcher trying her best to control the environment and other factors. Most of the subjects for this research being very young children there is a need to control extraneous variables more rigorously for example-Ideally, the time of the test could have been controlled In order to maintain standardized administration process the researcher administered all the 358 students by herself. Thus, the time when the test is administered could not be strictly maintained.

5. Attention deficit hyperactive children who could be having learning difficulty were not taken into the study. They were excluded from the study but if co morbidities would have been looked at they could have been identified as having learning difficulty.

7.7 Implications:

Whole purpose of our study is to identify children as soon as they enter pre primary section. Most of these children are bright eager minds that are embarking on a journey of learning. There is this vast ocean of knowledge laid at their feet and the method by which this can be achieved is through reading and writing. So, it becomes imperative on our part to provide children with methods to overcome the hurdles that come in their way- may it be skills to read or write or the strategies to overcome them. Intervention strategies are possible if identification is possible. The earlier the children are identified, the better it is for them, the parents, the school and the society.

Children would have a longer time period to cover the reading and writing skills and their base which is acquisition of these skills becomes stronger. The areas that they are delayed in reading or writing like phonemic skills, visual spatial orientation or auditory processing skills can be identified and appropriate remediation can be taken. The strengths of the child can also be identified through this method and remediation techniques can take the strength in one area to teach proper strategies.

By this test we can ensure the literacy readiness of the preschoolers. Wrong attribution given to the children like lazy, uninterested, poorly motivated etc. when they are not ready can demotivate such children, amount to lower self esteem and hinder proper development of self concept. These act as building blocks for later personality development. Such children are branded or tagged with personality attributes.

The general development process gets affected. By using this test to identify children early, misjudging of personality attributes can be avoided. Also we can use this for development of a remediation model.

Implication for the parents- We can build awareness in parents regarding the possibility of identification of learning difficulty before the child starts primary school, the area where the child is lacking and would consciously be aware of the difficulty and would try to get help or rectify it as early as possible.

Implication for the teachers- Teachers will be made aware of the areas that they need to work on with the child. While assessing the child for literacy readiness for school, the teachers too would emphasize on these areas and would know the areas that the child needs help and support.

Implication for the clinicians- Children would not unnecessarily be labeled as lazy or inattentive or hyperactive. Clinicians would also take this into consideration before labeling the children as ADHD, hyperactive, personality trait, aversive attitude towards school

7.8 Directions and Suggestions for Future Research:

1. Studies can be undertaken on younger age group with further modifications, using vernacular language to identify them earlier.
2. This tool can be used to diagnose and correlate with other childhood disorders like Attention deficit hyperactive disorder.
3. Depending on the particular deficit / field the child has in diagnostic results, further therapeutic or interventional module can be developed to improvise the learning difficulties of children.

4. The test can be used to identify and certify the school readiness for reading and writing skills for preprimary school entrants.
5. A curriculum can be developed after the identification on the basis of this test where the deficits identified are tackled in the regular classroom from the beginning of the academic session. This would help to integrate these children in regular class sessions with other children early so as to minimize the morbidities associated with learning difficulty in the later school years.
6. A common tool can be further validated and modified after testing this on a diverse group of children example high and low socioeconomic groups, English and Vernacular medium etc.
7. A further modification can be done taking into consideration the co morbid developmental problems of the children with learning difficulty.
8. Further work can be done to find out the psychosocial correlates like parent-child relationship, teacher- child relationship, self concept and self esteem of the child.

7.9 Conclusion:

The research provides evidence that learning difficulty is identifiable in early preschool children using phonemic decoding skills, auditory processing skill and visual-spatial motor skill. Usage of this measure can create awareness amongst parents, teachers and clinicians and sensitize them for early and better remediation and rehabilitation of these children, prepare better learning readiness in them. Also, this can avoid associated problems in future growth and development of the child.