ARF 3.77 project report

Development and Evaluation of Center-based Service Delivery Model for Children with Learning Disability-Phase I

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Duration of the Project: One year and four months

04-10-2010 to 04/02/2012

Research grant from AIISH Research Fund:

Rs. 5, 21,000-00 (Rupees five lakh twenty one thousand only)

CHAPTER I

INTRODUCTION AND REVIEW

The focus of rehabilitation of persons with disability is shifted in the recent years from early identification and management to prevention of occurrence of the disability. Prevention is viewed at different levels-primary, secondary and tertiary among which the primary level of prevention of a disability is very crucial. The cost as well as the outcome of rehabilitation would be most convincing if methods and strategies are devised for prevention of a disability. In order to plan and execute strategies and activities for prevention, there is a need to develop and evaluate service delivery models that are examined within a scientific framework. Such a study is viewed as very essential for prevention, identification and management of children with learning disability because they constitute a special population that often goes unnoticed owing to the subtle nature of the disability by teachers, caregivers and the society.

Children with learning disability (LD) are characterized by specific problems in learning to read, write and spell, despite sufficient educational experience. Learning disability (disability in reading and writing skills), generally known as dyslexia, is difficulty in learning to read and write, particularly in learning to spell correctly and to express thoughts on paper using language. It is a condition that is least understood by majority of professionals because of the subtlety and the complexity of its characteristics and manifestation. As a result, Parents, Teachers/Special Educators, Professionals fail to identify such children until school years. Therefore, there is a need to intensify special educational programs for remediation of learning disability. But, these programs may not be cost effective in the long run for a developing country such as India, if initiated after the occurrence of the disability. Hence, there is a need to develop methods and strategies for *service delivery to children with learning disability at primary, secondary and tertiary levels.*

Learning disability is an area that is attracting the attention of many educators and special educators in India since the past two decades. The emergence of the RCI Act and the other related acts (also media such as the movie ‘Taare Zameen Par’ by the famous

Film Director, Mr. Amir Khan) have heightened the awareness about this disability among the general public as also the rights of persons with disability. Consequently, the number of children referred for assessment and intervention is on the increase, particularly those in their initial grades at schools. This necessitates development of relevant tests and evaluative procedures to be adopted for identification and assessment of children with learning disability.

It is widely known that children's oral language proficiency, among others, is strongly and reciprocally related to early literacy development. Therefore, preschool children who have difficulties in acquiring oral language proficiency are at increased risk for delayed attainment of requisite early literacy skills. When these children enter kindergarten and or first grade lacking adequate early literacy knowledge, they fail to meet the rigors of formal reading and writing instructions. *Speech-language pathologists play a major role in prevention and early identification of language based learning disability* in such children. There is also a wide consensus amongst researchers and clinicians that language problems are both a cause and a consequence of literacy problems. It is noted that children with LD have some form of oral language deficits along with literacy difficulties and SLPs have the expertise and, therefore, have a crucial role in ensuring that children with LD receive adequate and appropriate early intervention services in reading and writing as well as in other forms of communication. Estimates of prevalence of LD vary, from 2% to 15% of the school going population. But, services to support children with LD in India are limited besides being not validated through experimental measures for its efficacy. This may be partially accountable to lack of agreement on the definition, classification system or the heterogeneity among children with learning disability. This calls for intensive efforts to develop service delivery models that will help in strengthening evidence based practice to be incorporated in professional services. Adequate and appropriate management of children with LD reduces frustration and low self-esteem since academic failures often continue into adult life if left un-intervened leading to social and emotional problems.

Children with impairment in oral language skills or those who develop language late are widely known to be 'at risk' for acquisition of literacy skills. Early identification of children who are at risk for literacy difficulties facilitates precise planning of the

necessary stimulation that can be applied to allow for more positive outcomes. Several studies have demonstrated that early literacy skills can be trained so that it reduces the risk of a child developing future reading problems. Scaffolding early literacy experiences can reduce problems associated with poor skills and low motivation for literacy activities.

The position statement of the American Speech-Language-Hearing Association (ASHA) titled, "The Roles and Responsibilities of Speech-Language Pathologists with respect to Reading and Writing in Children and Adolescents" (ASHA, 2001) strongly emphasizes that speech-language pathologists should play an active role in literacy promotion for young children. The position statement is made on the basis of four principal arguments:

a) Oral language provides the foundation for the development of literacy
b) The relationship between oral language and literacy development is reciprocal in nature, with interconnections originating in early childhood
c) Children with speech and language impairments are at increased risk for difficulties with early and conventional literacy development and
d) Intervention for oral language can positively influence literacy development and vice versa.

The primary roles and responsibilities of speech-language pathologists with respect to literacy, as asserted by ASHA, encompass the following areas: prevention, identification, assessment, and intervention (Justice, Invernizzi and Meier, 2002).

The potential to meet the above roles and responsibilities is driven by the issue of early identification. In order to prevent literacy problems and to ensure children's timely achievement of key literacy skills, there is a need to develop service delivery models that include services for screening, identification, assessment, management and periodic follow-up of children for later literacy development. The service delivery models may be Center-based/institutional-based, School-based and/or Community-based with its own advantages and disadvantages that are documented with reference to rehabilitation of other disabilities but not for Learning Disability. Considering the enormity of children with learning disability, and the vision of India to achieve 'Education for All' by 2015, it

is imperative that professionals such as speech language pathologists take the onus to evaluate the efficacy of service delivery model.

Service delivery can be considered at different levels such as for primary, secondary or tertiary prevention (alternately, to be more precise, for screening, diagnosis, assessment, rehabilitation (educational remediation), public education, development of resource materials and documentation to build-up evidence-based models. Each of these models when applied to remedial programs for children with learning disability pave way for more comprehensive assessment and intervention activities and provide critical baseline information for structuring literacy enhancement activities within direct therapy or through consultation and collaborative services. Hence, in the present study, Center-based Service Delivery Model was examined in order to initiate extensive services for children with learning disability at AIISH, the premier institute in India.

The proposed service delivery model incorporates the concept of established approach to remedial program i.e., Response-to-Intervention (RTI). RTI is a multi Tiered Service-Delivery Model . RTI is most frequently viewed as a three-tiered model, similar to those used for service-delivery practices such as positive behavioral support. While Tier-1 refers to primary supports for children with learning disability, Tier-2 and beyond refers to secondary-level interventions in specialized groups for at-risk students. Children who fail to respond to the interventions provided in Tier-2 and beyond would then be referred for an individualized, comprehensive evaluation and be considered for specialized instruction in special education. Since this model embraces scientific principles and is proven beyond doubt for its efficacy, the present study employs this paradigm in the design.

RTI is a systematic problem-solving process designed to allow for earlier identification of difficulties in children and to plan and provide instructions matched to their demonstrated response to intervention. RTI provides a data-based method for evaluating the effectiveness of instructional approaches and monitoring the progress. The assumption of RTI are centered around reduction in the need for rehabilitation/remediation/ special education by improving and providing individualized services early in a child's life based on evidence-based strategies, high quality of

"general" intervention, with resources and services added as per the need of the child in question.

Major Components of RTI are Tiered Framework, Screening, Assessment, Progress Monitoring, Evidence-Based Standard Protocols, Collaborative Problem-Solving, Parent and Family Engagement, Fidelity of Implementation. The Tier I of the Framework for supports and services include quality screening, progress monitoring; Tier II is focused towards more intensive response to children who need additional support to be successful (embedded & explicit), progress monitoring, use of standard protocols, collaborative problem-solving; Tier III includes additional support that is more intense and individualized, assessments & progress monitoring and collaborative problem-solving. Response to Intervention as a public health model that is in tune with WHO's mission 'HEALTH FOR ALL" (WHO, 2004).

The Tiered Model of RTI emphasizes on development of screening and progress monitoring tools that are designed to be used repeatedly, quick, easy to administer, correlated with long-term educational goals and not tied to a particular curriculum but gives information on both level of functioning and & rate of growth. Consequent to this movement at the universal level, the National Center for Learning Disabilities (NCLD, retrieved from www.NCLD.org) has shaped policies and developed resources and tools to strengthen early childhood programs. Working in partnership with practitioners and researchers, an increase in the capacity of teachers and parents to understand young children's learning strengths and needs, and to take action to support their readiness for instruction before entry to school is much emphasized. It is recommended by researchers that early recognition of learning problems, combined with timely,
effective intervening services to address such problems, is a mission and a critical component of any successful early childhood program. The RTI Action Network of NCLD connects practitioners, researchers and policymakers with the information needed to implement Response to Intervention frameworks in kindergarten through high school.

Early childhood culture, beliefs, and practices focus on the importance of supporting the family as well as the child. The holistic view of child development (i.e., cognitive, communicative, social–emotional, motor, and language); the importance of early intervention to enhance the child's success; the importance of providing supports

and services in naturalistic settings; the critical contributions of parents and families to the success of the child; and the need for multi-dimensional authentic assessments that can identify the child's strengths and needs over time are a few major dimensions within which RTI model is proposed. Therefore, evidence-based practices and standard protocols increase the likelihood that the supports and services provided will benefit the child. Evidence based curricula, instructional methods, and service delivery models can be used to respond to the academic, social, and behavioral needs of young children. Further, fidelity of implementation, or the degree to which a practice is used as it was intended, is fundamental to any new educational initiative.

The All India Institute of Speech and Hearing is a premier institute in the country with its primary objective to impart professional training, render clinical services, conduct research and educate the public on issues related to communication disorders The institute aims towards primary, secondary and tertiary prevention of communication disorders. A child with LD needs to be supported for cognition, language, listening, reading, writing, arithmetic, social, psychological, emotional and occupational skills, the center-based service delivery model plans to incorporate the necessary guidance and service strategies for all the above skills.

i. Early identification through screening and diagnostic procedures (including identification of subtypes of children with LD) applying response to intervention (RTI) based approaches
ii. Services through early management by a team of professionals
iii. Development of resource material for children with LD
iv. Suggesting accommodations
v. Suggesting necessary policies through extensive research in the area for the benefit of children with LD.

Models of service delivery conceptualize integrated approach for rehabilitation/remediation by including family and community apart from screening, assessment and intervention approaches. Therefore, the proposed model aims at the following objectives:

i. Development of research based assessment tools for LD through response to intervention (RTI) based approaches.

ii. Support and facilitation for formation of parent associations of children with LD.

iii. Development of tools for remediation of children with LD.

iv. Training special educators and regular teachers to work with LD.

v. Working towards public awareness on LD amongst different groups in the society including parents, teachers, medical practitioners, school administrations, NGOs, etc.

vi. Development of materials for diagnostic, management and public awareness including public education pamphlets, posters, videos, etc.

Survey of manual and digitized tests and tools available for screening and diagnosis of Learning Disability in children in Kannada and English languages was undertaken as the first step in Phase I. Various resources at the Institute (All India Institute of Speech and Hearing) such as , dissertation, theses, Independent projects and reports of other funded projects conducted at the Institute that are either in the form of text, CD's digitized or on OPAC and available on public domain served as main source for survey. The available resources and materials (yet to be published) were also compiled from various departments of the Institute (Clinical Services, Speech-Language Pathology, Psychology, Special Education and Library). The pooled tests and resources were scrutinized by the investigators to check if the available tests cover the entire range of skills necessary for screening/evaluation of literacy skills. It was also checked if the available tests cover the entire range of skills from pre-literacy through adult literacy. Further, screening and diagnostic tools already available for identification of children at risk for LD were compiled/adapted. Also, new tools were developed for a few skills in this phase as the existing did not meet the requirement. The list of available tests and other resources is given in Appendix I. On closer examination of the compiled resources, it was observed that not all the resources that are titled for in the digitized list serve the purpose of screening /evaluation of children with LD. Therefore, the investigators verified the objective, the content and the specific details of each of the selected test and

arrived at manageable list of resources relevant for assessment of children with LD. List of resources available for children with LD is shown in Table 1.1.

Table 1.2

List of Tier I resources for children with LD available

Tests developed in India			
Published		Unpublished	
1	Dyslexia assessment profile for Indian children (DAPIC) (Kuppuraj.S., 2009)	1.	Language Independent measure: A screening tool for identification of poor readers – Sharma, 2007
2	Subtyping of children with Developmental Dyslexia: Implications from Dual Route Cascaded model in the Indian context – Gnanavel, 2009	2.	Reading readiness test - Devaki Devi, 1978
3	Screening checklist for CAP (SCAP) - Yathiraj & Mascarenhas, 2003	3.	Screening Emergent Language and Literacy Skills (SELL) - Prema, 2006
4	Development of Early Literacy Screening Tool - Shanbal, Goswami, Chaitra & Prathima (2010).	4.	Test of writing for children in Kannada - Yeshoda, 1994
5	Reading acquisition profile in Kannada (RAP-K) - Prema, 1997	5.	Tool for screening children with writing difficulties - Shanbal, 2003
	Tests developed in other countries		
1	An observational assessment checklist – children's early literacy development - Justice (2002)	1	Quick Neurological Screening test – Margaret Mutti. M. A., Harold. M. Sterling, Norma. V. Spalding, 1968
2	Early identification of language-based reading disabilities : A checklist - Catts (1997)	2	Pre-school SIFTER (Screening instrument for targeting educational risk in pre-school children)

A cursory analysis of Indian tests and tests from other countries available at AIISH suggested that the existing resources are not adequate for Tier I level of primary prevention for children with learning disability. Despite the number of tests available, the components of the tests revealed that certain skills are tapped by many tests and a few others are totally ignored. Also, the age range for which majority of the available tests

can be used also suggested gaps that creates a vacuum for a professional/teacher to thus missing out testing relevant ages and skills for primary prevention.

Need for the study

The All India Institute of Speech and Hearing being one of the premier speech and hearing institutes in the country has always been successful in expanding its horizon to serve persons with communication disorders-be it through oral or other modes of communication. Consequent to the establishment of LD unit, a step towards becoming centre par excellence in the country, there arises a need for empirical based strategies right from primary prevention through tertiary prevention.

A review of Indian studies reveals that about 10% of school children have learning disability (Prema, 1998). The impact of the disability on the individual and society's well being acts as deterrents to person's productivity thus affecting a country's human resources. The enormity of the problem and its other psychosocial squeal calls for early identification and intervention by professionals and parents. Therefore, there is a great need to screen young children in order to identify and /or to predict literacy failures. Intensive efforts in this direction will facilitate prevention of learning disability.

1. To develop 'High Risk Register' (HRR) for screening children for language based learning disability.
2. To identify children 'at risk' for language based learning disability through screening tests and protocols.

In order to achieve primary prevention of learning disability in children, the objectives of this project (Phase I of a bigger project envisaged for future studies) are to:

a) Conduct a library survey in order to compile available resources in regional and English language for service delivery for primary prevention through text-based, CD-based, digitized, web-based and sources available in public domain.
b) Identify the skills and age groups for which resources are NOT available in regional and English language
c) Develop/adapt tests and resources for the skills and age groups for which it is necessary.

Service delivery for children with learning disability can be considered at different levels such as for primary, secondary or tertiary prevention (alternately, to be more precise, for screening, diagnosis, assessment, rehabilitation (educational remediation), public education, development of resource materials and documentation to build-up evidence-based models. Service delivery may also be considered along home-based, center-based, community-based and/or school-based setting. Each of these levels and set-up offer platform to establish service delivery models that can be employed in rehabilitation. Such models, when applied to remedial programs for children with learning disability pave way for more comprehensive assessment and intervention activities and provide critical baseline information for structuring literacy enhancement activities within direct therapy or through consultation and collaborative services. Hence, in the present study, Center-based Service Delivery Model was examined for Primary Prevention of learning disability in order to initiate extensive services for children with learning disability at AIISH and in due course of time, extend the model at national level.

CHAPTER II

METHOD

Establishment of Center-based Service Delivery System for children with Learning Disability (CBSDS-LD) will enable a systematic approach to assessment and intervention of children with special needs for academic learning. The CBSDS-LD will also work towards monitoring each child with LD right from the first visit of the child to the institute for screening until successful completion of schooling by monitoring through performance in the classroom and working out the necessary accommodations of the child in the classroom. CBSDS-LD will also facilitate formation of support groups of parents, caregivers and teachers who will work towards being a source of information, who will provide practical suggestions to others with similar problems. The accumulation of data through a systemic approach will provide database for further research and understanding of potential aspects of center–based service delivery strategies for children with learning disability.

Objectives of the study

a) Development/compilation of text/audio/video/digital resources:

1. Compilation of the tests and tools for screening and early identification of children with learning disability (LD).
2. Identification of non-availability of tests (gaps in the available tests) for specific skills and age groups, if any.
3. Development of screening tools for children with LD in the identified skills/age group, if found necessary.

Table 2.1

Skills assessed by the above mentioned tests in a particular age range in English

Age range / grade (E)	Phonology/ Metaphonology	Reading	Writing	Arithmetic	Cognition	Sensory	
						A	V
3.1-4	✓	-	-	-	✓	-	-
4.1-5	✓	-	-	-	✓	-	-
5.1-6	✓	✓	✓	-	✓	✓	✓
6.1-7	✓	✓	✓	-	✓	✓	✓
7.1-8	✓	✓	✓	-	✓	✓	✓
8.1-9	✓	✓	✓	-	✓	✓	✓
9.1-10	✓	✓	✓	-	✓	✓	✓
10.1-11	✓	✓	-	-		✓	✓
11.1-12	✓	✓	-	-	✓	✓	✓
12.1-13	✓	✓	-	-	✓	✓	✓
13.1-14	-	-	-	-	✓	-	-
14.1-15	-	-	-	-	✓	-	-

Note:

Phonology/metaphonology: story comprehension, Vocabulary, SHWA, syllable stripping, syllable oddity (words and nonwords), phoneme stripping(word), phoneme oddity (nonsense word), sentence completion, picture description, copying task, written language awareness skills, Phonological awareness skills. Emergent language skills.

Reading: Reading test, Non-word reading test, Reading comprehension, syllable inventory, gap test for reading comprehension,

Writing: Writing, Knowledge of orthrographic principles, spontaneous writing, passage for dictation, writing on dictation (syllable inventory, word, nonword),

Arithmetic: Prema and Ramaa

Cognition: - Nil

Table 2.2

Skills assessed by the above mentioned tests in a particular age range

Age range / grade	Phonology/ Metaphonology	Reading	Writing	Arithmetic	Cognition	Sensory	
						A	V
3.1-4	✓	-	✓	-	-	✓	-
4.1-5	✓	-	✓	-	-	✓	-
5.1-6	✓	-	✓	-	-	✓	-
6.1-7	✓	-	✓	-	-	-	-
7.1-8	✓	✓	✓	-	-	-	-
8.1-9	✓	✓	✓	-	-	-	-
9.1-10	✓	✓	✓	-	-	-	-
10.1-11	✓	✓	✓	-	-	-	-
11.1-12	✓	✓	✓	-	-	-	-
12.1-13	-	-	-	-	-	-	-
13.1-14	-	-	-	-	-	-	-
14.1-15	-	-	-	-	-	-	-

Tables 2.1 and 2.2 show the tests available for screening and assessment of children with LD in Kannada and English languages are available in the age range of 3-12 years and 3-13 years respectively. The available tests assess Phonology, Reading, Writing and Sensory skills of children in the above age range.

Table 2.3 show the skills assessed by the above mentioned tests in a particular age range. Table 2.3 also tests/tools available to assess the range of skills necessary for acquisition of literacy skills. There are no screening and diagnostic tools for children in the age range of 13-15 years which assess the literacy skills. Hence, a screening tool was developed in English language for the assessment of Learning Disability in children in the age-range of 13-15 years. The subtests of the screening tool were adapted from the Dyslexia Screening Test – Secondary which is standardized on western population. The subtests selected from DST-S (Fawcett & Nicolson, 2004)were Phonology, Reading and Writing skills.

Design of the study: With the above objectives, quasi-experimental design combined with qualitative/descriptive research was adopted for the study.

Procedure:

DST-S (ADAPTED TEST) – (see appendix II): The screening tool was divided into three subtests

1. Phonology
2. Reading
3. Writing

The tests items in each subsections included:

1. Phonology

a) Phoneme Oddity

b) Phoneme deletion

c) Spoonerism

2. Reading

a) One minute reading

b) Non-sense passage reading

3. Writing

a) One minute writing

b) Two-minute spelling

NOTE: The subtests and the materials included are given in the appendix.

Participants

The participants of the study included hundred typically developing Kannada-English bilingual higher secondary class children in the age range of 13-15 years. The screening tool developed was field tested with the help of these participants selected on random basis. Two schools were selected for the study on a random basis.

Materials used for the test

The stimulus material consisted of bi-syllabic, tri-syllabic and multi-syllabic words, meaningful and non-sense passages. A list of 20 single words was used for Phoneme oddity and Phoneme deletion. Two-word list comprising of 20 stimuli was included in the spoonerism task. The reading task comprised of 120 simple and complex single words and a non-sense passage containing 52 real words and 20 non-sense words which was adapted from the DST-S (Fawcett & Nicolson, 2004). A meaningful passage containing 35 words and 28 words for dictation were used for writing task.

Procedure

Two schools were randomly selected for the study. A total number of 100 typically developing children in the age range of 13-15 years participated in the study.

Children were seated comfortably in a quiet room and the test was conducted. The time taken for the completion of the test by each child was approximately 20 minutes.

I] Phonology:

Phonology task comprised of phoneme oddity, phoneme deletion and spoonerism as subtests. On the phoneme oddity task, the child was instructed to pick the odd word out of the list consisting of 4 words in each set. There were 20 such sets. Each correct response was scored as '1' and wrong responses were scored '0'. On phoneme deletion, the child was instructed to delete a particular phoneme from a given word. This task comprised of 20 bi-syllabic and tri-syllabic words. Each correct response was scored as '1' and wrong responses were scored '0.' Spoonerism task consisted of a list of two-word stimuli. There were 20 stimuli in this task. The child's task was to play around with the sounds and swap over the sounds at the beginning of two words for example, in a given word 'Best Friend', the expected response from the child would be 'Fest Brend'. A score of '1' was given for each word that was swapped around appropriately or '2' points for each item (which included both the words) told correctly. The maximum score for this subtest was 60.

II] Reading:

The Reading task comprised of one-minute reading task and non-sense passage reading tasks. One-minute reading task consisted of 120 meaningful words. These words were given in 4 rows with 30 words in each row. The child was instructed to read the words clearly and as fast as possible in one minute. The child was instructed to read the words in a vertical order. Each correct word read was given a score of '1' and incorrectly pronounced word was scored '0'. Hence, a total score accounted was 120 on one-minute reading task. A stop watch was used to check the time. The non-sense passage reading task consisted of both real words and non-sense words. The task comprised of 52 real words and 20 non-sense words. The child was informed in prior that the given passage for reading task contains both real words and non-sense words. The child was instructed to read the given passage without concentrating on the meaning of the sentences. Each correct pronunciation was given a score of '1' and incorrect responses were scored '0'. The maximum score for this subtest was 72.

III] Writing:

Writing task comprised of one-minute writing and two-minute spelling. The child's task on one minute writing was to copy down a given meaningful passage containing 35 words in one minute. The child was instructed to copy the passage legibly and as soon as possible in a blank sheet given by the examiner. This writing sample was checked for errors and handwriting quality. Each correct word was given a score of '1' and incorrect was scored '0'. There was also negative marking for handwriting quality, for immature or not joined up letters a score of '1' was deducted (-1), printed in capitals (-2) and illegible handwriting (-3). The next task on writing was two-minute spelling wherein the child had to write the words on dictation. This task comprised of 28 words. The child was instructed to write down the spelling of the word as fast as possible when dictated by the examiner. As the child finished writing a word, the examiner dictated the next one. Each word with correct spelling was scored '1' and '0' for the words with wrong spellings. Total maximum score was 28 on this task. The overall maximum score for the adapted version of DST-S (Fawcett & Nicolson, 2004) (Appendix II) was 160.

As part of previous study titled phonological sensitivity training kit in Kannada (PhoST-K; Prema, Devika & Mekhala, 2011), a survey was conducted for pre-school teachers in order to find out if the teachers understood the concept of children 'at risk' for learning disability. A workshop was held for preschool teachers to sensitize them on various issues of early language and literacy skills. They were provided with resource materials including pamphlets and checklists related to early literacy and learning disability. The training involved audio-visual presentation on the related topic covering the various aspects of early literacy and its importance in future literacy achievements including various examples and video demonstration of activities. A pre-test and post-test revealed that the teachers were sensitized to issues related to language and literacy (Average pre-test score=7.7 (Max. =10), Average post-test score=8.5 (Max. =10).

The data obtained was coded, scored and analyzed. The data was subjected to statistical analyses using SPSS 18.0 version.

CHAPTER III

RESULTS AND DISCUSSION

The primary aim of the study was to develop service delivery model for children with learning disability at Tier I level as described under RTI Model. Consequent to detailed search of available screening and other measures, a screening tool for children with Learning Disability in the age range of 13-15 years was developed in order to enable screening for those children who would have been missed out in their early years/grades. Further as part of the research project, an attempt was also made to achieve the secondary objectives of the study were:

a. Development/compilation of text/audio/video/digital resources
b. Compilation of the resource materials available for early identification of Learning disability in children, through screening and diagnostic procedures (including identification of subtypes of children with LD)
c. To finalize the resources for center-based service delivery on the principles of RTI for children with LD

During the course of research various skills related to literacy development in children were delineated from the review of literature. The present study attempted to investigate the contribution of various skills such as- listening, oral language, early literacy, phonological skills, reading and writing skills towards literacy development in higher secondary grade children. Research has shown that the children who are identified earlier for potential reading difficulties tend to overcome their reading problems more easily than the others who go unidentified at various stages of development. There are umpteen numbers of tools available in literature- some which are published and some unpublished in certain age groups and certain skills of literacy. However these tools cover the younger age range. Hence, DST-Adapted version was designed to identify the children who may be ‘at risk’ for reading failure so that they can be given extra support in schools. The test was intended to be used for children in the older age range, studying in secondary schools aged 13-15 years. This test can be administered by school professionals (teachers, special needs coordinators, learning support assistants, etc.) to refer children at risk for reading failures. It forms a valuable first step in deciding whether

to request strengths and weaknesses which can be used to guide the development of in-school support for the child; and it can form the basis for important records of the child's development. The pattern of errors in higher secondary grade children in the age range of 13-15 years was examined and the statistical analysis of data for these children was carried out. The data was subjected to four types of statistical analyses using the SPSS 18.0 version software:

1. Kruskal-Wallis Test which is a non-parametric test was done to compare the parameters (Phonology, Reading and Writing) across the groups.
2. Mann-Whitney Test was done to see the differences in performance across three groups of children (higher secondary grade children).
3. Correlation analysis was done to check the correlation among each of the domains in the screening tool.
4. Regression analysis was done to study the linear relationships among each of the skills in the screening tool.

3.1 Performance of children on Phonology, Reading and Writing Skills on DST

The performances of 100 higher secondary grade children (grade 8-grade 10) were assessed on three literacy skills (Phonology, Reading and Writing). The statistical analysis of the data revealed mean scores, Standard Deviation (SD) scores, main effects of the dependent variables (including three skills namely phonology, reading and writing) and independent variable (grade). The Phonological skills included Phoneme Oddity, Phoneme Deletion and Spoonerism. The Reading skills included One Minute Reading and Non-sense Passage Reading. The writing skills included One-minute Writing and Two-minute Spelling. The performance of children under each skill will be explained in the following sections.

Non-parametric tests such as Kruskal-Wallis test and Mann-Whitney test were used for statistical analyses of the data. Kruskal-Wallis test was done to see the significant difference across grades of all the parameters (including Phonology, Reading and Writing). The Mann-Whitney test was conducted for a pair wise comparisons for two independent samples such as grade 8 and grade 9; grade 9 and grade 10; grade 8 and

grade 10. Table 3.1 shows mean and SD scores for subtest of phonological skills, reading skills and writing skills. These subtests include phoneme oddity (PO), phoneme deletion (PD), spoonerism (spm), one-minute reading (OMR), nonsense reading passage reading (NPR), one-minute writing (OMW) and two-minute spelling (TMS).

Table 3.1

Mean and SD scores for phonological skills, reading and writing skills across grades (Max. Score=160)

Subtests	Grades					
	8th		9th		10th	
	Mean	SD	Mean	SD	Mean	SD
PO	19.55	1.17	19.57	1.78	20.00	0.00
PD	19.72	0.78	19.52	1.30	19.80	0.52
spm	38.42	1.90	38.37	1.83	38.90	1.02
OMR	74.20	23.01	85.22	14.30	94.55	6.70
NPR	67.40	6.31	68.60	5.62	71.10	1.20
OMW	29.25	4.75	30.00	4.79	34.60	0.99
TMS	18.95	6.87	20.45	5.66	24.90	2.14

Note: Phoneme oddity (PO), phoneme deletion (PD), spoonerism (spm), one-minute reading (OMR), nonsense reading (NPR), one-minute writing (OMW) and two-minute spelling (TMS).

Analysis of results on Kruskal-Wallis test revealed that overall there was an improvement in the performance of children on all the subtests from grade 8 (Mean=269.05, SD=38.15) to grade 10 (Mean=305.00, SD=8.48). The results revealed that there was a significant difference in the performance of children ($\square^2$ (2, *100*) = 23.70, $p<0.001$). This indicates that there was a developmental trend observed from grade 8 to grade 10. The data for subtests was further analyzed and the analysis of results revealed that there was an improvement in the performance of children across grades.

There was a statistically significant difference observed across one-minute reading (χ^2 (2, *100*) = 19.12, *p<0.001*), one-minute writing ((χ^2 (2, *100*) = 28.07, *p<0.001*), two-minute spelling (χ^2 (2, *100*) = 12.78, *p<0.001*) and also in the overall total score (χ^2 (2, *100*) = 23.70, *p<0.001*). Since there was a significant difference observed for subtests of reading and writing further, Mann Whitney test was done for a pair-wise comparison between grades across subtests of reading and writing. The analysis of results revealed that there was a significant difference in the performance of children between grade 9 and grade 10 for one-minute reading (p<0.01), one-minute writing (p<0.01) and two-minute spelling (p<0.01). There was a significant difference seen in the performance of children between grade 8 and 10 for one-minute reading (p<0.001), one-minute writing (p<0.001) and two-minute spelling (p<0.001). There was no significant difference observed for the performance of children between grade 8 and grade 9.

3.1.1 Performance of children on phonological skills across grades

The phonological skills included phoneme oddity (PO), phoneme deletion (PD) and spoonerism (spm). Table 3.2 shows mean and SD for phonological skills across grades 8, 9 and 10.

Table 3.2

Mean and SD scores for phonological skills across grades

	Phonology Tasks					
	PO (Max. score=20)		PD (Max. score=20)		Spm (Max. score=40)	
Grade	Mean	SD	Mean	SD	Mean	SD
8th	19.55	1.17	19.72	0.78	38.42	1.90
9th	19.57	1.78	19.52	1.30	38.37	1.83
10th	20.00	0.00	19.80	0.52	38.90	1.02

Note: PO-Phoneme oddity; PD-phoneme deletion; Spm-spoonerism

Table 3.2 shows the mean and SD scores for the performance of children on phonological skills. The results of the statistical analysis for Phoneme oddity (PO)

revealed that there was an improvement in the performance of children from Grade 8 (Mean=19.55, SD=1.17), Grade 9 (Mean=19.57, SD=1.78) to Grade 10 (Mean=20.00, SD=.00). This indicated that there was a developmental trend observed in the performance of children on PO task from grades 8 to 10 (Figure 3.1). Analysis of results on Mann Whitney test showed that there was no statistically significant difference in the performance of children between Grade 8 and Grade 9, between Grade 9 and Grade 10 and also between Grades 8 & 10.

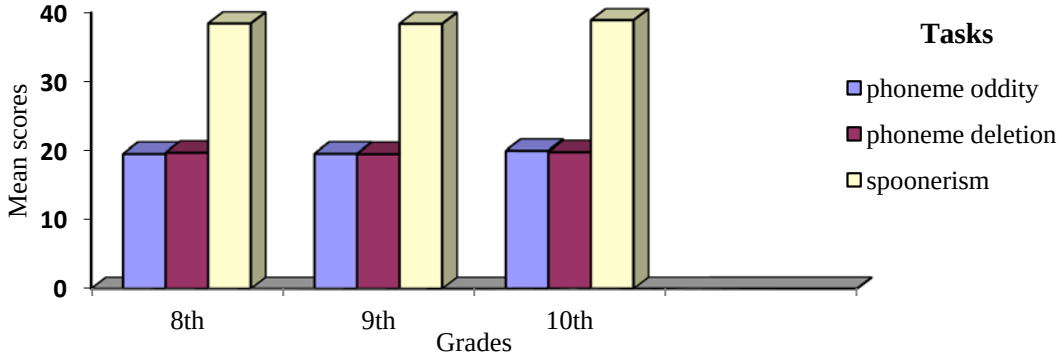

Figure 3.1: Performance of children on Phonological skills from grades 8 to 10

Analysis of results on phoneme deletion task revealed that there was an improvement in the performance of children from Grade 8 (Mean=19.7250, SD=0.78), Grade 9 (Mean=19.53, SD=1.30) to Grade 10 (Mean=19.80, SD=0.52). The results of Mann Whitney test showed that there was no a statistically significant difference in the performance of children between Grade 8 and Grade 9, between Grade 9 and Grade 10 and also between Grades 8 & 10. Analysis of results on spoonerism task revealed that there was an improvement in the performance of children from Grade 8 (Mean=38.43, SD=1.90), Grade 9 (Mean=38.38, SD=1.84) to Grade 10 (Mean=38.90, SD=1.021). The results of Mann Whitney test showed that there was no statistically significant difference in the performance of children between Grade 8 and Grade 9, between Grade 9 and Grade 10 and also between Grades 8 & 10 (Figure 3.1).

3.1.2 Performance of children on Reading skills

Tasks for reading skills included One-Minute Reading (OMR) and Non-sense Passage Reading (NPR). Table 4.2 shows mean and SD for phonological skills across grades 8, 9 and 10. Table 3.3 shows the overall mean and SD scores for the performance of children on Reading skills

Table 3.3
M*ean and SD for Reading skills*

	Reading Tasks			
	OMR (Max. score=120)		NPR (Max. score=72)	
Grade	Mean	SD	Mean	SD
8th	74.20	23.01	67.40	6.31
9th	85.22	14.30	68.60	5.62
10th	94.55	6.70	71.10	1.20

Note: OMR-One-minute reading, NPR-Non sense passage reading

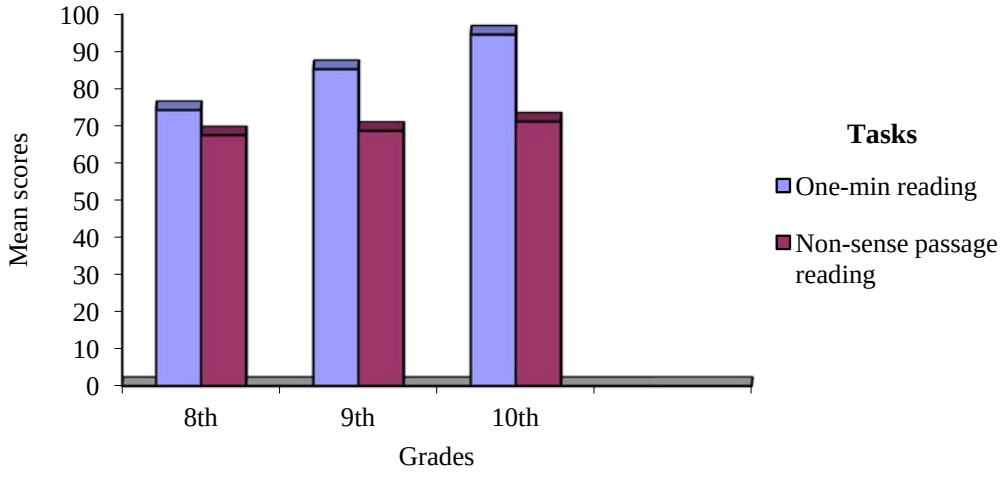

Figure 3.2. Performance of children on Reading task from grades 8 to 10

The results of statistical analysis revealed that there was an improvement in the performance of children on one-minute reading (OMR) task from Grade 8 (Mean=74.20,

SD=23.01), Grade 9 (Mean=85.23, SD=14.30) to Grade 10 (Mean=94.55, SD=6.70). The results of Mann Whitney test showed a statistically significant difference in the performance of children from Grade 8 to Grade 10 at 0.05 level of significance ($p<0.05$). There was no statistically significant difference in the performance between Grades 8 and 9. The results of the statistical analysis revealed that there was an improvement in the performance of children on non-sense passage reading (NPR) task from Grade 8 (Mean=67.40, SD=6.31), Grade 9 (Mean=68.60, SD=5.62) to Grade 10 (Mean=71.10, SD=1.21). The results of Mann Whitney test showed that there was no statistically significant difference in the performance of children between Grade 8 and Grade 9, between Grade 9 and Grade 10 and also between Grades 8 & 10.

3.1.3 Writing skills (One-Minute Writing and Two-Minute Spelling)

Table 3.4 shows the overall mean and SD scores for the performance of children on Writing skills

Table 3.4

Mean and SD for Writing skills

	Writing Tasks			
	OMW (Max. score=35)		TMS (Max. score=28)	
Grade	Mean	SD	Mean	SD
8th	29.25	4.75	18.95	6.87
9th	30.00	4.79	20.45	5.66
10th	34.60	0.99	24.90	2.14

Note: OMW-one minute writing, TMS-two minute spelling

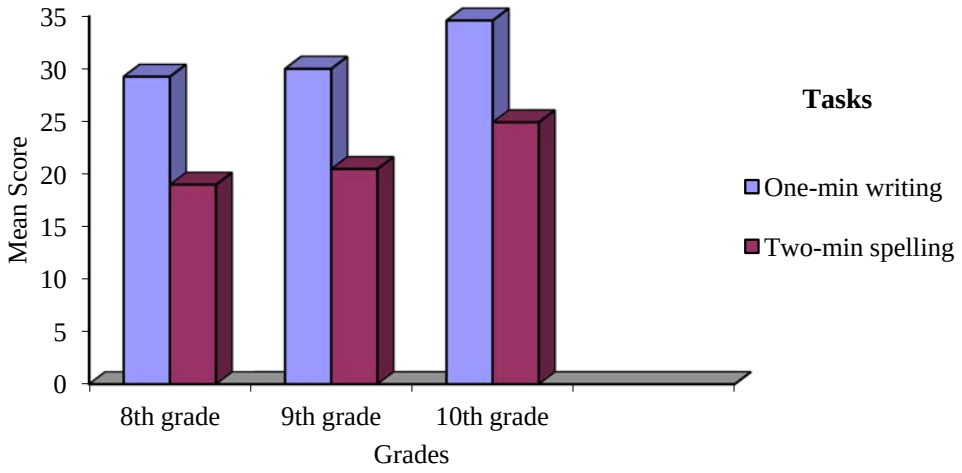

Figure 3.3: Performance of children on Writing task from grades 8 to 10

The results of statistical analysis revealed that there was an improvement in the performance of children on one-minute writing (OMW) task from Grade 8(Mean=29.25, SD=4.75), Grade 9 (Mean=30.00, SD=4.79) to Grade 10 (Mean=34.60, SD=0.99). The results of Mann Whitney test showed a statistically significant difference in the performance of children between Grade 8 and Grade 10 ($p<0.001$) of significance and between Grade 9 and Grade 10 ($p<0.004$). There was no statistically significant difference between grades 8 and 9.

Analysis of results on ANOVA revealed that there was an improvement in the performance of children on two-minute spelling (TMS) task from Grade 8(Mean=18.9500, SD=6.87974), Grade 9 (Mean=20.45, SD=5.67) to Grade 10 (Mean=24.90, SD=2.15). The results of Mann Whitney test showed statistical significant difference between Grade 8 and Grade 10 ($p<0.001$) and between Grade 9 and Grade 10 ($p<0.05$). There was no statistical significant difference in the performance of children between Grade 8 and Grade 9 ($p< 0.05$).

3.2 Correlation and regression analysis across skills on DST

In order to examine the relationship among the components of Phonology, Reading and Writing skills and also to identify the skills that would serve as predictors of literacy development and good reading and writing skills, statistical measures of correlation and regression analyses were employed. Pearsons' Correlation Analysis (2-tailed) was done to analyze the data to study relationship between phonological skills, reading and writing skills. Table 4.5 shows Pearson's correlations for measures of Phonology, Reading and Writing in English.

Table 3.5

Pearson's correlational analysis of skills (Phonology, Reading and Writing

Tasks	PO	PD	spm	OMR	NSP	OMW	TMS
PO	-	0.32**	0.28**	0.21*	0.21*	0.202*	0.10
PD	0.32**	-	0.14	0.10	0.38**	0.128	0.19*
spm	0.28**	0.14	-	0.21*	0.09	0.11	-0.10
OMR	0.21*	0.10	0.21*	-	0.68**	.501**	.715**
NSP	0.21*	0.38**	0.09	0.68**	-	0.44**	0.69**
OMW	0.20*	0.12	0.11	0.50**	0.447**	-	.681**
TMS	0.10	0.19*	-0.10	0.71**	0.69**	.68**	-

**p<0.01
*p<0.05
Note: phoneme oddity (PO), phoneme deletion (PD), spoonerism (spm), one-minute reading (OMR), nonsense passage reading (NPR), one-minute writing (OMW) and two-minute spelling (TMS).

The results of correlational analysis, although indicated positive correlation between phoneme delation and phoneme oddity, correlation was also seen between phoneme taks and spoonerism task. While the earlier notion of spoonerism was that it is a mere production activity, the results of the present study suggests that it does involve phoneme skills with the help of which an individual responds to spoonerism tasks. The

results suggest that spoonerism task could be employed as a quick measure of screening for learning disability in older children.

A positive correlation was observed for non-sense passage reading and spelling with the other measures under study. The results again suggest that while all the other measures appear to be distinct, the common skill that is necessary to perform on all these tasks is their underlying phoneme skills. In order to extract the most potential potential predictors among those employed for the study, a stepwise multiple regression analysis was carried out.

Stepwise multiple regression analysis was done separately for all the variables. A stepwise regression was performed, where in the first step, Phoneme oddity was the dependent variable and all the other factors (including phoneme deletion, spoonerism, non-sense passage reading, one-minute reading, one-minute writing and two-minute spelling skills) were the independent variables. Similarly, in the next step, analysis was done where in phoneme deletion was the dependent variables and all the other factors including the other phonological, reading and the writing skills were the independent variables. In the subsequent step, spoonerism was the dependent variable and the other factors were the independent variables.

A stepwise regression analysis was also performed on reading skills, where in the first step, non-sense passage reading was the dependent variable and all the other factors (including phoneme oddity, phoneme deletion, spoonerism, one-minute reading, one-minute writing and two-minute spelling skills) were the independent variables. In the next step, one-minute reading was the dependent variable and all the other factors were the independent variables. In the subsequent step of regression analysis, one-minute writing was the dependent variable with the other factors as independent variable. In the final step, two-minute spelling was the dependent variable and the other factors were the independent variables. It is interesting to note that for both OMR (One Minute Reading) and TMS (Two-Minute Spelling) tasks, the significance was seen for phoneme oddity (PO), Spoonerism (spm) and TMS (TwoMinute Spelling) , all those tasks that are dependent on phonem knowledge as discussed earlier. Table 3.6 show a summary of

results for stepwise regression analysis for phonological, reading and writing skills to predict literacy development in children.

Table 3.6

Summary of stepwise multiple regression analysis for skills

Sl no.	Dependent variable	Predictors	R	R^2	Adjusted R^2	Beta co-efficient	t	Sig.
1	OMR	PO	0.215[a]	0.04	0.03	0.21	2.17	**0.03**
		PD	0.107 [a]	0.01	0.00	0.10	1.06	0.29
		SP	0.215 [a]	0.04	0.03	0.21	2.17	**0.03**
		NSPR	0.681 [a]	0.46	0.45	0.68	9.20	**0.00**
2	TMS	PO	0.107[a]	0.01	0.00	0.10	1.06	0.29
		PD	0.199[a]	0.04	0.03	0.19	2.00	**0.04**
		SP	0.101[a]	0.01	0.00	-0.10	-1.00	0.31
		NSP	0.698[a]	0.48	0.48	0.69	9.65	**0.00**

Note:PO-phoneme oddity, PD-phoneme deletion, SP-spoonerism, NSP-non sense passage reading, OMR-one minute reading, TMS-two minute spelling

Results of regression analyses on measures of phonological, reading and writing skills revealed that phoneme oddity (R^2=0.04, p<0.05), spoonerism (R^2=0.04, p<0.05) and non-sense passage reading (R^2=0.46, p<0.05) are the potential predictors of one-minute reading, predicting 46% of the time. Phoneme deletion (R^2=0.04, p<0.05) and non-sense passage reading (R^2=0.48, p<0.05) are also the predictors of two-minute spelling that predicted 40% and 48% of the time respectively. Results of Stepwise multiple regression suggest that phoneme oddity, spoonerism and non-sense passage reading could be considered as potential measures to screen older children for learning disability. However, the study may be replicated on larger population before generalizing the results.

3.3 Discussion

As part of the objectives of the present study in Phase I included development/compilation of text/audio/video/digital resources related to learning disability. In this phase, resources related to tests and tools for early identification of children with LD were reviewed and compiled. In an earlier study teachers of preschool children and regular teachers were sensitized regarding language and literacy problems in children (Prema, 2010). They were oriented regarding the significance of imparting specialized training in classroom set-up for children at-risk/or those identified as having learning disability. In the present study, based on an extensive literature review, the sources that were lacking in certain age groups and certain domains to identify children at risk for LD were explored and a set of tools were finalized as resources for primary prevention for a center-based service delivery model for children with LD. Around 110 tests/tools were reviewed which were available either published or unpublished. These tools were developed wither for screening, assessment or diagnosing children with Learning disability. Out of these tools 35 tools/tests were shortlisted across age ranges and skills. In the present study, a set of tools along with the adapted version of DST-S were suggested as resources that can be used for primary prevention of Learning disability.

The results of the present study indicated that a developmental trend was observed for phonological skills, reading and writing skills (See Figure 3.1). The findings indicated that children showed a significant improvement in their performance for phonological, reading and writing skills on DST-Adapted. Further correlation analysis revealed that there was a significant correlation between domains of reading, writing and phonological skills. On similar lines the findings of the present study on regression also revealed that phonological skills were predictors for reading skills. The results of the present study are in consonance with those of Lonigan, Burgess, and Anthony (2000) who also demonstrated that phonological skills was found to be the best predictor of reading in children who were followed from late preschool into kindergarten and first grade. In the present study phonological skills were found to be significantly important for reading even to older children in the age range of 13-15 years. These findings indicate that

phonological skills are important for literacy skills throughout a child's schooling from kindergarten till higher grades. Numerous other studies have also documented the robust relationship between early phonological skills and subsequent reading achievement (Calfee, Lindamood, & Lindamood, 1973; Lonigan, et al., 2000; Shanbal, Goswami, Chaithra & Prathima, 2011; Shanbal & Prema, 2007; Torgesen, Wagner, & Rashotte, 1994; Wagner et al., 1997). A study by Prema, Devika and Mekhala (2011) on phonological sensitivity training kit in Kannada (PhoST-K) also supports the notion of a strong relationship between phonological skills and reading in children in non-alphabetic language such as Kannada. The findings of all these studies reveal that phonological skills which goes untested or unassessed in routine evaluation for identification of children at risk for LD has become a very important resource for reading and writing skills in children. Identification of a phonological deficit will help SLPs understand the nature of reading and writing problems in certain children or subgroup of children who may be at risk for LD.

The present study attempts to streamline resources for primary prevention of LD through tests and resources for identification of children at risk for LD. Children with impairment in oral language skills or those who develop language late are widely known to be 'at risk' for acquisition of literacy skills. Early identification of children who are at risk for literacy difficulties facilitates precise planning of the necessary stimulation that can be applied to allow for more positive outcomes. Several studies have demonstrated that early literacy skills can be trained so that it reduces the risk of a child developing future reading problems. Scaffolding early literacy experiences can reduce problems associated with poor skills and low motivation for literacy activities.

The position statement of the American Speech-Language-Hearing Association (ASHA) titled, "The Roles and Responsibilities of Speech-Language Pathologists with respect to Reading and Writing in Children and Adolescents" (ASHA, 2001) strongly emphasizes that speech-language pathologists should play an active role in literacy promotion for young children. The position statement is made on the basis of four principal arguments:

1. Oral language provides the foundation for the development of literacy

2. The relationship between oral language and literacy development is reciprocal in nature, with interconnections originating in early childhood
3. Children with speech and language impairments are at increased risk for difficulties with early and conventional literacy development and
4. Intervention for oral language can positively influence literacy development and vice versa.

The primary roles and responsibilities of speech-language pathologists with respect to literacy, as asserted by ASHA, encompass the following areas: prevention, identification, assessment, and intervention (Justice, Invernizzi and Meier, 2002).

The potential to meet the above roles and responsibilities is driven by the issue of early identification. In order to prevent literacy problems and to ensure children's timely achievement of key literacy skills, there is a need to develop service delivery models that include services for screening, identification, assessment, management and periodic follow-up of children for later literacy development. The service delivery models may be either Center-based or Community-based with advantages and disadvantages of the two approaches have been documented with reference to rehabilitation of disabilities other than Learning Disability. Considering the enormity of children with learning disability, and the vision of India to achieve 'Education for All' by 2015, it is imperative that professionals like speech language pathologists take the onus to evaluate the efficacy of service delivery model.

In an earlier study (Prema, 2010), the outcome of the training program was analyzed which suggested that the mean number of sessions required by preschool children was 16 to attain 80% accuracy in each of the phonological awareness skills. The results revealed that the rhyming skills were achieved with least number of sessions followed by segmentation, syllable deletion, blending, manipulation and syllable oddity skills while the phonemic skills were not achieved within the fixed number of sessions in older age group of children although they are from a native language background that differs from English. The results of the present study are in consensus with Anthony, Lonigan, Driscoll, Phillips and Burgess (2003) who stated that children master rhyming more quickly than smaller phonological segments such as the single phoneme onset that

is required for mastering alliteration. This is also supported by the explanation given by Goswami (2002) who attributes this to the familiarity and practice opportunities at home and in preschool childcare centers fostering rhyming skills and thus preparing children for deeper levels of phonological processing as they become older. Lundberg et al. (1988), Warrick (1993) reported that growth in rhyming ability was greater than the growth in any other phonological awareness skills. According to Justice & Schuele (2004), phonological awareness skills are classified as simple, shallow-level phonological awareness; and complex, deep-level phonological awareness skills. At its simplest level, phonological awareness manifests as the ability to attend to and make judgments about the general sound structure of language. For example, dividing words into syllables, identifying and generating rhymes, and matching words with the same beginning sound, are considered simple phonological awareness tasks indicative of shallow-level knowledge. At more complex or deep levels, the ability to isolate and manipulate individual sounds or phonemes is involved; skill at this level of phonological awareness is called phonemic awareness. Another study by Truch, (1993), Griffith & Olson (1992) reported that phonemic awareness involves a hierarchy of sub skills progressing from easier tasks like rhyming words, recognizing rhyme, and auditory discrimination, to intermediate tasks such as blending phonemes and syllable segmentation (splitting) to difficult tasks such as phoneme segmentation in spoken words, and manipulation of phonemes to form different words. All the authors explain that the phonological awareness skills varies in complexity and the easier ones like the rhyming, alliteration, and syllable level skills are attained at a early age and the phonemic awareness like phoneme deletion and phoneme manipulation are attained at later stages. In the present study it was observed that phonological skills were crucial even in the older grades. Phonological skills were found to be good predictors for reading skills even in the older children.

In order to achieve primary prevention of learning disability in children (Phase I of a bigger project envisaged for future studies) a library survey was conducted in which 110 tests were found to met the objectives of the study. On further meta-analysis of components of the 110 tests (Table 3), 35 tests were short-listed. Among those 35, only ten tests could be employed for Tier I level. It was found that for certain skills and age

groups, tests were not adequate for screening. Test incorporating these skills for age groups has been adapted and field tested in Phase I of this project. The resources compiled in this project would help in service delivery for children with learning disability (LD) at Tier I level. The resources and test developed by Prema (2010) Shanbal..(2011) are complementary to the set of tools/compiled/adapted through evidence based measures for screening as part of primary prevention through RTI model for service delivery.

CHAPTER IV

SUMMARY AND CONCLUSION

The primary aim of the study was to develop service delivery model for children with learning disability at Tier I level as described under RTI Model. Consequent to detailed search of available screening and other measures, a screening tool for children with Learning Disability in the age range of 13-15 years was developed. Further as part of the research project, an attempt was also made to achieve the secondary objectives of the study. These included the following:

i. Development/compilation of text/audio/video/digital resources
ii. Compilation of the resource materials available for early identification of Learning disability in children, through screening and diagnostic procedures (including identification of subtypes of children with LD)
iii. To finalize the resources for center-based service delivery on the principles of RTI for children with LD

During the course of research various skills related to literacy development in children were delineated from the review of literature. A meta-analysis of Indian tests and tests from other countries available at AIISH suggested that the existing resources are not adequate for Tier I level of primary prevention for children with learning disability. Despite the number of tests available, the components of the tests revealed that certain skills are tapped by many tests and a few others are totally ignored. Also, the age range for which majority of the available tests can be used also suggested gaps that creates a vacuum for a professional/teacher to thus missing out testing relevant ages and skills for primary prevention. The present study attempted to investigate the contribution of various skills such as- listening, oral language, early literacy, phonological skills, reading and writing skills towards literacy development in higher secondary grade children.

The participants of the study included hundred typically developing Kannada-English bilingual higher secondary class children in the age range of 13-15 years. The screening tool developed was field tested with the help of these participants selected on random basis. Two schools were selected for the study on a random basis. The stimulus

material consisted of bi-syllabic, tri-syllabic and multi-syllabic words, meaningful and non-sense passages. A list of 20 single words was used for Phoneme oddity and Phoneme deletion. Two-word list comprising of 20 stimuli was included in the spoonerism task. The reading task comprised of 120 simple and complex single words and a non-sense passage containing 52 real words and 20 non-sense words which was adapted from the DST-S (Fawcett & Nicolson, 2004). A meaningful passage containing 35 words and 28 words for dictation were used for writing task. This adapted version of DST-S was administered to all participants, the responses were scored, data was compiled and subjected to statistical analyses. The findings of the study revealed that there was a developmental trend observed from grade 8 to grade 10 across the subtests of phonology, reading and writing. Correlation analysis revealed a significant correlation between phonological skills and reading skills. Subtests of phonological skills were also found to be good predictors for reading skill in the present study.

To summarize, in order to achieve primary prevention of learning disability in children (Phase I of a bigger project envisaged for future studies) a library survey was conducted in which 110 tests were found to meet the objectives of the study. On further meta-analysis of components of the 110 tests (Table 3), 35 tests were short-listed. Among those 35, only ten tests could be employed for Tier I level. It was found that for certain skills and age groups, tests were not adequate for screening. Test incorporating these skills for age groups has been adapted and field tested in Phase I of this project. The resources compiled in this project would help in service delivery for children with learning disability (LD) at Tier I level. The resources and test developed by Prema (2010) Shanbal (2011) are complementary to the set of tools/compiled/adapted through evidence based measures for screening as part of primary prevention through RTI model for service delivery.

References

American Speech-Language-Hearing Association. (1999). *Guidelines for the roles and responsibilities of the school-based speech-language pathologist*. Rockville, MD: Author.

American Speech-Language-Hearing Association. (2001) *Roles and Responsibilities of Speech-Language Pathologists With Respect to Reading and Writing in Children and Adolescents.*

Anitha, S., & Prema, K.S. (2008) Computerized Linguistic Profile (CLIPS). *Unpublished Master's dissertation*, University of Mysore, Mysore.

Ehren, B.J., Montgomery, J., Rudebusch, J. & Whitmire, K. (2006). *Responsiveness to Intervention: New Roles for Speech-Language Pathologists*. Retrieved from http://www.ldonline.org/article/40614/

Blank, M., Rose, A., & Berlin, L.T. *(*1978*a).* Preschool language assessment instrument: The language of learning in practice. New York*:* Grune & Stratton.

Bryant, *B. R., &* Wiederholt, *J. L. (*1991*).* Gray Oral Reading Tests-*Dingnostic. Austin, TX: PRO- ED.*

Catts, H. (1997). Early identification of language-based reading disabilities. *Language, Speech and Hearing Services in Schools, 28,* 86-89.

Devi, D.(1978). *Reading readiness test.* Unpublished Master's dissertation, University of Mysore, Mysore.

Roth, F.P., Paul, D. R., Pierotti, A. M.(2006). *Emergent Literacy: Early Reading and Writing Development*. Retrieved from http://www.asha.org/public/speech/emergent-literacy.htm

Shiel, G., Cregan, A., McGough, A. & Archer, P. (2012*) Oral Language in Early Childhood and Primary Education (3-8 years)* (Research conducted on behalf of The National Council for Curriculum and Assessment) Commissioned research report. National Council for Curriculum and Assessment, Dublin.

Gnanvel, K., & Shanbal, J.C. (2009). Subtyping of children with developmental dyslexia: implications from dual route cascaded (DRC) model in the Indian context. *Student Research*, VII, 99-114, AIISH. A Publication of AIISH, Mysore.

Jayaram, J. (1997) Identification and assessment of reading disability in children : An information processing approach *Unpublished Thesis*, University of Mysore, Mysore.

Shanbal, J.C.,Goswami, S. P., Prathima, S., & Chaitra, S. (2010). Early Literacy Screening Tool, Publication of the All India Institute of Speech and Hearing

Justice, L. M. (2002). An observational assessment checklist – children's early literacy development. Retrieved from http://iis1.speechpathology.com/management/uploads/checklists/440971_justice1.pdf.

Justice, L. M., Inverizzi, M. A., & Meier, J. D. (2002). Designing and Implementing an early literacy screening protocol: Suggestions for the speech-language pathologist. *Language, Speech, and Hearing Services in School*, 33, 84-101.

Kuppuraj, S., & Shanbal, J.C. (2009). Dyslexia assessment profile for Indian children. *Student Research*, VII, 114-129, AIISH. A Publication of AIISH, Mysore.

Lakshmi. S. M. & Goswami, S.P.(2009-2010). Cognitive linguistic assessment protocol in Malayalam: an adaptation of CLAP in Kannada. *Student Research at AIISH, 3,* 106-120.

Loomba, M. (1995). Development of Early reading skills in Indian children. Unpublished Master's Dissertation of the All India Institute of Speech and Hearing, University of Mysore.

Sharma, M. (2007) Language Independent measure: A screening tool for identification of poor readers. *Unpublished dissertation*, University of Mysore, Mysore.

Mutti. M. A., Sterling M. H., & Spalding V. N., (1994) Quick neurological screening test (QNST) *Revised edition* CA, Academic Therapeutic Publications , Navato

Prema, K.S. (1997). Reading acquisition profile in Kannada (RAP-K). Published doctoral thesis, University of Mysore, Mysore.

Prema.K.S.,(1998) Reading acquisition profile in Kannada (RAP-K). Unpublished doctoral thesis, University of Mysore, Mysore.

Prema, K.S. (2006) Screening Emergent Language and Literacy Skills (SELL). Online Screening tool.

Purushothama, G.(1991). *Diagnostic reading test.* Unpublished Master's dissertation, University of Mysore, Mysore.

Purushothama. G., (1986) *Frame work for testing Kannada reading on the basis of automaticity, rules of orthrography and sequential processing,* Unpublished Doctoral Thesis, University of Mysore, Mysore.

Ramaa. S. (2001) Arithmetic diagnostic test for primary school children. *Dyslexia, 2,* 26-29.

Swaroopa . K. P. (2001). *Checklist for screening language based learning disability in children (Che – SLR).* Unpublished Master's dissertation, University of Mysore, Mysore.

Shanbal, J. C. (2003). *Tool for screening children with writing difficulties*, Unpublished Master's dissertation, University of Mysore, Mysore.

Veena, D.K. , Goswami. (2010). Cognitive linguistic assessment protocol in Telugu: an adaptation of CLAP in Kannada. *Student Research at AIISH, 3*, 98-105.

Wren. S., & Watts. J., (2002) ABecedarian reading assessment. Online assessment tool.

Yeshoda.K., (1994) Test of writing for children in Kannada. *Unpublished dissertation,* University of Mysore, Mysore.

Appendix

Adapted version of Dyslexia Screening Test-Senior

I PHONOLOGY:

a) Phoneme Oddity –

Instructions: "Now I am going to tell you few sets of words. There are four words in each set. You have to choose the word which sounds different from the other three words. You must concentrate on the sounds present in the words & not the meaning of it".

Examples:

i. Map Tap Top Lap
ii. Mad Bead Bad Sad
iii. Fan Pan Tan Gun

1. Pit Bit Sit Cut
2. Mat Cat Bat Pet
3. Pan Man Ten Can
4. Pot Kit Cot Lot
5. Gun Bun Run Tin
6. Weed Seed Bad Need
7. Thread Bed Mad Said
8. Fool Tool Tail Cool
9. Fog Dog Jug Log
10. Nick Teak Pick Tick
11. Pen Den Bun Ten
12. Thread Bread Stand Spread
13. Boil Coil Fool Foil
14. Cut But Cot Nut
15. Red Wed Did Fed
16. Mail Pool Fail Tail
17. Bag Lag Mug Tag
18. Car Bar Fur Tar
19. Wood Good Bed Should
20. Book Took Peak Cook

Scoring: 1 Point for each correct answer *Max score*: 20

b)Phoneme Deletion –

Instruction: "Now I am going to present few words. You remove a sound from the word that I tell you & say the remaining word"

Examples:

i. Party - /t/ = ? Pary
ii. Bike- /b/ = ? ike
iii. Snake-/n/ =? sake

1. Man – /m/ = ?
2. Milk - /l/ = ?
3. Pencil – /n/ = ?
4. Computer – /yu/ = ?
5. Bottle – /l/ = ?
6. Complex – /k/ = ?
7. Glad – /g/ = ?
8. Suggestion – /gg/ = ?
9. Flexible – /k/ = ?
10. Calender – /d/ = ?
11. Performance – /s/ = ?
12. Audience – /au/ = ?
13. Stop – /s/ = ?
14. Maximum – /i/ = ?
15. Black – /l/ = ?
16. Smile – /s/ = ?
17. Discovery – /v/ = ?
18. September – /p/ = ?
19. Institute – /n/ = ?
20. Information – /a/ = ?

Scoring: 1 point for each correct answer *Max Score* = 20

C) Spoonerism *– Play around with the sounds of words. Swap over the sounds of the beginning of 2 words.*

Instructions: "I will present some sets of words. Each set has two words. You just have to play with the sounds of words. Your task is to exchange the sounds at the beginning of two words".

Examples:

i. Baby – Lobby

ii. Fat pig – Pat fig
iii. Teddy Bear – Beddy Tear

1) Crushing blow
2) Busy dean
3) Down train
4) Lighting fire
5) Dear queen
6) Loving shepherd
7) Take a shower
8) Bad manners
9) Bad money
10) Funny bone
11) Butter fly
12) Wedding Bells
13) Bye All
14) Coupon
15) Right face
16) Listen here
17) Flipping the channel
18) Broken window
19) Save tigers
20) Flat battery

Scoring: 1 point for each correct word or 2 points per item. *Max Score* = 40

II READING:

a) ***One - minute Reading*** ;

Instructions: "Here is a list of words. I want you to read as many words you can in one minute, without mistakes. If you get stuck on a word, say 'pass' & go on to the next one.

Examples:

i. Calendar
ii. Organization
iii. Administration

Pat	Bridge	Concert	Relation
Fog	Freight	Village	Allotment
King	Evil	Payment	Encounter
Oil	Poet	Express	Admission
Golf	Busy	Patient	Institute
Tea	Arise	Transfer	Reduction

Fun	Rifle	Exchange	Interview
Gear	Civil	Presence	Advantage
Foam	Angle	Constant	Telephone
Site	Ocean	Football	Settlement

Risk	Error	Surprise	Assumption
Flow	Reply	Terrible	Employment
Base	Owner	Enemy	Resistance
Honey	Cover	Oxygen	Instrument
Blow	Patent	Origin	Impossible
Ranch	Temple	Dignity	Appearance
Mayor	Prison	Gallery	Consequence
Drill	Virtue	Victory	Appointment
Bench	Accept	Article	Construction
Frank	Device	Logical	Security
Trend	Region	Opinion	Testimony
Split	Victim	Regular	Emergency
Cotton	Bullet	Interior	Universal
Route	Stable	Vacation	Opposition
Curve	Surplus	Reality	Mechanical
Animal	Journal	Incident	Combination
Cross	Fortune	Tendency	Independent
Queen	Missile	Election	Contribution
Strain	Portion	Delicate	Intelligence
Throat	Delight	Quantity	Establishment

Max Score: 120 + additional bonus points if obtained.

b) Non – Sense Passage Reading

Instructions: “Now I would like you to give a try at reading a passage out loud. Not all words have meaning. Some are quite difficult so just do your best. We are interested in how long you take & hope accurate you are. So I am going to time you”.

Examples: “Good lub”, said the dix. ‘My name is Norgin’.

> “In the olden days, a rennifer set out to craiberg an enormous dollitroy that threatened his country. It was a really gragwally illadonter, & after killing it was chingersomely tried. But the very next day he set out to oligondervock to graffidanter his stettlenab. On his arrival, he met his bontuvildam at the station. They were married & lived happily ever after.”

Scoring:

- Basic score: 1 point for each real word correctly read. 2 points for each non-sense words. 1 point for close try.
- Bonus score: If time taken is less than a minute, add 1 extra point for every 2 seconds under the minute.
- Penalty score: If time taken is over one minute, subtract 1 point for every 2 seconds over the minute.
  If the child scores 62 in 120 seconds, the penalty would be 30 points leading to a score of 32 points.

  Max score: 72 (52+20)

III WRITING:

a) One - minute Writing

Instructions: "Here is a passage, copy it down as fast as you can, trying to copy it correctly & making sure one will be able to read it".
Example: 'Can you copy'

> "I am copying a short passage to check my speed of transcription. I have one minute to complete as much as I can. I should work quickly but accurately, so that my handwriting is legible."
>
> *Scoring*: Stop the child after 60 seconds.

1. Basic score: The number of words completed. 1 point for each correct word.
2. Bonus score: If the time taken is less than 1 minute, add 1 point for each 2 seconds.
3. Errors: If words are omitted or spelled incorrectly deduct 1 point for each 2 errors.
4. Assess handwriting quality:
   Subtract 3 points – poor quality
   Subtract 1 point – immature or not joined up
   Subtract 2 points – printed in capitals
   Subtract 3 points – illegible
   Max scores: 37 + bonus score if obtained

b) Two-minute Spelling

Instructions: I want to check your spelling, spell these words as fast as possible. We are interested in your first thoughts, as just write down what you think & as you finish writing the end of the word then I will start to speak the next one".
Examples:
Easy spelling (practice):
Bus, cat, bed, sand, day, five, home, book
Start here –

Morning	School	Age	Year
Tonight	Tomorrow	Doctor	Danger
Tongue	Laugh	September	Success
Wednesday	Foreign	Forty	Tomato
Address	Sincerely	Saturday	Hospital
Advertisement	Insurance	Electricity	Pension
Consequence	Government	Accessory	Reconciliation

Scoring: 1 point per correct spelling. *Max score*: 28

Non-sense Passage Reading

"In the olden days, a rennifer set out to craiberg an enormous dollitroy that threatened his country. It was a really gragwally illadonter, & after killing it was chingersomely tried. But the very next day he set out to oligondervock to graffidanter his stettlenab. On his arrival, he met his bontuvildam at the station. They were married & lived happily ever after."

One-Minute Writing:

"I am copying a short passage to check my speed of transcription. I have one minute to complete as much as I can. I should work quickly but accurately, so that my handwriting is legible."

One-minute Reading

Pat	Bridge	Concert	Relation
Fog	Freight	Village	Allotment
King	Evil	Payment	Encounter
Oil	Poet	Express	Admission
Golf	Busy	Patient	Institute
Tea	Arise	Transfer	Reduction
Fun	Rifle	Exchange	Interview
Gear	Civil	Presence	Advantage
Foam	Angle	Constant	Telephone
Site	Ocean	Football	Settlement
Risk	Error	Surprise	Assumption
Flow	Reply	Terrible	Employment
Base	Owner	Enemy	Resistance
Honey	Cover	Oxygen	Instrument
Blow	Patent	Origin	Impossible
Ranch	Temple	Dignity	Appearance
Mayor	Prison	Gallery	Consequence
Drill	Virtue	Victory	Appointment
Bench	Accept	Article	Construction

Frank	Device	Logical	Security
Trend	Region	Opinion	Testimony
Split	Victim	Regular	Emergency
Cotton	Bullet	Interior	Universal
Route	Stable	Vacation	Opposition
Curve	Surplus	Reality	Mechanical
Animal	Journal	Incident	Combination
Cross	Fortune	Tendency	Independent
Queen	Missile	Election	Contribution
Strain	Portion	Delicate	Intelligence
Throat	Delight	Quantity	Establishment