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Two Decades of Research on Learning Disabilities in India

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This paper describes a range of research studies relating to learning disabilities in India during the last two decades. Attention is called to the existence of many different languages within India. Standardized and teacher-made tools have been developed for assessment and remediation purposes. The paper ends by making some suggestions for further research.
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INTRODUCTION

The concept of learning disabilities is still new in many developing countries. However, India has a history of research in this area, primarily over the last two decades. Investigators from different disciplines have been involved, such as education, psychology, paediatrics, speech and hearing, and psychiatry.

Conducting studies of learning disabilities in India is not an easy task because of its multilingual and multicultural background. At present, there are 25 states and seven Union Territories (UT). Each state/UT has its own language and each language has many dialectical forms. There are 18 standard languages, each one of which has its own orthographic system (for details of Indian writing systems see Prakash and Malatesha Joshi, 1995). In fact, the states were formed on the basis of the main regional language spoken by the majority of the people within certain geographical boundaries. Each state/UT has its own regional language (the language spoken by the majority of its people) and its official language. For example, in South India there are four main states—Karnataka, Tamil Nadu, Andhra Pradesh and Kerala. The official languages of these states are Kannada, Tamil, Telugu and Malayalam, respectively. Sometimes the spoken language and the official language are one and the same and sometimes they may be different. In India the majority of the people speak Hindi, which means that Hindi is the national language. English, too, since it is an international language, is also

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compulsory in schools. In the majority of the states there is a three-language formula. This means that in these states every child is expected to learn to speak, read and write the regional language of the state, Hindi, and English. Because of migration, which has arisen for various reasons, one finds that in any state there are children whose home language is not the regional language of the state.

Another interesting factor is that, in some families, the parents or close relatives may be fluent in different Indian languages because they are from families who speak different language or because they lived in different states. Thus, in some families there will be bilingualism or even multilingualism. The child may be exposed to all of them simultaneously within the family itself. In addition, the school expects a knowledge of the regional language, Hindi and English. In some states only the regional language and English are expected.

In India, we find two types of schools on the basis of the medium of instruction, *viz.* English-medium schools and regional-medium schools. In English-medium schools, English is the main language and all the academic subjects are taught in English. In regional-medium schools, the regional language of the state is the main language and all the academic subjects are taught in that language. The child's first, second and third language will depend upon the medium of instruction. In regional-medium schools—mainly attended by rural children or children of low socio-economic status or lower-middle socio-economic status in urban areas—English as a second language will be introduced at Grade V and Hindi as a third language at Grade VI. These three languages are compulsory until Grade X. However, there are exceptions to this rule. Different syllabuses, such as the State Syllabus, the Syllabus of the Central Board of Secondary Education and the Indian Council of Secondary Education, may have different emphases on the languages to be learned. There are also certain exemptions for disabled children; thus, for deaf children there is exemption from learning more than one language. Although there is similar provision for learning disabled (LD) children, the rules are not very clear and such provision is not widespread. In some states, minority groups such as Muslims are allowed to study through the medium of Urdu. Similarly, for tribal children at Grades I–IV the text books may be in their own language, but as they do not have their own orthography, the orthography of the regional language of that particular state will be used.

For the purposes of this paper, the author has drawn on both primary and secondary sources as well as on personal communications. The majority of the reported studies are derived from doctoral or masters' degrees. Others include institutional or individual research projects, case studies and action research. (The latter refers to attempts made by teachers to understand children's problems and to help them; they may not always have sound theoretical bases.) The author has attempted to make the paper as comprehensive as possible, although a full database for research in India is not available. Most of the studies carried out in India, which were available to the author, have been included in the paper.

The objectives of these reported studies are:

1. identification of different types of learning disabilities or any one type of learning disability
2. identification of the specific difficulties faced by students with learning disabilities in any one or more areas of academic learning
3. analysis of the errors committed in spoken language, reading, writing or arithmetic
4. diagnosis of underlying psychological deficits which covers various neuropsychological processes, Piagetian stages of cognitive development and information processing deficits
5. development of remedial programmes in specific academic areas
6. construction of various ability, achievement and diagnostic tests which are useful in identification and diagnosis of learning disabilities in some languages

The paper provides a brief report of the studies conducted in the area of learning disabilities over the last two decades in India. Certain gaps in research in this area are identified and suggestions for further studies are given.

Some of the studies have many objectives whereas in others the objectives are restricted. The methodology adopted in the studies varies according to the nature of the objectives.

This methodology and the major findings are discussed in the following eight sections.

STUDIES RELATED TO THE IDENTIFICATION OF DIFFERENT TYPES OF LEARNING DISABILITIES

As there are only a few special schools or Remedial Education Centres for students with learning disabilities, in India most of the investigators attempted to identify such students from ordinary schools. Many adopted a set of exclusionary and inclusionary criteria (Ramaa, 1985; Nishi Mary, 1988; Ramaa, 1991; Sudipta *et al.*, 1995; Bindu, 1996; Indu, 1996; Umadevi, 1996; Abdunnsar, 1997; Akila, 1997; Srimani, 1998; Gowramma, 1998). The important criteria included:

- (a) No sensory problems.
- (b) No serious emotional problems.
- (c) No serious brain damage.
- (d) No intellectual retardation.
- (e) Eight years of age or above.
- (f) Regularity in school attendance.
- (g) Serious academic difficulty (more than 2 years of retardation).
- (h) Receiving help at home with schoolwork.
- (i) Motivation to achieve academically.

Additional criteria were specified by Abdunnsar (1997) and Srimani (1998) while identifying children with language disabilities in Malayalam and Kannada. They were:

- (a) Kannada/Malayalam speaking and no bilingualism.
- (b) No language difference between home and school languages.
- (c) No severe (obvious) speech motor (articulation) problems (so as to eliminate cases with hearing impairment, cerebral palsy or mental retardation).
- (d) Overall language age at least 12 months below age requirement.
- (e) Average socio-economic status.

Ramaa (1985, 1993) and Prema (on-going research) included the following additional criteria for identifying children with dyslexia and writing disabilities, respectively.

The intention was to exclude from their studies children with major spoken language disabilities.

- (a) Normal (age appropriate level) in auditory reception.
- (b) Normal (grade appropriate level) in aural comprehension.

Depending upon the objective(s) of the study, slight modifications were made in setting criteria for specifying children with learning disabilities.

Identification of children with learning disabilities has been attempted in various of the Indian languages. For example, some work has been done in Kannada, Malayalam and Hindi. Since English is one of the compulsory languages in Indian schools, work has also been initiated in Primary Schools so as to identify children with learning disabilities in English in Indian primary schools. Table 1 gives the prevalence of different types of learning disabilities among Indian students noted in these studies. Most of the studies are conducted in South Indian states

DEVELOPMENT OF ASSESSMENT INSTRUMENTS FOR IDENTIFICATION AND DIAGNOSIS OF LEARNING DISABILITIES

In India identification and diagnosis of learning disabilities is very difficult because ready-made standardized tools are not available in all of India's different languages. There is an urgent need to develop standardized/teacher-made assessment instruments in the different languages and to establish norms. The following assessments have been developed or re-standardized as a part of their research studies by different investigators. Most of the tools are developed in south Indian languages and in English. The descriptions of the following tools are available in the research reports prepared by the various investigators. A brief account of the majority of such studies is given in Table 2. Readers who are interested may wish to refer to the original reports.

The above list is not exhaustive, as there may be other tests that have not come to the notice of the author. However, there is still a shortage of assessment instruments in various Indian languages for children at different stages of schooling.

Table 1. Prevalence of children with learning disabilities

Investigator	Type of learning disability	Language of students studied	Total number of children screened	% of children identified as LD for LD
Ramaa, 1985	Dyslexia	Kannada	550	3
Nishi Mary, 1988	Different types of learning disabilities	English medium in Karnataka State	750	7.5
Ramaa, 1991	Dyscalculia (without reading and writing disabilities)	Kannada medium in Karnataka State	359	6
Bindu, 1996	Dyslexia	Malayalam in Kerala state	300	3
Indu, 1996	Different types of learning disabilities	English medium in Karnataka State	1380	3
Umadevi, 1996	Dyslexia	English medium in Karnataka State	612	4
Abdunnasar, 1997	Language disabilities	Malayalam in Kerala State	400	7.25
Geetha, 1997	Dyscalculia	English medium in Tamil Nadu State	1442	3
Gowramma, 1998	Dyscalculia	Kannada medium in Karnataka State	1408	6

STUDIES RELATED TO DIAGNOSIS OF NEUROPSYCHOLOGICAL PROCESSES AND INFORMATION PROCESSING SKILLS AMONG THE LEARNING DISABLED STUDENTS

A few studies are available with the objective of understanding the strengths and weaknesses in the neuropsychological processes and information processing skills of LD children. Two of them are related to dyslexia and one to dyscalculia.

Ramaa (1985) administered a series of diagnostic tests to 14 primary school children with dyslexia identified from a Kannada-speaking school population in Karnataka State. The tests assess visual discrimination, auditory discrimination, visual recall, visual recognition, auditory sequential memory, visual sequential memory, visual verbal association (symbols and sounds in isolation and in word context), word analysis and synthesis. The performance of 14 dyslexics was compared with that of 14 non-dyslexic poor readers and 14 normal readers. Findings of the study are as follows:

1. The dyslexics differed significantly from both the normal readers and the non-dyslexic poor readers in visual verbal association both when the stimuli were presented in the context of a word and when they were presented in isolation. All the dyslexics had difficulties in these tasks, which therefore differentiate them from normal readers and non-dyslexic poor readers.

Table 2. Assessment instruments constructed in India

Assessment instruments	Author, Year
<i>Auditory processing skills</i>	
Auditory discrimination test in Kannada	Devaki, 1978
Word synthesis test in Kannada	Ramaa, 1985
Word analysis test in Kannada	Ramaa, 1985
<i>Visual processing skills</i>	
Visual discrimination test in Kannada	Devaki, 1978
Visual recognition test (non-verbal)	Ramaa, 1985
Visual recall test (non-verbal)	Ramaa, 1985
<i>Visual-verbal association</i>	
Visual-verbal association test—I (To test grapheme-phoneme correspondence using Kannada Phonemes and symbols contrived from different scripts of Indian languages)	Ramaa, 1985
Visual-verbal association test—II (same as above but in word context)	Ramaa, 1985
<i>Oral language</i>	
Linguistic profile test in Kannada	Karanth, 1980
Malayalam language test	Rukmini, 1994
Boehm's tests of basic concepts in English (restandardized)	Indu, 1996
Peabody picture vocabulary test (adapted to Kannada)	Srimani, 1998
Vocabulary and grammar tests in English	Prema, on-going research
Peabody picture vocabulary test in English (restandardized to school population in Karnataka)	Prema, on-going research
<i>Reading</i>	
Kannada oral reading test	Jaya Bai, 1958
Reading comprehension test in Kannada	Ramaa, 1985
Kannada word recognition test	Ramaa, 1985
Malayalam word recognition test	Bindu, 1996
Word recognition test in English	Umadevi, 1996
Reading comprehension test in English	Umadevi, 1996
<i>Writing</i>	
Diagnostic test in writing (Kannada)	Hegde, 1998
Diagnostic test in writing (Malayalam)	Joseph, 1998
<i>Arithmetic</i>	
Arithmetic diagnostic test in Kannada and English for primary school children	Ramaa, 1994
<i>Reading, writing and arithmetic</i>	
Grade level assessment device in English, Hindi and mathematics (in English language)	Narayan, 1994
<i>Motivation</i>	
Academic achievement motivation inventory in Kannada	Ramaa, 1985
<i>Behavioural problems</i>	
Schedule for assessment of behavioural problems in children in Kannada and English	Ramaa, Ashok and Balachandra, 1997

2. Dyslexics also differed significantly from normal readers in auditory sequential memory, word analysis and word synthesis, and from non-dyslexic poor readers only in word analysis. Thus, though there is

regular grapheme–phoneme correspondence in the Kannada language, dyslexics still had difficulties with word analysis and word synthesis.

By means of a profile analysis of 60 primary school children, Jayaram (1998) identified seven categories of children with reading difficulties in the Kannada language. He used a series of tests measuring different factors associated with reading. The categories were:

Category I—General impairment group (21.67%): these were children who exhibited poor performance on five or more tasks out of 14. Their major problems were not in any specific task.

Category II—Cognitive impairment group (3.33%): these were children who had performed very badly only on cognitive tasks.

Category III—Linguistic impairment group (3.33%): these were only those children who performed poorly on linguistic tasks.

Category IV—Phonemic impairment group (11.67%): here, those children having difficulty in phonemic tasks were grouped together. None of the children showed any specific difficulties on syllable rhyme, grammaticality judgement and synonymy judgement tests.

Category V—Metalinguistic impairment group (11.67%): This group consisted of individuals who found difficulty on two or more metalinguistic tasks (related to syllables, phonemes, rhyme, grammaticality and synonymy judgement tasks).

Category VI—Linguistic and metalinguistic impairment group (35%): These children exhibited severe difficulties on both linguistic and metalinguistic tasks.

Category VII—Cognitive and metalinguistic impairment group (8%): This group showed severe problems in cognitive and metalinguistic skills.

Prakash and Chandy (submitted) in their study of 30 reading disabled children administered a *Letter Identification* test, a *Non-Word Reading* test, a *Diagnostic Reading* test, a *Serial Recall* test, a *Reading Readiness* test (auditory and visual discrimination), a *SHWA* test (Karanth and Prakash, 1996) and a *Writing Through Dictation* test. On the basis of the overall picture obtained, the authors suggested that dyslexics are those who have language and related deficiencies such as poor short term memory, rather than simple perceptual deficiencies.

In a study of 15 students with dyscalculia who were normal in reading and writing, Ramaa (1991) found that they had deficiencies in visual and auditory sequential memory, having more severe problems in the latter than the former. Though the number of tests carried out with this objective is relatively small, the findings are in agreement with those carried out in other countries.

ASSESSMENT OF COGNITIVE DEVELOPMENT STATUS AMONG LD CHILDREN

Nishi Mary (1988) assessed several Piagetian cognitive development tasks among 20 LD children aged 5.5–9.6 years. The Mysore Cognitive Development Status Test (Padmini and Nayar, unpublished) was administered for this purpose. Findings showed considerable individual differences among

the LD in their performance on the different sub-tests. Easiest for the LD as a group was the task of number conservation. The percentage of LD children who attained conservation decreased along liquid, area, length and mass conservation.

Ramaa (1991) studied the logico-mathematical structure of dyscalculics in second to fourth grades. Logico-mathematical structure includes seriation (seriating objects in terms of length, area and volume), conservation and classification. The Mysore Cognitive Development Status Test based on the Piagetian Cognitive Test (Padmini and Nayar, unpublished) and classification test constructed by the investigator were used for this purpose. It was noticed that the majority of the dyscalculics had difficulty in conservation tasks, whereas some of them had difficulty in both seriation and classification.

Both the studies indicate delay in the attainment of the concrete operational state of cognitive development. This suggests that a deliberate attempt has to be made to promote cognitive development among LD children. Remedial instruction should take into consideration the strengths and weaknesses of LD children in cognitive development.

STUDIES RELATED TO LANGUAGE DISABILITIES

Indu (1996) studied spatial (in front, in the corner, in the middle, etc.), temporal (before, after, first, last, etc.), quantitative (more, less, farther, etc.), and other language concepts in English among 47 LD children studying in Grades III–V in English-medium schools. She administered Boehm's (1971) Test of Basic Concepts for this purpose. She restandardized this test on an Indian school population before using it. Many of the LD children had not attained these concepts by Grade V. The order of increasing difficulty was—spatial, temporal, quantitative and other miscellaneous concepts such as 'alike' and 'skip'.

Abdunnasar (1997) studied language disabilities in the Malayalam language and Srimani (1998) in the Kannada language. Abdunnasar was interested in finding out whether there was any significant difference between normally achieving children, children with mild language disabilities (CMLD) and children with severe language disabilities (CSLD) on the total Malayalam Language Test (Rukmini, 1994) and its sub-components—namely syntax (receptive), syntax (expressive), semantics (receptive) and semantics (expressive). The sample included 13 CMLD, 18 CSLD and 34 normally achieving children studying in Malayalam-medium schools in the state of Kerala. He observed significant differences among the three groups in different sub-components of syntax (receptive and expressive) and semantics (receptive and expressive).

Srimani (1998) studied 68 children in Grades III and IV with language disabilities in the Kannada language. A set of five tests assessing different components of language, namely auditory reception, receptive vocabulary, phonology, syntax (receptive and expressive), semantics (receptive and expressive), auditory comprehension and verbal expression, were administered individually to all of them. The tests used were in the Kannada

language. The findings revealed that children with language disabilities had difficulty in all these areas in varying degrees. The least difficulty was exhibited in phonology, followed by semantics and auditory reception. The most difficult components were syntactic skills and verbal expression. The investigator has made a detailed qualitative analysis of various sub-components in semantic and syntactic aspects of language. One of the general observations was that, in most sub-components of language, the development of children with language disabilities continues up to a certain minimum level on a par with that of younger normally achieving children but that beyond that there may not be any progress. In these children there seems to be no effect of schooling, maturation or incidental learning. Systematic remedial attempts are, therefore, necessary for them in order to improve their language skills. Monika (1996) with the help of the *Linguistic Profile Test* in Hindi (Karanth and Rangamani, 1986) studied the language performance of 30 dyslexic children within the age range of 7–13 years. In her study, it was noticed that the language performance of dyslexic children was very poor.

The above studies identify the specific difficulties of LD children in different languages. These difficulties were found to have much in common. The findings are useful for the teachers in providing regular instruction or remedial instruction while they are teaching language to LD children.

STUDIES RELATED TO ACADEMIC DIFFICULTIES AND ERRORS

Ramaa (1985) in Kannada and Bindu (1996) in Malayalam analysed the reading errors of 14 and eight dyslexic children, respectively. For this purpose, they used a word recognition test in the respective languages. They observed similar types of error in both languages. The major types of error were word substitution, letter substitution, 'Kagunitha' (different consonant and vowel combinations), blending errors and reversal errors. They attempted to identify sub-categories of errors within each major category and to identify probable reasons for these errors. They also found that the errors of dyslexics did not differ qualitatively from those of non-dyslexic poor readers or those of normal readers; the main difference was in frequency and persistence.

Prema (1997) studied 150 reading disabled children with the objectives of developing a profile for acquisition of reading and writing, delineating the specifics of reading with respect to the orthographic features of Kannada, identifying predictors of reading ability and identifying reading disabled children. She administered a *Linguistic Profile Test* comprising items for phonology, syntax and semantics, a metaphonological test with words and non-words, a reading and writing test with hierarchically graded items, and a reading comprehension test with passages and stories. On the basis of her study, she claimed that research on alphabetic scripts is not wholly applicable to non-alphabetic scripts such as Kannada; reading tests and remedial reading procedures should, therefore, be developed which keep in view the nature of the script. She also stressed the importance of metalinguistic skills, knowledge of orthographic principles and reading comprehension skills, all of which need to be trained intensively in the early school years.

Prakash and Sunita (1998) compared 16 dyslexics and 21 normal readers in the Kannada language on various tasks such as rhyme recognition, phoneme oddity detection, phoneme deletion, syllable deletion, syllable reversal, a serial (sequential) recall test, identification of body parts, repeating polysyllabic words, a visual retention test and a test of knowledge of orthographic principles. Sixteen reading disabled children of Grade IV were compared with 16 normal readers of Grade IV and five matched normal readers of Grade II. They found that the dyslexics performed worse on most of the tasks than did either of the other two groups.

Writing

Bindu (1996) analysed the writing errors of eight dyslexics in the Malayalam language. She observed the following types of error: word substitution errors, difficulty in recalling the shape of the letters, spelling mistakes, difficulties in handwriting, omission of words or parts of a word, and reversal errors. She identified sub-types of errors under each category. Prema (on-going research) attempted to identify specific difficulties in writing English among 68 LD children in Grades IV–VI in English medium schools (they were from Kannada-speaking homes), comparing them with 84 normal readers from the same background. Using standardised tests, she analysed the errors/difficulties in handwriting, spelling, grammar and ideation in the context of writing of free and structured composition using descriptive language. The errors made by both LD and normally achieving children were compared. Except in a few cases, no qualitative differences were noticed between the groups; the percentage of children committing each type of error was far more among LD children than among the normally achieving children.

Arithmetic

Ramaa (1991) and Gowramma (1998) analysed various types of arithmetic error among 15 and 78 dyscalculic children, respectively, in primary schools. They administered an *Arithmetic Diagnostic Test* (Ramaa, 1991, 1994) in the Kannada language for this purpose. Both identified similar types of errors relating to number concepts, fundamental arithmetical operations and arithmetical reasoning. Some of the types of errors included rotation of numerals, reversals of digits, reading digits (or writing orally presented numbers) in the wrong order, lack of knowledge of 'carrying', subtracting a lower number from a higher one irrespective of place value, multiplication of numbers in a wrong sequence, writing the product in the wrong place, multiplying in between dividing, miscellaneous errors (that is, errors which cannot be fitted into any of the commonly accepted categories), difficulty in solving problems involving numerical relations, and difficulty with spatial relations and verbal relations in different combinations.

Ramaa and Gowramma (1999) analysed the performance of three High School students with learning disabilities on the *Arithmetic Diagnostic Test* designed for Primary School children (Ramaa, 1994). The children were undergoing an intensive remedial education programme at a special centre

in Mysore. The high school students with LD committed errors similar to those of primary school children with LD. Since these children had not been identified earlier or helped through remedial instruction they had difficulty in arithmetical tasks intended for primary school children. This indicates that the gap between normally achieving children and LD children increases through grades unless remedial help is provided in the lower grades. Both the studies help in the understanding of the specific difficulties of dyscalculic children in arithmetic and are useful for purposes of remedial instruction.

STUDIES RELATED TO CAUSATIVE AND CORRELATIONAL FACTORS IN LEARNING DISABILITIES

Ramaa, Ashok and Balachandra (1997) and Ramaa and Gowramma (1999) also studied some of the behavioural correlates of children with learning disabilities, particularly related to attention deficit disorders (ADD) and attention deficit hyperactivity disorder (ADHD). Their studies revealed fewer than 1% of such problems among children with LD. Poornima (1995) studied the self-perception and family learning environment in children who were weak at scholastic skills. The study included 20 children with specific developmental disorders of scholastic skills (SDDSS) selected from a clinical setting and 20 age and sex matched children without SDDSS taken from schools. Both groups were compared on self-esteem, self-perception and family learning environment. The SDDSS group were found to have significantly lower general, social, parental and academic self-esteem. The child's perception of his/her LD was positively correlated with general, social, academic and total self-esteem but not with parental self-esteem.

Sudipta *et al.* (1995) studied anxiety and self-esteem in 20 children aged 8–13 years with SDDSS and an equal number without SDDSS. The children with SDDSS were selected from a clinic set-up and the other children from normal schools. Findings showed that SDDSS children had higher levels of state anxiety (though not necessarily of trait anxiety) and lower self-esteem. The investigators stressed the need for management of high anxiety and low self-esteem in LD children.

STUDIES RELATED TO REMEDIATION OF DIFFERENT TYPES OF LEARNING DISABILITIES

There have also been experiments aimed at improving academic skills among students with learning disabilities. Srimani (1998) attempted to improve auditory reception, receptive vocabulary, various components of semantics and syntax, aural comprehension and verbal expression among 11 children of Grades III and IV with language disabilities in the Kannada language. The remedial programme was based on these children's specific areas of strengths and weaknesses in the components of language mentioned above (which were assessed through use of standardized tools), the distinctive features of the Kannada language and some well established principles

of language development programmes. Some of these principles included: individualization of the approaches and materials (from simple to complex, concrete to abstract), normal developmental patterns and sequences, a multi-sensory approach, a variety of instructional methods such as imitation, modelling, elicitation, stimulation, etc. which are all aspects of language function. There was sufficient scope for the remediation of the auditory-vocal channels, memorizing, concept attainment, transfer of learning, improving creativity and imagination in thinking, use of situational happenings and flexibility, etc.

The approach used for teaching language was an eclectic one involving most of the tested and recommended techniques currently in use. Every concept was introduced using two or more types of exercise activity. Each exercise contained at least 15–20 similarly structured items to provide the child with sufficient drill. They were given both in individual settings and as small group activities. The activities were so planned that they could be undertaken by the children in the regular classroom setting without taxing the teachers in terms of time, energy or expenditure.

This aspect of the programme is essential in developing countries including India. The programme was validated through an experiment with a single group pre-test post-test method. The sample was made as representative as possible in terms of the different types of deficits exhibited in different components and sub-components of language. Teaching was spread over 20 weeks, with five sessions of 1 h in each week. Thus, in all, there were about 100 training sessions. The analysis of the data was done both quantitatively and qualitatively. The programme was found to be very effective in improving almost all the language components and sub-components in all the children in the experiment.

Reading Disability

Ramaa (1985) developed a remedial instruction programme in Kannada for dyslexic children in primary schools for improving their reading skills. The main objective was to improve the children's knowledge of grapheme-phoneme correspondence and their word analysis and word synthesis skills. The programme was based on important principles of teaching reading to dyslexic children such as over-learning, variety in experiences, a multisensory approach, continuous evaluation and feedback, etc. The neuropsychological strengths and weaknesses of the dyslexic children, the types of errors made during the recognition of Kannada words and the salient features of Kannada script were kept in mind during the planning of the remedial programme. Each lesson except the first introduced only one new letter; the first lesson introduced two letters. The lessons included many words that could be formed by using the letters already introduced and the letter introduced in a particular lesson. Thus, considerable scope was provided for evaluation, revision and overlearning. In order to validate the effectiveness of the remedial programme, an experiment was conducted with six dyslexics with a single case pre-test, post-test design. The programme was administered individually to the children in 16–20 sessions of 30 min duration. All of them improved in their accuracy of word recognition skills after the

experimental treatment. However, there was not much improvement in their speed of word recognition—a problem which clearly needs to be addressed.

Rozario, Kapur and Shivaji Rao (1994) have reported on a study which aimed at improving reading skills in English in 25 children with reading disabilities in Karnataka. The remedial programme involved a task-oriented approach. The target set for remediation was that of improving basic sight words and phonic skills. The treatment, which was given over 25 sessions, was found to be effective in improving the reading skills of dyslexic children.

Umadevi (1996) attempted to improve the reading comprehension skills in English of 25 Kannada-speaking dyslexics. The programme which she developed included a number of activities aimed at teaching the sub-skills of word recognition and reading comprehension. The post-test performance of the subjects was significantly better than their performance in the pre-test.

Akila (1997) employed a neuropsychological remedial approach for improving the performance of reading disabled children. The tasks aimed at improving attention, phonemic processing, working memory and semantic processing. The study involved a pre-test post-test control group design. There were four children in the experimental group and four children in the control group. They were studying in Grades VII–IX. The experimental treatment was administered for 30 sessions of 30–60 min each. The subjects of the experimental group were given such tasks as ideation fluency, rhyming, digit span, digit symbol substitution, naming, phonetic recognition and continuous performance tasks. The programme was effective in improving the accuracy of reading but not the rate of reading. There was significant improvement in neuropsychological tasks as well.

Writing Disability

Prema (on-going research) attempted to improve the writing skills of 13 children with writing disabilities in English. They were studying in Grades IV–VI in elementary schools in Mysore City in Karnataka State. The remedial programme involved a phonic-based cumulative structured method for teaching spelling along with the language experience approach in developing vocabulary and written expression. For teaching handwriting, O'Nealian script was used. There was a significant improvement in handwriting, vocabulary, grammar and composition.

Arithmetic Disability

Geetha (1997) adopted a new approach for helping dyscalculics. She devised a training package for teachers which aimed at developing specific teaching competencies in those who taught children with dyscalculia. The purpose was to adapt certain specific strategies used in regular classroom teaching. The new strategies improved the children's performance

In the study by Gowamma (1998), mentioned above, an attempt was made to develop a remedial instruction programme for dyscalculics among primary school children in Grades III and V from Kannada-speaking families who were studying in Kannada middle schools. This programme was

developed so as to take account of the strengths and weaknesses of children with problems over the concept of number and over addition, subtraction, multiplication and division. It also took account of the type of errors committed by the children in the study. While planning the programme, the investigator kept in mind the theoretical framework of the development of mathematical concepts (Piagetian theory, constructive theory, developmental transition theory, informal and formal developmental theory), and the sequence of acquisition of quantitative skills in children. Some of the important principles incorporated in the remedial programme were development of readiness skills and meaningful counting skills, visualization of the tasks, different representations of the same task, teaching basic number facts, and establishing links with previous knowledge and independent learning. This provided broad scope for improving specific skills such as visual perception, awareness of spatial relations, visual discrimination, visual closure, object recognition and the ability to generalize. There was guided learning, a multisensory attack, provision of immediate feedback, and giving the children a sense of success. The programme also took into consideration the minimum levels of learning specified by the National Council of Educational Research and Training in Mathematics. Some of the teaching strategies used by the investigator during remedial instruction were: proceeding from concrete to semi-concrete to abstract levels, a drill method using different modes of presentation, activity-based learning, individualized instruction, simplification of language, self-instruction strategy, etc. A series of lessons was prepared covering different facts to be earned and different skills to be developed. An experiment was carried out with eight dyscalculic children who were free from reading and writing problems. A single group pre-test post-test method was used to test the effectiveness of the remedial programme. The experimental treatment was given over 150 training hours spread over 32 weeks, each session lasting for a period of 50–60 min. The pre-test and post-test data were compared through quantitative and qualitative analysis. It was found that the level of performance improved in 100% of the subjects. Almost all the expected facts and skills were acquired by them after the remedial instruction and this confirmed its effectiveness.

The investigators developed the remedial programmes in a very systematic way. Similar types of programme are required to be developed in other languages.

SUGGESTIONS FOR FURTHER STUDY

Though researchers have been actively studying learning disabilities in India over the past 20 years, there is much still to be done. Suggestions for further investigation include the following:

1. Similar studies need to be carried out in different Indian languages and assessment instruments need to be developed in all of them.
2. Studies relating to different co-morbid disorders and causative factors in the field of learning disabilities need to be conducted.
3. There is a need to carry out studies relating to diagnosis of specific difficulties in subject areas such as science, social studies, etc. among

students with learning disabilities. There is also a need for documentation on how to improve performance in these areas.

4. Studies relating to deficiencies in study habits, metacognitive skills and metamemory skills need to be conducted along with specific strategies for improving these skills.
5. Studies which were conducted in primary schools need to be extended to middle, secondary, senior secondary and college levels.
6. There is a need for studies to be conducted on adults and talents among learning disabled individuals.

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