Chapter 7
Learning Disability: Issues and Concerns with Implications for Social Policy

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1 Introduction

Dynamic interaction between brain and environment shapes behaviour including sensory and motor skills, language, memory, and executive function. Learning language is an early "test" of our brain's learning system. It requires core learning/thinking skills that we will use throughout our lives. It develops the main learning tool that students need—oral language. Conditions in the brain are dynamic. They change and "rewire" at any age. Research in the field of cognitive neuroscience has shown that brain's ability to change, or be trained, is known as brain plasticity. The brain can change and learn at any age, and certain conditions encourage learning. Neural circuits are continuously refined through experience and learning.

This chapter will focus on the issues related to definition, identification, diagnostic procedures, intervention and research on learning disabilities and the information that such issues bring about for policy making. All children learn in highly individual ways. Despite having average or above-average intelligence, some children perform poorly in academics. Such children are generally described as, slow learners, dyslexics, learning disabled, etc. Children with learning disabilities simply process information differently, but they are generally of normal or above-average intelligence. Having a learning disability (LD) can affect a child's ability to read, write, speak, do math, and build social relationships (CCLD 2003).

LD has become an increasing personal and public concern. Among the spectrum of issues of concern in learning disabilities, the inability to read and comprehend is a major obstacle to learning and may have long-term educational, social, and economic implications. Family concern for the welfare of children with dyslexia and learning disabilities has led to a proliferation of diagnostic and remedial treatment

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procedures, many of which are controversial or without clear scientific evidence of efficacy (American Academy of Pediatrics 1998). Learning disabilities are a chronic condition of neurological origin and are associated with problems in processing information, organizing information, and applying information.

Defining LD in operational terms has been difficult. The early definitions emphasized the medical framework in terms of minimal brain damage, gradually shifting to the educational framework, focusing on visuomotor processing and discrepancy between scholastic ability and IQ (John et al. 2002). Debates about definition and identification of LD arise from a range of factors causing it, which could range from biological factors, that is, soft neurological signs, lack of asymmetry in temporal and frontal lobes to environmental factors, that is, poverty and illiteracy, lack of access to preschool instruction, medium of instruction, and overcrowded classes, particularly relevant in the Indian context.

Kirk coined the term "LD" (Kirk 1963), and it was under his leadership the National Advisory Committee on Handicapped Children submitted the first definition. Since then, a number of definitions have been produced, but none of them was totally acceptable. The Diagnostic and Statistical Manual of Mental Disorders (DSM) IV (1994) defines LD as follows: "Learning disorders are diagnosed when the individual's achievement on individually administered, standardized tests in reading, mathematics or written expression is substantially below that expected for age, schooling and level of intelligence. The learning problems significantly interfere with academic achievement or activities of daily living". In other words, LD is a general term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, or mathematical abilities. Problems in self-regulatory behaviour, social perceptions, and social interactions may exist with learning disabilities but do not by themselves constitute a LD (Wong 1996).

In India, LD has attracted widespread attention only during the last decade or so (Karanth 2003a). There has been an increase in the identification of individual children with LD and a consequent demand for services. So far, this process is largely confined to children enrolled in urban schools with English as the medium of instruction. However, the identification of large numbers of children with learning disabilities even in rural areas in ongoing epidemiological studies in states such as Kerala lends support to the larger viewpoint of LD as widely prevalent, lifespan disorder contributed to by more than difficulties in sound to script matching.

2 Epidemiological Data on Learning Disability

The worldwide incidence of learning disabilities (dyslexia, dysgraphia, and dyscalculia) is about 5–17 % of the school-going population. In India, the population of children between 0 and 14 years is nearly 350 million, implying 35 million children with LD, based on a calculation of 10 % incidence. Learning disabilities are often not easily recognized, accepted, or considered serious

once detected. Learning disabilities affect one in seven people according to the National Institute of Health. Epidemiological studies of learning disabilities in India are fraught with difficulties ranging from the very definition of learning disabilities, identification, and assessment to sociocultural factors unique to India. In India, learning difficulties are compounded by factors like parental illiteracy and lack of exposure to literacy-related skills in the home environment (Suresh & Sebastian 2003). Learning disabilities are common in India as well but with a different context. Specific LD is observed in 7–8 % of the general population in the age range of 0 to 18 years (Suresh & Sebastian 2003).

The most common LD is difficulty with language and reading. A recent National Institute of Health study showed that 67 % of young students identified as being at risk for reading difficulties were able to achieve average or above-average reading ability when they received help early (CCLD 2003). Being aware of the warning signs and getting children the earliest possible help will increase the chance of meeting this goal and will greatly improve the chances of those with learning disabilities for greater academic achievement and self-esteem.

Although learning disabilities may occur concomitantly with other handicapping conditions (for example, sensory impairment, mental retardation, serious emotional disturbance), they are not the results of those conditions or influences [National Joint Committee on Learning Disabilities (NJCLD) Memorandum 1994]. About 5 % of the school-aged population has been classified as having some form of LD; approximately 28–64 % of the students receiving a special education in recent years were identified as learning disabled (Ysseldyke & Algozzine 1990). Many children with LD may also have attention deficit hyperactive disorder (ADHD).

In the context of the complexities associated with the definition and identification of LD, there is some evidence with respect to the characteristics of LD that aids in further understanding the nature of LD and the basis for identification of children with LD.

2.1 Characteristics of Learning Disabilities

The characteristics of learning disabilities show up as follows (John et al. 2002): academic problems exist in the area of reading, writing, spelling, and mathematics; perceptual disorder problems include inability to recognize, discriminate, and interpret sensation. It can be the area of auditory channel or/and visual channel; meta-cognitive abilities involve the ability to use self-regulatory mechanisms such as planning moves, evaluating effectiveness of ongoing activities, checking the outcome, and remediating the errors; memory problems. Learning-disabled students fail to use strategies that non-learning-disabled students readily use. In addition, learning-disabled students may have difficulty because of their poor language skills. Some exhibit fine motor difficulties, such as in cutting with scissors, short attention span, distractibility, and impulsivity. Prevalence rate of psychological disturbance is high among learning-disabled children compared with normal population. A continuous failure in academics also results in poor self-concept and self-esteem.

In the 1960s, a shift in terminology occurred with the introduction of the term "minimal brain dysfunction (MBD)". The term brought in the concept of minor brain injury and linked it with learning problems. MBD was popularized by Clements, the project director of Task Force 1 (ibid.). The following ten markers of MBD were identified: hyperactivity, perceptual motor impairments, emotional disorders, general orientation deficits, disorders of attention and impulsivity, disorders of memory and thinking, disorders of speech and hearing and soft neurological signs.

3 Learning Disability in the Early Years

The study of learning disabilities from a developmental perspective holds promise for new insights and improved practices. Recognition of the importance of early identification and intervention with young learning-disabled children has resulted in the implementation of numerous screening, diagnostic and intervention programmes and the publications of a plethora of early identification tests and procedures (Mastropieri 1988). Applying a development framework to LD raises some interesting but troublesome questions. How much teachers are aware of LD? What is the diagnostic significance of particular behavioural signs or "symptoms" in the early years? Whether teachers have knowledge or understanding of these signs or they are sensitive to these symptoms. Whether teachers in overcrowded classrooms have the time for individual attention. How valid are early indicators for predicting subsequent problems? In India, very few epidemiological studies have been reported and very few have addressed this issue so far. Our study with 102 primary school teachers in Allahabad city in northern India highlighted the need for educating the teachers about the different aspects of learning disorders in children and how it is different from other conditions such as attention deficit, conduct problems, scholastic backwardness, and mental retardation. Most often, teachers look at it as a manifestation of low IQ or behavioural disturbance (Tripathi & Kar 2008).

4 Teachers' Perception of Classroom Behaviour of Children with LD

By and large, the results of classroom observation studies indicate that compared with normal-achieving classmates, learning-disabled children are more likely to be off-task (Feagans & McKinney 1981; McKinney & Speece 1983). McKinney and Feagans (1984) classified students into subtypes on the basis of teacher ratings, measures of intelligence, and achievement on the basis of teachers' rating of first- and second-grade students:

1. Behaviour deficits independently and in task orientation, but socially well adjusted, with average verbal skills and mildly deficient in achievement;

2. Deficits in behaviour, uneven cognitive abilities, and severely deficient in achievement;
3. Deficits in task orientation, high on extroversion and hostility, and average cognitive ability but mildly deficient in achievement;
4. No behavioural problems and deficient only in academic achievement. These findings suggest that the scholastic problems are many and complex.

In one of our studies on teacher's perception of children (studying in grades 2–8 in an English medium school) with learning-related problems on Indian population, we found that a high prevalence of language-related problems particularly in expression and grammar was perceived across all classes. Writing-related problems were perceived as most prevalent across all classes. Problems related to reading were observed to be higher in lower classes and gradually decreased across the higher classes. Problems related to mathematics and behaviour showed a decreasing trend across classes II–VIII. Identification of children with learning-related problems by teachers appeared to be based on poor achievement and behavioural problems (Tripathi & Kar 2008).

There could be various manifestations of learning-related problems. A majority of students who receive services for LD have severe writing problems that persist over time (Graham & Harries 1989). Writing-related problems include errors in spelling, punctuation, capitalization, and handwriting. The essential feature of reading disorder is reading achievement (i.e. reading accuracy, speed, or comprehension as measured by individually administered standardized tests) that falls substantially below the expected standard given the individual's chronological age, measured intelligence, and age-appropriate education. Individuals who have LD in reading have difficulties decoding or recognizing words (i.e. letter/sound omission, insertions, substitutions, reversals) or comprehending them (i.e. recalling or discerning basic facts, main ideas, sequence, or themes). They may also display other difficulties such as losing their places while reading or reading in a choppy manner (Torgesen & Wagner 1998). Poor mathematics achievement may be due to a variety of reasons. Difficulties in abstract thinking, language, reading, motivation, and memory can impede the ability to learn mathematical skills and concepts (Hammill & Bartel 1986; Mercer & Mercer 1985; Bley & Thornton 1989).

5 Issues and Concerns Related to Screening and Diagnostic Procedures

The NJCLD believes that inappropriate diagnostic practices and procedures have contributed to misclassification of individuals and questionable incidence rates of learning disabilities. Such practices and procedures result in erroneously including individuals whose learning and behavioural problems are not attributable to learning disabilities and excluding individuals whose deficits are manifestations of specific learning disabilities. The following issues are important to an understanding of current concerns:

- Lack of adherence to a consistent definition of learning disabilities that emphasizes the intrinsic and lifelong nature of the condition.
- Lack of understanding, acceptance, and willingness to accommodate normal variations in learning and behaviour.
- Lack of sufficient competent personnel and appropriate programmes to support the efforts of teachers to accommodate the needs of children who do not have learning disabilities but who require alternative instructional methods.
- Insufficient prepared professionals to diagnose and manage exceptional individuals.
- False belief that underachievement is synonymous with LD.
- Incorrect assumption that quantitative formulas alone can be used to diagnose learning disabilities.
- Failure of multidisciplinary teams to consider and integrate findings related to the presenting problem(s).
- Lack of comprehensive assessment practices, procedures, and instruments necessary to differentiate learning disabilities from other types of learning problems.
- General preference for the label "LD" over "mental retardation" or "emotional disturbance", which leads to the misclassification of some individuals.

Policy makers, educational administrators, regular and special educators, related services personnel, parents, advocates, and others who identify, assess, diagnose, and provide services to people with learning disabilities should keep in mind the following issues:

- Learning disabilities vary in their manifestations and could range from mild to severe.
- Diagnostic procedures are different for different age groups from children to adults.
- Problems associated with LD (do we keep LD or learning disabilities?) may be observed in academic and non-academic settings.
- Differential diagnosis is necessary between and among other disorders, syndromes, and factors that can interfere with the acquisition and the use of listening, speaking, reading, writing, reasoning, or mathematical abilities.
- A comprehensive assessment is needed for diagnosis and for planning an appropriate intervention programme including assessment-related reading, writing, arithmetic, spelling, visuospatial abilities, perceptual motor skills, working memory, attention span, and intelligence. All aspects including sensory, motor, cognitive communication, and behaviour should be assessed. Data from case histories, interviews, direct observations, and assessments should be integrated. Curriculum-based assessment, task and error analysis, diagnostic teaching, and other non-standardized approaches are as follows:

1. Viable sources of additional information.
2. Intervention and services should be based on the individual's present level of performance and functional needs.
3. A multidisciplinary team is necessary for assessing, diagnosing, and determining provision of services. A clear distinction must be made between "diagnosis of LD" and "eligibility for specific services".

6 Intervention for LD and Policy-Related Concerns at School and Professional Level

Learning-disabled individuals can be helped in different ways through inclusive education with customized curricula at school and college level as well as with specific remediation programmes addressing the specific psychological, cognitive, and educational needs of the individual.

6.1 Inclusive Education

The Council for Exceptional Children (CEC), a large, international organization of special educators, parents, and other advocates for the disabled, issued a policy statement on inclusion at their annual convention in 1993. This statement begins with a strong endorsement for a continuum of services to be available to children, youth, and young adults with disabilities. It is only after making the point quite clear that services to the disabled, including various placement options besides the regular classroom, are to be tailored to individual student need that the policy actually addresses inclusion. Lieberman (1992) points out that many advocates (primarily parents) for those with learning disabilities also have significant concerns about the wholesale move towards inclusion. They recognize that students with learning disabilities do not progress academically without individualized attention to their educational needs. These services have evolved primarily through a specialized teacher working with these students individually or in small groups, usually in a resource room setting. Special education professionals and parents alike are concerned that regular education teachers have neither the time nor the expertise to meet their children's needs.

The issue of inclusion is also passionately debated in one other area of exceptionality students who are gifted/talented. It is discussed under the concept of "heterogeneous grouping" rather than "inclusion". However, the issue is still one of the providing appropriate services in an integrated versus a segregated setting. Some advocate, with research support, that gifted students are better served when they are able to work with other gifted students. Others promote the position that gifted students benefit more from being heterogeneously grouped with other students of various levels of ability (Tompkins & Deloney 1994).

Successful individuals with learning disabilities tend to be goal-oriented, determined, persistent, and creative (Reiff et al. 1993). Many students with learning disabilities are aware of their disabilities before matriculation. Once diagnosed, it is the student's responsibility to disclose his/her LD and the extent to which it affects academic access (Lynch & Gussel 1996). Witte et al. (1998) in their study at a major university found that students with learning disabilities were competitive academically with their peers and graduated with grade point averages not significantly below the control group. This study also found that students with learning disabilities on average took only one semester longer to graduate.

It is essential to have written policies that ensure that students with learning disabilities receive the same high-quality education as their peers. These policies should address the issues of admission, documentation of an LD, accommodations, and curriculum modifications. It is important that students be made aware of the existence of an appeal process that is set forth in writing. Students should have easy access to all written policies and procedures including the appeal process. Such documents should be available in a variety of formats, in all appropriate campus literature, and through available technology, which all students can access. Most students with learning disabilities meet the standard admission criteria and will not be readily identifiable during the admission process. However, some students with learning disabilities may appeal the standard entry requirements because of the effects of their disability on their academic performance or test scores. Within the appeal process for admission, available to all students, a mechanism is needed to consider the impact of a student's LD on his/her academic record. The federal laws and subsequent court decisions make it clear that colleges are not expected to make changes in the curriculum that compromise essential components of a programme.

6.2 Remediation Programmes

Intervention programmes in learning disabilities include manual- and computer-based programmes to address the specific learning-related problems such as dyslexia or dysgraphia or dyscalculia. Two kinds of approaches could be followed for intervention: one focusing on the central cognitive processes that underlie learning-related problems, for example, phonological awareness that underlies reading (Snowling & Nation 1997), or simultaneous and successive processing that mediates reading and writing skills (Kar 2012). Remediation in dyslexia aims at inducing normalizing and compensatory effects in brain function and language processing and reading skills. Remediation in dyslexia is mostly based on the use of intact areas of higher cortical functioning in the development of remedial strategies while minimizing the emphasis placed upon dysfunctional cortical areas.

A remedial programme that helps dyslexic children read better also improves activity in the part of the brain linked to the learning disorder, bringing the region closer to that of normal children. It is the method of improving the process or processes in which the child has deficits. Many children with reading disability are deficient in successive processing (for review, see Kar & Shukla 2010). In one of our case studies on the effects of remediation on phonological skills as well as electrophysiological correlates of remediation in dyslexia, we found improvement in phonological skills in terms of better accuracy and reduced reaction times after remediation (Kar 2012) Electroencephalography-/event-related potentials (EEG/ERP) showed reduced amplitudes of the early sensory component N1 (first largest negatively going waveform at 100 ms) and increased amplitudes of P3 component (positively going waveform at about 300 ms) on the temporal order judgement paradigm after remediation. These findings suggested that early

stages of sensory processing may require lesser recruitment of neuronal resources, whereas the late-stage processing involving decisions about temporal sequence of sounds or discrimination may require auditory attention and hence show an increase in amplitudes after remediation. We also found improvement in simultaneous and successive processing as core processes underlying reading skills. A recent neuroimaging study on reading taking Indian languages such as Hindi has shown different neural circuits mediating reading a complex orthography like Devanagari. This study has found greater involvement of the dorsal route mediating the visuospatial processes (Kumar et al. 2009), as the Devanagari script poses greater demands on visuospatial analysis. These findings indicate that reading acquisition in different orthographies may depend on certain central cognitive processes and also require different strategies and have implications for the development of remediation programmes specific to the Indian context.

7 Learning Disabilities in Indian Context

Three significant changes can be identified in the area of LD in India in the recent past. First, the definition of LD has shifted from the traditional approach, arrived at through a negation of all possible identifiable biological and environmental factors that might contribute to the learning difficulties of a typically developing child, to a newer dimensional approach of individual differences. Second, LD is no longer seen as an early childhood disorder but as a disorder that changes but persists over the lifespan. Thirdly, there is a recognition that the communication deficits seen in children with LD are not restricted to those related to reading and writing alone, but also encompass the more basic communicative/linguistic functions of speaking and listening too (Karanth 2003a, 2008; Thapa 2008). There is in particular a focus on phonological awareness and phonological processing difficulties leading to theories of LD as a linguistic/metalinguistic problem stemming from empirical evidence of phonological processing difficulty in children with LD, stimulating language-based research and theories of LD (Karanth 2012).

Given the neglect that LD has faced in India compounded by the complexity of the definition and identification procedure, we do not as yet have clear-cut figures for the incidence and prevalence of language learning and learning disorders in India. However, an extrapolation of available statistics from the western world would suggest a prevalence figure of over 18 million of school-aged children [source: Learning Disabilities National Institute of Mental Health (NIMH), USA: National Health Interview Survey (NHIS) 1999, National Centre for Health Statistics (NCHS), Centre for Disease Control and Prevention (CDC)]. It is imperative that we recognize the magnitude of this problem which is found in both sexes and affects children of all socioeconomic classes, creed, race, or religion. It is about time that their needs be taken into account in framing our education policies and implementation. In the recent past, a lot of work on literacy, language learning, and LD in various Indian languages such as Hindi, Kannada, Bengali, Odia

has been initiated to address the specific needs while learning letters and read-ing/writing in Indian orthographies (Agarwal & Kar 2007; Gupta & Jamal 2007; Karanth 2003b; Kar & Tripathi 2008; Nag & Snowling 2010; Pal & Kar 2011; Tripathi & Kar 2008, 2009).

Issues and concerns related to LD in Indian multilingual context have been put forth in a very comprehensive manner by Karanth (2012) as follows:

> Our multilingual context gives rise to many challenges in the identification and manage-ment of children with learning disabilities. For instance, at times it could be difficult for the teacher to tell whether a given child has a LD or whether his difficulties are because of the bi/multilingual background and lack of proficiency in the medium of instruction. Our solutions, limited as they have been, have also been trigger happy, instant recipes and short sighted in nature. For instance, the one achievement that is claimed by LD activists in India is the exemption for the child with LD, from having to learn more than one lan-guage at school that is now granted by some state governments in India. While this may provide some immediate relief to the overburdened LD child at school, the other related aspects such as the choice of the medium of instruction, in terms of its appropriateness for the specific nature of the child's learning difficulties, the environmental supports avail-able for the same, and its eventual impact on the child's overall well being are seldom considered.

Tests for identification of children with LD have been developed in different languages such as Hindi and English (Gupta 2004; Pal & Kar 2011), Kannada (Prakash & Rekha 1992; Nag & Snowling 2010).

8 Issues Related to Biliteracy and Diagnostic Procedures for Children with Reading Disability

Reading involves visual and semantic decoding, temporal processing, phonologi-cal processing, orthographic, syntactic, and contextual analysis, and comprehen-sion. An inefficient synchrony of these underlying mechanisms results in reading disability (Lachmann 2002). Dyslexia is the most common of the learning disor-ders that interferes with a child's ability to acquire speech reading despite average intellectual functions (Karanth 2003a). Manifestation of dyslexia in bilingual popu-lation is not very clear even in western literature with respect to the incidence as well as explanations for the same. Children with reading difficulty in one language could also have difficulties with another language. There have been rare instances of differential dyslexia where one of the two languages is affected (Veii 2005; Wydell and Butterworth 1999). However, the interaction between first language (L1) and second language (L2) during the process of reading acquisition is deter-mined by factors such as orthography, phonological systems, phonemic, or syllabic sensitivity. (Nag 2007).

Transparent orthographies may demand different strategies when, as in Hindi, the basic unit is a syllable and not a phoneme (Gupta 2004). However, if both languages are acquired simultaneously, the possibility of cross-linguistic interac-tion in terms of psycholinguistic aspects of the two languages cannot be ruled out.

The process of acquisition of literacy skills becomes complicated when there is a need to acquire languages following different writing systems, particularly when one is an alphasyllabary like Hindi with shallow orthography and the other is an alphabetic script with deep orthography as in English.

Nag and Snowling (2013) have raised issues related to the different needs of learning of sounds, symbols, and cross-modal mapping in the context of diversity across scripts as follows:

> … there are both language-specific and language-universal cognitive demands of learning to read, and that, different scripts pose differing challenges to the learner. Two key issues which remain under-studied are, how do children acquire knowledge of the symbols of the language and what places constraints on this process? More generally, models of reading and its development need to take account of the diversity across writing systems if they are to inform not only theory but also practice in the field of reading and its disorders.…

Bi/tri/multilingualism is a sociocultural condition and cannot be ignored in India. There are many languages which are spoken, written, and read in India, but all the four different orthographic families of modern India—Indo-Aryan, Dravidian, Astro-Asiatic (Munda, Santali), and Tibeto-Burman—have a common source in Brahmi and therefore share the same salient features. An Indian child's first language could be one of the Indo-Aryan languages like Hindi, Marathi, Gujarati or Punjabi, or Dravidian languages like Kannada, Tamil, Telugu, Malayalam, which form the two major groups (Indo-Aryan and Dravidian languages), and the second language is mostly English. English being the second language is acquired once the child starts school at 4 years of age when he or she has already acquired considerable skill in their first language. Cross-linguistic studies suggest that reading skill develops at a different pace in different orthographies (Karanth 2003b).

The nature of orthography, its transparency, and form of representation could influence the pattern of reading development. English follows an alphabetic script and depends heavily on grapheme–phoneme correspondence, whereas languages with transparent orthographies like Italian, Spanish, German, and Indian languages are considered as alphasyllabaries (Gupta 2004). It has been demonstrated that grapheme–phoneme recoding skills take longer to develop in less transparent orthographies as compared to more transparent orthographies like Spanish and Finnish (Seymour et al. 2003). Phonological awareness is crucial for reading alphabetic scripts. It is neither crucial nor necessary for successful reading acquisition in transparent writing systems. In a study on Indian population with monoliterates, non-literates, and biliterates (Hindi and English or Kannada and English) on tasks like rhyme recognition, syllable deletion, and phoneme deletion, it was observed that only biliterates performed well on phoneme awareness tasks, and others performed well on syllable deletion and rhyme recognition tasks (Karanth 1998; Prakash & Rekha 1992). There are several studies on biliterates with respect to English and more regular scripts like German, Spanish, or English and non-alphabetic scripts like Chinese/Japanese. However, research on reading difficulties with respect to English and semi/alphasyllabic scripts such as Indic scripts has gained attention recently.

Alphasyllabic scripts inform about the interaction between the structural properties of alphabetic scripts and those associated with syllabic scripts. Reading acquisition in biliterates with an alphabetic and an alphasyllabic script may pose unique demands for the acquisition of phonological skills and visual–phonetic decoding and their relative involvement in two different orthographies. Alphasyllabaries involve different reading strategies with respect to lexical (English) versus sublexical (Hindi) strategies (Gupta & Jamal 2007). Such issues related to biliteracy raise important concerns about the development of diagnostic procedures which are comparable across languages. In our studies on such issues, we have found that word and non-word reading accuracy is the best possible comparable procedure for reading assessment if one has to know whether reading difficulty exists in all the languages known by the individual with a possible diagnosis of reading disability. Nag and Snowling (2010) examined differences between good and poor readers of the Indian orthography, Kannada. Kannada is a relatively transparent alphasyllabary that contains alphabetic elements organized visually and phonologically into alphasyllabic units called *akshara*. They observed differences between good and poor readers of Kannada in the domains of phonological processing, naming speed, and oral language skills as observed by another study on Hindi–English biliterate children with an alphasyllabic and an alphabetic orthography. The main causes of reading difficulty may be similar for alphabetic and alphasyllabic writing systems.

Moreover, much less is known about the mechanisms of reading difficulties among biliterates, particularly when one is an alphabetic script and another is an alphasyllabary. Alphasyllabaries like Hindi are known to depend less on phonological awareness (Padakannaya et al. 2002) Transfer of phonological representations based on learning of an alphabetic script like English to develop internal representations of sounds in Hindi could pose unique demands. Visual decoding is more demanding in Hindi due to the spatial linear and nonlinear placements of "mantras", whereas phonological decoding is more demanding in English. It is difficult to build up internal representations of sounds in Hindi despite being primarily a shallow orthography. Such difficulties would be more detrimental in children with reading difficulties who have a weak phonological system. It is possible that if a child is not exposed to two different writing systems from the time the child starts formal schooling, it may inform about script-dependent effects on reading acquisition. Future studies are needed to look at normative reading development and nature of difficulties in slow progressing readers comparing children exposed to simultaneous versus sequential reading instruction in their first L1 and L2. Children with reading difficulties may experience difficulties in both L1 and L2 irrespective of the nature of orthography. It is interesting to note that even though the writing systems for Hindi versus English are different, the central processes seem to be more critical for reading acquisition in both the languages. On a speculative level, this could be due to the simultaneous acquisition of literacy skills in both L1 and L2 though the familiarity with phonological aspects is better with Hindi being the first language, which the child learns to speak and understand. A comparison with sequential biliterates will address this issue. As a policy, a sequential rather than simultaneous instruction for two different writing systems could prove to be a better strategy for the development of reading skills.

9 Research on Educational Neuroscience and Its Implications for Policy Making

In recent years, a new scientific field called educational neuroscience that brings together researchers in developmental cognitive neuroscience, educational psychology, educational technology, education theory, and other related disciplines has emerged to link findings from cognitive and biological research to education. Researchers in educational neuroscience investigate the neural mechanisms of reading, writing, numerical cognition, and attention deficit in order to link basic findings in cognitive neuroscience with educational technology. Important aspects of LD that need immediate attention, particularly in the Indian context, are as follows:

1. *Identification and incidence*: This would include development of age-appropriate assessment batteries, which may potentially emerge as early screening batteries that could be used by schools and administered by teachers. This will help identify children struggling at school and generate data on incidence. It will also help create nationwide awareness for conditions that are best corrected at an early stage.
2. *Remediation*: Remediation is the biggest challenge, but cognitive and neuroimaging research suggests that the findings of neuroplasticity show specific changes in the neural circuitry as an effect of remediation. Given that early identification is the key, remediation strategies need to be quickly developed, validated, and adapted so that they can be applied. There are some remediation programmes such as planning attention simultaneous and successive processing (PASS) reading enhancement programme (Das et al. 1995), which has shown beneficial effects of remediation on neural and cognitive processes underlying reading and phonological skills (Kar 2012). However, such remediation programmes need to be implemented on a larger scale. A computer-based training programme called Fast For Word is also based on core processes such as auditory attention, phonological awareness, sound discrimination, memory, and attention involved in reading. Though many such programmes exist, their efficacy needs to be empirically tested on children with different kinds of learning disabilities. A double-blind approach is required for evaluation.
3. *Education*: Most children with learning disabilities have skills/talents such as art, music, technical drawing, visuospatial abilities which could be enhanced if integrated in their curriculum. Strategies for teacher education programmes could be used to advise teachers and parents on inculcating and emphasizing skills in early education. This is an important component to include in curricula for teacher training programmes. In addition, our research on reading and reading disability, in particular, suggests the following:

- Sequential and not simultaneous introduction to literacy skills in two different writing systems.
- Oral proficiency in a language should precede literacy skills.

- Development of measures for screening and identification of LD, grounded in theory and applicable to Indian languages and context, to be used at school level as well as professional level. Training in core processes such as phonological skills and visuospatial analysis would be needed to develop script-specific strategies for children with reading disability.

10 Conclusion

This chapter has focused on relevant issues and concerns related to learning disabilities with implications for social policies regarding the definition, diagnosis, remediation, and education of learning-disabled children and adults. The chapter has also highlighted complex issues of concern in the Indian context related to the identification of LD itself and the lack of organized services addressing the educational, cognitive, psychological, and social needs of individuals with LD.

The following steps could be taken in order to influence policy making, particularly in the Indian context:

- Research-based knowledge about learning Indian languages to acquire reading writing skills needs to be disseminated among school professionals.
- Development of short standardized tools for screening children with learning difficulties pertaining to language, reading, writing, calculation, and behaviour is the first step to ensure early and timely identification of learning difficulties. Such screening tools could be used by the schools and administered by the teachers. This will help identify children having problems in learning at school and to understand the child's specific difficulty rather than attributing it to intelligence or attention deficit. It will also help create awareness for conditions that are best corrected at an early stage.
- Sequential and not simultaneous introduction to literacy skills in two different writing systems would be better.
- Oral proficiency in a language should precede literacy skills.
- Most children with learning disabilities have certain skills and strengths, which include art, music, technical drawing, visuospatial abilities, and these abilities could be enhanced and channelized for better learning.
- Regular interactive workshops could be held to encourage teachers and parents to stress such skills in early education, and this could be included as an important component in the curricula for teacher training programmes.

The gap between the service providers such as school professionals, educational psychologists, psychiatrists, special educators on the one hand and researchers in the field of cognitive science of learning, developmental cognitive neuroscience, and educational neuroscience on the other hand needs to be reduced. A coordinated effort of such professionals could certainly bring about a substantial change by influencing the policies that would understand the concerns and benefit the individuals with LD.

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