An Educational Model for Assisting Students

With Non-Verbal Learning Disabilities

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Abstract

The Nonverbal Learning Disability (NLD) is a condition distinctly different from the more commonly known language based learning disability. Scholarly literature regarding educational planning for the NLD student is, as yet, far from exhaustive. Also wanting is information presenting models to address the educational needs of NLD learners. Relying upon evidence from published research and literature, current practices, and the author’s experience in special education, resource, and regular classroom, this thesis will contribute to these areas of concern by: reviewing the scholarly literature regarding NLD; selecting twelve published case studies of individuals diagnosed with NLD and discussing them in relation to the literature review; and constructing an educational model to address the needs of individuals with NLD based on information gleaned in the literature review and the consideration of the case studies.
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Chapter One: The Problem

During the late sixties and early seventies, researchers working with language based learning disabilities began to notice a consistent subgroup within the larger population under their consideration. Johnson and Myklebust (1967) contributed the first written description of this particular occurrence. Unlike the overall group being examined, one comprised of students exhibiting general learning disabilities (at that time thought to be only learning disabilities such as dyslexia, dysgraphia, and other left-hemisphere brain disorders), in which the performance scale of a standardized intelligence test was expected to be significantly higher than that of the verbal scale, the newly recognized group consistently displayed a performance score significantly lower than the verbal score (Rourke, 1989). Empirical investigation was undertaken to ascertain whether a distinct group within the more generalized learning disabled population existed (Rourke & Finlayson, 1978; Rourke & Strang, 1978; Strang & Rourke, 1983). As a result, a distinct syndrome (affecting the right hemisphere of the brain), known as the nonverbal learning disability, was identified. Wright (2008) cites the following researchers as contributing significantly to the current knowledge of the nonverbal learning disability: Casey, J.E., Rourke, B.P., & Picard, E.M., 1991; Fisher, deLuca, and Rourke, 1997; Harnadek and Rourke, 1994; Ozols and Rourke, 1985; Rourke, 1985; Rourke, 1988; Rourke, 1993; Rourke and Fuerst, 1992; Rourke, young, Strang, and Russell, 1986; and Ahmad, Pelletier, and Rourke, 2001.

For some time, the general condition of learning disability has been known, and fairly well understood, by most educators. Owing to the fact that the disorders associated with the left hemisphere of the brain were the first to be described, and also to the fact that the education system may be biased towards the acquisition of literacy and the problems related to it (Cornoldi, Venneri, Marconato, Molin, & Montinari, 2003), it is primarily this group of disorders in the minds of educators when they consider the term “learning disability” (Thompson, 2009). Less recognized by society at large, but specifically by
education professionals regularly confronting them, are the nonverbal learning disabilities thought to originate in a dysfunction in the brain's right hemisphere (Wright, 2008); (Thompson, 2009); (Thompson, 1997).

NLD may be a significant and seriously debilitating disorder, with symptoms varying from mild to severe, and may cause considerable consternation for schools as they attempt to program for NLD individuals. As a result of this difficulty, the possibility exists that the public education system may not currently provide the most effective educational opportunities for all students with NLD (Thompson, 1997). It is the position of this author that there is a need for an educational model to specifically address the unique needs of all students diagnosed with NLD. While some ideas and suggestions for the education and remediation of this group are currently present in the academic literature, models and plans encompassing the wide variety of needs that characterize students displaying this disorder are in limited supply; if in fact they exist at all. Owing to the wide variety of needs often presented by students with NLD, some such students may require individualized educational plans. In an effort to construct a theoretical model designed to address the specific concerns of all students with NLD, a wide range of services, knowledge, expertise, and materials must be considered. While no informed teaching professional would challenge the notion that the education of any child reaches far beyond a “one size fits all” strategy, it is often at the point of constructing a theoretical model to encompass this philosophy that differences may arise.

Because of the unique profile of disabilities in this disorder, students with nonverbal learning disabilities are often at risk of going unnoticed in their early years of school. Because of their generally strong skills in verbal areas, some students with NLD often appear to be far more capable than they may actually be. As well, owing to the nature of this disability, some of its symptoms may mistakenly be confused with emotional or behavioural disorders. As development proceeds, problems associated with this disorder become clearer and more urgent with the onset of adolescence and young adulthood. The
psychological effects of this disability can result in depression, or even suicide (Thompson, 1996). The need for a well-constructed, comprehensive plan and model for the appropriate and successful management of the needs of all students with NLD within the educational system and beyond is an immediate and urgent concern that cannot be underestimated. There is a need for school, and also society, to address the identification and programming needs of individuals diagnosed with NLD from early identification stages throughout life.

Both the scope and the severity of needs presented by individuals with NLD are vast and various. For an educational model to serve such a population, it must respond to these needs with a continuum of widely diverse options. To this end, an educational model for students affected by NLD should provide appropriate learning opportunities for those requiring limited or no interventions as well as those most severely affected by this condition.

While total inclusion of all students within a school setting is a noble goal indeed, and one vehemently supported by this writer, educators must nonetheless be cautioned against viewing the scope and ultimate end of inclusion as limited only to the school classroom. In the case of the some individuals with NLD, research has shown that the tertiary social-emotional effects of this disorder extend well into the adult years and throughout life. During these adult years, particularly through adult social experiences, some of the most damaging effects of this disorder are experienced. With this fact in mind, an educational model for students affected by NLD must be constructed in such a fashion to avoid or ameliorate the effects of such an occurrence, and to work towards the prevention of such tertiary symptoms. When such long-term effects are considered, inclusion into “life”, adulthood as well as childhood, however that may most successfully be accomplished, is an important goal.

For many students the authentic inclusion class is a splendid experience. UNESCO describes inclusive education as being “based on the right of all learners to a quality education that meets basic learning needs and enriches lives, focusing particularly on vulnerable and marginalized groups, it seeks
to develop the full potential of every individual” (www.UNESCO.org). Special needs students have the right to be educated with peers, and can be assisted and supported with individualized programs within classrooms. However, when student need is severe, and it is being met only in bits and pieces, the scene may be set for a slippery slope of failure, and the goals of authentic inclusion might fail to be accomplished.

During a career in special education and resource, the writer has observed that the problems of children with nonverbal learning disabilities are sometimes compounded in teen years. As the social/emotional issues of adolescence present themselves, providing curricular accommodation is only one aspect of creating a good program of inclusionary practice. It is also of interest to note that such programs are possibly most successful for children with special needs during the early years of their education. During this time, from pre-school to about grade four, variables affecting the total school experience are relatively obvious and straightforward. They are easier to articulate, to plan, and to predict. Within this age group, children, while still of widely varying needs and abilities, have not yet begun to differentiate to the extent that will occur as they pass through middle years and subsequently through high school. At this early years stage, good authentic programs of inclusion based upon diligent planning and maintenance on the part of all involved is highly effective. However, it is possible that even the best examples of inclusion might encounter difficulty as the student enters the middle years. The variables may simply become more complex to manage, especially if they fall within the social domain. In the case of the student with NLD, the disability is often not noticed until the middle years, or until a diagnostic process is undertaken. Thus, often the disability presents itself at the very weakest time for school personnel to offer support. It is sometimes at this point in time, and for these reasons that the student, family, and school, may consider educational environments that will best address the student’s total needs. An educational model for students with NLD should provide a continuum of options for varying needs.
With particular reference to the province of Manitoba, the student with a nonverbal learning disability walks a very difficult path indeed. Manitoba sets three levels of support funding for students with special needs. Level One funding is provided on a per capita basis to school divisions to be spent at their discretion in the service of students with special needs. Level Two funding, which provides for the support of an educational assistant on a half time basis, is dedicated to students who have severe multiple disabilities, moderate autism spectrum disorder, severe visual impairment, or those who are deaf or hard of hearing, severely psychotic, or very severely emotionally/behaviourally disordered. Level Three funding provides for a full time educational assistant for students with severe to profound Autism Spectrum Disorder, profound multiple disabilities, profound emotional/behavioural disorder, or those students who are deaf or blind (http://www.edu.gov.mb.ca/k12/specedu/funding/level2-3.html).

Within the experience of this writer, it is sometimes problematic and frustrating to secure financial support for the severely needy student with NLD. In order to obtain any provincial funding for individual program support in the form of an educational assistant (probably at very most half time except in severe cases of potential danger to self or others), often the most apparent avenues for special for students with NLD include the “Other” category and also the “Emotionally/Behaviourally Disordered” category. An application under the “Other” category would more broadly consider variables other than social/emotional/behavioural domains, and would give weight to the learning disability assessment. However, often such applications are not fruitful in yielding the desired supports. The only other option would be to rely upon a collection of evidence documenting inappropriate behaviours, if such exist, and to apply under the emotionally and behaviourally disordered category. Such categorizing casts a completely different shadow upon the nature of a student than the original diagnosis of learning disability, and runs the risk of creating a potentially damaging label.

A lesser level of support would be granted to a student of Level One designation than to a student of a Level Two or Level Three category. However, applications for many students with learning
disabilities are often made to the Level One Category. The writer has noted that a student of Level One
designation sometimes, depending upon the severity of need, may experience difficulty functioning
within the inclusive classroom without the support afforded to a student with Level Two or Level Three
designation. As a result, students of Level One designation are sometimes hampered in many areas.
Such a student could potentially be provided with a less comprehensive individualized program and less
support from a student support team. Since Level One funding is typically allocated on a block funding
basis it may not amount to much more than a few minutes of individualized E.A. time per day, if that.
There is the possibility of a choice beginning to emerge: wear a label perhaps suggestive of something
you are not, or be resigned to limited or no funding support.

A dilemma similar to this scenario was recently reported in The Brandon Sun describing the
Brandon School Division’s proposal for an additional budget expenditure of nearly one million dollars
beyond that provided by the province “for additional teachers and educational assistants for ‘Level One’
special needs students” (Dowd, 2009). Dowd (2009) quotes school board trustee, Linda Ross, as saying
that “What we have here are kids with some pretty serious problems but don’t fit criteria for Level Two
and Three Funding. That’s an issue that’s got to be resolved with the government...” (p.A1). In an
additional article in this same issue of The Brandon Sun, Robson Fletcher (2009) quotes Secretary
Treasurer Gerald Barnes as saying that: “Last year, the extra-budgetary expenses for E.A.’s exceeded
$400,000.00. This year it topped $700,000.00” (p.A7). Fletcher (2009) supports the position that many
students of Level One designation should receive Level Two funding and many students receiving Level
Two support should receive Level Three, or fulltime assistance.

Dowd (2009) clarifies the position of the Manitoba government on this matter, quoting a
statement made by Barnes that: “in past, the government has said that two percent of funding is for
Level One (needs) students” (p.A1). Barnes further states that “we have found over the last number of
years that that (student base) is now running in the four to five per cent range. So our funding that
we’re getting is just not providing for the amount of services that these students need.``

The writer of this paper also notes that, as well as the paucity of funding at Level One, an
additional problem at this level is that this funding comes to the school divisions in the form of block
funding, and monies are not specifically ear-marked for specific students, as is the case with Level Two
and Level Three funding. It then becomes up to the individual division to determine the manner in which
the expenditure of this money best serves the interests of students of Level One designation. This
service may or may not result in direct and/or equitable service to each student in need.

From the perspective of the author, a successful inclusionary school experience is sometimes a
challenge in middle years for some students with special needs when even appropriate funding and the
most well designed program are in place. This challenge may be further magnified when this student is a
student diagnosed with the NLD condition. By its very aetiology, NLD is unlikely to present severely
troublesome and obvious symptoms until the middle school years. During this time, even the best
model of inclusion will encounter challenges, as most adolescents experience the extremely sensitive
periods of emotional and physical development that come with this age. As noted by Thompson (1996),
it must be remembered that the individual with NLD who may experience difficulty within the motor,
visual-spatial, and social domains, is sometimes less able to access compensatory skills than his/her left
brain LD counterpart. Individuals with NLD, in addition to cognitive challenges, may struggle to decipher
social cues and situations. This particular disability may make the area of socialization, social choices,
and friendships less accessible to them. As well, they may tend to be physically awkward and clumsy,
making distinction in many athletic endeavours inaccessible to them as well. Thus, the student
diagnosed with NLD may be affected by a condition that typically involves a late diagnosis, insufficient
funding and supports, and an inclusionary model which tends to focus more on cognitive skills than on
social skill development (Thompson, 1996).
It is the belief of this writer that in certain instances, and depending upon variables affecting the student, some consideration may be given to the possibility of alternative educational options for some of the more severely needy students with NLD. This is not to say that the needs of many students with NLD cannot be adequately addressed within the inclusive classroom, because for many, success at this level has been a reality. It is rather the writer’s position that in situations of extreme need and in situations in which programming at the inclusive classroom level has not been successful, that additional educational options should be available for some students with NLD within the public school system.

Fuchs & Fuchs (2001) outline educational models featuring levels of universal design, secondary prevention, and tertiary interventions levels. Tertiary intervention levels, exercised for only the amount of time needed to accomplish stated goals, ideally allow the student with severe needs the option of working intensely on specific skills. In this scenario, the goal of inclusion is ultimately that the student with NLD could eventually function in adult life as a citizen capable of living life as happily, responsibly, productively, and independently as possible.

However, this writer notes that even when attention is shifted to the idea of alternative options for those students with NLD not experiencing success with in the inclusive classroom, that sometimes appropriate options are not available. The writer has encountered educational alternatives within the public school system which use full scale IQ as criteria for admittance to alternative educational options. Often the IQ must fall below a certain score on a standardized IQ test in order to gain admittance. In the case of some students with NLD, the performance IQ score may be far below the full scale IQ score required for admission to an alternative educational option. However, the existence of the characteristically higher verbal IQ score may result in an overall full scale score in excess of the admission standard. This scenario occurs despite the fact that in specific areas of functioning, some students with NLD are as needy, if not more so, than other students who would be afforded an alternative educational option. A similar situation could also occur in the case of a student who has both
performance and verbal scores above the required mark, and within the average range of intelligence. Despite appearing to have totally average intelligence, the full scale IQ and the overall performance scale may not reflect the existence of some extremely low subscale scores which could reveal the presence of an NLD. The existence of a higher score in other areas compensates and pulls the total score into a higher range when the total score is calculated. To the untrained person looking at these scores, the problem areas may remain undetected. In the author’s experience it is exactly these areas that can sometimes prove problematic for some severely affected students with NLD.

Unfortunately, some of these students may eventually gain admission to alternative educational options, but these are sometimes classes designed for behavioural/emotional issues, and not for learning disabilities. At this point in the school career of some students with NLD, it may be difficult to accurately discern whether or not the emotional/behavioural factor is truly comorbid with the NLD disorder, or whether it has arisen from the intense frustration that the student has experienced throughout years of repeated mismanagement of his/her disorder (Thompson, 1996).

The philosophy of inclusive education is reaffirmed throughout the world in numerous documents addressing this subject. UNESCO (www.UNESCO.org) describes inclusive education as being the right of all learners to a quality education that meets basic learning needs and enriches lives, and states that inclusive education should seek to develop the full potential of every individual. In 2006, the Manitoba Department of Education, in the document “Appropriate Educational Programming in Manitoba”, notes that inclusive education allows every individual to feel accepted, valued, and safe. It sets as a goal that inclusive education evolves to meet the changing needs of its members (www.edu.gov.mb.ca/ks4/specedu/documents.html). This document states, that the support and recognition of differences in an inclusive educational community should provide all students meaningful involvement and equal access to the benefits of citizenship.
It is the position of the writer that such sentiments should extend to all learners with NLD. The possibility exists that current models of education for students with NLD do not always offer a full gamut of educational options necessary to address the entire spectrum of variety and severity that characterize the NLD condition. While still remaining within the philosophy of inclusive education, a model for the education of individuals with NLD should provide such choices.

To complicate matters, the question of how best to serve individuals with NLD within the educational environment is further confounded by disagreement amongst the very professionals who research, diagnosis, and treat this disability. As a result, to this date, there is not yet an officially accepted standard definition of the nonverbal disability. Psychiatrists utilizing the DSM-IV-R make their diagnoses based on behavioural observations; neurologists are concerned with internal physiological and neurological factors, while psychologists, for the most part, rely on standardized assessment instruments as a means of managing symptoms in an objective, measurable fashion. The ramifications of this lack of a consistent agreed-upon definition affect all those who concerned with the NLD condition, including the education system and individuals with NLD. The goal of this study, therefore, is to synthesize the literature regarding nonverbal learning disabilities in order to develop a unified theory of the pedagogical, interpersonal and substantive best practices for students with a nonverbal learning disability using a meta-analysis of the literature. Then, based upon evidence from research, current practises, and the author’s own experience in special education, resource, and regular classroom settings, this thesis will ultimately present a definition of nonverbal learning disability and propose a model or framework upon which educational program plans for the student with NLD can be based.

Following this introductory chapter, a second chapter will present a review of the literature on nonverbal learning disabilities. A third chapter will describe the methodology used in this study. In the fourth chapter, several case studies of individuals with NLD will be provided and discussed with reference to the theory and principles of practice outlined in the literature. Theory and practice will be
synthesized in the fifth chapter in the creation of a proposed model for effective programming for students with nonverbal learning disabilities. A final chapter will conclude the thesis.
Chapter Two: Review of the Literature

The scholarly literature addressing the subject of nonverbal learning disabilities runs a wide gamut of concerns. Predominant themes highlighting the discussion of this subject include: the history and overall nature of the disability, the ongoing debate and confusion surrounding the establishment of a definition for this disability, the methods and procedures developed for its assessment, and the resultant profiles and characteristics of the person with NLD that such assessments reveal. Consideration is also given to the impact of this disability upon the affected individual and his/her family, as well as to the lifelong social emotional implications which accompany it. In addition, a significant portion of scholarship and research focuses upon the management of the nonverbal learning disability within the educational environment. In this pursuit, literature also examines topics such as strategies and accommodations for program planning, information regarding individual educational plans, and application of these tools in the treatment and remediation of individuals with NLD. Central to understanding the many issues regarding the NLD condition are hypothetical models of the brain which underpin and explain many assumptions made regarding NLD’s existence and functioning. Literature on the subject of NLD also explores these theories and hypotheses. In addition, current scholarly literature and research also offers discussion directed towards the future treatment and management of NLD as well. Numerous scholars offer positions on the nature of this disability, and extend comments on the progressive recognition of its scope and symptoms.

Palombo (1996) comments upon learning disabilities in general with his statement that learning disabilities are conditions presumed to be of neurological origin that occur in children or adults of at least average intelligence. These conditions are not the result of trauma or medically diagnosed neurological abnormalities (Abrams, 1987; Hammil, 1987; National Joint Committee on Learning
Disabilities, 1987). The conditions affect one or more of a broad range of cognitive functions. The severity of the deficits is highly variable. (p.311)

Palombo (1996) notes while researchers have no consensus regarding the number of learning disability subtypes, there is at least agreement that learning disabilities can be separated into the two categories of verbal learning disabilities and nonverbal learning disabilities (p.311). Palombo (1996) outlines that:

- verbal learning disabilities include the dyslexias, auditory processing difficulties, and other disorders that affect the reception, expression, and processing of verbal and written language.
- Nonverbal learning disabilities include the disabilities related to visual-spatial processing information and disorders associated with the reception, expression, and processing of affective communications. (p.312)

**NLD Characteristics**

Sue Thompson (1996) points out the nonverbal learning disability is also called the right-hemisphere disability, and also states that

The NLD syndrome reveals itself in impaired abilities to organize the visual-spatial field, adapt to new or novel situations, and/or accurately read nonverbal signals and cues. It appears to be the reverse syndrome of dyslexia. Although academic progress is made, such a student will have difficulty “producing” in situations where speed and adaptability are required. Whereas language-based learning disorders have been shown to be genetic in origin, heredity has not, as yet, been linked to NLD. It is known that nonverbal learning disabilities involve the performance processes (generally thought of neurologically as originating in the right cerebral hemisphere of the brain, which specializes in nonverbal processing. (pp. 1-2)

Thompson (1996) documents that nonverbal learning disorders occur considerably less frequently than language-based learning disorders. “Whereas it is approximated that about 10% of the
general population could be found to have identifiable learning disabilities, it is thought that only 1 to 10% of those individuals would be found to have NLD (or between 1.0 to 0.1% of the general population. Unlike language-based learning disabilities, the NLD syndrome affects females as often as males (approximately 1:1 sex ratio)” (Thompson, 1996, p.2).

In a very practical chart, Little (1999) presents an acronym (SAVME), that presents features she feels are central to the description of individuals with NLD. In the following table, she highlights these characteristics:

SAVME: Common Characteristics of Nonverbal Learning disorders

<table>
<thead>
<tr>
<th>Social</th>
<th>Lack of ability to comprehend nonverbal communication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Significant deficiencies in social judgement and social interaction</td>
</tr>
<tr>
<td>Academic</td>
<td>Problems in math, reading comprehension, handwriting</td>
</tr>
<tr>
<td></td>
<td>Problems with organization, problem-solving, higher reasoning</td>
</tr>
<tr>
<td></td>
<td>Strengths include strong verbal and auditory attention and memory</td>
</tr>
<tr>
<td>Visual-Spatial</td>
<td>Lack of image. Poor visual recall</td>
</tr>
<tr>
<td></td>
<td>Faulty spatial perception and spatial relations</td>
</tr>
<tr>
<td>Motor</td>
<td>Lack of coordination</td>
</tr>
<tr>
<td></td>
<td>Severe balance problems</td>
</tr>
<tr>
<td></td>
<td>Difficulty with fine motor skills</td>
</tr>
<tr>
<td>Emotional</td>
<td>Frequent tantrums, difficulty sorting, easily overwhelmed</td>
</tr>
<tr>
<td></td>
<td>Fears of new places and changes in routines</td>
</tr>
<tr>
<td></td>
<td>Prone to depression and anxiety as they get older</td>
</tr>
</tbody>
</table>

(Little, 1999, p.114)
Yalof (2006) echoes these preceding descriptions in comments that

There is general consensus within the literature of neuropsychology, school psychology, and developmental paediatrics that NLD reflects a constellation of neurocognitive, interpersonal, and social-emotional competency deficits that negatively impact the academic and psychological adaptations of children, adolescents, and adults (e.g., Roman, 1998; Rourke, 1989, 1995; Rourke and Tsatsanis, 2000; Semrud-Clikeman & Schafer, 2000; Weintraub & Mesulam, 1983). Features associated with NLD might include verbal skills, superior to visual-spatial skills; specific learning disabilities in math and/or written expression; problems with perspective taking, affect labelling, and self-regulation; motor findings; possible attention deficit/hyperactivity disorder (ADHD); and a range of social-emotional co-variants including shyness, anxiety, social isolation, and depression. (p.16)

**Disagreement Regarding Definition of NLD**

However, despite these areas of commonality, many other features of the disability remain in question. Scholarly literature cites numerous accounts of the ongoing debate and confusion surrounding the establishment of a definition for this disability. It is a lack of agreement on these points of difference that continues to hinder progress made in all areas of NLD research and treatment. Yalof (2006) strikes directly at the heart of the problem in his astute observation that:

there is less of a consensus, however, around three other issues associated with NLD. First, there is an ambiguity about whether NLD should be classified as a learning disability subtype, a right-hemisphere syndrome, or a learning disorder (LD). Second, NLD is not identified formally as a unique category in DSM-IV-TR or as a specific learning disability in the Individual with Disabilities Education Improvement Act (IDEA; 1997). The absence of clear-cut item sets for NLD
therefore creates a diagnostic challenge when trying to evaluate for NLD as a clinical entity.

Third, questions have arisen about the conceptual relationship between NLD, AS, and high-functioning autism (HFA); (Schopler, Mesibov,&Kunce,1998), leading to speculation about whether NLD is unique from AS and from different types of autism, and necessitating a diagnostic approach to NLD assessment that includes history, neuropsychological, academic, personality measures, observations, rating scales, and collateral information. These three issues- NLD terminology, NLD nomenclature, and differential diagnosis of NLD from AS and HFA- have implications for everyday clinical practice. (p. 16)

In early descriptions, Myklebust (1968, as cited in Yalof, 2006) initially characterized the nonverbal learning disability as a learning disability subtype, and stated that “nonverbal learning disability is at least as consequential and debilitating to behaviour as are verbal deficits”(p.16). Yalof (2006) notes that Rourke (1989,1995) extended this concept, first documenting NLD as a particular type of learning disability, and then expanding this idea to a definition presenting NLD as a specific syndrome of disorders. In addition, Rourke’s research (1989, as cited in Yalof, 2006) identified the NLD disorders as mainly right-hemispheric disorders. Based on this research, Rourke (1989, as cited in Yalof, 2006), hypothesized:

the concept of NLD from a specific learning disability subtype to a developmental syndrome of right-hemispheric dysfunction that characterizes many different childhood disorders. For example, as a syndrome disorder, NLD captures specific learning disabilities (e.g. superior verbal skills relative to nonverbal skills, with particular weakness in the area of mechanical arithmetic), acquired brain injury, and neurodevelopmental disorders (e.g. Asperger’s syndrome, fetal alcohol syndrome, Williams syndrome, Sotos syndrome) that manifest a particular pattern of dysfunction related to deficits associated with right hemisphere brain correlates for NLD (p. 17).
Rourke (2011) has further classified the related disorders into categories according to the varying degrees of similarity they bear to the characteristic NLD profile. To this end, Rourke (n.d.) has proposed a definition for the nonverbal learning disability and intends to submit it to the International Classification of Diseases (ICD) for consideration as a standardized definition for the nonverbal learning disability. Based upon his opinions regarding the nonverbal learning disability, Rourke (1995) has also constructed a physiological model to further explain and exemplify the nature of this disability.

In contrast to the position previously discussed, Pennington (1991, as cited by Yalof, 2006) views the NLD as a disordered learning style, which could be described as a deficit in one or more neuropsychological systems, such as attention or memory, (a single learning disability may be a subset of a larger style of disordered learning), and proposes that this position to is distinct from that of a learning disability or a syndrome of right-hemisphere disorders. He views NLD as part of a larger classification of learning disabilities of which NLD would be one. Within the category of LDs, Pennington includes autism spectrum and acquired LDs.

In addition to challenging Rourke’s (1989) notion of NLD as a learning disability subtype, Pennington cautions against overvaluing the correlation of the relationship between right hemisphere visual-spatial skills and NLD social deficits. Pennington notes that although right-hemisphere mediated visual spatial deficits are connected frequently to problems in the area of arithmetic, the relationship between right-hemisphere visual-spatial deficits and social cognition deficits, which Rourke (1989) anchored with the right hemisphere, is less clear (Pennington, 1991, as cited by Yalof, 2006, p. 18). Pennington affirms that right hemisphere functions surrounding the process of spatial cognition are not necessarily connected. The anecdotal support arising from research conducted by Palombo (2001) who demonstrated that children with math and handwriting disabilities did not always demonstrate deficits in social cognition offers support for Pennington’s position.
Yalof (2006) states a survey of academic literature reveals that each of these previously discussed applications is supported by substantial research and scholarship. He notes, however, it is not yet clear that any one of these positions emerges as being clearly superior to the others. Partially as a result of varying opinions regarding the nature of the nonverbal learning disability, to date, no standardized definition of this disorder exists.

Herein lays the difficulty in managing this syndrome in practical, as well as in academic terms. It is hard to be ultimately authoritative regarding what does or does not clearly constitute nonverbal learning disability in the absence of an officially accepted diagnostic standard. The task is doubly difficult when an attempt is made to differentiate between this particular syndrome, and other disorders which do carry such official descriptors. It becomes an even greater task to ascertain whether there are two different disorders, overlapping symptoms of two different disorders, or symptoms of one disorder only partially described by the officially noted disorder. The matter becomes further entangled by the fact that often the subject of nonverbal learning disabilities and the related disorders have been approached by different academic disciplines: medicine, neurology, education, psychology, occupational therapy, speech and language pathology, etc. As each describes evidence from their own particular perspective, the possibility of a situation approaching the blind men describing the elephant comes into play; and the possibility of each discipline describing the same, different, or overlapping disorders does become a distinct problem indeed. Simply stated, it is difficult to diagnose and treat what is not yet defined. Yalof (2006) speaks to the dilemma facing clinicians in practical terms:

The clinician might therefore speculate about NLD, for example, if a child has a neuropsychological and social-emotional profile that is supported by NLD literature, but the clinician must do so cautiously, inferentially, and without guidance from formal diagnostic criteria in existing classification schemas. The clinician working in the school system might classify the youngster with NLD under IDEA as having multiple disabilities to capture a specific
mathematical calculation disability and a prominent social-emotional disturbance, whereas the diagnosis of LD not otherwise specified might be the easiest way of acknowledging NLD under DSM-IV-TR. These latter considerations can make differential diagnosis challenging, particularly when NLD appears to overlap with other conditions. (p.18)

Disagreement surrounding the description of the NLD condition presents a significant challenge for research and scholarship in this area. Such uncertainty often leads to great confusion regarding not only the NLD definition, but also extends to the definitions of other conditions closely resembling it. Yalof (2006) points to substantial research (Frith, 2004; Pennington, 1991; Rourke; Volkmar, Lord, Bailey, Schultz, & Klin, 2004) which, as a result, presents some of the serious questions that have been raised regarding the definitional integrity of even these similar conditions (p.18). Yalof (2006) also notes research (Volkmar & Klin, 1998) that raises additional questions regarding definitional difficulties surrounding Asperger’s syndrome.

Scholarly literature regarding NLD abounds with references addressing the similarity and differences which exist between NLD and other conditions such as Asperger’s Syndrome (AS), high-functioning autism (HFA), to name only two, and offers comments on the problem and process of distinguishing NLD as a separate entity from other conditions. Research done in this area by Carey, Barakat, Foley, Gyato, and Phillips (2001) notes marked similarity on comprehensive neuropsychological evaluations between survivors of paediatric brain tumours and students with NLD. Results of other research (Goldstein, Beers, Seigel, Minshew, 2001) indicates “that the cognitive profile of HFA is most like what is seen in individuals with LD who are not significantly impaired in reading but who have academic difficulties in other areas...They may be best characterized as the DSM-III-R diagnosis of Developmental Arithmetic Disorder” p. 152. Klin, Volkmar, Cicchetti, and Rourke (1995) report the cognitive profile in Asperger’s Disorder, but not HFA, is similar to that of NLD. Vacca (2001) has noted that “as with most learning disabilities and neurological disorders, nonverbal learning disabilities cover a
broad continuum from mild to severe, with no two students showing identical behaviours. In its most severe form, the functional presentation of the disorder is virtually indistinguishable from Asperger’s syndrome and high-functioning autism. It is the student with the milder form who may be perplexing to school personnel” (p.26). Stein (2004) adds further support to these previously expressed opinions with his statement that “the process of differentiating the characteristics of AS, NLD, and a pragmatic language disorder arguably may be the most challenging diagnostic tasks in developmental-behavioral pediatrics” (p.1462). Stein (2004) feels that the AS diagnosis is often incorrectly applied, and expresses this opinion in his comment that “Many clinicians have the impression that AS is used as a diagnosis indiscriminately to describe children and adolescents with atypical social behaviours without careful considerations. I agree with this observation” (p. 1458). Additional studies (Gunter, Ghaziuddin, & Ellis, 2002, as cited in Yalof, 2006) report that AS and NLD were almost indistinguishable based on the test results of their research.

It is during this process of over-generalization, that the diagnosis of NLD may be overlooked. Klin (2004, as referenced by Stein, 2004) notes the similarity between AS and NLD and suggests a strategy for separating AS from other disorders, namely NLD, may lie in measures of adaptive functioning and observations of social and communicative behaviour, and suggests using The Autism Diagnostic Schedule (Lord, Rutter, DiLavor, & Rist, n.d.) or Autistic Diagnostic Review (Rutter, n.d.) as both provide results based on DSM-IV definitions. Klin (2004, as cited by Stein 2004) notes that “almost by definition, individuals with AS exhibit discrepancies over three standard deviations between their verbal IQ and their socialization scores on the Vineland” (p.1459), as differentiated from the other groups which do not. Despite identifiable differences, Klin (2004, as cited by Stein, 2004) does feel that “although AS and NLD are not a mutually exclusive diagnosis (because they belong to different nosologies or classification systems), they often co-occur” (p.1460).
In an effort to confront such confusion, some researchers note features which differentiate NLD from other similar disorders. Miller (2004, as reported in Stein, 2004), as well, allows for considerable overlap between AS and NLD, but nonetheless raises some key points of difference. She states that AS appears to differ from NLD in the presence of repetitive behaviours in AS, and the fact that AS appears to be without “clinically significant delays in cognitive development” (Miller, 2004, as cited in Stein, 2004, p.1460), unlike NLD. Stein (2004) differentiates between NLD and AS by utilizing the presence of the “…below-average scores in visual motor integration and visual memory” (p.1462), which appears to particularly characterize NLD.

In contrast, Kuschner, Bennetto and Yost (2006) have noted differences between the patterning within cognitive profiles of these groups: cognitively delayed autistic subjects, non-autistic delayed subjects and subjects with typical development, and concluded that “given the relative and specific nonverbal cognitive strengths and weaknesses found in the young group of children with ASD presented here, this pattern might represent a core component of autism.” Results from their study build on previous research suggesting that visuospatial disembedding and detail-focused processing abilities are specific, relative strengths for children with ASDs. In the ASD group 88% of the children showed positive deviation scores on both Figure Ground and Form Completion. This was significantly higher than the presence of these relative strengths in only 13% of the DD group.

**Assessment Issues**

It is clear from an examination of the scholarly literature that efforts to clearly define and to properly position NLD vis a vis other similar disorders will rely to a significant degree upon information (visuospatial scores, visiomotor information, adaptive behaviour measures etc.) gleaned from neuropsychological assessments. To this end, the topic of assessment, and the documentation it
provides, occupies a key position in the scholarly literature addressing the subject of the nonverbal learning disability. Information gleaned from such neuropsychological assessments is crucial to the eventual establishment of a comprehensive definition of NLD, as well being vital to its identification process. Data garnered from such testing indicates profiles and patterns that may more precisely identify and define the uniqueness of individuals with NLD.

Rourke (1998) describes the qualities of good neurological assessment:

- a comprehensive neurological assessment is one that involves the measurement of the principal skills and abilities that are thought to be served by the brain. Thus a fairly broad sampling of tasks involving sensory, perceptual, motor, psychomotor, attentional, mnestic, linguistic, concept formation, problem-solving and hypothesis-testing skills would need to be administered. Finally, it is particularly important in the analysis of the NLD symptoms to have available fairly comprehensive personality and “behavioural” data on the child. Standardized tests of important dimensions of psychopathology, activity level, and common problem behaviours are quite essential for this purpose. (p.140)

Michael Roman (1998) concurs with Rourke (1998), and further expands upon cognitive and neuropsychological performance. Roman (1998) notes that ‘Cognitive’, as used in this context, refers to an individual’s abilities rather than to specific required skills. Roman (1998) seeks to enhance our understanding regarding the inter-relationship between cognitive and neuropsychological variables in a reference to Flavell (1970) who states that “neuropsychological” refers to both simple and complex cognitive abilities that can be directly or indirectly linked to the integrity of cerebral functioning. The goal of neuropsychological evaluation is to investigate discrete cognitive processes involved in acquiring new information (Roman, 1998, pp.4-5).

Roman et al. (1998) cites Johnson (1987), and maintains that typically one of the most readily identifying features of the NLD condition has been a significantly higher Verbal IQ score than a
Performance IQ score on a standardized IQ test. Kaufman (1979), as referenced in Roman et al. (1998), suggests that the differences between the Verbal Comprehension Index and the Perceptual Organization Index of the WISC (Wechsler, n.d.) are more accurate indicators of the NLD. A discrepancy of 15 points between these two indexes is generally indicative of NLD; however a psychologist may make this diagnosis with even a 10-point difference given the appropriate psychological profile. Generally, it is expected that the greater the difference between these two indexes, the greater the degree of expected impairment.

In more recent times, subsequent research (Pelletier, Ahmad, & Rourke, 2001), has examined the successfulness of this previously established method of assessment, and has proposed new classification criteria for the assessment of Nonverbal Learning Disabilities as follows:

1. Fewer than two errors on simple tactile perception and suppression

2. WRAT/WRAT-R standard score for Reading at least 8 points higher than standard score for Arithmetic.

3. Two of WISC/WISC-R Vocabulary, Similarities, and Information are highest of the Verbal IQ scale.

4. Two of the WISC/WISC-R Block Design, Object Assembly, and Coding subtests are the lowest of the Performance IQ Scale.

5. Target Test at least 1 SD below the mean.

6. Grip strength within 1SD of the mean or above vs. Grooved Pegboard Test more than 1 SD below the mean.

7. Tactual Performance Test Right, Left, and Both hand times become progressively worse vis-à-vis the norms

8. WISC/WISC-R Verbal IQ exceeds Performance IQ by at least 10 points. (p.94)
Pelletier et al. (2001) tested the reliability of these rules in consistently identifying NLD individuals within a specific population, and found that, taken individually, none of these rules were particularly consistent in identifying NLD students. Pelletier et al. (2001) also noted that the VIQ> PIQ rule used alone was accurate 27.3% of the time. This method allowed for an error margin of 72.7% of the time used. It is the belief of Pelletier et al. (2001) “The strict application of criteria numbers 1 through 7 should result in very few false positives and false negatives” (p.95). Also arising from the same research, Pelletier (2001) proposes a probability scale, which can be applied against the results of the previously listed assessment data to further assist in making the diagnosis of NLD:

- The first 5 features: Definite NLD
- 7 or 8 of the features: Definite NLD
- 5 or 6 of these features: Probable NLD
- 3 or 4 of these features: questionable NLD
- 1 or 2 of these features: low probability of NLD. (p.87)

The reliance upon a larger profile in making the diagnosis of NLD is noted by other researchers as well. Tuller, Jantzen, Olvera, Steinberg, and Kelso, (2007) also point out “Current research (Pelletier et al., 2001; Rourke et al. 2002) places less importance on the differential between Verbal IQ and Performance IQ and relies more on specific subtests that provide evidence of processing strengths and weaknesses” (p.95).

Such patterns of skills or deficits can be evidenced through neuropsychological assessment, and standardized testing yields information along these critical dimensions. Accounts of current scholarship provide significant discussion in this area.

Roman (1998), citing Strang and Rourke (1983), discusses problems with executive functioning as a major area of difficulty amongst individuals with NLD. Such deficiencies result in impairment with such processes as the ability to reason, to logically analyze information, to test hypotheses to move
easily from one area of thought to another, to focus attention, to remember information, as well as the ability to generally manage thought processes. Roman (1998) notes the following standardized tests as being valid tools for the assessment of executive functioning: “...the Wisconsin Card Sorting Test (Berg, 1948), the Category Test (Reitan, 1979), the Tower of London (Shallice, 1982), the Trail Making Test (Reitan, 1979) and the Progressive Figures and Color Form Tests (Reitan & Wolfson, 1985)” (p. 5). These findings are supported by Marti (2004) who notes the ability to organize, evaluate, and synthesize information into a practical, workable form is often woefully lacking in the case of the student with NLD. Marti (2004), in an anecdotal account, comments upon the daily difficulties encountered by individuals with NLD as they struggle with this area of functioning:

Making decisions is a very difficult and drawn-out process for me.... I usually do not have a sense of intuition or “gut feeling”... Pros and cons do not work for me because of difficulty prioritizing and an inability to identify which items carry more weight...

The array of problems that people with nonverbal learning disability have to deal with makes negotiating the challenges of everyday life very difficult and extremely time-consuming. (Marti, 2004, p. 832)

Impairments in certain types of nonverbal memory function have also been regularly noted within the population with NLD. This tendency is also an important neuropsychological function to be considered in the assessment of an individual with NLD. This tendency is noted by Roman (1998) in his references to other studies (Fletcher et. al.1992). In these statements it is observed that pictures were more easily remembered than designs, as were items that could be easily attached to particular words as a means of assisting the memorization process. Assessment of ability in these particular areas may prove useful in the identification of both the existence and the scope of the NLD. Standardized tests quickly point to differences that may exist between the individual with NLD and a person general population. The extent of this discrepancy would provide some evidence of the extent of the disability.
Roman (1998) states that a good core memory battery for assessing the presence of nonverbal learning disabilities might include the California Verbal Learning Test (Kramer, Kaplan, & Ober, 1987) and selected subtest of the Wide Range Assessment of Memory and Learning (WRAML) (Sheslow & Adams, n.d.), particularly the Story Memory, Picture Memory, and Design Memory subtests. For many children with this disorder, discrepancies can also be found between auditory span of attention, as measured by a digit span test, and a spatial span of attention, as measured by the Finger Windows subtest of the WRAML (Sheslow & Adams, n.d.) or Corsi blocks (Milner, 1971). In addition, many of these children demonstrate significantly poor backward digit span with a relatively better forward digit span. The tendency of many children to mentally visualize the forward sequence and then read it backwards frequently exceeds the NLD child’s capacity to manipulate mental representations.

Roman (1998) feels his observations of individuals with NLD generally reveal substantial impairments with any tasks requiring visual or motor skill or those skills requiring judgments involving visual spatial perception. The Test of Visual Perceptual Skills-Revised (Gardner, 1996), Judgment of Line Orientation Test, (Benton, Hamsher, Varney, & Spreen, 1983), Halstead-Reitan Neuropsychological Test Battery (Reitan, 1979) are tests of these abilities. As well, Roman (1998) also points to the possibility that the Tactual Performance Test (Reitan, 1979) is the only true spatial assessment tool because it is conducted without visual input.

Accounts of research indicate that individuals with NLD experience significant difficulty with tasks of a visual, motor, or spatial nature. They may do reasonably well on tasks involving finding similarities and differences, but often do very poorly on other tasks that require them to locate figures embedded within backgrounds and similarly struggle with tasks of tactile perception and discrimination (Roman, 1998). Standardized instruments, such as Judgment of Line Orientation Test (Benton, Hamsher, Varney, & Spreen, 1983) and the Test of Visual Perceptual Skills-Revised (Gardner 1996), provide the clinician with means of accessing information regarding a student’s performance in these areas. Tasks
involving drawing and copying often present a challenge for the person with NLD. Often difficulties with printing and handwriting present early indications to school professionals that close observation is warranted. These basic fine motor tasks that are repetitive in nature will be mastered with time and practice.

It has been stated that difficulty with both gross and fine motor skills is a defining feature of NLD. A recently proposed definition of NLD (Pelletier et al., 2001), previously mentioned in this paper, discusses items for use in providing measurement of these areas. However, often initial evidence of fine and gross motor skills is anecdotal and is gleaned through interviews with the individual with NLD or their family, or comes from observations of their behaviour. The person with NLD may have encountered difficulty learning to ride a bicycle, to tie shoelaces, or to cut with scissors, etc. Because NLD is generally regarded as a right brain disorder, it is not uncommon to see deficits even slightly more pronounced on the left side of the body than on the right side.

Evidence suggests that the student with NLD also possesses strong verbal skills and generally performs well on tests of receptive vocabulary. Roman (1998) lists “...The Peabody Picture Vocabulary Test (Dunn & Dunn, 1981)...the Receptive One-Word Picture Vocabulary Test (Gardner 1985), The Expressive One Word Vocabulary Test-Revised (Gardner, 1990) and the Boston Naming Test (Kaplan, Goodglass, & Weintraub, 1983)...” (p. 6) as examples. Standardized assessment of academic achievement can also play an important role in the recognition of the student with NLD. As well, such assessment can be used as an objective and dependable tool for establishing characteristics and profiles of, and also monitoring the progress of, the individual with NLD.

Because children with NLD frequently have adequate phonological abilities, they may be more successful at reading and spelling phonetically predictable words than phonetically unpredictable words. This can sometime result in a failure to find the expected discrepancies between math and reading or math and spelling on integrated tests such as the Wide Range Achievement Test (WRAT) (Jastak &
Jastak, n.d.), even when the diagnosis of NLD is appropriate. More sensitive measures, such as the Woodcock-Johnson Tests of Achievement (Woodcock & Johnson, 1989), can frequently assist the examiner in documenting the discrepancy. Children may sometimes demonstrate better performance on the Word Attack subtest then the Word Identification subtest. More sensitive measures of spelling, such as the Test of Written Spelling-3 (Larsen & Hammill, 1994) often yield notable discrepancies, with higher standard scores obtained for phonetically predictable words than phonetically unpredictable words.

The discrepancy between content areas of academics as opposed to more applied aspects is another classic finding. Content areas can be defined as the more basic and mechanical aspects of an academic subject. These include word recognition and word attack for reading; arithmetic calculations within math; and spelling, grammar and syntax within written language. In contrast, applied aspects of academic subject areas include reading comprehension, math application (including word problems and algebra), and written composition (Roman, 1998, pp. 6-7). It is not uncommon for the student with NLD to easily read and decode words, but to struggle with comprehension within the same passage of material.

Children with NLD sometimes demonstrate weakness in particular aspects of speech and language. Ryalls, Joanette, & Feldman, (1987) note individuals encountering difficulties with speech, prosody and problems understanding and/or expressing emotional intonation are frequently observed in more severe cases of NLD. A difficulty with prosody often involves monotone speech with little inflection. Because these children are often hyper verbal in social contexts, their peers frequently see them as droning on relentlessly over boring topics. The deficits these children demonstrate in nonverbal aspects of interaction directly lead to an over reliance on verbalization as a primary means of social interaction. Because the content of their speech is often simple and repetitive, they frequently present as having a restricted range of interests, one of the primary features of Pervasive Developmental
Disorder. Difficulties with emotional intonation and affective expression in speech can be measured by asking the child to repeat a neutral phrase within different emotional contexts. For example, they may be asked to state, “I’m going to the store,” as if they were angry, sad, or surprised. Similarly, having the examiner repeat this same neutral phrase with different emotional inflections, then asking the child to label the corresponding mood, can assess their receptive understanding of the affective tone of language. (Roman, 1998, p.7)

Most (2000), in a study that concludes that individuals with NLD were significantly less able than their peers to accurately identify emotions through non-verbal cues, draws attention to several standardized measures of emotional perception. She feels that The Perception of Nonverbal Sensitivity (Rosenthal, Hall, Di Matter, Royers & Archer, 1979) represents such a measure. The PONS (Rosenthal et.al, 1979) examines “general perception of nonverbal communication by using two affective dimensions-positively-negatively and dominance-submission” (Most, 2000, p.172), but does not examine emotions. The Identification of Emotions Test (Most, Weisel, & Zaychik, 1993) provides information regarding such emotions (Most, 2000).

Social/Emotional Issues

Scholarly accounts also focus upon the person with NLD as an individual, a family member, and as a member of a larger community. It is in the lifelong social and emotional consequences of this disability that perhaps the harshest effects of the NLD condition can be witnessed. Thompson (1996) sums up the resultant reality for such an individual: “A young child with NLD is less likely to explore her environment motorically because she cannot rely upon her kinaesthetic processing and spatial perceptions. This child learns little from experience or repetition and is unable to generalize information” (p. 3). Thompson explains how, in an extrapolated way, what initially begins as a difficulty
in perceptual processing has ultimate ramifications in social emotional consequences for the individual with NLD.

In the early years, such a child may appear "confused" much of the time (he is confused) despite a high intelligence and high scores on receptive and expressive language measures. Closer observation will reveal a social ineptness brought about by misinterpretations of body language and/or tone of voice. This child is unable to "look and learn". He does not perceive subtle cues in his environment such as: when something has gone far enough; the idea of personal "space"; the facial expressions of others; or when another person is registering pleasure (or displeasure) in a nonverbal mode.....These are all social "skills" that are normally grasped intuitively through observation, not directly taught....The child’s verbal processing may be proficient, but it can be impossible for her to receive and comprehend nonverbal information. (Thompson, 1996, p.3)

A significant amount of literature regarding the subject of nonverbal learning disabilities focuses upon the issues arising from this dilemma. The severity of the situation resonates in Thompson’s (1996) statement that “the child with NLD is particularly inclined toward seriously debilitating forms of internalizing psychopathology, such as depression, withdrawal, anxiety, and in some cases, suicide” (p.4). Thompson (1996) gives voice to the bleak possibilities which await the NLD individual: The child with NLD is regularly punished and picked on for circumstances he cannot help, without ever really understanding why, and he is in turn often left with little hope that his situation will ever improve. After amassing years of embarrassing and misconceived unintentional social blunders, it is not too difficult to comprehend how a person with nonverbal learning disorders could come to the conclusion that his environment is not structured to accommodate him. (p.4)

Little (2001) comments upon the experiences of individuals with disabilities in general, noting that their school careers are often fraught with bullying and victimization. She notes that such experiences do not provide a sound foundation for positive development in future years. Little (2001)
references the work of several other investigators when she states “Cognitively and physically disabled children are at a greater risk for peer victimization and exclusion than their non-disabled peers (Llewellyn, 1995; Morrison, Furlong & Smith, 1994; Santicht & Kavanagh, 1997. Thompson, Whitney & Smith, 1994)” (p. 45). Little (2001) also cites Cook and Semmel (1999) whose work with students in mainstream educational settings has ascertained that the severity of disability is inversely correlated with the level of peer acceptance. The resulting experience of victimization and peer shunning, as discussed by Little, is demonstrated to be a major concern for children with disabilities, and she notes (2001) that the self-perception enhanced by this experience further predisposes students with disabilities to even further victimization. Little (2001) also refers to Hodges et al. (1997), as well as Ladd and Ladd (1998) who have noted that “lack of friends and social exclusion can increase a child’s risk for peer-bullying and assault” (Little, 2001, p. 45).

Little (2002) further expands knowledge in this area with her research on mothers’ perception of victimization in their NLD and AS children. In this study, she used the Comprehensive Juvenile Victimization Scale, a three-question instrument designed to assess shunning and bullying. She asked mothers of NLD and AS children to report their children’s experiences of victimization. Little’s (2002) work found that “94% of mothers reported that ¾ of their NLD and AS children had been hit by peers or siblings in the past year; 75% had been emotionally bullied; 10% attacked by gangs; and 15% had been victims of nonsexual assaults to the genitals. In addition, 1/3 of these children had not been invited to a single birthday party in the past year; many ate lunch alone and were the last ones to be picked for teams” (p. 52). From this research, Little (2002) concluded that “The high rates of peer shunning and peer victimization reported suggest that children with Asperger’s syndrome and nonverbal learning disorders may require further scrutiny and attention concerning their victimization experiences by peer and siblings” (p. 52). Older children were subjected to progressively more and more emotional bullying as their ages advanced. As a result of her research, Little (2002) draws the following conclusions:
These results have implications for inclusion policies that increasingly place students with disabilities in general education environments for the entire school day with the end goal of greater social benefits for the child. These findings suggest that proactive interventions to facilitate peer acceptance and prevent peer and sibling victimization are needed. (p. 55)

In addition to the needs of the NLD individual, the stress that such a child places on the rest of the family cannot be underestimated. Antshel and Joseph (2006) have studied the effect of a learning disabled child upon family stress and have noted that “the presence of a child with learning disabilities, and certainly a child with NLD, within a family appears to present ramifications for parents” (p. 195). Their work echoes that of colleagues in their declaration that “parenting stress is an important variable to consider when providing services for children and their families McDowel, Saylor, Taylor, Boyce, & Stokes,1995) (Antshel & Joeseph, 2006, pp.194-195); for example, mothers who reported high levels of stress from life events appear to be more controlling, abusive, and punitive than mothers who have lower levels of stress (Webster & Stratton,1990)” (Antshel & Joseph, 2006, pp. 194-195). In addition, they also note that parents of children with learning disabilities are more vulnerable to higher levels of frustration and dissatisfaction. As a result of such escalating levels of parental stress, the relationship between the child and parent is often affected and, consequently, L.D. children are at an increasing risk for developing unstable parent/child attachments. They further state that “families with a L.D. child often display lower levels of family cohesion, which, in turn, results in an increase in internalizing and externalizing behaviours on the part of the L.D. children” (Antshel & Joseph, 2004, p.195). The work of Antshel and Joseph (2006) would indicate that differences exist in the manner in which children with reading and nonverbal learning disabilities impact upon family stress levels and, in the case of the child with NLD, heightened degrees of impact were in direct proportion to the severity of the disability. They note “mothers of children with RD reported higher levels of general distress, whereas mothers of children with NLD reported higher levels of dysfunctional interactions with their child” (Antshel &
Joseph, 2006, p. 194). As well, these researchers indicate that mothers are more likely to be adversely affected by the stress of an LD child than are fathers. They note that “...mothers are more stressed by children’s demandingness and neediness, whereas fathers are more concerned about the child’s social acceptance” (Antshel & Joseph, 2006, p. 195). Antshel and Joseph (2006) also note that owing to the severity of their disability and their increased need for family support even as they mature into adulthood, many children with LD often place a burden of prolonged stress on families who struggle to support the ever increasing needs of the adult with LD. Little (2003) provides further information on the subject of children with learning disabilities and their effect upon family/parental stress as she examines the specific components of such stress:

Some of the most important dimensions of stress related to raising a child with disabilities are those linked to family and personal problems of the parent (Konstanareas, Homatidis, & Plowright, 1992). Family problems include stress due to time demands, severity of the child’s symptoms, and the presence of family supports. Parental attitudes toward the sacrifices they must make and their attitudes (optimistic or pessimistic) towards their child’s disabilities are also important dimensions that have been identified. (p. 566)

Little (2003) isolates four variables which affect the stress experienced by the parents of a child with disabilities: “(a) parent and family problems; (b) parental pessimism; (c) child characteristics; and (d) physical incapacitation” (p. 565). She notes that often the stress experienced by families is further exacerbated by the perceived lack of support services available to such families. In the capacity of family advocates, school clinicians would fill an invaluable function. Little (2003) also states the fact that “...many parents rated educational advocates as the third most helpful resource” (p. 265) suggests that “parents of child with AS and NLD do not have easy, clear access to educational services, and do not necessarily know what they are entitled to or how to get these services from their schools in order to help their children” (p. 265). The work of Little (2003) further points out that “...older, better-educated
wealthier parents... were more able to access support services than were their younger, less educated counterparts” (p.265). In light of such evidence, Little (2003) emphasizes that “sadly it may be families such as the latter that are most in need of resources for their children, because they struggle with all other social problems that often accompany parents with fewer financial resources, less education, and fewer years of experience as parents” (p. 265).

Given the distinct nature of the NLD profile, and considering the challenges such individuals often encounter within the social/emotional realm, it is readily understandable that persons affected by NLD would struggle in matters of everyday functioning. As such, for most individuals with NLD, navigating the educational environment becomes a very challenging, frustrating, and often hopeless task.

**Educational Issues**

Thompson (1996) notes that “nonverbal learning disorders are often overlooked educationally because the student is, as a means of compensating, very verbal” (p.9). She (Thompson, 1996) cautions parents to be “...especially leery of self-righteous educators who use the superficial psycho-babble ‘he chose’ implying that this child made a conscious choice to put himself in a position of disadvantage” (p.12). Thompson (1996) advises that “it is always wise to locate the underlying cause of behavioural observations (i.e., a disorder of the central nervous system) so that appropriate, helpful, and nonpunitive measures can be implemented” (p.11). She (Thompson, 1996) offers further wisdom to families in her advice that:

Once a child has been diagnosed, parents should not accept the rationale of some well-meaning professionals who may tell them that NLD will play a minor role in their child’s ability to perform well in school. Physicians and psychologists may assume that a child with superior expressive
language skills can easily compensate for a deficit in nonverbal skills. This assumption is true only in relation to the child’s capacity to “parrot” back school work in the early grades and does not address the child’s inability to “flow through life”. As the child moves into the higher grades, where less and less will be “spelled out” for him, he will reach a point where functioning in school is impossible without specific compensations, accommodations, modifications, and strategies (CAMS). The incredible rote memory which served this child very well in the lower grades, before he was asked to interpret and evaluate information, fails him when academic demands shift to more complex applications. At this point he may cease to try or “burn out” attempting to succeed under the impossible demands now being placed upon him. (Thompson, 1996, p.10)

Thompson (1996) speaks to the necessity of providing the student with NLD with adequate and appropriate supports to facilitate, and indeed maximize, the success of his/her school experience, and feels that “employing interventions early in the child’s schooling is certainly preferable to waiting until junior or senior high to accommodate his disability when he finally bottoms out”(p.10). She (Thompson, 1996) notes that without the implementation of these supports the “prognosis for success in school is poor for this child” (p.10).

Thompson (1996) justifies the need for such individualized planning for the student with NLD through an acknowledgement of the physical basis of the NLD disability.

The child with NLD requires individualized approaches to educational intervention in order to succeed in school because her right hemisphere systems are dysfunctional or inaccessible to her. The left cerebral hemisphere processes information based upon fixed systems of rules and is not equipped to deal flexibly with problem-solving strategies. Effective remedial methods include direct verbal training in planning, organizing, studying, written expression, social cognition, and interpersonal communication. (Thompson, n.d., p.9)
Thompson (1998) discusses features that she feels are vital to the individual education plan, beginning with recognition of the student’s assets and also his/her deficits. Strengths must be built upon and strategies to compensate for weaknesses must be developed. She (Thompson, 1998) notes “programs which address both academic and social competencies achieve the most success. The child’s individualized education program should not merely focus on academic growth, but should also stress compensatory strategies which will assist her future academic progress by enlarging her repertoire of coping mechanisms” (Thompson, 1998, p.1).

Thompson (1996) differentiates between her understanding of an educational program and the Individualized Education Program, often found in school settings. While the specific name given a program is of limited consequence, it is nonetheless worthwhile to heed the specific points she notes as differences:

Unlike Individualized Education Programs in which the primary goal is to master a continuum of curricular skills, the educational program for the child with NLD consists of providing additional coping skills, practical support, and CAMS (compensations, adaptations, modifications, and strategies). Interventions for this child are not curative in nature, but rather designed to offer compensatory skills and to lessen the daily stress he encounters. (Thompson, 1996, p.13)

An examination of further research and literature addressing the subject of the nonverbal learning disability offers additional discourse on the subject of the educational plan, and lends support to many of Thompson’s opinions. Dean Garrison (2008) points out individuals with Asperger’s Syndrome or NLD “...require different types of support to achieve the best outcomes in life” (p. 3). While he states these needs in general terms, and not all needs apply to every individual with NLD, they are, nonetheless, quite representative of various areas which may be considered in the construction of an individual education plan for the student with NLD. Garrison (2008) observes:
they need help developing social skills necessary for survival in the bigger world. They need assistance in learning how to keep organized and stay on track. They need help learning skills for reducing anxiety and coping with stress. They may require occupational therapy to help them improve physical motor skills. They may benefit from medication that addresses mood and attentional difficulties. Parents of these children often benefit from outside support to assist in accepting and understanding their children’s differences and special needs. (p. 3)

Research also notes that the process of constructing an individual education plan for the support of the student with NLD, in addition to addressing the many concerns previously raised, is further complicated by the presence of additional factors. On this matter, scholarly literature notes that the symptomology of this disorder changes over time, in conjunction with the individual’s development, and progresses through primary, secondary, and tertiary deficits as the course of development advances. Deficits in perceptual processing exhibit unique patterns of development as well.

Bearing such considerations in mind, Rourke (1989) documents that tactile perceptual deficits, which are often most evident on the left side of the body seem to diminish somewhat as development proceeds. Impairments with visual perception show an increase with age, as do bilateral psychomotor coordination deficits, often most prominent on the left side of the body. Management of new material presents a difficulty over time, while the ability to make age appropriate accommodations, and also the tendency towards over-assimilation of events becomes progressively more troublesome with age. Simple repetitive motor tasks remain stable from mid childhood through life. Some repetitive motor tasks, such as speech, handwriting, and the like, though initially difficult, are often done very well eventually. As well, auditory perception skills appear to be difficult in early development, but as growth advances, become an area of strength for most individuals with NLD. Rourke (1989) notes “differences between good to excellent memory for rote material and impaired memory for complex material and/or that which is not readily coded in a verbal fashion tend to increase with age” (p. 84). He concludes that
deficits in concept formation, problem solving, and understanding cause and effect relationships, strategy generation, hypotheses testing and the ability to gather and generate information and experience are also similarly affected.

Problems associated with the manifestation of primary, secondary, and tertiary deficits and the unique patterns of perceptual development characteristic of NLD are often addressed by the individual education plan. However, by the time such concerns have become problematic and individualized programming is undertaken, the intervention is often focusing upon secondary or tertiary symptoms. The social emotional inabilities often displayed by the person with NLD illustrate this situation, as do other problems stemming from various primary deficits. For example, Rourke (1989) examines how the same basic deficits of reasoning and concept formation giving rise to later problems in arithmetic are also fundamental to the difficulties in social judgment which sorely affect many individuals with NLD in their adolescent/adult years. Social problems similarly blossom from initial deficits in visual-spatial-organizational and perceptual skills. Deficits in these areas later translate into problems in recognizing faces, emotions, and other nonverbal indicators.

Owing to the nature of these previously described deficits it is extremely important, in the case of the student with NLD, that all areas of need identified by the assessment procedure be addressed in the individualized plan, however innocent they may initially appear. The rationale for this belief comes again from the process of magnification that moves from primary deficit onwards to secondary and tertiary symptoms. The occasional omission of some areas of demonstrated need from a plan often takes place with the best of intentions, as more effort is heaped upon other issues deemed to be more prominent at a specific time e.g. academic concerns during school years. Given such a scenario, problems affecting psychomotor coordination and sensory and perceptual processing, for example, may appear relatively innocuous during the student’s younger years, when compared to spelling and math concerns. However, as development proceeds, deficits in these areas can expand to difficulties with
social interactions, understanding body language, appropriate allocation of personal space, and even the visual perceptual skills necessary for performing simple job-related skills or operating a vehicle. As a history of failure accumulates, the individual becomes more and more depressed, angry, or seriously pathological. Oversight of a seemingly innocent deficit could eventually contribute to severe emotional problems, criminal record, or even suicide in the adult years.

Scholarly writing offers varying opinions regarding the effectiveness of the educational plan within the conventional classroom. Thompson (1996) offers hope for the use of this tool in the management and assistance of students with NLD in her statement that “the child with NLD can usually be accommodated in a ‘fully-included’ mainstreamed educational setting if her unique academic and social needs are understood by her parents and her school staff. A comprehensive and detailed Individualized Education Program (IEP) put together by a team of informed experts will aid in a successful outcome” (p.12). In opposition to the stance taken by Thompson (1996), Miller (2008) insists “learning in a conventional classroom is ineffective for NLD students” (p. 2). Following this line of thought, Thompson (1998), while not exactly being guilty of arguing both sides of the issue, also discusses factors which would impede the success of the student with NLD in the conventional classroom. To this end, she (Thompson, 1996) offers qualification to her otherwise positive position in her assertion that one of the most critical compensatory areas for assuring the success of this student within the school environment rests upon the competence and skill of the school staff to appropriately gauge the ability and capacity of the student with NLD. She (Thompson, 1998) reluctantly notes that unfortunately many educators still struggle to understand even the nature of the disorder and its difference from other learning disabilities. Thompson (1998) references a statement by Rourke (n.d.) who states that many teachers and staff are under the:

faulty impression that the child is much more adept and adaptable than is actually the case.

Given the verbal prowess of the NLD individual and given that our society places such a high
value upon verbal skills, this student is often expected to be far more capable (to the extent that the disability may be completely overlooked) than is actually possible. Nonetheless, appropriate planning must be in place for this student to experience success within the school environment. (p. 8)

In addition to the challenges already encountered by individuals with NLD as they attempt to navigate the school system, Wright (2008) notes, based upon her research findings, clear evidence exists that school personnel in the school district within her sampling have little knowledge of NLD or its profile. Given that her sampling of teachers could be assumed not to be appreciably different from those in other settings, her (Wright, 2008) results would imply that students, already challenged by the NLD profile, would also face a school system with very little understanding of their condition.

The understanding and implementation of best practices and strategies greatly impacts upon the success of the student with NLD. While each individual education plan addresses each student’s unique needs and abilities, on a larger dimension, certain generalized instructional strategies or best practices have been found successful with a large number of students with NLD. A significant amount of scholarly writing reflects this realization.

Telzrow and Bonar (2002) allocate most of such strategies into one of three categories: remedial, compensatory, and instructional or therapeutic, and further define these delineations. Remedial interventions are designed to exercise deficient skills directly.... compensatory approaches employ assistive technology or other techniques to assist students with NLD in circumventing areas of deficit.... Instructional or therapeutic interventions use specialized methods to teach the student foundational skills or strategies to enhance performance in deficient areas. (p. 10)

A consideration of compensatory practices would automatically lead to the student’s immediate learning environment. The physical nature of the classroom environment is an area of concern addressed in many discussions regarding best practices for students with NLD. Neuroanatomist, Jill
Bolte Taylor (2006) discusses the neurological implications underlying the goal and practices of brain-based learning techniques that strive to attain safe and familiar classroom environments for all students, not just exclusively students with NLD. She states “the primary objective is to create an environment where the brain’s fear/rage response (amygdale) is not triggered” (Taylor, 2006, p. 19). Maintaining a comfort level and the ability to focus attention thus becomes a balance or struggle between the area of the brain responsible for focusing attention (cingulated gyrus) and the area of the brain (amygdala) which responds to change in the environment or unfamiliar situations.

When incoming stimulation is perceived as familiar, the amygdale is calm and the adjacently positioned hippocampus is capable of learning and memorizing new information. However, as soon as the amygdala is triggered by unfamiliar or perhaps threatening stimulation, it raises the brain’s level of anxiety and focuses the mind’s attention on the immediate situation. Under these circumstances, our attention is shifted away from the hippocampus and focused toward self-preserving behavior about the present moment. (Taylor, 2006, p.19)

In light of this situation, classroom environments characterized by predictability, structure, and lack of distracting stimulation, would benefit all students, including those with NLD. However, in the case of the student with NLD, these classroom characteristics are vital to successful program implementation. Thompson (1998) echoes the importance of these fundamental features in her statement that educational environments must provide the student with NLD with “…the external structure, organization, and stability that he/she lacks internally” (p. 2). The student with NLD experiences difficulty processing many types of incoming sensory stimuli, and failure to successfully process this stimulation will drastically impact upon the organizational, emotional, and focusing characteristics of the student and his/her participation in learning. It is Thompson’s (1998) belief that students with NLD may also benefit from cooperative learning situations, provided that they are placed in roles which allow them to access their generally excellent verbal skills and abilities to read as well as
in situations which offer them positive peer models, clearly defined group structure and considerable teacher monitoring (Thompson, 1998).

The deficits encountered by individuals with NLD in internal organizational skills require that more structure and predictability be provided for them. Thompson (1998) has suggested how this support may be accomplished. Communication between home and school is extremely important as the student with NLD does not adapt easily to change and needs to be prepared ahead of time for any change in daily routines. At school, Thompson suggests using a written or numbered schedule for the student. These schedules are paired with an ongoing discussion between student and staff of the expectations and activities anticipated.

As students with NLD may benefit from stimuli through auditory channels, it is often helpful for an instructor to be constantly talking about information previously learned in order to help in bridging these gaps. Thompson (1998) offers practical points to assist the student with NLD deal with challenges in generalization and cause and effect learning:

Never expecting the student to automatically generalize instructions or concepts
Using language as the bridge to tie new situations to old learning
Reviewing past information before presenting new concepts
Verbally pointing out similarities, differences and connections
Verbally indicating generalizations which can be drawn in various situations
Methodically discussing the cause-and-effect relationships of events and situations with the student. (Thompson, 1998, p.3)

When working with the NLD student, the transfer of previous learning to a new situation can never be assumed.

Thompson (1998) notes step by step instruction is a preferred method of instruction, and explains this situation by reasoning that most students remember multi-step instructions by some form
of visualization, some students by actually seeing themselves doing each step in the required process. They do not actually try to remember each word in a long string of directions. She notes that the individual with NLD is unable to effectively pass this information to the right hemisphere and activate this ability to visualize. The student with NLD thus tries to memorize the sequence verbatim and that becomes an extremely difficult task. Thompson further states that his behaviour does not indicate a listening problem, as some teachers might expect. “The child was paying close attention and heard the whole series of instructions, but because he (she) was unable to visualize himself carrying through, he could not “hold on” to the information. He is not inattentive or unmotivated, but rather his brain processes information differently from most other students” (Thompson, 1998, pp.3-4). Suggestions offered by Thompson (1998) to compensate for the weakness experienced by the student with NLD in multi-step management include: writing out or recording instructions, numbering the steps in a sequence and only presenting a few steps at a time, breaking tasks down into small steps, insuring that the student actually understands the instruction and is not merely parroting it back to you, using a buddy to prompt the next step, using mnemonic devices to aid remembering, and constantly monitoring the student’s progress throughout the task.

Teachers and parents alike often note volatility in the behaviour of the student with NLD. An examination of literature evidences the need for strategies to address the impact of this disability upon the emotional and sensory needs of the student with NLD as well. In an extremely interesting list entitled “Challenges Kids Face” Smith Design, (2008) points out no less than one hundred and fifteen problems as stressors that students in school could potentially encounter on a daily basis as they simply pursue their normal routine. If such pressure exists for peers of students with NLD who function without a challenging disability, imagine the stress heaped upon the individual with NLD. Sue Thompson (1998), drawing on her experience with individuals with NLD, also notes that these students have a tendency to become easily overwhelmed and offers some explanation for this occurrence: “...the
student with NLD is missing at least 65% of the intent of their communications ...and... attempting to cope with cognitive, as well as the visual-spatial-organizational demands of attending school” (p. 6).

Previously in this chapter it has been noted that the school experience bombards the student with NLD, who simply does not process incoming stimuli in the same manner as most individuals. This overwhelming amount of noise, movement, and stressful social interaction is simply extremely difficult for this student to process.

Thompson (1998) recognizes that, as a result of this experience, the student with NLD would be quite predictably exhausted at the end of the school day. She (Thompson, 1998) feels every effort must be made to reduce extraneous stimuli for the student with NLD. This sensory overload and the accompanying exhaustion place a special burden upon the individual with NLD as well as his/her family. To this end, Thompson (1998) feels that, as a vital consideration in the education and program planning for individuals with NLD, it must be recognized that “…it is unreasonable and unfair, and it places an undue burden upon the child’s parents, to expect that this child spend hours each night trying to get through tedious homework assignments. The strain of the school day becomes even more apparent as the student advances to higher grades” (p. 6). This situation only stands to reason as increases in social pressure, feelings of alienation, feelings of inadequacy only continue to magnify. Thompson (1998) suggests that modified schedules and creative programming be considered at this point. As an example, she suggests “Have the students attend school for half of the regular school day, or every other day, with individual tutoring provided in the interim to ensure that he/she is still meeting grade-level competencies” (Thompson, 1998, p.6). It is often in response to frustration to the unmet needs of stress, failure, anxiety, etc. that serious behaviour and emotional problems begin to emerge.

Remedial strategies may also attempt to exercise deficit skills. Programming to assist students with NLD with academic material (e.g. math, handwriting etc) and with areas of self-monitoring provide examples of this type of intervention. Telzrow and Bonar (2002) note remedial intervention may include
instruction in areas of self-monitoring. Through the use of such strategies, students with NLD could continuously and independently learn to reduce troublesome symptoms such as inattention and impulsive behaviour. In addition to learning memorized “rules” for behaviour, such as systems of etiquette and protocol, which would be seen as a compensatory intervention, a remedial intervention in this area might involve “direct instruction and rehearsal of appropriate responses in various situations” (Telzrow & Bonar, 2002, p. 11).

Given the characteristics of the NLD disorder, mathematics is a subject that often presents a challenge to many learners with NLD, especially as the grade levels advance and the content of the subject becomes more abstract. In anticipation of this generalized weakness affecting individuals with NLD, strategies have been developed to offer support in this area.

Rourke (1985) notes that the complex nature of mathematics dictates that a mistake made at any juncture will result in an error, unlike the reading process in which information can be gleaned from the overall sense of the passage, despite the fact that not every word may have been correctly read. In math, however, changing only one number may drastically alter the outcome.

Through his research of math skills, Rourke has concluded that students in general make mathematical errors in the specific areas of spatial organization, visual detail (e.g. misreading a sign or number, procedural errors, failure to shift psychological set (e.g. change operations when needed), graphomotor, memory, and judgment and reasoning (e.g. estimation and the production of unreasonable solutions). Rourke’s (1985) research regarding the acquisition of math skills further expanded to examine the development of mathematical ability in a group of students with NLD, and found that students with NLD tended to make a wider range of errors, generally made more errors, and demonstrated a high number of errors in reasoning and judgment when compared to their age-peers in the regular population.
It was noted that a test group of students with NLD demonstrated particular neuropsychological weaknesses: “…bilateral tactile perceptual impairment (more pronounced on the left side of the body); bilateral psychomotor impairment (particularly on the Tactual Performance Test); and poorly developed visual-perceptual organizational abilities” (Rourke, 1985, p.171). Given the nature of these particular deficiencies, it would be reasonable that these students would have been disadvantaged from the very earliest stages of development to adequately benefit from sensory–motor experiences. Rourke (1985) notes “Since Piaget (e.g. Piaget 1928) and others have theorized that the development of nonverbal concept-formation and reasoning abilities are dependent upon the adequacy of a child’s sensory motor experience, it would follow that children with NLD should exhibit signs of impairment of these abilities” (p.171). Rourke (1985) refers to Goldberg and Costa (1981) in pointing out that the right hemisphere systems are vital in providing the content for the formation of constructs and concepts. Dysfunctional right hemispheres do not allow for individuals to properly benefit from sensory experiences necessary for construct and concept development.

Bearing these considerations in mind, Rourke (1985) postulates practical suggestions for math instruction for students with NLD. It is his belief that educators must pay heed to the student’s strongest sensory modality. For example, he suggests that if the auditory modality is the strongest modality, then math instruction should be conducted as a verbal task whenever possible. As well, presentation of subject matter should proceed in a manner that is systematic and concrete. Math manipulatives should be used whenever necessary, even with older students.

Instructors should begin by presenting an example of the calculation to be learned. This type of calculation should then be described to the student in words. At this point of instruction, it would be necessary to have the student become able to describe the mathematical procedure in words, even if the actual concept is not understood. It is necessary that the procedure be broken into very detailed, precise, small steps. Next, the procedure is written out. This amounts to the rules for the particular
procedure, and creates a recipe for the procedure that the student can refer to for as long as need be. Next, the student would actually attempt to work through a sample calculation. Only at this point would an attempt be made to actually explain the underlying concept of the operation. The student could continue to practice the calculations with close supervision. Drill and practice would follow.

Rourke suggests the use of graph paper to minimize organizational problems and the use of color-coding to determine such things as right and left sides of the paper etc. This author has also noted that a lined notebook turned horizontally also helps to keep calculation columns straight. Students should be taught to read each question before beginning any mathematical operation, and could be given a calculator to check their answers. Teachers should analyze all student errors in an attempt to determine if patterns of errors may be occurring. Rourke (1985) stresses that practical application of mathematical concepts to real life situations is a preferred, and ultimately more successful, method of providing math instruction to NLD students.

Bryant and Bryant (2008) further extend information regarding best practices in math instruction. They note that standards set by the National Council of Teachers of Mathematics (NCTM) have resulted in regular classroom instruction that involves “...inquiry-based, or discovery, approach to solving mathematical problems (Baxter, Woodward & Olson, 2001)” (Bryant & Bryant, 2008, p. 6). Bryant and Bryant (2008) also cite Jitendra et al. (2005; NCTM 2000) in their assessment that such an approach may be reflected in classroom practices encouraging peer interaction, discovery, sharing, small group work, etc which tend to encourage “...conceptual understanding and reasoning rather than abilities in memorization and rote learning” (p.6). These researchers (Bryant & Bryant (2008) also cite Woodward (2004) who notes that discovery ...may be insufficient for some students with math disabilities ; these students require mediated instruction to enable them to be actively engaged in the learning process. Such instruction may be characterized by teacher questioning to guide learning more explicitly and by
systematic, strategic instruction to teach concepts and skills that students may lack. For example, findings from Swanson, Hoskyn, and Lee’s (1999) meta-analysis of academic treatment outcomes for students with LD confirmed the benefits of employing procedures from explicit, systematic, and strategic instruction in a combined instructional approach”.

Scholarly literature also addresses possibilities for the future management of the NLD condition. Cornoldi, Venneri, Marconato, Molin, and Montinari (2003) feel that “in the education system, there has been a biased emphasis towards the acquisition of literacy and its related problems” (p. 305). To this end, Reading Recovery, phonemic awareness, and other similar language based programs are often visible within the Early Years school setting. By comparison, interest in nonverbal areas of concern has lagged. While it is recognized that the nonverbal learning disability initially presents in very young children as a sensory processing disorder, many tests for assessing such difficulties, especially the visio-spatial disabilities consistently demonstrated by students with NLD, are generally not intended for use with very young children. Cornoldi et al. (2003) note

...that several procedures are available for the psychological evaluation of visiospatial abilities, such as the Developmental Test of Visual Motor Integration (VMI; Beery,1989) and the Developmental Test of Visual Perception (Hammill, Pearson, & Voress,1994), but no procedures are available for the detection of learning difficulties associated with visiospatial deficits in primary school. (p. 300)

These authors note that tests to assess other areas such as reading, behaviour, attention etc. have been developed, but that “...no screening tool is available to identify children who have nonverbal disabilities...” (Cornoldi et al., 2003, p. 299).

To this end, these researchers designed a short eighteen item screening tool, based on a previously existing longer visiospatial questionnaire 1997 of thirty-seven items. They then clinically demonstrated and validated the merits of the new instrument as a measure of indicating visiospatial
deficits in primary school children. The resulting tool was the Shortened Visuospatial questionnaire (Cornoldi et al. 2003). This test is meant only as a screening tool to identify children who may possibly benefit from further referral to qualified clinicians. The normalized sample for this test included children as young as six years old. Clearly potential exists for such measures of early predictability.

Research also offers future possibilities for educational design. Extrapolating the work of Bryant and Bryant (2008) into the future, and applying it to the question what actual school structure could perhaps accommodate the unique needs of the student with NLD within the public system, it is possible to construct a model that has potential to serve this specific population. Their model (Bryant & Bryant, 2008), while addressing reading concerns, includes a continuum from participation in regular classroom, to the use of a specialized part time remediation room, to the option of a completely specialized classroom. Where exactly a student fits along this continuum is completely dependent upon the individual presentation of his/her unique combination assets and deficits. In their discussion of other somewhat similar frameworks for remediation, Bryant and Bryant (2008) refer to the 3-Tier Reading Model described by Vaughn (2002):

The 3-tier Reading Model provides a framework for a data-driven delivery of differentiated instruction for all students (Vaughn Gross Center for Reading and Language Arts [VGCRLA], 2005) that can be generalized to mathematics or any other academic area. Tier 1 consists of evidence-based core instruction for all students, including struggling students receiving concurrent services in Tier 2 and Tier 3 (Bryant & Bryant, 2007). Tier 2 provides supplemental instruction and ongoing progress monitoring to students who have been identified as achieving below their average and above-average performing peers. The classroom teacher or an intervention specialist may provide Tier 2 instruction. Tier 3 is reserved for students who have not responded to Tier 1 instruction and supplemental Tier 2 instruction and who require additional intensive intervention and continuous progress monitoring. Tier 3 intervention may be delivered by a special education teacher or academic specialist. (pp. 5-6)
This model described by Vaughn (2000) as referenced in Bryant and Bryant (2008), in many features, represents a model with the future potential to accommodate the unique needs of students with NLD, in that there is a progressive movement towards increasing levels of support as the severity of the disability increases. Bryant and Bryant (2008) also draw attention to a similar plan of prevention and intervention identified by Fuchs and Fuchs (2001) who proposed a framework which consisted of three levels of intervention:

Primary prevention focuses on universal design, or instruction that benefits all students, including those with learning problems. Secondary prevention involves instructional adaptations that are feasible to implement, nondisruptive to the targeted child, and nonintrusive for the other students in the class. Finally, tertiary prevention is intensive and individualized, involving special services that are often provided by the special education teacher. (p.6)

Bryant and Bryant (2008) further discuss some plans for prevention and intervention which involve up to four or five various levels of intervention (Dickson & Bursuck, 1999; Grizzle, n.d.). In reviewing these several examples of tiered remediation, Bryant and Bryant (2008) conclude that all such systems focus upon similar goals to “…(a) provide instruction to students in growing levels of intensity, (b) reduce the numbers of students receiving instruction in the succeeding tiers, and (c) identify a group of students who may qualify as having LD” (p. 6). In a manner similar to these previously considered models, the proposed model for remediation and intervention of students with NLD also progressively advances through its various tiers to the final level of a specialized classroom designed to meet the needs of the most severely disabled students.

Given the unique nature of the NLD condition and its potential for severe lifelong pathology, students are owed this full gamut of choice. It is necessary for the well being and the proper education of the student with NLD that school systems and educators realize the possibility that inclusion within
the regular classroom may not be an appropriate educational choice for every student and in every situation. Programming options must reflect these very unique needs. Foundations that prepare the basis for such plans have hopefully been established in this chapter through the research, theories and knowledge shared. This information can now be applied to the instructional practices chosen for students with NLD.

Thompson (1998) eloquently states, “It is the responsibility of educators to ensure an appropriate learning environment for all of their students” (p. 8). Teachers and staff members must be ever mindful that they “hold the key. (They) can maximize his child’s potential or (they) can destroy his life” (Thompson, 1998, p. 8).
Chapter Three: Methodology

The methodology of this research work is scaffolded through three levels. The first level will involve researching the extant literature on Nonverbal Learning Disabilities. The second level of this study will involve using this review of the literature as a conceptual framework through which to examine twelve comprehensive studies of individuals/students with this condition. The third level will involve synthesizing and applying the understanding gained from the first two levels in the creation of a model for reaching and teaching students with Nonverbal Learning Disability.

Scholarly literature addressing the subject of NLD presents itself as a substantial fabric woven with numerous threads. Writing and research within this area aligns itself within the parameters of several diverse, but consistently recurring themes and areas of interest. Predominant among these, and of central focus to this thesis are: the history and overall nature of this disability, the debate and confusion surrounding a universally accepted definition and underlying physical model of NLD, the methods and procedures used in its assessment, as well as NLD’s resultant profile and characteristics. Considered also is the impact of the NLD condition upon the affected individual and his/her family. In addition, the lifelong organizational, social, and emotional ramifications of NLD and its management within the educational environment are also of significant concern for both scholarly literature and this current document.

Highlights of a survey of scholarly writing attest to the NLD condition as one presenting individual variations in the number and degree of characteristic features affected by this disability. Typically, difficulties in the social-emotional, sensory, motor, and visual-spatial domains, as well as strengths in auditory abilities feature in the NLD profile. Difficulties encountered in attempts to create a standardized definition of this disability owe, in part, to the individual and the variable presentation of this condition. Research points to the necessity of obtaining a complete neuropsychological profile for
making a reliable diagnosis of NLD. Understandably, as evidenced through an examination of the research, the extent of affliction has lifelong implications as the individual with NLD interacts with family, the educational environment, and society.

Against a previously surveyed background of research and scholarship, this thesis will examine individual case studies of those presenting the NLD condition. This data has been garnered from published studies. Owing to the fact that these case studies have been done by different examiners, in different locations, and at different times, a total one to one matching of variable for variable is not possible. Rather, an attempt will be made to note characteristics common amongst the subjects. Summaries containing highlighted data from these case studies will be included within the body of the chapter.

To this end, each case where data exists will be evaluated against the social-emotional, motor, sensory, visual-spatial, and auditory domains, and will be assessed for evidence of strengths and/or deficits in these areas. Measures of cognitive functioning, and achievement functioning will also be considered where available. For each of the case studies, a chart will be created containing data highlighted from the case study. The data thus gleaned from the total subject sample will then be recorded on a table. This table will provide a visual account of the NLD trends and characteristics presented by this group.

Whether or not the evidence garnered from subjects studied within this chapter correlates positively with trends noted within the academic literature will be considered. Consideration will be given to the similarities and differences between subjects.

As individuals such as those presented in the case studies might well be present within a school or division population, the particular strengths and difficulties presented by this group will be considered and applied to the construction of an educational model for nonverbal learning disabled learners. The intent is to construct an educational model for students with NLD. This model will be
created with consideration given to the scholarly literature and research, as well as to its adaptability to a sampling of individual NLD students.
Chapter Four: Case Studies

Case studies of twelve individuals presenting the NLD, or NLD-like, condition were obtained from published material. Of these twelve cases, ten are conclusively diagnosed examples of the NLD disability. In one of the remaining two cases, although a diagnosis of Asperger’s Disorder is presented, the examiner draws attention to the fact that the presenting symptoms of this individual could easily be interpreted as other disabilities, of which NLD could be one. The other case follows somewhat of a reverse course of action, as subject symptoms are presented, and the diagnostic opinions of different professionals are presented. Substantial variation is noted in these diagnostic results.

A common format, intended to aid in the extraction of data from these original case studies, and to assist in classifying it as it relates to research trends and generalized characteristics of NLD, was then created for summarizing and comparing the data of each individual case study. As the original case studies have been done by various examiners, at various times, and often for various reasons, continuity of testing instruments, testing environments, and testing procedures cannot be expected. Thus, in light of this factor, as well as to better serve the purpose at hand, consideration of data in this chapter will take place on more generalized terms.

It is not the intent of this chapter to repeat or approximate the degree of detail found in the original case studies, but rather to highlight and to draw instances of data and behaviour from them for viewing against the body of scholarly research pertaining to NLD that is presented in this thesis in the literature review chapter. In such a fashion, it is hoped that practical representation of, and support for, the numerous themes and ideas surrounding the subject of NLD can be examined and exemplified. As well, individual profiles, similarities and differences between subjects, and the relation and interplay of this information to the literature review chapter, will be considered. It is hoped that perspectives
gleaned from this examination will yield factors worthy of consideration in the construction of an educational model for the student with NLD.

To this end, the following information has been condensed and highlighted from the original case studies and presented in a common format:

**Study 1** (Rourke, 1989, pp.108-121)

Name: David

Age: 11 years 0 months

Background information:

-Referral because previous cognitive testing evidenced large difference between verbal and performance scores.

-school previously conducted assessment for social, behavioural, emotional issues.

-referred to psychiatrist as a result of school assessment

-history of reading comprehension difficulty, social isolation

-suspected central processing disturbance

Developmental and Family History:

-Breech presentation at birth, all other development unremarkable

-youngest child of three

-family medical and developmental history unremarkable

Behavioural Observations throughout Assessment:

-cooperative, motivated, showed no emotion or enthusiasm, seldom made eye contact, test appeared to be a reliable assessment of his ability

Assessment Results:
1. Cognitive:
- WISC – R Verbal IQ 107; large sub scale scatter with scaled score lows of 9 on word knowledge and mental arithmetic (Vocabulary and Arithmetic) to scaled score of 19 on Digit Span subtest.
- WISC-R Performance IQ 78; Scaled scores of Picture Arrangement, 10; Coding, 9; Block Design, 5; Object Assembly, 3; Picture Completion, 7.

2. Achievement:
- WRAT-R yielded percentile rankings of Reading 95, Spelling 98, and Arithmetic 21. Written spelling and single word reading approximately three and a half years above age expectation.
- Peabody Individual Achievement Test (Dunn & Dunn, 1981) indicates relative weakness in reading comprehension as compared to extremely well developed word recognition capacities, although reading comprehension is within average range (55th percentile). Category Test (Retain, 1979) indicates an information processing deficit involving nonverbal concept formation and reasoning, especially poor performance involving capacity to recall and benefit from prior nonverbal problem-solving experiences.

3. Visual:
- Deficits in spatial analysis, perceptual organizational ability, visual imagery
- Difficulty with tasks of visual discrimination
- Responses improved on items on which he was able to employ a verbally mediated problem-solving strategy

4. Motor:
- Exclusively right-handed, right-footed, right-eyed
- Moderately slower motor speed bilaterally with performance relatively slower on right side of body
- Strength of grip within normal limits bilaterally
- Eye-hand coordination significantly impaired with each hand’s visual spatial deficits on pegboard task.
- consistent errors in estimating size of drawings and in integrating various parts of the drawing to form a cohesive gestalt.

- impaired bilateral finger agnosia and dysgraphesthesiA

- average tactile recognition of geometric forms and kinesthetic perceptual abilities markedly impaired

- Tactile-perceptual examination revealed bilateral deficits

- tactile recognition of geometric forms was average

- complex tests of tactile, kinesthetic, and perceptual ability was markedly impaired

5. Auditory:

- auditory analysis tasks above average ability

- generally well-developed auditory-perceptual capacities

- short term digit recall was above average

- well developed phonemic ability

- no indication of aphasic deficit

6. Social/Emotional

- social isolation cited as a reason for referral

- Personality Inventory for Children- Revised (PIC-R)(Lachas, Klinedinst, Seat, & Broen, 2001) was completed by David’s mother indicates social, emotional, behavioural difficulties. Subject is described as socially isolated, depressed, anxious, and withdrawn. Flattened affect is noted.

- Vineland Adaptive Behaviour Scale (Sparrow, Balla, & Cicchetti, n.d.) completed by mother resulted in an Adaptive Behavioural Composite scaled score of 44, indicated performance below the .1 percentile. Standard score (percentile rankings) equivalents were: Communications, 61 (.5); Daily Living Skills, 27 (less than .1); and Social Domains, (.1).

- overall adaptive capacities considered to be low

- social isolation within educational environment noted
* David was re assessed at age 12 years, 11 months with results bearing close similarity to those described in this assessment.

**Study 2** (Rourke, 1989, pp.172-181)

Name: Jane
Age: Jane received neuropsychological assessment at age 9 years, 6 months; 11 years, 0 months; 12 years, 11 months; and 15 years, 5 months. She received a more limited assessment at age 17 years, 8 months.

Background Information:
- referral made by family physician
- subject in regular grade 4 program
- subject having difficulty with written communication and mechanical arithmetic
- poorly developed fine and gross motor ability
- difficulty with concentration
- difficulty relating to other children
- good oral reading and spelling skills

Developmental and Family History:
- first born child, number of siblings not indicated
- full term pregnancy, delivered by Caesarean section after unsuccessful labour, in incubator for first 24 hours of life, subsequent infancy unremarkable
- delayed motor coordination and vocabulary noted at 14 months
- a few febrile episodes, became delirious in one or two
- medical attention for possible allergies
Behavioural Observations throughout Assessment:

- 9 years, 6 months: cooperative and friendly, good rapport, but distractible, noted to do better on tasks of a verbal nature, inappropriate and unrelated conversation, poor motor coordination.

- 11 years, 0 months: cooperative and good rapport established, distractible, tendency to give up, poor eye-hand coordination and page orientation, "sing song" quality to her voice.

- 15 years, 5 months: motivated, cooperative, talkative hypoactive, distractible in situations involving visual stimuli, poor motor coordination, immature behaviour.

Assessment Results:

- 9 years, 6 months: neurological assessment was unremarkable, overall Jane displayed neuropsychological, academic, and social emotional features of the NLD syndrome (Following this first neurological assessment, Jane entered a day-treatment program on a fulltime basis and spent five years in this program. She spent about two years in residential treatment after this. Programs emphasized life-skill training, motor development, counselling, and also level appropriate academic instruction)

1. Cognitive:

9 yrs. 6 months:

- WISC (Wechler, n.d.): FSIQ, 88; VIQ, 101; PIQ, 75; difference between PIQ and VIQ = 26 points; graph indicates wide subscore scatter

- PPVT (Dunn & Dunn, 1981): just below the 50th percentile

11 years 0 months: improvement noted in problem solving strategies, and some areas of attentional deployment

12 years 11 months: - information not noted

15 years 5 months: -- WISC: F IQ, 90; VIQ, 101; PIQ, 79; difference between VIQ and PIQ = 22 points

- Category Test (Reitan, 1979): overall problem solving skills dropped relative to age

- PPVT: just below the 60th percentile
2. Achievement:

9 years 6 months: -WRAT (Jastak & Jastak, n.d.): Reading, 99.3th percentile; Spelling, 86th percentile; Arithmetic, 16th percentile

11 years 0 months: -word recognition and spelling skills well-developed, math is an academic weakness

12 years 11 months: -information not noted

15 years 5 months: -WRAT: Reading, 84th percentile, Spelling 73rd percentile, Arithmetic 7th percentile

3. Visual:

9 yrs. 6 mos: -highest scores on WISC Picture Arrangement subtest (45th percentile) and Picture Completion subtest (45th percentile), lowest scores on Target Test (20th percentile), with all scores falling below the 50th percentile range

11 years 0 months: -marked visual-spatial-organizational difficulties noted, limited short term memory of visual sequences

-some improvement noted in ability to organize visual-spatial output, eye-hand coordination (not under speed expectations)

12 yrs. 11 months: -marked visual-spatial-organizational difficulties continue; visual tracking and scanning remain problematic

15 yrs. 5 months: -visual spatial abilities show overall improvement compared to initial testing at 9 years, 6 months.

4. Motor:

9 yrs. 6 mos: -all scores below the 50 percentile, maze and peg board tasks very difficult

11 yrs. 0 months: -improvement in motor and psychomotor skills: more steadiness, motor coordination

12 yrs. 11 months: dramatic improvements in motor and psychomotor skills, examiner speculates that this is owing to specific programming within the special class placement

-tactile –perceptual problems continue
15 yrs. 5 months: -positive growth in motor skill development from first assessment, although overall similarity in patterns of performance over time is noted; improvement on Tactile Performance Test is noted.

-persistence of difficulty with left hand continues

5. Auditory:

9 yrs. 6 mos: -sentence memory subtest difficult, below 40th percentile.

11 yrs. 0 months: -improved ability to attend to auditory stimulation

12 yrs. 11 months: -improved ability to attend to auditory stimulation

15 yrs. 5 mos: -auditory skills showed general improvement; sentence memory subtest still below 50th percentile

6. Social/Emotional:

9 yrs. 6 months: -very few positive socializing experiences

-psychosis score highest on PIC test (105)

11 yrs. 0 months: - slight gains made in areas of adaptive functioning from previous testing (examiner speculates that this was owing to special placement class)

-poorly developed social skills, Vineland Social Maturity Scale age equivalent score of 6 years, 3 months

-poorly developed social skills and unable to interpret nonverbal communications, does not accurately interpret many social situations.

12 yrs. 11 months: -limited expression in social situations, poor peer relationships, silly inappropriate talk

-treatment afforded her better social opportunities, -although still wanting, small gains noted in social situations

-social age of 8.3 years on Vineland Social Maturity Scale

-responses to social interaction in a “robotic “fashion
- continuation of poorly developed social skills and unable to interpret nonverbal communications, does not accurately interpret many social situations.

15 yrs. 5 months.: -social emotional indicates positive growth.

-PIC results indicate much lower elevation on Psychosis scale (78) and a decrease in factors creating the PIC internalized psychopathology factor, attributed to the therapy/ intervention program in which she had been a participant.

-VABS (Sparrow, Balla, Cicchetti, n.d.) results not yet positive for completely independent living abilities

**Study 3 (Rourke, 1989, pp.163-170)**

Name: Cathy

Age: 13

First Assessment: 13 years 1 month

Second Assessment: 13 years, 7 months

Background Information:

-severe head trauma following motorcycle accident

-became severely comatose, began to decerebrate, bleeding over right cerebral hemisphere, lacerations and contusions to right temporal lobe and parietal lobe regions, brain swelling, required craniotomy, required excision of entire right temporal lobe and part of the parietal lobe

-neuropsychological assessment to determine effects of head trauma and surgery

Developmental and Family History:

-development unremarkable until time of accident

-no specific family information given

Behavioural Observations throughout Assessment:
First Assessment:

-friendy, rambling conversation, desired to be cooperative, disorientated and confused requiring frequent re-direction and repeating of instruction.

-affect is flat and expressionless

Second Assessment:

-behaviour more agitated that during first assessment, very distractible and impulsive, easily frustrated and confused, became confused mid –task,

-affect is flat and expressionless

-evidence of a serious level of social/emotional disturbance emerging

-complaints regarding current academic placement (friends have gone to high school, she has remained in elementary school)

Assessment Results:

1. Cognitive

First Assessment: done 5 weeks after craniotomy

-WISC: FSIQ: 64; VIQ: 81; PIQ: 51; 30 point split between VIQ and PIQ

-PPVT (Dunn & Dunn, 1981)-very low score

Second Assessment: done 6 months after craniotomy

-WISC: FSIQ: 71 VIQ: 84; PIQ: 62; 22 point split between VIQ and PIQ

-PPVT- very low score but a significant increase in performance since first testing

-examiner explains this difference by stating that the subject is “moving towards a more typical manifestation of the NLD syndrome as the acute effects of her brain lesions subside”

2. Achievement:

First Assessment:

-WRAT indicates high scores in Reading and Spelling, low score in Arithmetic
Second Assessment:
- WRAT indicates high scores in Reading and Spelling, low score in Arithmetic

3. Visual

First Assessment:
- large deficits in visual-spatial-organizational skills
- WISC Block Design and Object Assembly beyond her ability
- good script writing
- impaired score on Target Test

Second Assessment:
- large deficits in visual-spatial-organization skills continue (Note subtests of WISC)
- assists copying tasks through verbal self-talk
- WISC Block Design and Object Assembly beyond her ability.
- good script writing (examiner speculates this skill was intact prior to accident)
- impaired score on Target Test

4. Motor:

First Assessment:
- all left hand task performance below normal
- performance of simple motor skills, relative to her age, superior to performance on more complex psychomotor tasks.

Second Assessment:
- all left hand task performance below normal
- some limited improvement in left-hand motor skills
- the degree of difference in abilities to perform simple motor tasks and more complex motor tasks, relative to her age, has increased
5. Auditory

-First Assessment:
- normal scores on Speech-Sounds Perception Test (Reitan, n.d.) and also WISC Digit Span Subtest
- Sentence Memory and Verbal Fluency Tests were impaired

-Second Assessment:
- normal scores on Auditory Closure Test and also WISC Digit Span subtest
- impairment in Sentence Memory and Verbal Fluency Tests
- some slight improvement in verbal fluency

6. Social/Emotional:

First Assessment:
- immediately prior to accident very popular with peers
- ability for adaptive behaviour severely impaired for tasks in which perception, memory, analysis, synthesis, and integration of visual-spatial information is required.

Second Assessment:
- friends go to high school, she remains in elementary school, loss of peer group, poor social skills
- excluded by peer group, no interactions
- frequent incidents of inappropriate behaviour
- content-free conversation, ineffective conversation, unable to appreciate the communication of others
- ability for adaptive behaviour severely impaired for tasks in which perception, memory, analysis, synthesis, and integration of visual-spatial information is required.

Study 4 (Roman, 1998, pp.15-18)

Name: C.K.
Age: 15 years
Background Information:
- attends 9th grade
- referred for neuropsychological assessment by psychiatrist during his third inpatient psychiatric hospitalization
- poor academic performance, class for behavioural disorders has been placement for several years
- history of school refusal

Developmental and Family History:
- none indicated in report

Behavioural Observations throughout Assessment:
- none indicated in report

Assessment Results:

1. Cognitive:
- WISC-III indicates Full Scale IQ of 65, Verbal IQ of 78, and Performance IQ of 58
- notable 22 point span between Verbal Comprehensive Index and Perceptual Organizational Index
- only remotely successful perceptual tasks involved a measure of verbal input (Picture Arrangement)
- perseveration with use of incorrect problem strategy noted through session
- Trail Making Test (Reitan, 1979): difficulty switching mental sets between sections A and B

2. Achievement:
- WRAT: word recognition and spatial data:
  - generally impaired visual-spatial perception
- Developmental Test of Visual Motor Integration indicates poor design copying

3. Visual:
- Not noted

4. Motor:
-sensory/perceptual /and fine motor abilities all within impaired range

-right hand not superior to left hand

-fingertip number writing stronger than finger localization

5. Auditory:

-PPVT-R and WISC-III indicate low average receptive vocabulary

-some evidence of deficits in expressive language as noted in Controlled Oral Words Association Test, Boston Naming Test (Kaplan, Goodglass, & Weintraub, 1983)

6. Social /Emotional:

--history of depression, suicide ideation, anxiety, aggressive behaviour

-Ritalin, various anti-depressants ineffective

--no friends at school or home, picked on by other children

-beginning to experiment with gang involvement, unaware what gang gestures mean although he occasionally uses them

-more successful in interactions with adults

-continuing involvement with mental health network, including inpatient hospitalization

-regarded by school and parents as not caring to address his behaviour problems

-early stages of gang interest and involvement

- family intolerance of learning and behavioural issues

Study #5 (Rourke, 1989, pp.192-200)

Name: Bob

Age: 6 years, 8 months

Background Information:
-at 16 months suffered a compound depressed skull fracture of the right temporo-parietal region
-referred to determine nature and extent of adaptive skills and abilities

Developmental and Family History:

- none given

Behavioural Assessment throughout Testing:

-more alert during morning testing sessions than afternoon sessions, test results still considered reliable
-talkative, easily distracted, careless in task execution
-at times antagonistic towards tester
-intolerant of frustration

appeared to be confused by test instructions occasionally

Assessment Results:

1. Cognitive:

WISC-R:

-Full Scale IQ of 93
-Verbal IQ of 94, subscales ranging from low of 7 (Arithmetic) to high of 10 (Information and Vocabulary tests)
-Performance IQ of 92, large subscale range, low of 6 (Picture Completion) to high of 14 (Coding)

PPVT: mental age of 6 years, 6 months, equivalent to an IQ of 95

2. Achievement:

-WRAT-R:

-results indicated in grade equivalent scores and percentile scores: Reading,1 (23); Spelling, <1 (5); and Arithmetic, 1 (21)
-evidence of stronger phonemic skills in spelling, as opposed to sight words

3. Visual:
- no evidence of visual distortion when reproducing visual designs, age appropriate
- visual discrimination and visual-spatial-organizational skills were quite variable
- mild to moderate impaired memory for visual sequencing on Target Test

4. Auditory:
- no indications of simple auditory imperceptions or suppression
- Rosner Auditory Analysis Test (Rosner, n.d.) (analysis of complex words) evidenced poor performance
- Within average range were Auditory Closure test and Sentence Memory Test, for memory of sentences of increasing length
- no aphasic deficits

5. Social/Emotional:
- no evidence of pathology
- Examiner notes that “...significant lesions within the right cerebral hemisphere at an early age are often found to have long-lasting negative impact on personal, social, and vocational adaptation. The presence of relatively intact verbal skills often masks the nature of problem-solving and other deficiencies which tend to increase with the passing of time.”

Study # 6 (Rourke, 1989, pp.151-163)

Name: Mary
Age: First Assessment: 9 years, Second Assessment: 11 ½ years

Background Information:
- referred because of problems in academic performance
- subject suffers from complete agenesis of corpus callosum, has seizure disorder, anti convulsant medication (Depakene, 1000mg once daily; Tegretol, 200mg three times daily)
-concerns regarding social/emotional deviations

Developmental and Family History:
-no information given

Behavioural Observations throughout Assessment:
-none noted

Assessment Results:

1. Cognitive:

First Assessment:
- WISC: FIQ, 94; VIQ, 104; PIQ, 85
- PIQ 19 points lower than VIQ on WISC
- difficulty with cause and effect (WISC Picture Arrangement)
- Category Test: moderately impaired (requires strategy generation, problem solving, hypothesis testing)

Second Assessment:
- WISC-R: FIQ, 78; VIQ, 88; PIQ, 70
- drops in FIQ (15 points), VIQ (16), and PIQ (16)

2. Achievement:

First Assessment:
- WRAT: word recognition (Gr. 6.9; 91 percentile) and spelling (Gr. 6.5; 92 percentile) well above average for her age, math performance (Gr. 4.1; 55 percentile) significantly inferior although still in average range

Second Assessment:
- WRAT: word recognition (Gr. 8; 87 percentile) spelling (Gr. 8; 94 percentile) math (Gr. 4; 16 percentile)

3. Visual:

First Assessment:
- low scores on some WISC Performance Subscales (Picture Arrangement and Object Assembly)
- Target Test yields moderately impaired level

- Rote Memory Tasks (WISC Information, Vocabulary, and Digit Span) borderline

Second Assessment:

- visual distortion and difficulty reproducing visual design in both assessments

4. Motor:

First Assessment:

- some impairment of tactile perception noted on both hands, left-handed, right-footed, left-eyed

- moderate to severe bilateral deficiencies (Grooved Peg Board Test, Holes Test, Tactile Performance Test), performance especially impaired in the left hand

Second Assessment:

- psychomotor scores continued in moderate to severely impaired range

- lower score on hyperactivity

5. Auditory:

First Assessment:

- strong phonemic skills noted

- PPVT: average level

- did less well on test requiring a degree of verbal processing (WISC Comprehension and Arithmetic)

Second Assessment:

- decline in age-related verbal fluency

- strong phonemic skills continue

6. Social/Emotional:

First Assessment:
-PIC: assessed by mother, shows subject to be deficient in social relationships with persons outside of immediate family, tendency for internalized psychopathology (anxiety, social withdrawal, depression, inappropriate social behaviour)

-Second Assessment:
-PIC: increase in elevation, increased perception of social/emotional disturbance over time, decline in hyperactive behaviour

-VABS: Subject’s Adaptive Behaviour Composite on this assessment is one or less, severely low, extreme deficiencies continue from first assessment on many age-appropriate adaptive skills, more prominent internalized psychopathology

**Study 7** (Yalof, 2006, pp.15-34)

Name: Allen

Age: 5th grade, latency aged student

Background Information:

-referred by a psychologist for an evaluation for NLD and social-emotional adjustment, and to rule out OCD.

Developmental and Family History:

- intact home and family with 2 parents and 3 younger brothers

-family financially comfortable and children have benefit of enriching experiences

-uncomplicated pregnancy

-birth by c-section

-family history of autism and ADHD, possible LD on father’s side

-no early childhood developmental delays
- gross motor coordination better than hand-eye
- hypersensitivity noted for auditory and tactile modalities
- beginning early on, subject had encyclopaedic knowledge of and preoccupation for dinosaurs etc
- found school difficult

Behavioural Observations throughout Assessment:
- Allen reported feeling anxious, socially awkward communication style, was very upset about ending testing session- obsessive interest in dinosaurs noted.

Assessment Results:

1. Cognitive:
- significant difference between PIQ and VIQ on WAIS-III
- processing speed and perceptual organizational scores lower than FIQ and VIQ
- challenges in visual processing and auditory attention noted...completed only 3 of 5 designs on Object Assembly task of WAIS-III and was very frustrated
- superior performance on identifying missing item on Picture Completion subtest of WAIS-III-presented a pattern noted by Weintraub and Mesulam (1983) in which NLD subjects typically have Block Design Scores within the normal range as compared to Object Assembly scores which are significantly lower
- PPVT-III above average
- WIAT-II (Wechler, 1992) demonstrate arithmetic lower than reading comprehension

2. Achievement:
- WIAT-II indicated arithmetic lower than reading comprehension, spelling slightly higher than arithmetic,
- scored mild-moderate impairment on measures of executive functioning

3. Visual:
- visual retrieval or visual memory deficit noted

4. Motor:
- left hand stronger than right hand
- bilateral strength normal
- motor skill tests did not show typical NLD deficit pattern

5. Auditory:
- scores average to above average on measures in this area

6. Social/Emotional:
- imaginary friend despite age-inappropriateness of this
- considerable time spent in fantasy world
- anxiety about his mother’s health despite her apparent good condition –
- anxiety over the death of an aunt some years previous
- noted that he was teased and bullied by peers, and that he preferred to “play in my mind”
- no visual hallucinations, but sometimes thought he heard a voice very much like his mother’s.
- appeared to meet some diagnostic criteria for AS, but ultimately a diagnosis of NLD with AS features was determined as the result of thorough, multi-disciplined, and meticulous assessments and consultations.
- when frustrated would tantrum
- struggled with social interactions
- diagnosed with ADHD (mixed subtype) and placed on Ritalin


Name: Robert

Age: 11 years, 8 months

Background Information:
-referred by parents concerned about his peer isolation, despite excellent school performance

-younger of two children

-MRI shows abnormality in the right middle temporal gyrus white matter of his brain

Developmental and Family History:

- uneventful pregnancy and birth, normal first year, normal preschool development except for some awkwardness and clumsiness.

-social problems at 3 years in preschool, particular interest in astronomy

-diagnosed with anxiety disorder at 8 years

Behavioural Observations throughout Assessment:

- information not given

Assessment Results:

1. Cognitive: WISC-III VIQ, 150; PIQ,116 indicating intelligence in the very superior range, great variability on subtests was noted with average on social skill tasks, to very superior on others.

-measures of executive function were 1.0-2.5 standard deviations below average

2. Achievement:

3. Visual:

-visual motor tasks noted to be 2.5 standard deviations below average

4. Motor:

-clumsiness and awkwardness noted

5. Auditory:

-not described in this report

6. Social/Emotional:

-3 standard deviations below average for age peers in expressive language

-unable to use or decipher nonverbal communications
Vineland Adaptive Behaviour Scale indicated adaptive behaviour at 5 standard deviations below that of his full scale IQ.

Profile indicates written language skills at 14yr.6 months age level and interpersonal abilities at 2years 7 months level.

**Study 9** (Stein, 2004, pp. 243-247)

Name: Frankie

Age: 8

Background Information: referred because of school difficulties in second grade, decreasing self-confidence

difficulty with visual motor skills and handwriting

-previous psychological testing at school, parents seeking second evaluation-

-attachment to carrying a piece of rope

-difficult to get him to change activities when he becomes involved

-has emotional outbursts, easily frustrated

-Ritalin unsuccessful

Developmental and Family History:

-born with cord around neck, normal neonatal period, normal preschool milestones.

-preschool teacher noted difficulty with fine motor tasks

-father has ADHD and learning disabilities

Behavioural Observations throughout Assessment:

-not noted

Assessment Results:
1. Cognitive:
- Woodcock Johnson Battery showed strength in word retrieval skills
- WISC-III: VIQ, 104; PIQ, 97- high subscore Vocabulary (13) lowest subscores Coding (6) and symbol search (6), indicating a wide score scatter

2. Achievement:
- weak in spelling and reading, good vocabulary, poor organizational skills, knowledge superior, other scores average

3. Visual:
- difficulty with visual motor skills and handwriting

4. Motor:
- difficulty with handwriting

5. Auditory:
- Woodcock Johnson Battery showed weakness in auditory processing

6. Social/Emotional:
- Behaviour Assessment System for Children (BASC) indicates concerns in anxiety/depression, adaptability.

Study 10 (Rourke, 1989, pp. 183-191)

Name: John
Age: almost 12 years 11 months

Background Information:
- had neuropsychological assessments at age 12 years, 11 months, and also at 11 years.
- information is reported on the 12 year, 11 month assessment
- difficulties in the sciences and in social relationships

- parents investigating possible therapy and/or alternative education program for son

- Parents misunderstanding of subject’s assets and deficits,

Developmental and Family History:

Behavioural Observations throughout Assessment-subject cooperative, but it was difficult to establish rapport, limited eye contact, flat expression, uncommunicative, repetitive behaviour of examining his watch

Assessment Results:

1. Cognitive:

- WISC: VIQ, 106; (range of 8 on Comprehension to 19 on Digit Span); PIQ, 72; (low of 4 on Block Design to high of 7 on Picture Completion) Difference in Verbal and Performance Scales = 34 points

- Concept formation on Categories Test moderately impaired

- difficulty with nonverbal concept formation, good rote memory skills

2. Achievement:

- WRAT-R: Reading 99th percentile, Spelling 95th percentile, Arithmetic 68th percentile

- spelling errors were all phonetically accurate

- inattention to visual detail confounded many mathematical attempts

3. Visual:

- mild visual distortions in design copying, difficulty with complex visual stimuli

- showed pattern of impaired visual-spatial-organizational skills

4. Motor:

- marked impairment in fine motor coordination under speed, difficulty with eye-hand coordination

- tactual perceptual deficits
5. Auditory:
-no indication of auditory difficulty, verbal fluency mildly impaired

6. Social/Emotional:
-Personality Inventory for Children completed by father indicates difficulty in social judgement, and social learning, also internalized psychopathology (examiner notes that “treatment within a center for the emotionally disturbed is often recommended for children such as this, but one has to be very cautious with such a recommendation because it is usually the case that the therapeutic personnel within such a center are naive with respect to the social, emotional, and academic implications of the NLD syndrome.”

**Study # 11** (Woods, Weinborn, Ball, Tiller-Nevin, & Pickett, pp.247-285)

Name: Twin
Age: 8 yrs

Background Information:
- an identical twin study involving one twin, diagnosed at birth with periventricular leukomalacia, a neuropathological condition in which areas of necrotic white matter develop within the anterior and temporal-occipital horns of the lateral ventricles and corona radiate (Spreen, Tupper, Risser, Tuoko, & Edgell, 1984). “The correlates of PVL include impairments in myelination along with diminished cerebral white matter volume and increased ventricular size (Volpe, 1998), as cited in Woods et.al (2000). The nonclinical twin was not affected. Both twins were assessed separately by the same experienced neuropsychological technician.

Developmental and Family History:
- mother bled heavily from 6th – 16th week of gestation.
- at 18th week of gestation mother diagnosed with severe anemia, gestational diabetes, amniotic fluid surrounding clinical twin leaked, but amniotic fluid surrounding the non clinical twin did not.

- labour and delivery at 28 weeks gestation.

- birth weight of clinical twin was 2 lbs .5oz., required ventilator

- PVL lesions noted on 2nd day of life (clinical twin) via head ultrasound. CT at 12 and 14 months showed enlarged ventricles and mild cortical atrophy.

- clinical twin weaker on left side of body

- clinical twin had additional hospitalizations for seizures, pneumonia, ear infections, tonsils . Seizures began at 6 months of age in clinical twin

- no family history of seizures

- clinical twin had good language skills from an early age

- demonstrated psychomotor weakness, especially on the left side, and was unable to walk until 21 months of age

- demonstrates difficulty following directions, poor problem solving ability. School indicates clinical twin can only handle one step directions

- clinical twin demonstrates difficulty writing

K teacher thought language skills warranted eligibility for gifted placement of clinical twin

- non clinical twin delivered via c-section, but not diagnosed with PVL, weighed 3 lbs,3 oz at birth, also required ventilator, had jaundice, at 3 weeks, had laser surgery to remove hemangiatosis which was causing him to be lethargic...situation was resolved successfully, asthma and some respiratory problems ensued throughout development, spoke late, other developmental milestones within average parameters.

- teacher notes that nonclinical twin often requires re-direction, achieves well in academic areas.

- family history positive for LD, depression, alcohol abuse, MS, and Parkinson’s disease.
-this case study supports Rourke’s (1987) theory that “white matter disease may play a significant role in the expression of NLD.” (Woods et.al. 2000, p282)

Behavioural Observations throughout Assessment:

-during testing twins were alert, no indication of psychotic thought processes or content, no evidence of gross motor impairment, spoke well.

-clinical twin encountered difficulty with fine motor tasks and tasks involving visual motor skills, demonstrated low tolerance for frustration, was oblivious to social cues. Nonclinical twin demonstrated mild inattentiveness. Both were cooperative and motivated. Test results considered valid.

Assessment Results:

1. Cognitive:

-clinical twin above average intelligence: WISC-III FIQ= 118; VIQ= 128, PIQ= 103. Statistically significant difference between verbal and performance scores. Specific weakness noted on some subtests: Digit Span (7) and Picture Arrangement (8)

-- nonclinical twin evidenced WISC-III FIQ=123; VIQ=134, PIQ=106(with significant difference between verbal and performance scores, and consistent with NLD literature).

2. Achievement:

-clinical twin presented achievement scores consistent with intellectual ability: WRAT-3, Reading+107; PIAT-R Reading Comprehension=114, written expression WIAT=111. As measured by WRAT-3 there is a 1.5 sd discrepancy between FIQ=118 and spelling ability =94. There was a 1 1/3 discrepancy between FIQ=118 and arithmetic (WRAT-3)= 98. Nonclinical twin demonstrated superior expressive vocabulary PPVT-III=123

-nonclinical twin presented academic achievement scores that were consistent with measured intellectual functioning and did not evidence the presence of any learning disability
“The clinical twin displayed a distinct pattern of intellectual, academic, and neuropsychological test results that have been identified among children with NLD” (Woods et al., 2000, p.282).

3. Visual:
- clinical twin demonstrated superior range visual motor integration VMI=128

4. Motor:
- clinical twin evidenced significant deficits in Tactile Performance Test (TPT).
- neuropsychological tests for the nonclinical twin were within normal limits

5. Auditory:
- not given

6. Social/Emotional:
- Scores of daily living assessment for clinical twin fell within the borderline range
- clinical twin evidenced elevated intellectual, withdrawal, and psychosis scales of the PIC-R
- problem solving and concept formation for clinical twin within normal limits.
- adaptive abilities for nonclinical twin fell within normal range
- clinical twin often cries when frustrated, has low tolerance for frustration
- so far, gets along with other people

Study 12 (Plotts & Livermore, 2007, pp.124-134)

Name: LP Age: 20 years 4 months

Background Information:
- referred by parents to see if learning disability was the cause of difficulty experienced in college. No previous assessments (psychoeducational, neuropsychological, psychiatric)
- currently attending small private college, placed on academic warning after failing one course.
-school performance to this point had been satisfactory

-Developmental and Family History:

- third of three children

- birth weight 3 lbs, 11 oz following a full term normal pregnancy

- RSS diagnosed 1 year after birth, based on clinical features: triangular face, minimal appetite, lack of expected growth, low birth weight, no genetic testing done, RSS phenotype displayed by LP considered to be mild

- diagnosed with scoliosis during early childhood

- family history negative for RSS or any other medical, psychological, or psychiatric disorders.

Behavioural Observations throughout Assessment:

- Acknowledged feelings of depression

Assessment Results:

1. Cognitive:

   - WAIS-III verbal IQ superior range = 122 (93 %ile), PIQ in average range = 104 (61 %ile) FIQ = 114 (82 %ile).

   Statistically significant difference between PIQ and VIQ. Verbal comprehension index score very superior, perceptual organization index score average

   - working memory was average while processing speed index was in the borderline range

   - considerable score scatter noted: significantly below average Digit Symbol Coding, very superior Vocabulary, evidence of superior verbal knowledge and reasoning

2. Achievement:

   - Woodcock-Johnson Tests of Academic Achievement-Revised (WJ-R) superior reading skills, word recognition than passage comprehension; math skills in average range, low average writing fluency consistent with weak processing speed noted on WAIS-III

3. Visual:
-average range visual perceptual ability noted on WAIS-III, Benton Visual Retention Test-5th edition, LP scored in defective range, this test indicated weak visual spatial memory Results of Bender Gestalt Visual Motor Test confirm weakness in visual-motor skills.

4. Motor:
- below average visual-motor processing speed

5. Auditory:
- average short term auditory memory

6. Social/Emotional:
- LP and parents both indicate a history of LP’s social skills problems, limited friendships, and difficulty maintaining friendships
- Beck Depression Inventory (Beck & Steer, 1993) indicates mild level of depression
- LP reported difficulty in completing and focusing upon tasks
- LP sees counsellor at college for issues of stress management, reported feeling helpless and worried

The information contained in the previous study summaries can be condensed yet again. In order to further clarify factors common to NLD as they relate to the case study population, a chart was created that illustrates the existence of such symptoms and features within each individual case study. This chart is included at the end of this chapter.

**Discussion of Case Histories**

An initial overview of the data samplings immediately impresses upon the reader the great amount of symptom variability present amongst individuals with NLD, while, at the same time, ironically focusing his/her attention upon the presence of the consistent patterns and features that currently
attempt to define the disorder. Such perusal engenders a degree of sympathy for academics and professionals charged with the task of determining a universally accepted standard or definition for this disability. As well, such a broad range of deviation within this syndrome is evidence of the huge challenge facing the educational system as it struggles to plan for the student with NLD.

At first glance, the standard expected features of this disability, widely ascribed to in academic literature (Little, 1999; Thompson, 1996) are clearly present in this sampling of individuals: visual-spatial problems are common, motor coordination functions, especially fine motor coordination, are often compromised, and cognitive patterns in which the performance IQ is significantly less than the verbal IQ are frequent. Evidence of consistent difficulty within the social/emotional domain is observable, as is a common profile of cognitive and academic strengths and deficits. As such, the current sampling of data presented in this chapter provides a representation of the nonverbal learning disability that is comprehensive and inclusive.

However, further examination of these cases reveals the individual differences as well. Such points of individual difference may involve such features as variance in individual FIQ scores, the presence of physical trauma, and the degree to which NLD begins to closely resemble and merge with other disorders, to name a few. To this end, a delineation of the less obvious factors which appear to exist amongst sample subjects is also useful, as is the practical application of this knowledge, to extant scholarly documentation and to a discussion of the challenges confronting educational environments as they attempt to appropriately accommodate the unique needs of learners with NLD.

Aside from addressing a fairly universal acceptance of the existence of the predominant characteristics and patterns of the NLD presentation, the scholarly community quickly divides itself into varying opinions and positions regarding an actual definition of this condition. To some, NLD is regarded as a specific condition (Myklebust, 1968); to others, it is seen as a unique syndrome of disorders (Rourke, 1989, 1995). Others regard it on a continuum with other similar disorders, and understand the
NLD condition to present many features that overlap and intermingle with these other conditions (Schopler, Mesilow & Kunce, 1998). Still others (Pennington, 1991) question NLD’s representation as a unique disability at all.

The cases presented within this chapter offer a practical illustration of many of these opinions presented within the scholarly literature. Even within this small number of cases, evidence is found of some of the many factors which fuel such debate. The consistent presentation of features typically associated with NLD, and demonstrated within this sample; lend support to the scholarly position characterizing NLD as a unique syndrome of disorders. As well, the cases of Robert and Frankie also lend evidence to the opinion that NLD is on a spectrum with other similar disorders.

The summarized material, and also the highlighted chart, presented in this chapter draw immediate attention to the symptom deviation and confusion affecting the NLD condition. While all of the cases represented within this sample present NLD’s hallmark indicator of a verbal IQ higher than the performance IQ, some fall short of the mark when the criteria of a significant split in these two scores, regarded as being fifteen or even ten points of difference, is applied. In the cases of Frankie, (VIQ,104 ; PIQ,97 ), and Bob(VIQ,94 ; PIQ,92 ), the significant split in scores between the VIQ and PIQ is absent, and yet symptoms of the NLD condition are still very much in evidence. On the other hand, the case study involving the identical twins interestingly evidences the nonclinical twin as presenting the hallmark significant split between FIQ and VIQ scores, but failing to display a full array of symptoms characterizing NLD when further neuropsychological assessment is applied. Often, closer scrutiny of the subscale scores of the PIQ and VIQ sections of the cognitive assessment reveals the source of concern. Variation in subscale scores or "score scatter" is often characteristic of the NLD syndrome. Here, again, the practical presentation of this disorder poses challenges for those attempting to secure its diagnosis. An overall pattern of generally characterizing the NLD condition may exist; but the profile of each subject is unique.
A difference between the overall PIQ and VIQ scores, with the PIQ being the significantly lower score, and to some extent, the influence of the subscale scores, plays a key role in fuelling the definition debate which rages within the scholarly community. It is not uncommon for such patterns to characterize other closely related disorders as well. As such, it is not difficult to understand the academic frustration arising regarding this apparent overlap of conditions such confusion supports. The case of Robert presents a situation in which a diagnosis of Asperger’s Disorder has ultimately been made, but is also one in which the examiner allows that the subject’s profile bears significant likeness to the nonverbal learning disability. When the number of potentially overlapping characteristics between the NLD and the Asperger’s conditions are considered, indeed, the possibility exists that a different examiner may have possibly made a diagnosis of NLD. The overlap of characteristic NLD features is often noted by researchers (Vacca, 2001), and at times, as in the case of Robert this is often substantial. An examination of Robert’s case immediately illustrates the frustration encountered by the academic community in its struggle to define and standardize the NLD condition. In a similar, yet reversed situation, the case of Allen indicates an individual who, despite presenting many symptoms often attributed to AS, is ultimately diagnosed as NLD with AS features.

At the same time, the cases of Allen and Robert also illustrate defining features which research has established as factors serving to delineate NLD and other closely related conditions. Typically it is the ability of the Asperger’s individual to use language (Klin, Volkmar, Cicchetti and Rourke, 1995) that often differentiates him/her from the autistic individual, and it is the existence of repetitive movements and obsessive interests developed to a very superior degree which often mark the difference between the Asperger’s and NLD conditions (Miller, 2004). As well, Asperger’s individuals do not generally present compromised achievement profiles (Miller, 2004), and thus do not necessarily display the characteristic math deficit. Measures of adaptive functioning have also been accessed as a means of distinguishing between individuals with Asperger’s and NLD. Stein (2004) noted that characteristically there was a
difference of three standard deviation points between the verbal intelligence quotient and the socialization score on the Vineland Adaptive Functioning Index for individuals affected with Asperger’s Syndrome. Some of these defining tendencies are evident in the case of Robert, most notably the difference between FIQ and the score on the Vineland Adaptive Functioning Index, which is reportedly a score spread of five standard deviations. In addition, AS individuals often demonstrate pervasive interest in and knowledge of unique subjects of personal interest. This tendency is not usually symptomatic of the NLD condition, although it is present in the case of Allen.

However, in practical application, such separating differences often become subtle factors, and the task of differentiating between these varying conditions becomes extremely challenging indeed. The case of Frankie also demonstrates how numerous professionals can come to a number of different diagnoses based on the same set of symptoms; NLD being one such possible diagnosis. The case of Allen illustrates the painstaking process leading to the ultimate diagnostic conclusion. As can be illustrated by these few cases, these subtle confusions, overlaps, and interplays, which occur between these several, close, but hypothetically different, conditions, become, in practical diagnostic application, very problematic. They well illuminate the dilemma confronting scholars as they struggle to create a diagnostic standard and consensually acceptable definition of this disorder.

Other degrees of variance within the population affected by NLD may also become problematic for those seeking to define this disability. It is possible that one subject may present severely impaired visual perceptual difficulties while another may present a milder disability. In the case of Bob, the youngest subject included in this sample, scores in the visual domain were quite variable, with some areas only rating mild impairment, whereas Robert demonstrated evidence that his ability in the visual domain lagged 2.5 standard deviations below the mean. Intelligence also, as represented by FIQ, can be a highly variable characteristic within the population affected by NLD. An overview of sample subjects presents evidence of this factor: Peter, FIQ within the average range; Robert, FIQ in the superior range;
and C.K., FIQ more than a full standard deviation below the mean. Adaptive functioning skills, affected by perceptual impairments over time, can also be widely varying, not only from individual to individual, but also as measured at different stages of the individual’s development. It is of interest that Bob, a significantly younger subject is the only subject in the selected cases to not show evidence of social/emotional/behavioural difficulty at this stage of his development.

Under the terms of the physical model of NLD compiled by Rourke (1995), it is also possible for the nonverbal learning disability to exist co morbidly with other neurological afflictions. Damage in another part of the brain may well impact upon, or interact with the white matter of the right hemisphere already hypothesized to be damaged in the individual with NLD. Such a situation may well offer explanation for a variant profile, especially in the case of an NLD diagnosis with AS features or an AS diagnoses with NLD features.

Physical trauma to the right brain may effect a presentation of the NLD condition. In this chapter, Cathy incurred severe trauma to her right brain. As a result, it is speculated that she is able to produce good handwriting because this skill was developed prior to the insult and was already transferred and stored predominately in the left brain area. In this case, it is possible to note the decline of certain skills and abilities, and the subsequent appearance of NLD-like symptoms, over time following this trauma to her right brain. Academic questions are also raised surrounding the appropriateness of including such disabilities in later stages of development within the definition of NLD. However, as demonstrated in the case of Cathy, the symptoms and profiles are compatible. Support for such inclusion comes from Rourke (1995) and his theory of the “great common pathway”. It is of interest that numerous cases presented in this chapter have documentation of some type of physical trauma to the brain, or documentation of events in which the potential for such trauma to have occurred is existent, such as Caesarean sections, difficult labour, etc. The cases of LP (RSS) and the clinical twin (PVL) support this position.
The cases presented in this chapter offer illustration of additional considerations presented throughout scholarly literature addressing the subject of nonverbal learning disability. Rourke (1998) states the assessment process querying the existence of NLD condition must be multifaceted in nature. It is the feeling of Roman (1998) that a diagnosis of NLD not be determined based solely on information gleaned from cognitive assessment alone. To this end, scholarly literature is supportive of the necessity of a complete neuropsychological assessment being employed in establishing the NLD diagnosis. Such assessment embraces investigation of visual-spatial-organizational, motor, and often auditory domains, in addition to the standard cognitive assessment. Information from achievement testing offers further insight into this condition. The evaluation is not complete without a consideration of the emotional/social/behavioural status of the individual in question. Rourke’s (1998) original proposal has been further expanded upon most notably by Pelltier, Ahmad, and Rourke (2001) who have put forth a detailed assessment protocol to perhaps most completely address the extremely variable and individually unique nature of this disability. In the case of the nonclinical twin, a diagnosis of NLD, which could have been anticipated as a result of cognitive testing alone, was subsequently evidenced as incorrect on the basis of further neuropsychological testing which provided an expanded range of assessment.

Within the structure hypothesized by Pelltier, Ahmad, and Rourke (2001) the existence and degree of the NLD condition is assessed by the number of qualifying variables demonstrated by the individual. Such a system of assessment presents flexibility to encompass a wide variety of symptoms displayed as well as the varying degree of severity that each of these may present. As such it offers the assessor an indication of the severity of the nonverbal disability affecting the individual under consideration. Applied to the sample of cases presented in this chapter this system of assessment would be very useful as certain subjects could be determined to be more severely affected by this disability.
than others. In subsequent planning and intervention, this information would be valuable in determining program characteristics as well as the level of support required by the individual.

Researchers (Thompson, 1996) have noted this disability to be an extremely serious, often underrated disability with far-reaching consequences for the entire life of the individual. Thus seen, the prognosis for such affected individuals is bleak. Unable to interpret nonverbal information, to perform well in situations requiring requisite amounts of nonverbal problem solving ability and to profit from past experiences, individuals with NLD do not adapt well to independent living situations or independent productive function within society. The tendency for internalization of psychosis as a result of this dilemma further compounds the situation. It is critical that adaptive behaviour be assessed and factored into the degree of the individual’s affliction; it is also critical that training to improve this situation, to even a limited extent, be undertaken. Cases presented in this chapter give evidence and practical support to such academic postulations. With the exception of Bob and the clinical twin, who are possibly too young to yet experience such tertiary symptoms of this disability, all other subjects are noted to struggle in the social/emotional/behavioural domain, with a significant number of subjects already accessing psychiatric services.

The cases presented in this chapter put forth an illustration of some of the challenges faced by the educational environment as it attempts to plan for the individual with NLD, as well as point to some practical suggestions for the management of this student. Of first importance is the role and importance of assessment. Given the similarity to and overlap with other related disorders, as well as the academic confusion surrounding the NLD symptoms, it is critical that the foundation for any student programming be based upon a solid foundation of good neuropsychological assessment proven to be appropriate to this condition. Accurate information regarding the existence, as well as the individual profile and also the degree and severity of this condition is crucial for appropriate student planning. In the instances of
the cases presented in this chapter, programming for C.K. in all likelihood would look different than that designed for Cathy.

As a means of alerting schools to the presence of the NLD condition, school-wide and grade specific assessments could, as part of their purpose, be utilized to denote early indicators of this disorder. Assessments such as Brigance (Brigance, n.d.) kindergarten assessment, TWS (Larssen & Hammill, 1994), group WRAT (Jastak & Jastak, n.d.) and the House, Tree, Person (Buck, 1966) tests could be useful in this regard. Teachers trained to discern problematic information would then refer the student onwards for further assessment. The NLD condition proceeds throughout secondary and tertiary symptoms as age advances, and it is crucial that attempts for specific training begin as early as possible.

While an assessment system such as the one set forth by Pelltier, Ahmad, and Rourke (2001) provides an excellent measure for the assessment of this disorder, informal flags of this disability may also serve a valuable role within the educational system. The cases under consideration in this chapter offer insight into this possible application within the educational environment. Informal indicators, if noted by educators and parents may precede the formal assessment, may raise concerns that a formal assessment is warranted, and may well insure that the needs of the affected individual are met early on and without delay. The case of David illustrates the importance of childhood drawings, of physical clumsiness etc. in the early screening of this disorder. Of greatest danger is the attitude expressed by one professional assessing Frankie who suggested an attitude of “let’s wait and see”. In the case of the individual with NLD such an attitude is not only dangerous, but actually guarantees that the effects of this condition will be more serious than if it had been addressed early on. Many individuals, including parents, day care workers, preschool teachers, early years teachers, to say nothing of those individuals providing services within the health care system, could be educated and made aware of the warning signs of this disability and thus act as screeners who would eventually seek competent assessors for children who display NLD like symptoms.
The case of LP allows the reader to view the NLD condition from the perspective of a 20 year old individual with no prior definitive diagnosis. If this intervention had been available earlier on in his development, more appropriate interventions could have been planned. The case of Bob points to the absence or lesser degree of secondary or tertiary symptoms at an earlier age. The case of Jane illustrates that through appropriate planning, training and educational experiences, the symptoms of this disorder are not able to be eliminated, but are somewhat able to be ameliorated. The importance of early diagnosis and intervention to the eventual and overall adaptive function of the individual with NLD throughout later life and within society cannot be understated or underestimated.

It is of interest to note that within this sampling of cases that Jane showed some modest gain in the social/emotional/behavioural domain and also received an appropriate, specialized, and in this situation, separate, educational program. The case of Allen illustrates a family’s sense of perceived need as well as their active search for an appropriate educational setting for their child’s unique learning needs. The case of C.K. denotes the tragedy that can befall a student with NLD who is lacking appropriate management within the educational environment. C.K. did receive special programming, but he was improperly labelled and placed in a class for emotionally/behaviourally disturbed students. No specialized attention was given to his NLD profile. The fact, unfortunately, this mistake is often repeated with students affected by NLD, points to the need within the educational system for consideration of and provision of appropriate specialized classroom alternatives for some of the students affected by NLD.

In considering the case studies presented within this chapter, it is possible to see areas of commonality between NLD and other conditions with similar and overlapping symptoms. While these conditions are doubtlessly separate and different from each other, it is still understandable that such areas of common ground could be utilized to the benefit of these unique students as their educational plans were created. If specialized classes and programs were established within the school system for
students with NLD, it is possible for reasons of numbers or sheer economics, that some of these closely related conditions could be accommodated within the same framework.

A common factor noticeable amongst the cases presented in this chapter is the prevalence of concern demonstrated within the social/emotional/behavioural domain. As the subjects in this study have advanced in age, such difficulty appears to have been all but guaranteed. Subjects presented in this chapter have struggled with peer relationships, demonstrated a deficit in the area of nonverbal problem solving skills, presented extremely poor levels of adaptive functioning, and have often reported feelings of low self esteem. Levels of internalized psychosis, as assessed on standardized tests, predictably rise in direct proportion to age development. The subject sample at hand in this chapter clearly offers a practical illustration of just how important a consideration of these variables would be to the development of appropriate educational program plans for NLD students. Also illustrated is the vital need for sensory perceptual training, as directed by occupational and physiotherapists, in the younger years, to lessen the effects of such inevitable deficits in the social/emotional/behavioural domain in later years. As the individual develops, programming concerns shift but the need for intensive programming in the areas of nonverbal communications, adaptive functioning, and self esteem can never be ignored.

The role of self esteem is of particular interest to the educational system as these children, as noted in the research by Thompson (1998), do not generally have any areas in which to shine unlike their left brain disabled counterparts. The perpetuation of such feelings only serves to hasten the onset of the psychosis often demonstrated in later years. Measures of self esteem presented for sample members discussed in this chapter lend support to this belief.

Counselling is of critical importance as can be evidenced by the fact of the number of case participants who display emotional/behavioural/social symptoms. Literature notes (Rourke 1998) that to be effective, therapy needs to follow a cognitive behavioural model. The low scores indicated for
nonverbal problem solving skills and social communications by the profiles of most students in this sample would attest to the fact that talk or insight therapy would be of little value. Within this sample, numerous individuals have already demonstrated needs severe enough to warrant becoming involved with psychiatric services. Of importance too is the effect of such individuals upon the immediate family (Antshel and Joseph, 2006). The fact such a factor is commonly characteristic of the NLD group is testament in itself to the fact that there is definitely a yet unfulfilled role for the educational system to play in this area of need.

Of prime importance to the educational planning needs of the individual with NLD is programming that aggressively concentrates upon and addresses the area of adaptive functioning. Social/emotional/behavioural data collected for the sample population considered within this study provides support for this belief. Without the ability to function successfully within this realm, independent living in (as seen in the case of Jane), and productive contribution to society remains beyond the reach of this group.

An examination of the NLD cases presented within this chapter clearly illustrates and supports many of the trends, concerns, and topics presented within the academic literature. A consideration of such cases illustrates as well the challenges, and opportunities for the educational environment in future planning for individuals with NLD.

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**Social emotional medical concerns**

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<td>Weak concept formation</td>
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<td>x</td>
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**Achievement assessment data**

| Strong reading | X | X | X | X |
| Strong Spelling | X | X | X | X |
| Strong phonetics | x | ? | ? | ? |
| Weak math | O | X | X | X |

**Neuropsychological Assessment data**

| Auditory problems | o | o | o but impaired sentence memory, verbal fluency | ? |
| Hand-eye problem noted; bilateral deficit | x | X, mostly left side | x |
| Visual problems | x | Visual spatial difficulty | x | x |

**Educational Placement issues**

| No special placement | o | o | o | X |
| Special placement + effects | o | Very + effects, improvements attributed to program (specialized programming) | o | o |
| Special Placement -effects | 0 | o | Friends went on to high school, she was retained, - effect | X | but this class was for behaviour disorders |

**Cognitive Assessment data**

<p>| FIQ average - high | X | o | o | o |
| FIQ low - low average | o | x | x | x |
| Diff between PIQ and VIQ = 15 | x | x | x | x |
| Large sub-score scatter | x | x | x | x |</p>
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**Social emotional medical concerns**

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</table>

**Achievement assessment data**

<table>
<thead>
<tr>
<th>Strong reading</th>
<th>x</th>
<th>x</th>
<th>x</th>
<th>x</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong Spelling</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Strong phonetics</td>
<td>Some early evidence</td>
<td>x</td>
<td>x</td>
<td>?</td>
</tr>
<tr>
<td>Weak math</td>
<td>X</td>
<td>X but still in average range</td>
<td>x</td>
<td>X</td>
</tr>
</tbody>
</table>

**Neuropsychological Assessment data**

<table>
<thead>
<tr>
<th>Auditory problems</th>
<th>x</th>
<th>x</th>
<th>x</th>
<th>x</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor problems</td>
<td>Some impairment</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Visual problems</td>
<td>variable</td>
<td>x</td>
<td>x</td>
<td>X visual-spatial difficulty</td>
</tr>
</tbody>
</table>

**Educational Placement issues**

<table>
<thead>
<tr>
<th>No special placement</th>
<th>x</th>
<th>x</th>
<th>x</th>
<th>x</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special placement + effects</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Special Placement -effects</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

**Cognitive Assessment data**

<p>| FIQ average- high | x | x | x | x |
| FIQ low/low average | x | x | x | x |
| Diff between PIQ and VIQ+ 15 | x | x | x | x |
| Large sub-score scatter | x | x | x | x |</p>
<table>
<thead>
<tr>
<th>name</th>
<th>Frankie</th>
<th>John</th>
<th>LP</th>
<th>Twin</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>8</td>
<td>11 yrs &amp; 12.1 yrs</td>
<td>20</td>
<td>8</td>
</tr>
</tbody>
</table>

**Social emotional medical concerns**

<table>
<thead>
<tr>
<th>Social emotional behavioural issues</th>
<th>Social functioning issues</th>
<th>Social issues</th>
<th>Bullying victim</th>
<th>Feelings of isolation</th>
<th>Physical impairment or birth trauma noted within first year of birth</th>
<th>Physical impairment or trauma noted after first year of birth</th>
<th>Confusion of NLD or AS diagnosis</th>
<th>Psychiatric involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
<td>x</td>
<td>0</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>

- Does not note social cues
- Bullying victim
- Bullying victim
- Physical impairment or birth trauma noted within first year of birth
- Cord around neck at birth
- RSS low birth weight
- PVL
- Confusion of diagnosis with various conditions
- Communication and socialization scales were good, daily living scale in borderline range on VABS

**Achievement assessment data**

<table>
<thead>
<tr>
<th>Strong reading</th>
<th>Strong Spelling</th>
<th>Strong phonetics</th>
<th>Weak math</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>O</td>
<td>0 phonetic processing disorder suspected</td>
<td>0</td>
</tr>
</tbody>
</table>

- Lower than expected for FIQ
- Lower than reading etc.

**Neuropsychological Assessment data**

<table>
<thead>
<tr>
<th>Auditory problems</th>
<th>Motor problems</th>
<th>Visual problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

- Only able to follow one step instructions

**Educational Placement Issues**

<table>
<thead>
<tr>
<th>No special placement</th>
<th>Special placement + effects</th>
<th>Special Placement -effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>

- Being investigated
- Had been in high achieving class but was picked on

**Cognitive Assessment data**

<table>
<thead>
<tr>
<th>FIQ average- high</th>
<th>FIQ low-low average</th>
<th>Diff between PIQ and VIQ+ 15</th>
<th>Large sub-score scatter</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>o</td>
<td>o</td>
<td>x</td>
</tr>
</tbody>
</table>

- O - did not show concept development deficits common to NLD pattern

- X seizures continued until about 6 years of age

- Bullying victim
- Social emotional behavioural issues
- Bullying victim
- Bullying victim
- Bullying victim
- Physical impairment or birth trauma noted within first year of birth
- Physical impairment or birth trauma noted after first year of birth
- Confusion of NLD or AS diagnosis with various conditions
- Psychiatric involvement
- Poor adaptive functioning
- Weak concept formation
- Achievement assessment data
- Neuropsychological Assessment data
- Educational Placement Issues
- Cognitive Assessment data
Chapter Five: An Educational Model for Assisting Students with Nonverbal Learning Disabilities

Once the CAT scans have been read, the neuropsychological examinations completed, the data interpreted, and all the results tabulated and combined into a final clinical report which has been tendered to all those concerned, we have, at the end of the whole process: “Johnny” (or “Jane”, if you prefer), and a diagnosis of a nonverbal learning disability. The clinicians, the data gathers, the “white coats”, and all the others, despite their best work and intentions, still cannot escape the fact that they conduct their work from an “arms length” distance from the actual student. No matter how the lines are drawn, at the end of the evaluation, regardless of its standard of excellence; generally, only three representatives are left standing: the child, the family, and the school. Armed with whatever information these three have gleaned, and with whatever programs have been created, these stakeholders face the future on an intimate and daily basis as they attempt to carry out the successful implementation of the student’s educational plan. The task is huge indeed when one considers that the success of this mission will undoubtedly impact dramatically on the future outcome of this student’s life. Such a serious mandate begs the obvious question: “What now?”

An examination of the scholarly literature and the case studies presented in this thesis has illuminated numerous aspects of the nonverbal learning disability. As has been noted, there are factors which distinguish this disability from other conditions, and even from disorders which are very closely related and display overlapping symptoms. Problems and patterns in social/emotional, visual-spatial-organizational, and motor domains, as well as strength in the auditory domain are common features characterizing the NLD condition. Of particular significance is the difference often noted on intelligence tests between the Performance IQ and the Verbal IQ, with the Verbal IQ being the stronger of the two. Characteristic “scatter” or discrepancy amongst the subscores is often reported, as are sensory and
motor skill deficits. As well, social and emotional issues may present huge and very real challenges as the NLD individual matures, especially for the development of adaptive functioning abilities.

While these aforementioned factors of the nonverbal learning disability appear to be generally consistent across its population, NLD is nonetheless a condition which also presents wide variability amongst its membership. As a result of the diverse degrees of affliction, individuals affected by this condition present themselves as individuals with highly consistent, and yet simultaneously unique, needs.

While attempting to construct an educational model for the population with NLD, it must be remembered that schools exert their influence upon children for a significant number of hours each day, and also throughout many important developmental stages. To this end, the timely, critical, and effective role which schools potentially play in the successful education of the student with NLD cannot be underestimated. The possibility exists that, within a society and throughout an individual’s life span, time spent in school represents the most opportune time, if not the only time, when a concerted, universal effort could be undertaken to diagnose the NLD condition as well as to undertake a program of intervention for this condition. Once the student reaches the age of majority, opportunities for programming may be lost. By this age, such assistance must be actively pursued by the individual and depends, to a large extent, upon their knowledge of the NLD condition and its inherent problems. Schools cannot ignore the importance of providing students with NLD opportunities based upon an educational model embracing the wide variance of their individual needs.

An educational model intended to respond to the NLD condition within the school environment would be required to accommodate NLD’s commonly consistent characteristics, and yet be flexible enough to address the highly varying needs of the individual learners. While one individual may be highly dysfunctional and require assistance in almost every aspect of school functioning, another may be
only mildly affected and require relatively minimal adaptations and accommodations to their educational program.

**Education**

A model of education specifically addressing the needs of learners with NLD would have numerous components. Of importance would be the education not only of personnel within the public school system, but also those within medical, day care, and social service systems, as well as parents. Services and programs for individuals with NLD will expand in direct proportion to the knowledge schools and society at large has of this condition. Both Wright (2008) and Thompson (1997) have pointed to the need for work in this area. A strong, well-informed advocacy base would be an important component of an educational model for the population affected by NLD.

Provision for the early identification of this disorder both at the preschool and elementary school levels would follow as a critical facet of this model. The case studies presented in this document indicate a number of prenatal and birth concerns within the population considered. The correlation of this occurrence with the eventual diagnosis of NLD is a possible indicator that preschool populations should be screened for the NLD condition. Assessment tools designed for the screening of the population affected by NLD should be employed. As well, older students would be regularly monitored through group assessments and observations for indicators of NLD. Following the screening and identification of potential students with NLD, the model would assure that neuropsychological assessments by qualified clinicians would be conducted to determine the ultimate diagnosis. The neuropsychological assessment would form the foundation of subsequent planning for the person with NLD.
The educational model would encompass the wide variety of needs presented by the population affected by NLD through the establishment of various educational options. Such options would address the continuum of NLD needs beginning with minimal intervention for those of lesser need, and would progress through tiers of increased support and intervention. A three-tiered support plan would be established to meet this goal. “Best practices” for the teaching of learners with NLD would be addressed at all levels of this model. Inherent in its plan to incorporate best practices, the model would also provide support for the social/emotional needs of students with NLD as well as providing support for families encountering the unique needs of a family member with NLD.

Together, the above components would comprise an educational model designed to accommodate all individuals presenting the NLD condition. The following discussion, offers further amplification of each of these components, and is based upon academic research previously outlined in the literature chapter, the previously reviewed case studies, and also upon the writer’s career as a teacher in special education and resource.

**Early Identification**

The effects of an early identification and intervention program for an individual with NLD are extremely positive (Rourke, 1989). As documented in the previous review of the literature chapter, Rourke (1989) notes that the symptomology of the NLD condition changes over time in conjunction with the individual’s development. Symptoms progress through primary, secondary, and tertiary deficits as development advances. For this reason, early identification of the NLD condition is crucial. Rourke (1989) notes basic deficits in reasoning and concept formation may later cause problems in math and subsequently difficulties in social judgement. Similarly, difficulties in visual/spatial/perceptual skills may later translate into later deficits in nonverbal communication skills. Many primary symptoms of this
condition can be addressed at the sensory level before they have magnified into secondary and tertiary conditions. The case studies presented in this thesis provide evidence that Bob, the youngest subject in the sample, is not yet affected by many of the difficulties that characterize the older subjects; and suggests that the secondary and tertiary symptoms are not yet fully developed.

Subsequently, at the school level, an educational model for use with students with NLD would vigilantly monitor the entire school population, starting with the kindergarten and early years levels and continuing on through, for evidence of particular symptoms indicative of the nonverbal learning disability. Interventions at the early years level would focus largely upon sensory, motor, and visual remedial activities. Depending upon level of need, such work may necessitate the participation of an occupational therapist. Even at this early stage, the social/emotional condition of the student with NLD would be vigilantly monitored, and intervention would be provided if need was apparent. Interventions for older students, while still attending to sensory, motor, and visual interventions, would shift focus to additionally address academic as well as social/emotional issues.

Scholarly literature considered in this thesis indicates several instruments, procedures, and points of observation, which could be of use in this regard. Certain screening tests such as the Shortened Visual Spatial Questionnaire (Cornoldi et al., 2003), as well as sections of various Brigance (Brigance, n.d.) tests of early development, can easily be incorporated into the general class assessment battery of the early years classroom. Brigance (Brigance, n.d.) tests of early development and the Shortened Visual Spatial Questionnaire (Cornoldi et al., 2003) are representatives of a small number of preschool tests which are useful for this purpose. The above mentioned tests are of particular value because they investigate developmental levels of various domains known to characterize the NLD condition: visual perceptual organization, motor, auditory, emotional/ behavioural/ social. Research (Rourke, 1989) indicates that it is possible to note the early primary stage symptoms of the NLD condition in the very young child through an examination of such sensory perception channels.
The writer notes based upon her experience, that owing to the characteristic deficits in the visual spatial organizational domain of many individuals with NLD, the drawings of young children are often indicators of perceptual delay in the student with NLD. An early years teacher, aware of the nonverbal learning disability and its symptoms, might very likely detect problems in the visual spatial organizational domains through an informal perusal of daily work. On a more formal level, the Goodenough (1926) House Tree Person test also offers potential as a visual-spatial-organizational screening tool for classrooms of younger students. As well, the Test of Visual Perception (Hammil, Pearson & Voress, 1994), and also the Visual Motor Index (Beery, 1989) are useful to some extent in this regard. The educational model for the student with NLD would insure that any early years students exhibiting suspected significant lags in visual-perceptual development, motor skills, and/or early social skills, would be immediately referred for clinical assessment.

Assessment tools intended for the screening of classroom populations of older students can easily be incorporated into the regular assessments of progressively older students as well. The Test of Written Spelling (Hammil, 1994) quickly highlights students with significant differences between spelling words that utilize phonetic abilities as opposed to visually orientated sight word vocabulary. The group administered version of the WRAT yields scores for Reading, Spelling and math performance. Wide score differences between the reading and Spelling sections and the math test can also serve as an indicator of a development pattern worthy of further investigation by a clinician. The Johns Reading Inventory (Johns, 2008), although individually administered, will quickly point to comprehension difficulties. The writer cautions that in order for schools to monitor populations for growth and change over time that it is vital for schools to create a school wide assessment package comprised of assessment tools that are consistent from grade to grade.

With younger grade students, as with their older counterparts, informed teachers can anecdotally note difficulties in social/emotional/behavioural areas, gross and fine motor coordination,
visual spatial organizational tasks, and also adaptive functioning skills. Such observations of knowledgeable teachers are especially useful in screening for the nonverbal learning disability and speak to the need to provide teachers with adequate information regarding the NLD condition. Certain hallmark characteristics act as red flags throughout the course of individual development. The child who converses at a high level uncommon for children of his/her age, or may prefer the company of adults, could be worthy of note. Often although students with NLD are quite verbal, the substance and depth of their conversation is wanting. The student who is withdrawn, who struggles to comprehend nonverbal information, whose problems begin to intensify in the middle years age group, as well as the student who decodes words well yet struggles to comprehend written material, could potentially be affected by the NLD condition. The student with NLD may well exhibit strong phonetic spelling skills but encounter difficulty spelling sight words. Difficulties in making inferences or predictions could also be an indicator of the NLD condition. The list of possibilities goes on, and encompasses poor math performance as grades progress. Classically the student who flounders with any sort of task requiring organizational skills, whose adaptive functioning skills are weak, could also be at risk for NLD. Of no benefit to the student with NLD are attitudes of “wait and see”, reminiscent of those applied to Frankie in the case studies. Possible indicators of the nonverbal learning disability would be referred for clinical assessment.

Assessment

An appropriate model for the student with NLD would include adequate access to clinicians able to perform in depth and comprehensive neuropsychological assessments for all screened students suspected of presenting the NLD profile. Neuropsychological assessments to date have proven to provide reliable diagnosis of individuals presenting the NLD profile (Pelletier, Ahmad, & Rourke, 2001). As noted in the scholarly literature (Rourke, 1998; Roman, 1998) and also evidenced in the variability of
the individual case studies, sound neuropsychological assessment must provide the foundation for any program planning intended to assist the NLD learner within the educational environment. Only through such comprehensive assessments can the actual strengths and deficits of each individual learner with NLD be identified. Roman (1998) in the previous chapter regarding scholarly literature, states that sound assessment of the NLD condition must be both cognitive and neuropsychological in its areas of investigation. Such individualized professional assessment would be a necessary prerequisite for any further educational plans of intervention.

**Individual Education Plan**

Following the assessment and diagnosis of the person with NLD, plans for educational programming must be undertaken. Based on the neuropsychological profile derived from the comprehensive assessment, a plan is created for the individual with NLD. The individual education plan is an anchor of the educational model designed to address the needs of individuals with NLD. Scholarly literature presents opinions regarding the individual educational plan (Thompson, 1996; Garrison, 2008). Some researchers (Thompson, 1996) feel that the IEP exists as a unique entity differentiated from the overall educational program. It is Thompson’s (1996) belief that the IEP encompasses goals that are continuous and are curriculum based, while the educational program addresses issues such as adaptive functioning. Other researchers (Garrison, 2008), while maintaining that the IEP is an individual and unique plan; do not see the IEP exclusively as a document representing curriculum concerns or adaptive functioning issues, and combines both of Thompson’s (1996) suggestions into a single document known as the IEP.

The educational model presented in this thesis endorses the Garrison (2008) position. It is acknowledged that in some instances such delineation may prove useful, however is not perceived as a
necessary characteristic. The IEP, as a document specific to the individual in its presentation of accessible strengths and areas of deficit functions, is the fundamental tool upon which all subsequent programming will be constructed. The student, parents, teacher, resource teacher, guidance counsellor, as well as the clinician, and possibly others, are likely participants in such planning. The IEP is constructed by the student’s IEP team, consisting of individuals directly involved in the student’s educational programming. It is necessary that the IEP goals be objective and quantifiable, and that they be regularly assessed and revised.

In a similar vein, individual behaviour plans, which may be used in conjunction with the individual education plan, could also be viewed as a strategy used to assist some students with NLDs in the ultimate goal of improving and overcoming many of the social and emotional deficits affecting their current behaviour. Such plans are successful when they are constructed by members of the student’s individual educational programming team, including at least one clinician thoroughly familiar with the student’s neuropsychological profile. Effective behaviour plans are unique and specific to the student, describe the student’s needs in empirical terms, and establish a clear, objective plan of action as a consequence for the behaviour.

**Best Practices**

Scholarly literature previously noted in this document has made reference to the body of research regarding “best practices” known to assist learners with NLD. In the proposed educational model for the student with NLD, such practices would be addressed in both the construction and execution of the student’s IEP. These strategies and procedures known to benefit individuals with this condition would be applied in varying degrees and areas as would best benefit the unique and varied needs of the student with NLD. Instructional and therapeutic strategies employed, to a degree dictated
by the student’s need, would aim, in addition to academic instruction, to teach skills which would enhance self esteem and nurture adaptive functioning. In the following presentation of best practices for the instruction of the student with NLD there is clear evidence that teaching various skills to individuals with NLD goes beyond simply giving directions.

Best practice strategies would require school personnel to extend their vision to the future potential of the student with NLD abilities. Schools would need to recognize that, even though it is difficult to comprehend, that someone presenting as intelligent and competent in verbal communication might require programming for such issues as visual-spatial integration, sensory integration, recognition of nonverbal cues, to name only a few. The school staff would also have to recognize that work on such issues would sometimes assume priority over regular academic subject matter. Previously, the review of literature chapter has noted that Rourke (1989) has outlined how social problems may eventually arise from earlier deficits in visual/spatial/perceptual deficits. The required understanding would be that programming in these areas would be vital to the future of the student with NLD and thereby a valid and important component of their work at school.

An educational model to serve the needs of individuals with NLD embraces, at all levels and wherever necessary, best practice strategies to assist the student with NLD to accomplish goals and lessen the daily stress which many experience. Thompson (1996) refers to these as CAMS (compensations, adaptations, and strategies) and notes, that while these are not curative in nature, they facilitate daily functioning. Similarly, Telzrow and Bonar (2002) describe strategies designed to assist learners with NLD as being remedial, compensatory, and therapeutic or instructional. An educational model to address the various needs and levels of severity which characterize the NLD condition employs such strategies in the pursuit of the individual’s unique goals.

Thompson (1998) has noted that programming for students with NLD should address both academic and social competencies. Thompson (1989) also indicates that, in the education of the student
with NLD, skills must be maximized and deficits addressed. Rourke (1989) notes many students with NLD may possess excellent rote memory skills as well as auditory skills. He (Rourke, 1989) notes that students with NLD also have good verbal vocabulary skills, although cautions that substance of conversation may be wanting. Best practices for the education of students with NLD would acknowledge such strengths in instructional planning. Thompson (1998) stresses the importance of providing the student with NLD with structure, stability, and predictability in programming, and stresses the need to assist the student to develop organizational skills. She (Thompson, 1998) cites home/school journals as well as various systems of student charts and lists as possible methods for assisting students with organization. Taylor (2006) notes the need for this structure and organization to be present within the classroom environment to avoid over stimulating the student with “visual clutter”.

In the literature chapter, Thompson (1998) outlines several generalized suggestions which may assist many learners with NLD. She notes that the student should not be expected to automatically generalize instruction or concepts, and that spoken language should be used to connect new situations to old learning. She (Thompson, 1998) speaks to the effectiveness of reviewing previous information and noting connections before beginning new material. As well, Thompson (1998) also notes the importance of specifically discussing cause and effect situations in a step by step fashion. Above all, she (Thompson, 1998) emphasises that transference of old material to new situations can never be assumed.

Drawing from experience, the writer notes, in the utilization of some of these aforementioned best practices strategies, that the techniques drawn from cognitive behavioural therapy might regularly be employed. “Backwards chaining”, “shaping”, “fading”, “cueing”, and “generalization” are examples of such strategies which could be employed in the instruction of some students with NLD. In a backwards chain, the student works backwards from the specialized behaviour in a step by step fashion until the task is completely mastered, in such a fashion, the student always has the benefit of experiencing the
target behaviour as a reward, and never misses the point of the step by step instruction in which he/she is participating. Backwards chaining is a very useful teaching strategy in many life skill situations. In a different manner, shaping involves teaching a behaviour by initially providing the subject with a maximum amount of support (shaping) and progressively as the subject increasingly masters the task, withdrawing (fading) the support in increments over time and number of trials. Rourke’s (1985) strategies for math instruction of the person with NLD, discussed in the literature review chapter, involve the use of a shaping/fading technique. Once the math skill has been learned, Rourke (1985) encourages further shaping of adaptive function by practising the math skill, for example, time management, money handling, through practical application within real situations. The suggestions for math instruction outlined by Rourke (1985) in the literature review chapter represent an excellent example of a carefully researched teaching methodology that can be successfully applied to the math instruction of the student with NLD. It is of interest, as well, to note that Bryant and Bryant (2008) cite Woodward (2004) in noting that the discovery method, often employed in math instruction, may be insufficient for some students with math disabilities. This observation (Bryant & Bryant, 2008) furthers supports Rourke’s (1985) position that students with NLD may benefit from math instruction delivered in a systematic, incremental manner.

As a further example of shaping, instruction in being on time might require that in the early stages of instruction a large amount of support and prompting for this skill might be required. As the skill was progressively mastered, pieces of this support would be withdrawn until the behaviour was mastered. Teachers and other staff members would withhold criticism for tardiness, etc. and be otherwise supportive as a specialized goal is approximated. These particular strategies would work towards the goal of improved future performance. Such strategies would require the school community to look past the needs of present day. The shaping technique is often employed to alleviate anxiety experienced by some students with NLD during changes of routine. In the event of substitutes,
assemblies or other anxiety causing situations, the anxious student is often allowed a safe space to calm themselves; a plan is established for class re-entry. As the student becomes more adept at responding to cues that changes are impending, the safe space is required less and less.

In the cuing strategy, a sufficient amount of prompting necessary to insure the desired behaviour is given in advance of the behaviour being required. As an example of utilizing this strategy, some students with NLD may need the support of sufficient warning time to prepare for a change of routine. A cue of “It is ten minutes until gym is over”, allows the student time to prepare to change activities, rather than to be frustrated when he/she is suddenly asked to change activities. The writer notes that clocks that actually cover a specific amount of the clock face, and show it gradually uncovering as time elapses are available from suppliers and are an excellent tool in assisting changes from one activity to the other.

Teaching through a series of small incremental steps is also an application of techniques drawn from cognitive behavioural therapy and applied to the best practices for the instruction of many students with NLD. For some individuals with NLD, tasks are taught through a step by step methodology, often with a focus on auditory coaching.

As an example, teaching some students with NLD to behave at school could more properly amount to actually teaching specifically what the desired behaviour looked like in school: what this behaviour looks like in math class, in music, at recess, in the lunchroom etc. Allowing for the fact that many students with NLD do not generalize well from one setting to the next, single behaviours may have to be taught separately for each situation. The eventual result would be that the student would gain competence in all locations. However this target behaviour would not be learned through unspecified instruction that did not relate to the actual behaviour, nor is it accomplished at the same time.
In another example, a sweeping generalization such as “be neat and tidy at school” might be separated into behaviourally specific items that clearly delineate exactly what the goal behaviour looks like in its various settings of application.

<table>
<thead>
<tr>
<th>Item</th>
<th>In hallway</th>
<th>In classroom</th>
<th>On playground</th>
<th>In lunch room</th>
<th>On school bus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>My clothing</strong></td>
<td>-remove cap once you are inside school</td>
<td>-Put outside clothes on hook</td>
<td>-Outside clothes on, done up</td>
<td>In my inside clothes, leave outside clothes in classroom at lunchtime</td>
<td>Leave outside clothes on and done up—if warm loosen clothes, don’t remove</td>
</tr>
<tr>
<td><strong>My shoes</strong></td>
<td>Change to inside shoes at the outside doorway put outside shoes on shelf</td>
<td>On my feet and not trying to make black marks on the floor</td>
<td>Change to outside shoes put inside ones on shelf</td>
<td>Inside shoes</td>
<td>Outside shoes</td>
</tr>
<tr>
<td><strong>My backpack</strong></td>
<td>Carry backpack to classroom do not swing it in hall</td>
<td>Empty class items, put on desk, leave lunch inside, hang backpack on hook</td>
<td>Don’t take on playground at recess</td>
<td>Remove lunch from backpack, hang backpack back on hook, go for lunch</td>
<td>Hold on lap or place under seat. Take backpack when leaving the bus</td>
</tr>
</tbody>
</table>
Depending upon the severity of the disability, students would require varying amounts and intensities of programming and rehearsal with social stories, behaviour grids, and other similar items. For some students with NLD, simply having the behavioural request dissected into small manageable objective concrete expectations, and presented to them in a straightforward, concrete and organized fashion is in itself effective in initiating a positive behavioural change.

Generalization or the transfer or application of previously learned information to new situations presents a considerable challenge for many students with NLD. It is difficult for such students to apply existing knowledge too new situations, even when the difference between the two situations may be minimal. As well, even when two situations are completely different, they cannot perceive that behaviour that would be appropriate in one situation would be totally unacceptable in another. In similar fashion, cause and effect relationships are also extremely difficult for this group of individuals to comprehend. As this information is applied to the classroom or programming level, educators must be constantly aware of the need to continuously re-teach skills in new contexts and situations. It can never be assumed that the student will make the connection from one situation or event to another without assistance.

Social/Emotional Concerns

A further best practice strategy would be to address the social/ emotional needs of students with NLD and their families. To this end, an educational model would insure the provision of counselling and support opportunities for both NLD individuals and families in need of such service. Research (Little, 2001), (Little, 2002) has indicated that students with NLD may experience social difficulties in their interactions with peers. As well, Thompson (1996) has noted that having only good intentions in mind, many parents often place heavy burdens of expectations upon students with NLD. It is not their
intention to be harsh; parents sometimes simply do not understand the nature of this condition, for to all outward appearances, the student appears to be “normal”. Life in a family with a person with NLD is not an easy process and the support of a knowledgeable counsellor would help to make home life more positive and thus more productive for all concerned. Antshel and Joseph (2006) have indicated that the unique needs of the individual with NLD may place additional stress on all family members, including the siblings. For this reason, provision should also be made for counselling services to address sibling needs where necessary. Rourke (1985) discourages the use of “talk therapy” with individuals with NLD. This position is recommended in the case studies chapter by John’s clinician as well.

Attention to social emotional issues could also take place within small group opportunities. Little (2004) draws support from other colleagues when she states that “social skills and pragmatics training are considered among the most important components to any program for children with AS and NLD (Klin et al., 2000; Rourke, 1995; Thompson, 1997)” (p.263). Social interaction and the interpretation of nonverbal social cues present continual challenges for many individuals with NLD, as does the need for continual enhancement of skills contributing to increased levels of adaptive functioning; training in these areas would be present as well. In addition, as life sports offer a significant venue for the application and development of motor, visual-spatial, and social skills, these activities would also feature as very visible aspects of a specialized classroom program. In many life sports the need for competition is less important than in many team sports. In many life sports, the individual is generally in competition with only him/herself. In addition, specific programs to develop the ability of the student with NLD to respond to and to recognize various emotions through the presentation of pictures, voice recordings, and other indicators of nonverbal social cues; programs to enhance the development of manners, social etiquette, skills for independent living, and also programs focusing upon personal safety, are all sequentially constructed and strive to assist needy students in acquiring skills in their deficient areas.
Educational Options

In addition to the creation of the IEP and the application of best instructional practices, following the assessment and a diagnosis of NLD, questions may be raised regarding the educational environment of the student with NLD. Educators must acknowledge the unique and varying needs of individuals with NLD and cede that there is no “one size fits all” strategy which can be accessed. As such, consideration of an educational model to address the needs of individuals with NLD must acknowledge that there are both pros and cons in all points of view, and that these differences may well give rise to controversial discussions.

Documents such as the Salamanca Statement of 1994, endorsed by UNESCO, the Drakar Framework for Action (UNESCO, 2000), the Individuals With Disabilities Act (IDEA) (2004), and the Manitoba Department of Education “Appropriate Educational Programming In Manitoba” document (2006) offer insight and direction for educational environments for students with special needs. Summarized, such documents ascribe to the universal access of all children to education, and state that public schools should be inclusive of all children regardless of their individual differences. It is also consistently noted that all children should have the right to an education within “the least restrictive environment”. While it is noted that the inclusive classroom is the preferred educational environment for all children, including those with special needs, it is also noted that, in cases of severe need, when education within the inclusive classroom cannot meet the specific needs of the special education student, that it is acceptable for education within a specialized class or alternate educational environment to take place. The advisement is also made that, under such circumstances, access to interactions with other children within the school should be facilitated when possible, and that students should limit participation in such settings to only the amount of time deemed necessary to appropriately serve their unique needs. Specifically cited examples of special needs that may require access to special
class placement include: severely needy students who are deaf, blind, diagnosed with autism etc. Given
the symptom overlap between autism in the nonverbal learning disability, and the tone of these
documents on this subject, it is the position of this writer that the opportunity for participation within a
specialized classroom, and the opportunity to make that choice if desired, should be available to NLD
students in cases of severe need.

Similar sentiments suggesting the wide continuum of settings needed within an educational
model to accommodate the educational requirements of all students with NLD is echoed in the scholarly
writing and research presented in this document. Thompson (1996) notes in many situations, the
student with NLD can be “accommodated in a ‘fully-included’ mainstreamed educational setting” (p.12).
However, despite this statement, Thompson (1996) also notes that the student with NLD presenting
severe needs may sometimes require a flexible school day schedule allowing for half days to be spent
within the school setting and half days spent elsewhere, perhaps with the services of a tutor. Moving
along the continuum, Little (2002) notes, that owing to the poor adaptive functioning skills and
difficulties within the social/emotional domains, that students with NLD are frequently the victims of
bullying and victimization. She (Little, 2002) suggests that her findings present “implications for
inclusion policies that increasingly place students with disabilities in general education environments for
the entire school day with the end goal of greater social benefit for the child” (p.55). Miller (2008)
postulates, in a statement diametrically opposed to Thompson’s position, that “learning in a
conventional classroom is ineffective for NLD students” (p.12).

While the benefits of quality inclusion are many, and are not to be disputed, nonetheless the
devastating and lifelong consequences for some severely needy students with NLD continue to surface.
At some point, the opportunity of a specialized classroom alternative for NLD students should be
available for consideration, if such an option would be of assistance to such individuals. Quite simply
stated, it would be unprofessional and immoral to ignore any option of treatment or intervention that
might possibly ameliorate the effect of this disability upon the future of the person with NLD. The widely-varying nature of the nonverbal learning disability strongly suggests that various levels of support and educational options should be available to individuals affected by this condition and that such levels should be present in an educational model designed to meet the needs of this group.

The work of Vaughn (2002) presents a somewhat similar situation in its consideration of the various degrees of support necessary in the remediation of math students. To this end, Vaughn (2002) has proposed a three-tiered model to accommodate such variation. Within the Vaughn model the level of need and the level of intervention required rise in direct proportion through three tiers of intervention. Bryant and Bryant cite examples of intervention which involve four and five levels of intervention (Dickson & Bursuck, 1999; Grizzle, n.d.) and note thoughts which underpin their construction. Bryant and Bryant (2008) conclude that such systems focus upon similar goals to “… (a) provide instruction to students in growing levels of intensity, (b) reduce the numbers of students receiving instruction in the succeeding tiers, and (c) identify a group of students who qualify as having LD.” (p.6.) Following the lines of these researchers (Vaughn, 2002); (Bryant & Bryant, 2008), an educational model for students with NLD could be constructed. Such a system within the educational environment would provide an appropriate level of support and intervention for students with NLD while simultaneously acknowledging and respecting the unique variances of his/her individual condition.

The writer proposes a three tiered model of education for students with NLD. Students showing milder degrees of impairment resulting from the NLD condition could be inclusively educated with minimal intervention by utilizing such supports as the IEP, behaviour plan, teaching assistant, resource teacher, and clinicians. The IEP would specifically outline the individual’s goals as well as the proposed methods to achieve them. Students with NLD within the inclusive classroom would also address the regular grade level curriculum, with the goals of their IEP being accommodated within that framework wherever possible. Within the inclusive classroom, allowances could be made for program adaptations
and accommodations, and also for the unique dimensions of the IEP, if necessary. However, the student’s program would take place within the parameters of the inclusive classroom.

Students showing increasing levels of affliction would, in addition to the supports described in the previous paragraph, access the support of a satellite classroom. A satellite classroom would operate in a fashion similar to that of a resource room. Students would attend the satellite classroom for scheduled times throughout the school day and work towards goals outlined in their IEP. A teacher with competent knowledge of the nonverbal learning disability, as well as other learning disabilities, would be assigned to this classroom. Depending upon need, the satellite classroom may or may not service only students with nonverbal learning disabilities, but may also accommodate other types of learning disabilities as well. The maximum class size for this classroom would always be significantly lower than that of the regular classroom, and would thus ensure a lower teacher/pupil ratio, as well as more individualized attention for the student. These students would attend their inclusive classroom and continue to utilize their IEP for the balance of the school day. In this fashion, the student who accesses the school satellite classroom remains at least partially involved with the regular grade level curriculum, while still benefitting from increasing flexibility in programming for his/her own specific needs. This classroom would be available within the student’s catchment area school and would not necessitate the student attending a school outside of his/her community.

The student would be allowed to attend the satellite class for up to 50% of their school day. Such time allocation could possibly be useful to some students only supported by half time funding and E.A. support (province of Manitoba level two), and yet in need of some level of assistance for a portion of the remaining school day. In addition to meeting the needs of students only receiving half time funding, such a classroom could be of benefit to students with NLD and other students with learning disabilities receiving only minimal or no funding and only minimal supports (province of Manitoba level one). Within the province of Manitoba, a portion of the block funding currently allocated to schools could be used to
partially fund the classroom. In many situations (in Manitoba) often this funding is being used to fund nonprofessional teaching assistants to work individually with learning disabled students for blocks of time that often amount to no more than fifteen or twenty minutes, and not even on a daily basis at that. By pooling financial support such students could all benefit from more support for longer periods of time, with lower student/teacher ratio, under the instruction of a teaching professional skilled the management of learning disabilities, as opposed to being supervised and assisted by a paraprofessional. The students in this satellite setting would change throughout the day and throughout the school day cycle, and only particular segments of their IEP would be directed and monitored from this location. This classroom would be intended to meet the needs of a student with NLD whose learning difficulties were not so severe as to warrant placement in a completely specialized classroom.

Despite the fact that the education of all students within the inclusive classroom is the option preferred by official documents, educators, and the writer of this document, occasionally the specific needs of some students with NLD may extend far beyond the mandate and concerns of the inclusive classroom and present a situation of severe need. For this reason, a model of education proposing to serve the severely needy student with NLD must provide the option of a specialized classroom or educational alternative at some point in its hierarchy of services. When the needs of the student with NLD cannot be sufficiently accommodated within either the inclusive classroom or with the support of a satellite classroom, the option of a specialized classroom should be available for consideration by student, family, and school.

Many factors must be considered in the event that a choice is made for student participation in such a class. It would be recommended that attempts be made to address the needs of such a student through the inclusive classroom, and subsequently through the satellite classroom before considering the option of a specialized classroom. In some circumstances in which participation in a specialized classroom is the appropriate decision, such a decision should always be voluntary, and should never be
made through “force” or “pushing”. At this point, the student, the family, and the school are in agreement and are all beneficiaries of that decision. Only under such conditions is there assurance that the correct decision has been made. It must be noted as well that even within a specialized classroom; opportunities for integration with other school students should be constantly sought and arranged. Such opportunities could include recess, lunchtime, school assemblies, intra mural sports, and possibly through involvement in peer helper programs. Participation within a specialized classroom should be limited to only the least amount of time needed to meet the student’s severe and unique needs.

It is the position of this writer that to ignore the pressing needs that necessitate the creation of specialized classrooms, would create disastrous repercussions for the future lives of some severely affected students with NLD. Supporters of the opposing philosophy may clamour for only complete inclusion, but in some situations the question of “Inclusion into what?” must be asked, and asked again. What benefit is a student afforded by an inclusive placement if, in doing so, appropriate programming is not sufficient to meet their unique needs? Such a situation would severely impact upon opportunities for severely impaired students with NLD to develop skills needed in order to achieve or approximate an independent, happy, and productive life. The question is not so much about the philosophy of inclusion per se, but remains “Inclusion into what?” When the choice is either inclusion for a few short years of school experience, or inclusion into adult life, it is the writer’s position that the opportunities for such should be provided. Unfortunately, it has been the writer’s experience that, despite the severely debilitating nature of the NLD condition for some affected individuals, options for specialized classrooms to meet these unique needs rarely exist within the public school system. It has been previously noted in this chapter that international and regional documents on the subject of inclusion have cast wordings that would encompass the development of such choices within the public school system for individuals of severe need.
It has been previously noted that opposition will be voiced by some to the idea of removing students from inclusive classrooms for any amount of time for any reason. Owing to this opposition, it is necessary to further describe the purpose which might be served by an either the satellite classroom or the fulltime specialized classroom proposed by this proposed model for the education of individuals with NLD. In the previously reviewed literature, Garrison (2008) has commented upon the programming necessary for some students with NLD. He (Garrison, 2008) notes that such students may “require different types of support to achieve outcomes in life” (p.3). Despite the best efforts towards the inclusionary process, at times, it is the provision of some of these “different types of support” which remain extremely difficult to accomplish within the bounds of the inclusive classroom in which the primary focus must be upon curriculum material. Within the option of the specialized classroom for severely impaired students, such issues could supersede curriculum concerns. While still focusing on aspects of the IEP pertinent to each individual student, placement in a separate environment would allow for those students with some similar IEP goals to work as a group on programming aspects that might not otherwise be consistently addressed within the scope of the inclusive classroom. As well, teachers knowledgeable of the characteristic yet widely various and unique needs of students with NLD as well as with specific teaching strategies to address these needs would be assigned to such classrooms. Both Wright (2008) and Thompson (1997) have noted the value of professionals knowledgeable about the NLD condition to the progress and success of the student with NLD. Such an example might include areas of adaptive functioning which would allow for the practise of targeted skills within an authentic setting. As well, the development of lifesports which would likewise contribute to increased adaptive function ability could also be included within the mandate of a specialized educational environment. In addition to the area of adaptive functioning, nonverbal communications, speech concerns, and specific activities for visual spatial motor development could also be addressed.
In the establishment of a specialized classroom, it would be necessary to maintain an environment involving age-appropriate peers. In the proposed model, groupings would acknowledge an early years classroom, a middle years classroom, as well as classrooms for junior and senior high school students. Such a classroom would be established in a fashion similar to that applied to the construction of multi-age classrooms (www.multi-age.com), as this model has already experienced success. Small class size and the use of EAs to assist the classroom teacher would also be requirements. Little (2003) has stated that “...when queried, mothers of NLD students indicate that smaller class sizes, as well as the presence of trained educational aides would also be of benefit to the children” (p. 263). If numbers were wanting, it is feasible, owing to the symptom overlap of these conditions, that the specialized NLD classroom could also accommodate students with similar and overlapping disabilities such as Asperger’s syndrome and high functioning autism.

The practical viability of the educational model for students with NLD discussed in this chapter can be tested against the needs of the individuals with NLD presented in the case studies. Examination of the data table immediately illustrates the widely varying abilities of the NLD population. Particularly striking is the strong, consistent presence of severe emotional/behavioural issues, and subsequent involvement with mental health services, as well as difficulties with adaptive functioning skills. In the case history of Jane, improvement in these areas was noted following participation in a specialized classroom. In the case of C.K., referred to in the case studies chapter, referral had been made to a classroom for emotional/behavioural concerns rather than to a learning environment specifically addressing his severe needs as a learner with NLD. The present indications of that choice paint a bleak picture for the young man’s future success and happiness. Other individuals, discussed in the case study chapter and presenting needs that were less severe, were able to function successfully within mainstreamed classrooms. Difference in the cognitive abilities of these students, as well as in adaptive functioning, motor skills, visual/spatial abilities and social/emotional domains, all point to varying levels
of need spanning from minimal to severe in nature, and also to the need for an educational model for
the population affected by NLD which encompasses such divergence. The IEP, whether utilized within
the inclusive or specialized classroom, would address such variation. In situations where the need is
more evident, a version of a specialized educational environment, whether satellite class or a fulltime
classroom addressing highly specific and severe needs, would allow for a setting conducive for its
thorough and consistent implementation.

The proposed educational model for students with NLD would offer support and programming
in these areas. Within the option of the specialized classroom for severely needy students, such issues
would supersede academic concerns. Counselling and support would be available for families as well as
students. Motor skill deficiencies are consistently presented by the individuals examined in this study,
and the presence of life sport activities, while also fostering the development of social and adaptive
functioning skills, would also assist in this area.

The need for a wide spectrum of educational options is most illustrated by the devastating life-
long difficulty which develops from such severe and specific needs which are unmet. All measures must
be made available to ensure that all students with NLD, regardless of need, will have the best
opportunity to develop to the best of their ability, as happy, functioning, and productive adults. The
anticipated result of not providing such services is tragic.
Chapter Six: Conclusion

In conclusion, a consideration of nonverbal learning disabilities raises a broad spectrum of concerns, questions, and implications for the education system, and also for society. NLD may be an extremely serious condition, and may also be the harbinger of debilitating and bleak prospects for the futures of some affected individuals. Apparent too, is the limited understanding of families, schools, and communities regarding this disorder. There is urgent need for strong advocacy for the needs of individuals with NLD, early detection of NLD, as well as appropriate educational options for students with NLD.

Central to the NLD issue, and still remaining, is the lack of consensus amongst diagnosticians regarding its definition. As yet, varying professional and academic orientations view NLD symptomology from different perspectives. To this end, the same symptoms might possibly result in different diagnoses if examined by a psychiatrist, neurologist, neuropsychologist, or other professional. Researchers and professionals have also been noted to question whether or not NLD represents a learning disability subtype, a syndrome, or a style of disordered learning, with no one position emerging as clearly superior to the others. It is vital to the future well-being and treatment of individuals with NLD that such definitional issues be resolved. Often, various types of support for individuals with NLD hinges upon diagnostic information.

The research of Pelletier, Ahmad, and Rourke (2001) has established an objective system of measuring NLD symptoms that guarantees a high diagnostic accuracy. It is the position of the writer that this research is of great importance to individuals with NLD. Academic debate on the definition of NLD may well continue until such times as questions are settled by future advances in technology or other areas that may allow researchers to more accurately assess the inner workings of the brain with greater ease. However, the education system must face the symptoms of the NLD condition on a daily basis;
however it is defined or diagnosed. In the meantime, it is the position of this writer that the NLD condition may most usefully be described by its characteristic profile of outwardly observable features, as proposed by Pelletier et al. (2001). It is predominately these outward symptoms which concern the education system. The current ability of clinicians to now accurately diagnose the NLD condition and the likelihood of its occurrence is of extreme importance for education systems. From the point of view of this author, an operational and useable definition of NLD has been determined.

In addition to the clarification provided by the work of Pelletier et al (2001), it is the position of the author that the NLD condition, while overlapping in some areas with other closely-related conditions, nonetheless presents features that collectively combine into an overall profile that is unique from other conditions. Strong verbal language skills, but characteristically weak mathematical abilities separate NLD from the closely related Asperger’s syndrome. The verbal language skills of the individual with NLD are also distinguishing hallmarks which may separate this individual from others with different autistic spectrum disorders. As well, much wider differences of standard deviation between the adaptive functioning level and the expected potentials of individuals with Asperger’s as compared to individuals with NLD are often noted.

The work of Rourke (1989) postulates that the NLD condition may well represent “a great common pathway”, in that many various causes (birth defects, head trauma, genetic conditions etc.) may result in the characteristic profile of the NLD disorder. Rourke (2008) has noted the degree of similarity between NLD and other related disorders through the creation of a hierarchy of classifications into which the related disorders may be sorted. Such disorders are assessed by the varying degrees of similarity they bear to the characteristic NLD profile, and the assessment criteria developed by Pelletier et al. (2001). Again, what is measureable and useable holds value for educators. Such research offers insight useful in programming effectively for students displaying the characteristic NLD profile, whatever
the cause might be. The writer concludes, that for purposes of practical application, the colloquial rule of “if it looks like a duck” should apply.

The unique nature of the NLD condition coupled with the serious possible consequences it may hold for adult life are indeed cause to challenge our thought on “best practices” for the course of education best implemented for these individuals. While inclusive philosophy endorsing total inclusion of all learners within classrooms offers inherently positive features, a more specialized approach may better equip some severely needy individuals with NLD for successful, independent functioning in adult life. The success claimed by proponents of cognitive re-patterning (Doige, 2007) and by specialized schools such as Arrowsmith School in Toronto, Ontario are worthy of subsequent investigation. It is worthy of note that components of the Arrowsmith program are now being marketed to some Canadian school districts (www.Arrowsmith.com).

Although consistency of definition is required, neither the symptoms of NLD, nor the problems encountered by those affected, will change regardless of how they are characterized by definitions or terminology. Today’s families, schools, communities, and advocacy groups such as Learning Disabilities Associations and others are challenged to advocate for those affected by the unique NLD condition.
References


Vaughn, S., & Wanzek, J. (2002). *Preventing reading difficulties: A three tiered intervention model*. Retrieved 02 01, 2111, from National Ressearch Center on
Learning Disabilities: http://www.nrclld.org


Agenesis of the corpus callosum: Agenesis of the corpus callosum (ACC) is a rare birth defect (congenital disorder) in which there is a complete or partial absence of the corpus callosum, the band of white matter connecting the two hemispheres of the brain, fails to develop normally, typically in utero. The development of the fibres which would otherwise form the corpus callosum become longitudinally orientated with each hemisphere and form structures called Probst bundles. (Retrieved from Wikipedia.com, Feb. 6, 2011).

Agnosia: The loss of ability to recognize objects, persons, sounds, shapes, or smells while the specific sense is not defective nor is there any significant memory loss. It is usually associated with brain injury or neurological illness. (Retrieved from Wikipedia.com, Feb. 6, 2011).

Amygdala (singular form: amygdale): Almond shaped groups of nuclei located deep within the medial temporal lobes of the brain in complex vertebrates, including humans. Shown in research to perform a primary role in the processing and memory of emotional reactions, the amygdale is considered part of the limbic system. (Retrieved from Wikipedia.com, Feb. 6, 2011).

Anticonvulsant medication: Anti convulsants are a diverse group of pharmaceuticals used in the treatment of epileptic seizures. (Retrieved from Wikipedia.com, Feb. 6, 2011). Increasingly anticonvulsants are used as mood stabilizers to treat mania in bipolar disorder. Lamictal and Depakote are used to treat bipolar depression. (Retrieved from WebMD Feb. 6, 2011).

Aphasia: Partial or total loss of the ability to articulate ideas or comprehend spoken or written
language resulting from damage to the brain by injury or disease. (Retrieved from American heritage dictionary, Feb.6, 2011).

**Astereognosis:** A loss of the ability to recognize objects by handling them. (Retrieved from The free dictionary/medical dictionary, Feb.6, 2011).

**Craniotomy:** Surgical removal of part of the skull to expose the brain. (Retrieved from The free dictionary/medical dictionary, Feb. 6, 2011).

**Decerebrate:** To eliminate cerebral function by transecting the brain stem or by ligating the common carotid arteries and basilar arteries. (Retrieved from The free dictionary/medical dictionary, Feb. 6, 2011).

**Diagnostic and Statistical Manual IV (DSM):** The standard classification of mental disorders used by mental health professionals in the United States. (Retrieved from Psych. org/main menu/research/DSMIV.aspx, Feb.6, 2011).

**Dygsraphesthesia:** A disorder characterized by difficulties in being able to recognize letters or numbers written on the fingertips. (Retrieved from Epinions.com, Feb.6, 2011).

**Hemangiatosis:** A hemangioma of infancyis a benign self-involuting tumor (swelling or growth) of endothelial cells, the cells that line the blood vessels. It usually appears during the first weeks of life and resolves by age ten. In infancy, it is the most common tumor. (Retrieved from Wikipedia.com, Feb.6, 2011).

**Inclusion:** Inclusive education differs from previously held notions of “integration” and “mainstreaming” which tended to be concerned principally with disability and “special
education” needs and implied learners changing or becoming “ready for” or deserving of accompndation by the mainstream. (retrieved from Wikipedia.com, June 25, 2011).

**Individuals With Disabilities In Education Act** (IDEA): A United States federal law that governs how states and public agencies provide early intervention, special education, and related services to children with disabilities from birth to age 18 or 21 in cases that involve 13 specified categories of disability. (Retrieved from Wikipedia.com, Feb.6, 2011).

**International Classification of Diseases 10th Revision** (ICD): The ICD is the international standard diagnostic classification for all general epidemiological, many health management purposes and clinical use. These include the analysis of the general health situation of population groups and clinical use. These include the analysis of the general health situation of population groups and monitoring of the incidence of prevalence of diseases and other health problems in relation to other variables such as the characteristics and circumstances of the individuals affected, reimbursement, resource allocation, quality and guidelines. (Retrieved from Wikipedia.com, Feb.6, 2011).

**Kinaesthesia**: The ability to feel movements of the limbs and body. (Retrieved from The free dictionary/medical dictionary, Feb 6. 2011).

**Least Restrictive Environment**: “As part of the U.S. Individuals with Disabilities Act, the least restrictive environment is identified as one of the six principles that govern the education of students with disabilities and other special needs. By law, schools are required to provide a ffree appropriate public education (FAPE) i the least restrictive environment that is appropriate to the individual student’s needs. “Least restrictive environment” means that a student who has a
disability should have the opportunity to be educated with non-disabled peers, to the greatest extent appropriate. They should have access to the general education curricular activities, or any program that non-disabled peers would be able to access. Should the nature or severity of his or her disability prevent the student from achieving these goals in a regular educational setting, then the student would be placed in a more restrictive environment, such as a special school, classroom within the current school, or a hospital program. The types of educational settings for the student with disabilities will vary...there is no single definition of what a LRE will be for all students.” (Retrieved from Wikipedia.com, June 25, 2011).

**Mainstreaming:** Mainstreaming in the context of education is a term that refers to the practice of educating students with special needs in regular classrooms. (Retrieved from Wikipedia.com, June 25, 2011)

**Myelin:** The white matter coating our nerves enabling them to conduct impulses between the brain and other parts of the body. (Retrieved from Wikipedia.com, Feb. 6, 2011).

**Myelination:** The acquisition, development, or formation of a myelin sheath around a nerve fiber. (Retrieved from Wikipedia.com, Feb. 6, 2011).

**Parietal Lobe:** The parietal lobe is the part of the brain positioned above the occipital lobe and behind the frontal lobe. The parietal lobe integrates sensory information from different modalities. (Retrieved from Wikipedia.com, Feb. 6, 2011).

**Perventricular Leukomyeosis (PVL):** PVL or white matter injury is a form of brain injury characterized by the death of white matter near the cerebral ventricles due to damage and softening of the brain tissue. It can affect foetuses or newborns; premature infants are at the
greatest risk of the disorder. Affected individuals generally exhibit motor control problems or other developmental delays, and they often develop cerebral palsy or epilepsy later in life. (Retrieved from Ask.com encyclopaedia, Feb.6, 2011).

**Sotos Syndrome:** Is a rare genetic disorder characterized by excessive physical growth during the first 2 to 3 years of life. The disorder may be accompanied by mild mental retardation, delayed motor, cognitive, and social development, hypotonia (low muscle tone), and speech impairments. Children with Sotos syndrome tend to be large at birth and are often taller, heavier, and have larger heads than is normal for their age. (Retrieved from Wikipedia.com, Feb.6, 2011).

**Tegretol** (Carbamezapine): An anticonvulsant and mood stabilizing drug used primarily in the treatment of epilepsy and bipolar disorder. (Retrieved from Wikipedia.com, Feb.6, 2011).

**Temporal Gyrus:** Any of the three major convolutions of the external surface of the temporal lobe of a cerebral hemisphere that are arranged approximately horizontally with one above the other. (Retrieved from dictionary.com Feb.6, 2011).

**Temporo Parietal lobe:** Where the temporal and parietal lobes meet. (Retrieved from Wikipedia.com, Feb. 6, 2011).

**William’s Syndrome:** A rare neurodevelopmental disorder caused by a deletion of about 26 genes from the long arm of chromosome 7. It is characterized by a distinctive “elfin” facial appearance, along with a low nasal bridge; an unusually cheerful demeanour and ease with strangers; developmental delay coupled with unusual (for persons who are diagnosed as developmentally delayed) language skills; and cardiovascular problems. (Retrieved from Wikipedia.com, Feb.6, 2011).