THE EFFECTS OF ENRICHMENT PROJECTS ON GIFTED LEARNING DISABLED STUDENTS' ACADEMIC SELF-PERCEPTIONS: AN EMPIRICAL STUDY

by

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Running head: GLD Enrichment Projects

The Effects of Enrichment Projects on Gifted Learning Disabled Students' Academic Self Perceptions: An Empirical Study

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Abstract

This study implemented a treatment program focused on the improvement of gifted learning disabled students' academic self-perceptions through the enrichment of visual-spatial strengths. The rationale for this study was based upon the concept of abilities as developing competencies that can be altered characteristics of an individual. The notion of altering or changing abilities through the implementation of appropriate interventions (i.e. enhancing noncognitive factors) to improve domain specific areas of giftedness and learning disabilities was the impetus for this study. The research question aimed to determine if enrichment intervention activities positively produced an effect upon the academic self-perceptions of perceived general intellectual ability in Gifted Learning Disabled (GLD) students (i.e. how smart am I?). The participants were 4th and 5th grade public elementary school students who displayed strong visual-spatial skills and learning difficulties. This empirical study included a pre/post treatment design with a experimental group and a waitlist comparison group. The hypothesis was confirmed with treatment results demonstrating significant gains in perceived general intellectual abilities subsequent to the completion of a ten-week enrichment program. Research and practice implications for curriculum decisions and program interventions are discussed. Recommendations for future research considerations based on the findings from this study are included.

Table of Contents

Dedication	4
List of Tables	5
Review of Literature	6
Method	40
Results	51
Discussion	54
Summary and Conclusions	59
References	61
Appendix A	77
Appendix B	80
Appendix C	83
Appendix D	86
Appendix E	89
Appendix F	91
Appendix G	94
Appendix H	96
Appendix I	98
Appendix J	102
Appendix K	109

Dedication

To Mom and Dad for all your love, encouragement, and support throughout my very long academic career.

To Bill for always believing in me and for your unconditional love and understanding.

...and especially to Grace for waiting and for being the most wonderful baby in the world!

List of Tables

Table

1) Participants' Demographic Information 41

2) Analysis of Covariance (ANCOVA) results for Perceived General Intellectual Ability 53

Review of the Literature

Gifted individuals have typically been defined exclusively on the basis of superior performance (130 or above) on intelligence tests (Baum, 2004). These gifted individuals were believed to be those who could perform at the highest levels in all areas of intelligence (Baum, 2004; Baum, Cooper, & Neu, 2001; Mauser, 1981; Terman, 1925). Consequently, little room was left for the concept of special populations of gifted students (Baum, 2004; Brody & Mills, 1997). One of these special populations is gifted students' with learning disabilities (GLD) (Baum, 2004; Baum, Cooper, & Neu, 2001; Brody & Mills, 1997; Nielsen, 2002).

The National Association for Gifted Children (NAGC) (1998) described gifted children with learning disabilities as children who, "...are not achieving up to their potential despite the fact that they demonstrate high ability or gifted behavior. These students exhibit characteristics of both exceptionalities: giftedness and learning disabilities" (p. 1). NAGC (1998) suggested that the following can serve as gifted indicators: high levels of creativity, excellent problem-solving abilities, superior abilities in abstract thinking, and extreme interests in certain areas. Gifted Learning Disabled (GLD) children are comparable to children with learning disabilities (LD), as they often display difficulties in reading, writing, mathematics, memory, organization, or sustained attention (NAGC, 1998). However, unlike their LD peers who solely experience learning deficits, GLD students have somewhat conflicting characteristics because in addition to having learning difficulties they also have areas of extreme strength. These areas of extreme strength can be hindered due to the barriers learning difficulties impose upon learning. For example, a student may have a strength in visual-spatial skills and have a reading disability. As a result of the conflicting attributes (i.e.

well-developed visual-spatial skills and significant reading difficulties), GLD students may develop low self-esteem, feelings of frustration, feelings of overall inadequacy, and/or inferior feelings regarding their academic self-perceptions (NAGC, 1998).

Although there are interventions for GLD students, there is currently a lack of appropriate services available to meet the needs of this population of students. In order to provide effective curriculum and intervention programs for GLD students, a focus should be placed upon addressing students' strengths as well as the weaknesses (Baldwin & Gargiulo, 1983; Baum, 1988; Bireley, 1995; Higgins & Nielsen, 2000; Korinek, 1992; Laycock, 1992; Udall & Maker, 1983). At present, most GLD program interventions do not provide interventions that meet the academic, social, and emotional needs of GLD students (Baum, 2004; Brody & Mills, 1997).

The objective of the current study was to evaluate the effectiveness of an enrichment program upon the academic self-perceptions of GLD students. Academic self-perceptions were measured before and after receiving treatment (the enrichment program). Some GLD students have unique characteristics such as well-developed visual-spatial skills and poor academic performance in one or more areas (this topic will be discussed in further detail within the literature review). Self-perceptions can be formed through direct experiences encountered by students and they can be shaped through feedback offered from others (Bandura, 1989, 1997). Students who have the opportunity to experience success through a direct experience and through the positive responses of others are more likely to develop favorable self-perceptions (Bandura 1986). As a result, it was hypothesized that treatment focused on the strengths of certain GLD students would produce positive gains upon their academic self-perceptions. This study implemented an enrichment program that concentrated

on the development of improved academic self-perceptions through the enrichment of visual-spatial skills (PACE Center n.d.).

Description of GLD students

Several investigators (Baum, 1994; Baum, Owen, & Dixon, 1991; Fox, Brody, & Tobin, 1983; Laudrum, 1989; Starnes, Ginevan, Strokes, & Barton, 1988) described three subgroups of GLD students. The first group included students that have been identified as gifted in school, but were considered to be underachievers because they experienced academic difficulties. It was believed that because of the academic difficulties these children experienced in school, some students lacked motivation, experienced social problems, developed a poor self-concept, and exhibited behavior problems (Baum, 2004; Baum, Cooper, & Neu, 2001; Brody & Mills, 1997; Korinek, 1992; Nielsen, 2002; Reis & Renzulli, 2004; Reis & McCoach, 2002; Silverman, 1989; Waldron, Saphire, & Rosenblum, 1987; Udall & Maker, 1983). The second group of gifted students described in the literature exhibited academic difficulties that were acute, which caused them to be identified as learning disabled. However, these students' exceptional abilities were never detected and therefore, never addressed (Baum, 2004; Baum, Cooper, & Neu, 2001; Brody & Mills, 1997; Korinek, 1992; Nielsen, 2002).

The third group of GLD students, possibly the largest, were those students whose abilities and disabilities mask each other causing these children to remain hidden in the general education setting (Baum, 2004; Baum, Cooper, & Neu, 2001; Brody & Mills, 1997). This group of children did not receive services for their gifts nor were they eligible to receive services for their disabilities (Baum, 2004). They will most likely never be referred for either gifted or disabled programs because they are considered to be average learners (Baum, 2004;

Baum, Cooper, & Neu, 2001; Brody & Mills, 1997). Typically, what will remain undiscovered is that their true abilities are far superior to that of average (Baum, 2004; Baum, Cooper, & Neu, 2001). This third group of students who appeared to be average, but were truly GLD, seemed to be the leading group of gifted students that endure their difficulties in silence (Baum, 2004).

Gifted individuals who exhibit learning disabilities have also been described as "twice exceptional learners" or "gifted underachievers" (Baum, 2004; Reis & McCoach, 2002; Renzulli, Baum, Hebert, & McCluskey, 1999; Shevitz, Weinfeld, & Jeweler, 2003). Twice exceptional learners are described as students who are gifted, but at developmental risk because of difficulties with learning and attention (Baum, 2004). Gifted underachievers are described as students who fail to perform at a level commensurate with their abilities (Reis & McCoach, 2002; Renzulli, Baum, Hebert, & McCluskey, 1999; Shevitz, Weinfeld, & Jeweler, 2003). GLD students are described as gifted students that typically, but not in every case, display a discrepancy between ability and achievement (Reis & McCoach, 2002), but also display a difference between exceptional abilities and deficit areas (Baum, 1988, 2004; Dole, 2000; Reis, McGuire, & Neu, 2000; Reis, Neu, & McGuire, 1997). For the purposes of this study, the term gifted learning disabled (GLD) will be used synonymously with twice exceptional learners and gifted underachievers.

In the past, the concept of GLD students sounded like a contradiction, yet approximately 2– 5 percent of the total population of children with disabilities are GLD (Marker, 1977; Whitmore, 1981; Whitmore & Maker, 1985). More recently, Baum, Cooper, and Neu (2001), Bisland (2004), and Nielsen (2002) found that the estimates of GLD students

were conservative. However, a reason for the conservative estimates was not established. Winner (1996) stated that the overall prevalence rate of GLD children is unknown.

The prevalence rate of the GLD population is under-represent within the total population of GLD students for many reasons. One reason is that research has demonstrated that teachers tend to refer non-learning disabled students for placements in gifted programs, which may have been due to teachers' lack of familiarity with the concept of GLD (Minner, 1990; Minner Prater, Bloodworth, & Walker, 1987). Other researchers reported that the empirical data regarding the current estimated prevalence rate of GLD children appear to be, in effect, nonexistent (Nielsen, 2002; Winner, 1996).

An earlier study conducted by Mauser (1981) examined the number of gifted students within a population of students with LD. This researcher found that 2.3 percent of children within the LD group additionally met the criteria for giftedness. Baum (1985) found that after randomly selecting LD students from six different elementary school districts, up to 33 percent of the LD sample had superior intelligence. Silverman (1989) reviewed 14 thousand test protocols to find that 1.4 percent of gifted children also had a LD in a gifted child center. Brody and Mills (1997) reported that the causes for the under-identification of GLD students in schools may be attributed to inadequate assessments and possible depressed intelligence scores that were most likely the result of a learning disability. Moreover, Brody and Mills (1997) stated that when LD students' potential remains unnoticed, the likelihood of the identification of their intellectual abilities becomes decreased. As a result, these students were rarely referred to gifted programs or for any form of gifted services (Brody & Mills, 1997).

In summary, over the past two decades the concept of GLD students has evolved within the literature. Current studies suggest that the number of GLD students is significant and under represented (Baum, Cooper, & Neu, 2001; Bisland, 2004; Nielsen, 2002; Winner, 1996). Additionally, researchers have reported that the empirical data concerning the prevalence rate of GLD students has not been established (Nielsen, 2002; Winner, 1996).

GLD students' lack of depiction within the school setting may be attributed to teachers' unfamiliarity with the concept of GLD students. Consequently, many GLD students most likely will not receive referrals to gifted programs (Minner, 1990; Minner Prater, Bloodworth, & Walker, 1987). Researchers have found potential reasons for the under-representation of the GLD population to possibly be related to assessment measures that are not effective in detecting gifted abilities in GLD students and intelligence scores that are depressed because of GLD students' disabilities (Brody & Mills, 1997).

Current State of Affairs in the Definitions of Gifted, Learning Disabled, and Gifted Learning Disabled

The current state of affairs pertaining to definitions of gifted, learning disabled (LD) and gifted learning disabled (GLD) vary in the sense that different definitions exist depending upon the source of the definition. Within the literature, it appears as if an established, commonly agreed upon definition for gifted and GLD does not exist. Whereas, definitions of LD may vary, however several definitions frequently have elements in common. It is not entirely clear as to the reasons for the difficulties in determining agreed upon definitions for gifted, LD, and GLD. This section will attempt to address some of the various issues pertaining to definitions such as: a) the literature demonstrated that there is a lack of agreement among professionals in the field upon the criteria for a unified definition of

giftedness (Boodoo, Bradley, Frontera, Pitts, & Wright, 1989; Brody & Mills, 1997, Fox & Brody, 1983; Renzulli, 1978; Stanley, 1971; Sternberg, 1981, 1986 & 1998; Witty, 1958; Whitmore, 1981), b) definitions of giftedness claim that the gifted are a heterogeneous group (Schmitz & Galbraith, 1985; Gardner, 1983 & 1993; Lerner, 2000), c) there are different definitions of LDs that can be broken down into different disability domains (Individuals with Disabilities Education Act (IDEA), 1997; Lerner, 2000; National Center for Learning Disabilities (NCLD), 2001; NJ Administrative Code Title 6A Chapter 14 Special Education, 2003; Silver, 2003; Stein & Lounsbury, 2004), and d) definitions of GLD can be broken down into definitions that require advanced intelligence in all ability domains (Baum, 2004; Fox & Brody, 1983; Hannah & Shore, 1995), strengths and weaknesses profile definitions (Baum, 2004; Crawford, 1994; Tannenbaum & Baldwin, 1983) and domain specific definitions (Dole, 2000; NAGC, 1998).

Gifted Definitions.

There appears to be a lack of agreement among many educational professionals as to a general definition of giftedness (Brody and Mills, 1997). For example, Boodoo, Bradley, Frontera, Pitts, and Wright, (1989) found that in one state (Texas) twenty-one separate definitions of "giftedness" were being used among different gifted programs. In the past, definitions of giftedness by and large have only made references to intelligence. Terman (1925) was the first to operationally define giftedness through the use of the Stanford-Binet Intelligence Scale utilizing students who scored in the top 1% on this measure. Some found the use of Terman's operational definition too limited (Witty, 1958; Whitmore, 1981), which led towards broader, less restrictive definitions. Witty (1958) proposed that an individual could be considered gifted if he/she consistently displayed remarkable performance in any

meaningful undertaking (i.e. academic area, musical talent, creative abilities, etc). Renzulli (1978) discussed the idea that giftedness can differ in terms of the scores received from the intelligence measure given. For example, the difference in intelligence scores falling at the 90^{th} percentile as opposed to the 98^{th} percentile.

Global versus Domain Specific Giftedness.

Definitions of giftedness can fluctuate regarding whether it is possible for a student to demonstrate gifted potential in one domain as opposed to displaying global giftedness in all areas. Some researchers (Fox & Brody, 1983) have debated gifted definitions in which a child exhibits potential in one domain, yet he/she performs inadequately in school and on achievement tests. An example of the fluctuation of gifted definitions pertaining to global versus domain specific definitions was witnessed in the results of a study conducted at The John Hopkins University's Study of Mathematically Precious Youth (SMPY) (Stanley, 1971). This study initiated a different perception of giftedness by using students who did not display intellectual superiority in all domains, yet were identified as gifted in one or more specific areas (i.e. mathematically, reading, etc.). Renzulli (1978) used the interactions of groups of traits as a means for defining giftedness. He examined the ways in which above average general ability, high levels of task commitment, and high levels of creativity interacted. The results of this study revealed that those who possessed or were capable of developing these traits with the ability to apply them to any constructive area of human functioning (i.e. academics, musically ability, or creativity) would be considered gifted. Additionally, Feldman (1979) examined this definition further by proposing the concept that children do not have to be gifted within an academic or intellectual domain. For example, this researcher

stated that all children may be considered gifted in some socially esteemed mode (i.e. having strong interpersonal skills).

Sternberg (1981, 1986) introduced an alternative to psychometric methods for defining giftedness. He developed an information-processing theory of intelligence covering three distinct components of giftedness. The three components are: a) metacomponents, such as high ordered processes used for problem solving b) performance components, which were defined as elements such as inference, acquisition, and retention, c) transfer components, such as the skills used in learning, retaining, and employing information. As described by this theory, individuals skilled in producing interactions of a high quality and a high quantity nature in the midst of the three components as listed above, would be considered gifted. In an updated version of Sternberg's triarchic theory of human intelligence the three abilities included were: memory-analytic, creative-synthetic, and practical-contextual (Sternberg & Clinkenbeard, 1995).

Later, Sternberg included the concept of intelligences as developing abilities rather than fixed characteristics of an individual (Sternberg, 1998, 1999, 2001, 2002, 2003). Developing competencies is defined by Sternberg (2001, 2003) as a continuing process in the attainment and consolidation of a set of skills required for a high level of mastery in one or more domains of life functioning. Within Sternberg's theory the relationship between abilities and competencies is seen as two distinct constructs that are intertwined and dependent upon one another (Sternberg, 1998, 2001, 2002). Sternberg's research regards the concept of developing competencies as fixed or predetermined abilities as a remnant of previous theories of intelligence (Sternberg, 1997).

Intelligence tests and related assessments are viewed as measuring the development of expertise and not as tools used to assess a prior existing set of abilities (Sternberg, 2001). The developing competencies or expertise position does not negate the involvement of genetics influences, however it measures the manifestations of the developing competency (Sternberg, 1997, 1998). According to this theory, gifted individuals are those who advance their expertise at a more rapid rate or have the ability to build-up their expertise to a higher level than their gifted peers (Sternberg, 1999, 2003).

The model of developing competencies incorporates five key elements: metacognitive skills, learning skills, thinking skills, knowledge, and motivation. Gifted individuals' developing expertise excels through the growth of the five elements (Sternberg, 2001). The elements affect one another both directly and indirectly (i.e. learning leads to knowledge and learning facilitates further learning) (Sternberg, 1999, 2001). The scope of these elements are domain specific in the sense that the advancement of competence in one area does not inevitably lead to the development of competence in another area. For example, a person could be gifted in terms of the skills needed to adapt to the environment, while exhibiting poor skills on conventional tests of intelligence and school assessments (Sternberg, 2001). The current study focused on individuals with domain specific advancement in visual-spatial skills and demonstrated poor academic achievement.

Gifted Students: a Heterogeneous Group.

Researchers who have studied giftedness in the past have described this population as a heterogeneous group (Schmitz & Galbraith, 1985; Gardner, 1983, 1993). Schmitz and Galbraith (1985) reported that gifted persons' talents and strengths were extremely varied just as any sample selected from an average population had wide-ranging abilities across different

domains. Gardner (1983, 1993) discussed the possibility of multiple intelligences, which meant that people could possess different types of intellectual abilities. Gardner (1983, 1993) described eight different forms of intelligence, such as verbal/linguistic, logical/mathematical, visual/spatial, musical/rhythmic, body/kinesthetic, interpersonal, intrapersonal, and naturalistic. The extent to which different forms of intelligence develop may depend upon various variables (i.e. exposure to opportunities for the development of gifts, the emotional support from school and home, etc.) (Lerner, 2000). Linguistic intelligence was greatly used in the areas of academics and schooling, which may imply that some students can experience deficits in writing, while encompassing superior abilities in visual-spatial skills. For example, this type of individual may be dyslexic, yet exhibit special abilities in mathematics as well as unusual strengths in other areas (Lerner, 2000).

LD Definitions.

According to the National Center for Learning Disabilities (NCLD) (2001) learning disabilities (LD) affect approximately 2.9 million school-aged, public school educated children in the United States. LD students compile approximately 5 percent of the total population of school-aged children in public schools (NCLD, 2001). A LD is a disorder that affects the neurological processes involved in the ability to receive, process, store and respond to information (Lerner, 2000; NCLD, 2001). The term learning disability is used to portray the apparent inexplicable difficulty a person of at least average intelligence has in obtaining basic academic skills (Lerner, 2000; NCLD, 2001). A LD is not a single disorder, as this is a term that refers to a group of learning difficulties, such as dyslexia, dyscalculia, dysgraphia, and pragmatic language disorder (NCLD, 2001; Stein & Lounsbury, 2004).

Stein and Lounsbury (2004) reported that many educators divide learning disabilities into at least four domains of dysfunction (dyslexia, dyscalculia, dysgraphia, and pragmatic language disorders). The first domain, dyslexia, is a language-based disorder related to difficulties in single-word decoding and in processing phonemes. Some symptoms of dyslexia may result in difficulties in reading and spelling (NCLD, 2004c; Stein & Lounsbury, 2004). Dyscalculia is a disorder of mathematics that can be associated with difficulties in mathematical calculation and/or mathematic concept formation (NCLD, 2004a; Stein and Lounsbury, 2004). Dyscalculia symptoms are described as a possible deficiency in visual-spatial skills, difficulty with arithmetic fact retrieval, and difficulty with the use of mathematical procedures (Stein & Lounsbury, 2004). Dysgraphia is defined as a problem with fine-motor and visual-motor coordination (NCLDb, 2004; Stein & Lounsbury, 2004). Some symptoms of dysgraphia are messy handwriting, distorted shapes, and poorly structured drawings (Stein & Lounsbury, 2004). The fourth domain described is pragmatic language disorders, which are a distortion of the nonverbal aspects of language used in a social context (i.e. knowing what to say, how to say it, and when to say it in social situations) (Stein & Lounsbury, 2004). An example of a pragmatic language disorder is when a child does not understand how to take turns in a social interaction (i.e. they will talk over the other person in the conversion) or at other times the child will respond in a conversion with inappropriate silences (Anderson-Wood, Smith, & Summers, 1997).

Lerner (2000) found that various LD definitions frequently had similar fundamentals in common. These similarities included central nervous system dysfunction, imbalanced growth patterns, psychological processing deficits, difficulty with academics, difficulty with learning new tasks, discrepancies between ability and achievement, and the exclusion of other

possible causes for the learning difficulties (i.e. minimal brain dysfunction, traumatic brain injury, cultural or economic disadvantage, etc.). Silver (2003) described other areas that a learning disability might impact, such as the student's ability to organize thoughts and materials (i.e. books, notebooks, and other materials required for learning) as well as the ability to plan and carry through a task.

Another definition of LD supplied by the Individuals with Disabilities Education Act (IDEA) (1997) described a specific learning disability as, "...a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations" (p.13). The term learning disability does not include disabilities such as a perceptual disabilities, brain injury, minimal brain dysfunction, or developmental aphasia (IDEA, 1997). LDs are also not the consequence of visual, hearing, or motor disability, mental retardation, emotional disturbance, or environmental, cultural, or economic disadvantage (IDEA, 1997).

Each State has a special education administrative code that implements the requirements as stated in IDEA to further guide school districts and local Departments of Special Services for the purposes of providing a Free Appropriate Public Education (FAPE) for every child. In New Jersey, the New Jersey Administrative Code, Title 6A, Chapter 14, Special Education (2003) additionally included requirements related to the criteria needed in order to be found Eligible for Special Education and Related Services (ESERS). These regulations include that a specific learning disability must be, "...characterized by a severe discrepancy between the student's current achievement and intellectual ability in one or more of the following areas: basic reading skills, reading comprehension, oral expression, listening

comprehension, mathematical computation, mathematical reasoning, and written expression" (New Jersey Administrative Code, Title 6A, Chapter 14, Special Education, 2003, p.32). Each school district in NJ has the ability to adapt procedures that utilize a statistical formula and criteria for determining the severe discrepancy between ability and achievement. Additionally, the students' evaluations must include an assessment of current academic achievement and intellectual ability (NJ Administrative Code, Title 6A, Chapter 14, Special Education, 2003).

The current study utilized the criteria from the IDEA (1997) as part of its eligibility criteria. More specifically, students who experienced difficulty with the ability to process language (written or spoken) as well as those who had difficulty with reading, writing, or math were considered to have a LD. The discrepancy between ability and achievement criteria proposed by the NJ Administrative Code Title 6A, Chapter 14, Special Education (2003) was determined to be too restrictive for the purposes of this GLD study.

GLD Definitions.

Over the past two decades there appears to have been a lack of research demonstrating a collective definition of GLD. Brody and Tobin (1983) and Reis and McCoach (2002) both found that while attempting to define GLD there did not appear to be a universally agreed upon definition because of the complexity of these children's abilities and disabilities. Likewise, Fox, Brody, and Tobin (1983) reported that there was no clear definition of gifted students who also encompassed learning disabilities. Fox et al. (1983) hypothesized that the lack of a clear definition was due to apparent confusion over labels in both the fields of the gifted as well as the learning disabled.

Definitions of GLD that require advanced intelligence in all ability domains.

Some researchers have reported the difficulties associated with using definitions of giftedness with GLD students that require high levels of intelligence in all or multiple ability domains (i.e. reading abilities, mathematical concept formation, visual-perception, auditory processing, memory, processing speed, etc). Fox and Brody (1983) reported that the concept of GLD students was viable according to some definitions, but not others. GLD students would not be considered gifted according to the definitions that required high levels of intelligence to be demonstrated in all academic areas because the LD would result in at least one deficit. However, according to definitions that included precocity in only one area as a requirement for giftedness, the LD child may demonstrate exceptional ability in an area that is not affected by the disability (Fox & Brody, 1983). Baum (2004) described GLD students as individuals who can think critically, develop keen interests, and incorporate good problem solving abilities, however they simultaneously encompass learning difficulties that cause developmental delays and hinder gifted potential. Hannah and Shore (1995) defined GLD students as those who demonstrate high abilities in areas that may be academic or creative. However, due to a learning disability these students are not able to perform within the average range in school.

Strengths and Weaknesses Profile definitions of GLD.

Strengths and weaknesses profile definitions of GLD necessitate more specific requirements in order to meet the criteria for GLD (Crawford, 1994; Tannenbaum & Baldwin, 1983). For example, Crawford (1994) utilized a strengths and weaknesses profile definition of GLD that contained intelligence specific characteristics, such as obtaining a Full Scale IQ score above 120 on the Wechsler Intelligence Scale for Children – Revised (WISC-R).

Additionally, Crawford (1994) included a two step weakness specific component that required a demonstrated deficit in successive processing as evidenced by a score below the 25th percentile on three successive marker tests on the Cognitive Assessment System (CAS) and a deficit in decoding skills that was determined by a score at or below the 25th percentile on the Basic Skills Cluster of the Woodcock Reading Mastery Test – Revised (WRMT-R). Only three subjects matched the eligibility criteria for participation in this study, which implies that this particular criteria was too stringent. Baum (2004) and Tannenbaum and Baldwin (1983) reported that some GLD definitions were confounded because many States require a discrepancy between ability and achievement in order to be identified as LD. Because of the required discrepancy between ability and achievement as evidenced by intelligence and achievement measurement sores, many GLD students are not detected because their disabilities may depress the overall intelligence score (Baum, 2004; Tannenbaum & Baldwin, 1983; Willard & Holt, 1999). As a result, many GLD students remain undetected throughout their school careers (Baum, 2004).

Domain specific definitions of GLD.

Dole (2000) and NAGC (1998) reported domain specific definitions of GLD. Dole (2000) utilized a definition of GLD that described these students as individuals who have either potential or evident exceptional talent and/or ability in one or more area(s), but also experience specific academic problems as a result of a processing deficit (i.e. deficits in auditory perception, visual perception, or memory). The National Association for Gifted Children (NAGC) (1998) defined GLD students as those who because of a specific learning disability, are not achieving up to their potential despite the realization that they display high ability or gifted behavior. GLD students exhibit both giftedness and learning disabilities.

Gifted behaviors may include superior abilities in abstract thinking and problem solving, keen interests, and high levels of creativity, while deficit areas may include difficulties in reading, writing, mathematics, organization, memory, or sustaining attention (NAGC, 1998).

In summary, the GLD students are not a homogeneous group (Schmitz & Galbraith, 1985; Gardner, 1983, 1993; Lerner, 2000). GLD children can encompass superior abilities in certain areas, while demonstrating deficits in others (Lerner, 2000). Due to the complexity of GLD children's abilities and disabilities, different GLD definitions have evolved (Brody & Tobin, 1983; Fox, Brody, & Tobin, 1983; Reis & McCoach, 2002). GLD definitions can fall into different categories, such as global definitions (Baum, 2004; Fox & Brody, 1983; Hannah & Shore, 1995), strengths and weaknesses profile definitions (Baum, 2004; Crawford, 1994; Tannenbaum & Baldwin, 1983) and domain specific definitions (Dole, 2000; NAGC, 1998).

Global definitions of GLD may be problematic because research has shown that the likelihood that GLD students will exhibit giftedness in all areas of intelligence is not anticipated (Fox & Brody, 1983). Presumably, the GLD student's disability will result in at least one deficit area that will reduce the likelihood of global giftedness occurring. In contrast to global definitions, strengths and weaknesses profile definitions of GLD require even more detailed criteria, which may be too restrictive to use with the GLD population. Domain specific definitions of GLD may be more appropriate to use with the GLD population because these definitions are less rigid. The likelihood of displaying exceptional ability or the potential to develop exceptional ability amongst a disability may be a less restrictive criteria to meet (Dole, 2000; NAGC, 1998). Sternberg's theory (2001, 1999, 1998, 1997) of intelligence as developing abilities that are not fixed characteristics of an individual may be a more suitable definition to apply towards the GLD population. This concept of giftedness can

include a developing expertise in one domain of giftedness, which can appropriately characterize GLD students who may only exhibit their gifted ability in one area of expertise. Additionally, there is a debate in the field between global giftedness versus domain specific giftedness, however for the purposes of this study a domain specific definition of GLD was utilized.

Identification of GLD Students

The literature demonstrated that difficulties arise when identifying GLD students in the general education population (Baum, 2004; Baum, Cooper, & Neu, 2001; Brody & Tobin, 1983; Baldwin & Gargiulo, 1983; Daniels, 1983; Fox & Brody, 1983; Johnson, 1996; Karnes, 1988; Korinek, 1992; Lazarus, 1989; Maker, 1977; Senf, 1983; Silverman, 2000; Tannenbaum & Baldwin, 1983; Waldron, Saphire, & Rosenblum, 1987). Among these difficulties are a) unique ability patterns and compensation strategies in GLD students that can comprise the identification process (Bickley, 2002; Silverman, 2000), b) the process of identifying GLD students can be influenced by the assessment measures used to assess gifted potential (Baum, 2004; Baldwin and Gargiulo, 1983; Brody and Tobin, 1983; Johnson, 1996; Lazarus, 1989; Tannenbaum and Baldwin, 1983), and c) some GLD students that are identified as having a learning disability (LD) and are receiving academic services for their LD (i.e. resource room instruction) may not be identified as gifted within the school setting (Baum, 2004).

Special Abilities and Compensation Strategies.

One element found in the literature that depicted the difficulties associated with identifying GLD students described special abilities that are likely to compensate for deficit areas (Bickley, 2002; Silverman, 2000). Special ability patterns are unique and can fluctuate

over time (Bickley, 2002). As a result, difficulties may arise due to uneven development. (Bickley, 2002). For example, despite superior visual-spatial skills, a GLD student may experience academic weaknesses in areas such as reading, writing, and spelling (West, 1997). As a means of coping with the academic weaknesses, a GLD student may develop strategies to compensate for the reading, writing, and spelling difficulties (Bickley, 2002; Reis, McGuire, & Neu, 2000). Examples of compensation strategies used for reading difficulties are listening closely to classroom discussions and asking questions, focusing on topic sentences, conclusions and summaries to help with comprehension, and outlining the chapters of books to aid in the retention of facts (Coleman, 2001).

Some GLD students have the ability to take areas of strength and use them to help offset weaknesses (Coleman, 2001; Reis, McGuire, & Neu, 2000; Silverman, 2000). Silverman (2000) referred to compensation as a "two-edged sword," because it greatly helps a child to adapt in any environment, however the compensation strategies employed may consequently prevent the recognition of the disability and may even prevent an accurate diagnosis of the disability (Baum, 1990; Silverman, 2000). Further complicating the compensation strategies, Silverman (2000) explained that compensation can be unstable, as elements such as fatigue, illness, and stress can produce an affect upon a person's compensation abilities. As a result, further difficulties in the identification process may occur, since the child may only display the deficit area occasionally or not often enough to obtain a referral for a Child Study Team evaluation (Silverman, 2000). Mechanisms such as compensation may mask a disability and make the identification of GLD even more difficult (Baum, 1990; Silverman, 2000).

Improper Assessment Measures.

Baum (2004) explained that the process of identifying GLD students can be difficult because of assessments that may not properly demonstrate GLD potential. Drawing conclusions about a child's capabilities based on the results from one intelligence test may not be reflective of the child's true abilities (Johnson, 1996). Baum (2004) found that traditional measures used to identify gifted students may not be reliable for the GLD population, since learning characteristics typically associated with gifted abilities may not be outwardly exhibited in GLD students. Further, Baum (2004) reported that test results may unjustly exclude students with high abilities from gifted programs. In order to increase the likelihood of success when identifying GLD students, a multi-component identification method should be employed (Baum, 2004; Baldwin & Gargiulo, 1983; Johnson, 1996; Lazarus, 1989). Consequently, other strategies that employ multi-component methods, such as examining the entire educational picture of the student (i.e. intelligence test scores with a focus on subtest score differences, achievement scores that examine individual abilities, teacher input, parent input, etc.) may be more appropriate (Baum 2004; Johnson, 1996; Lazarus, 1989).

Tannenbaum and Baldwin (1983) provided guidelines for assessing giftedness in children with learning disabilities, especially when developing a special enrichment program for GLD students. These guidelines were considered to be similar to those that would be used with all children, with the exception that the methods used for implementation would be different. The screening stage in the identification process included elements that assessed remote indicators of potential and information (i.e. a review of records to examine the potential for extreme interests in certain areas, teacher input, parental reports, etc.). The purpose of this stage was to allow children who demonstrated vague characteristics of

giftedness to be included in the possible GLD candidates' pool of students, so that further exploration of potential exceptional abilities could be considered (Tannenbaum & Baldwin, 1983).

In order to identify GLD students, one element that is typically included in the evaluation process is an intelligence test (Baum, 2004; Brody & Mills, 1997; Coleman, 2003; Fox & Brody, 1983; Johnson, 1996; Karnes, 1988; Maker & Udall, 1985; Tannenbaum & Baldwin, 1983). However, some researchers warned (Tannenbaum & Baldwin, 1983; Willard-Holt, 1999) that when attempting to identify GLD students based on their overall scores from intelligence measures, the student's disability will often depress the overall score. As a result, it is important to use multiple identification measures within the assessment process (Baum, 2004; Brody & Mills, 1997; Coleman, 2003; Fox & Brody, 1983).

Another typical measure used in the identification process, achievement tests (Brody & Mills, 1997; Coleman, 2003; Fox & Brody, 1983; Maker & Udall, 1985; Tannenbaum & Baldwin, 1983), may predict ability in a certain area that is not affected by the child's disability (Fox & Brody, 1983). However, the child's deficit area(s) would reflect the area(s) of need and remediation (Fox & Brody, 1983). For example, a child may score extremely well on a difficult mathematics test, while producing an extremely low score on a test of reading comprehension (Fox & Brody, 1983).

An additional example of a multi-component GLD assessment identification element included the concept of obtaining information through multiple sources. Specifically, these multiple sources included obtaining information from teachers and parents (Coleman, 2003; Maker & Udall, 1985; Tannenbaum & Baldwin, 1983) and the student (Coleman, 2003). Obtaining information regarding learning characteristics, out-of-school activities and

interests, as well as extracurricular activities is important (Tannenbaum & Baldwin, 1983). Brody and Tobin (1983) found it useful to employ parental checklists that described specific learning characteristics (i.e. learning style, study habits, etc.) when attempting to identify students for gifted programs. Although Brody and Tobin (1983) stated that these checklists should be used in conjunction with test scores, the checklists may be useful to help identify children who do not test well on standardized assessments.

Students Already Identified as LD.

Some GLD students that are identified as having a learning disability (LD) and are receiving academic services for the LD (i.e. resource room instruction) may not be identified as gifted within the school setting (Baum, 2004). Baum (2004) reported that during many GLD identification processes, once GLD students were identified as having a LD, these students were placed in remedial or special education classes. After identified as LD, these students were provided with remediation for their deficit area(s), however little if any attention was provided for the students' gifts (Baum, 2004). Often, GLD students are inappropriately offered the same remediation as their "average" LD peers with limited or no special provisions allotted for foster their strengths (Baum, 2004).

Other researchers (Baum, Cooper, & Neu, 2001) reported GLD students were often neglected within the United States school systems, as little educational provisions were made for this population's special abilities. Due to limited or lacking special provisions for GLD students' gifts, they were rarely able to achieve their true abilities in school (Baum, Copper, & Neu, 2001). Removing gifted students from the mainstream setting to place them in remedial settings (resource centers or other special classes) may worsen the situation since GLD students' access to any form of an obtainable gifted education would be limited or stifled

(Baum, Cooper, & Neu, 2001). However, Winner (1996) reported that many GLD students did not gain admittance into gifted programs because of their disabilities, nevertheless these same students were considered too intelligent to be eligible for special education and related services.

In summary, the GLD identification process can be influence by certain elements that will effect the outcome of the students that are identified. Some of these elements are unique ability patterns and compensation strategies created by GLD students in order to compensate for their deficits areas (Bickley, 2002; Silverman, 2000). Other influential identification factors included inappropriate assessment measures that may not properly demonstrate GLD students' potential (Baum, 2004; Johnson, 1996). As a result, multi-component methods need to be implemented in order to reduce the likelihood that one measure would not accurately represent a student's true abilities (Baum, 2004; Baldwin and Gargiulo, 1983; Brody & Mills, 1997; Coleman, 2003; Johnson, 1996; Karnes, 1988; Lazarus, 1989; Fox & Brody, 1983).

For the purposes of this study a multi-component assessment method was implemented for the identification of GLD participants. A test of nonverbal intelligence, achievement measures, parental input, teacher input, and student input were utilized in the identification process.

Curriculum and Intervention Programs for GLD Students

The literature pertaining to the curriculum and program needs of GLD students focuses on challenging strengths as well as addressing weaknesses (Baldwin & Gargiulo, 1983; Baum, 1988; Bireley, 1995; Higgins & Nielsen, 2000; Korinek, 1992; Laycock, 1992; Udall & Maker, 1983). One of the most important factors to consider when making appropriate curriculum decisions for GLD students involves addressing the unique, individual

needs of these students (Baldwin & Gargiulo, 1983; Baum, 1988; Bireley, 1995; Higgins & Nielsen, 2000; Korinek, 1992; Laycock, 1992; Polloway, Patton, Epstein, & Smith, 1989; Udall & Maker, 1983). The students' needs should be considered in relation to their specific interests (Van Tassel-Vaska, 1989; Polloway, Patton, Epstein, & Smith, 1989). For example, challenging GLD students who have extreme interests in science to conduct more hands on science experiments (Baum, Cooper, & Neu, 2001) because their disability does not allow them to demonstrate their exceptional science knowledge through traditional means, such as tests.

Specifically, within this section elements pertaining to appropriate curriculum planning and intervention program requirements will be addressed. Special attention will be devoted to previous GLD program studies present within the literature such as: a) a description of GLD instructional accommodations and methods that have been portrayed as useful (Baum, 1988; Daniels, 1983; Fox, Brody, & Tobin, 1983; Gallagher, 1983; Silverman, 1989; Vaughn, 1989; Whitmore & Maker, 1985), b) a description of program interventions that involve specialized enrichment curriculum for the academic needs of GLD students (Baldwin & Gargiulo, 1983; Baum, 1988; Baum, Cooper, & Neu, 2001; Baum & Olenchak, 2002; Baum, Olenchak & Owen, 1998; Bireley, 1995; Higgins & Nielsen, 2000; Korinek, 1992; Laycock, 1992; Udall & Maker, 1983; Whitmore, 1980), c) an example of a unique enrichment program for GLD students (Enrichment Triad Model) (Renzulli, 1977; Renzulli & Reis, n.d), and d) a review of the GLD programs that have been formally studied (Baldwin & Gargiulo, 1983; Baum, 1988; Baum, Cooper, and Neu, 2001; Baum, Renzulli, & Hebert, 1995; Bees, 1998; Olenchak, 1995; Shevitz, Weinfeld, & Jeweler, 2003; Udall and Maker, 1983).

GLD Instructional Accommodations and Methods.

Some curriculum suggestions from the literature included accommodations and methods that have instructionally aided GLD students with obtaining educational progress. Although these suggestions would be appropriate for any student, they are believed to be especially helpful for GLD students. Some of these suggestions included: allow opportunities for high interest activities, provide challenging topics to motivate students and cultivate strengths, provide opportunities to boost self-esteem, self-awareness, and self-control, encourage student participation in decision-making and create an active learning environment, and avoid drill and practice activities by utilizing multisensory approaches within the learning environment (Baum, 1988; Daniels, 1983; Fox, Brody, & Tobin, 1983; Gallagher, 1983; Silverman, 1989; Vaughn, 1989; Whitmore & Maker, 1985).

Curriculum for Intervention Programs.

Intervention programs involve special curriculum for enriching GLD students. The literature established that GLD students require unique academic programming because of their set of different abilities ranging from gifts to deficits (Baldwin & Gargiulo, 1983; Baum, 1988; Baum, Cooper, & Neu, 2001; Baum & Olenchak, 2002; Baum, Olenchak & Owen, 1998; Bireley, 1995; Higgins & Nielsen, 2000; Korinek, 1992; Laycock, 1992; Udall & Maker, 1983). Whitmore (1980) provided one of the initial descriptions of special programs for GLD students that encompassed academic and school issues. Whitmore's descriptions of special programs for GLD students was first introduced during the 1980s, however over the past two decades, educators have continued to support the continued need for programs that will specifically and comprehensively address the needs of the GLD population (Baum, Owen, & Dixon, 1991; Bireley, 1995; Fox, Brody, & Tobin, 1993; Korinek, 1992; Laycock,

1992; 1994; Schwartz, 1992; Silverman, 1989, 1993; Suter & Wolf, 1987, Van Tassel-Bassel, 1991, 1992; Waldron, Saphrie, & Rosenblum,1987).

More recently, the National Association for Gifted Children (NAGC) (1998) provided recommendations for fundamental features that should be included in a comprehensive program. These features included a program design aimed to nurture GLD students' gifts while establishing accommodations for their deficits (NAGC, 1998). Other provisions included a learning environment that valued individual abilities, the identification and fostering of strengths, and educational guidance towards the development of compensatory strategies to help areas of weakness (NAGC, 1998).

Enrichment Triad Model: A Unique Program.

One form of a unique program used with GLD students is the Enrichment Triad Model (Renzulli, 1977), or also known as the Schoolwide Enrichment Model (Renzulli & Reis, 1994; Renzulli & Reis, n.d.). The Enrichment Triad Model was designed to expose and foster students to various areas of interest, fields of study, and subject matter (Renzulli & Reis, n.d.). This model also aims to further train students to utilize advanced subject matter, process-training skills, and methodology training to self-selected areas of interest (Renzulli, 1977). Three types of enrichment are included in the Enrichment Triad Model, which are Type I, Type II, and Type III enrichment (Renzulli, 1977; Renzulli & Reis, n.d.).

Type I enrichment involves exploratory activities aimed at exposing the student to a large variety of disciplines, visual and performing arts, occupations, topics, hobbies, persons, places, and events that are not generally covered within the general education curriculum (Olenchak & Renzulli, n.d.; Renzulli, 1977; Renzulli & Reis, 1994; Renzulli & Reis, n.d.). Examples of Type I activities in the school setting are having mini courses pertaining to areas

of interest, demonstrations, and performances (Renzulli & Reis, n.d.). Schools that implement this model typically have an enrichment team consisting of teachers, parents, and students (Renzulli & Reis, n.d.).

Type II enrichment consists of group training activities (Olenchak & Renzulli, n.d; Renzulli, 1977; Renzulli & Reis, 1994; Renzulli & Reis, n.d.). These activities utilize instructional methods and materials designed to promote the development of creative thinking abilities, problem-solving abilities, critical thinking, and affective processes (Renzulli, 1977; Renzulli & Reis, 1994; Renzulli & Reis, n.d.). Type II training is considered to be general instruction usually delivered within the classroom or enrichment program setting (Renzulli & Reis, 1994; Renzulli & Reis, n.d.). Fox example, students who become interest in botany after the Type 1 enrichment experience could obtain further training in this area by conducting advanced reading on the topic. Next, these students could gather, plan, and carry out plant experiments (Renzulli & Reis, n.d.).

Type III enrichment involves individual and small group investigations of real problems (Renzulli, 1977; Renzulli & Reis, 1994; Renzulli & Reis, n.d.). During Type III enrichment activities, the student becomes the lead investigator that acts like a practicing professional in the area of interest (Renzulli & Reis, 1994; Renzulli & Reis, n.d.). The student takes part in investigative activities and creates artistic productions in a self-selected area of study (Renzulli & Reis, n.d.). Some of the goals of Type III enrichment include: a) providing opportunities for the utilization of interests, knowledge base, and task commitment to self-selected problems or areas of interest, b) obtaining advanced level understanding of the content and processes that are implemented within certain disciplines, artistic areas, and interdisciplinary studies, c) the development of self-directed learning skills, planning and

organization skills, and resource utilization skills, and d) the development of time management, self-confidence, and feelings of creative accomplishment (Renzulli & Reis, n.d.).

For the purpose of the current study, special attention has been given to Type III enrichment activities of the Enrichment Triad Model (Renzulli, 1977), which has been known to demonstrate effectiveness in the education of GLD students (Baum, 1988; Olenchak, 1995). Programs that implement Type III enrichment activities adhere to the concept of allowing children to self-select activities (Renzulli, Baum, Herbert, & McCluskey, 1999). Research indicates that gifted children produce greater achievement when they are permitted to engage in activities they choose for themselves (Renzulli, Baum, Herbert, & McCluskey, 1999; Renzulli & Reis, n.d.). The design of Type III enrichment attempts to allow students opportunities for gaining knowledge through exploration activities permitting further exposure to new concepts and facts that have not been taught within the mainstream curriculum (Renzulli, Baum, Herbert, & McCluskey, 1999; Renzulli & Reis, n.d.). When engaging in programs that utilize Type III enrichment activities students are encouraged to broaden the advancement of higher ordered thinking through opportunities to investigate problems (Renzulli, Baum, Herbert, & McCluskey, 1999). Additionally, students are instructed to display the knowledge they have just gained through the enrichment process by constructing projects (Renzulli, Baum, Herbert, & McCluskey, 1999).

Previous GLD Program Studies.

Overall, in reviewing the GLD programs that have been formally studied in the literature (Baldwin & Gargiulo, 1983; Baum, 1988; Baum, Cooper, & Neu, 2001; Baum, Renzulli, & Hebert, 1995; Bees, 1998; Olenchak, 1995; Shevitz, Weinfeld, & Jeweler, 2003;

Udall & Maker, 1983), these studies did not appear to produce a great deal of research pertaining to the effectiveness of GLD enrichment activities. With the exception of one study utilizing quantitative analysis (Olenchak, 1995), and one study conducting both quantitative (pre-intervention only) and qualitative analysis (Baum, Renzulli, & Hebert, 1995), the remaining studies only produced qualitative results. All the GLD program studies reported positive outcomes, such as an improved attitudes towards academics (Baldwin & Gargiulo, 1983; Baum, Renzulli, & Herbert, 1995; Olenchak, 1995), a gain in the understanding of their unique learning styles (Shevitz, Weinfeld, & Jeweler, 2003), positive gains in achievement (Baum, Renzulli, & Herbert, 1995), increased motivation (Baum, 1988), improved classroom behavior (Baum, 1988; Baum, Renzulli, & Herbert, 1995), and improved self-perceptions (Baum, 1988; Baum, Cooper, & Neu, 2001; Olenchak, 1995; Udall & Maker, 1983). However, limited evidence of empirical support demonstrating the success of enrichment activities with the GLD population was established. Specifically, these studies used poor methodology, which made conclusions unreliable and questioned validity. For example, none of the GLD program studies reviewed utilized a control group or a comparison group to help demonstrate the effectiveness of the enrichment intervention outcomes. Additionally, most of the studies did not use formal measures to assess the reported outcomes.

In summary of the curriculum needs and intervention programs for GLD students, the focus of curriculum planning should comprise students' strengths as well as weaknesses (Baldwin & Gargiulo, 1983; Baum, 1988; Bireley, 1995; Higgins & Nielsen, 2000; Korinek, 1992; Laycock, 1992; Udall & Maker, 1983). Individual academic programming is imperative for the success of GLD intervention programs (Baldwin & Gargiulo, 1983; Baum, 1988; Baum, Cooper, & Neu, 2001; Baum & Olenchak, 2002; Baum, Olenchak & Owen,

1998; Bireley, 1995; Higgins & Nielsen, 2000; Korinek, 1992; Laycock, 1992; Udall & Maker, 1983). A special enrichment program used with GLD students (The Enrichment Triad Model, Renzulli, 1977, or also know as the Schoolwide Enrichment Modal, Renzulli & Reis, n.d.; Renzulli & Reis, 1994) is a specific program with curriculum and intervention strategies proven to be effective in meeting the unique educational programming needs of the GLD population (i.e. addressing strengths and weaknesses by focusing on areas of strengths to improve weaknesses, concentration in areas of interest, increasing time management skills and follow-through, etc). Therefore, this study focused on Type III enrichment of the Enrichment Triad Model because of the individual and small group investigations of problems (Renzulli, 1977; Renzulli & Reis, n.d.; Renzulli & Reis, 1994) and the idea that students take part in investigative activities while creating artistic productions (Renzulli & Reis, n.d.). Additionally, the GLD program studies reviewed by this researcher failed to establish empirical support for the effectiveness of enrichment activities with GLD students.

Academic Self-Perceptions

Self-perceptions can be shaped through an individual's direct experiences and they can be formed through feedback obtained from others (Bandura, 1989, 1997). Positive or favorable responses from others are more likely to result in successful direct experiences and improved self-perceptions. (Bandura 1986). Self-perceptions can be considered the elements that shape children's awareness of their abilities (Mauser, 1981). Self-perceptions were found to influence all aspects of behavior including cognitive and achievement behavior (Bandura, 1989, 1997; Kelly & Norwich, 2004; Mauser, 1981; Shen, 2002; Silverthorn, DuBois, & Crombie, 2005; Xinyin, Yunfeng, & Dan, 2004). Positive self-perceptions have been linked

to overall emotional satisfaction and improved behavior (Coplan, Findley, & Nelson, 2004; Diamantopoulou, Henricsson, & Rydell, 2005; Harter, 1990; Xinyin, Yunfeng, & Dan, 2004).

Researchers who study self-perceptions have determined that young children in early primary school are able to differentiate themselves through a sense of their own abilities (academic, sports, social, etc.) (Eccles, Wigfield, & Schiefele, 1998). In general, children have a positive view of their abilities during the early school years, however their self-perceptions may deteriorate as they enter into late elementary school (4^{th} and 5^{th} grade) (Eccles, Wigfield, Harold, & Blumenfeld, 1993). Students with learning difficulties who experience repeated failure may acquire an earlier decline in the self-perceptions of their competences when compared to their nondisabled peers (Jordan, 2004). The reason for this earlier decline is most likely related to the struggle and frustration associated with continued academic difficulties (Jordan, 2004). The lowered competency self-perception may make students who are experiencing academic difficulties avoid seeking teacher assistance (Greenberg, 2002; Hoehn, 1999; King, Naylor, Segal, Evans, & Shain, 1993; Lall, Hirisave, Kapur, Subbakrishna, 1997; Ryan, Pintrich, & Midgley, 2001). This phenomenon can create a vicious cycle in which students who experience lowered self-perceptions continue to evade academic help causing their competencies and grades in school to deteriorate further (Greenberg, 2002; Hoehn, 2002; Ryan, Pintrich, & Midgley, 2001). The end result of this cycle comprises a further decline in academic self-perceptions and may produce and effect in other areas of self-perceptions (Greenberg 2002; Hoehn, 2002).

GLD students tend to display a lowered sense of self-perceptions when compared to both of their peer groups (gifted peers and LD peers) (Baum, 1985). However, the reason for GLD students' lower self-perceptions has not been established. Several researchers (Reis,

Neu, & McGuire, 1995; Reis & McCoach, 2002; NAGC, 1998; Nielsen, 2002) reported GLD students to exhibit an overall lowered self-concept and even weaker academic self-perceptions. Baum and Owen (1988) and Baum, Renzulli, and Hebert (1995) found that GLD students' scores on a measure of perceived academic ability (the Self-Efficacy for Academic Tasks test) was lower then that of their nondisabled gifted peers. Olenchak (1995) also found that GLD students' pretest scores on the Piers-Harris Scale indicated a lowered self-concept.

The literature demonstrated that there have been a limited number of studies that have specifically measured GLD students' academic self-perceptions. With the exception of three studies (Baum & Owens, 1988; Baum, Renzulli, & Hebert, 1995; Olenchak, 1995) most researchers have only examined the overall self-perceptions of GLD students (Baum, Owen, & Dixon, 1991; Bireley, 1995; Daniels, 1983; Fox, Brody, & Tobin, 1983; Reis, Neu, & McGuire, 1997; Tannenbaum & Baldwin, 1983; Udall & Maker, 1983; Van Tassel-Baska, 1991; Waldron, Saphire, & Rosenblum, 1987). For example, Reis, McGuire, and Neu (2000) found that GLD college students reported overall lowered self–perceptions, however there was no specific examination in the area of academic self-perception. Whereas, Baum and Owens (1988) and Olenchak (1995) concluded that GLD students tended to have poor academic self–perceptions.

In summary, self-perceptions that are positive in nature are important for emotional well-being (Harter, 1990). Children who experience academic difficulties can develop self-perceptions that are greatly deteriorated (Jordan, 2004). More specifically, GLD students' academics may actually suffer because of lowered self-perceptions that trigger the avoidance of seeking teacher assistance (Greenberg, 2002; Hoehn, 1999; King, Naylor, Segal, Evans, & Shain, 1993; Lall, Hirisave, Kapur, Subbakrishna, 1997; Ryan, Pintrich, & Midgley, 2001).

The avoidance behavior may add to a succession of repeated academic failures, worsening self-perceptions even further (Greenberg 2002; Hoehn, 2002). As a result, this study specifically focused on measuring GLD students' academic self-perceptions.

Rationale

The rationale for this study was based upon the concept of abilities as developing competencies that are pliable or changeable characteristics of an individual. Abilities can be altered with the appropriate interventions (i.e. abilities can change over time with the implementation of the appropriate interventions necessary for the change to occur) (Sternberg, 1998, 1999, 2001, 2002, 2003). Through the enhancement of noncognitive factors, such as self-perceptions, abilities can be altered and improved (Bandura, 1986, 1997; Dorsey & Jackson, 1995; Meyer, Talbot, Stubblefield, & Poon, 1998; Turner & Lindsay, 2003). Therefore, this study focused upon enhancing the academic self-perceptions of GLD students through the enrichment of strengths (i.e. visual-spatial skills) with the expectation of altering abilities.

For the purposes of this study, giftedness and learning difficulties are developing competencies that are domain specific. For example, a person can be gifted and learning disabled simultaneously across various domains of learning (i.e. strong visual-spatial skills and poor reading abilities). GLD students' deficit areas can be improved through the further development of their gifts and through learned compensation strategies for their LD(s).

This study specifically utilized a domain specific definition of GLD in which participants who exhibited exceptional abilities in visual-spatial skills and displayed academic weaknesses in reading, writing, or mathematics were recruited. This study's domain specific definition of GLD required the following elements: a) above average intelligence

(demonstrated by an above average score from an intelligence measure), b) strong visual-spatial skills (demonstrated by the ability to effectively use visual discrimination) and c) academic weakness (demonstrated through poor performance on a measure of academic achievement and/or teacher and parental report of poor academic performance).

The purpose of this study was to investigate the effects of an enrichment intervention program (Type III enrichment), Leonardo's Laboratory (Eli Whitney Museum, n.d.), on GLD students' academic self-perceptions. The hypothesis in this study was as follows: Enrichment intervention activities will positively produce an effect upon the academic self-perceptions of GLD students' perceived general intellectual ability in late elementary school (4^{th} and 5^{th} grades).

A Type III enrichment intervention program was chosen for this study because these activities focus on an area that is of interest to the student. In this study, students that displayed an area of interest in visual-spatial activities (i.e. hands-on tasks, building projects, etc.) were included in the enrichment intervention program. Due to the lack of a control group or comparison group within each GLD program study reviewed by this researcher, the current study's research design implemented a waitlist comparison group to further establish significance. In addition, as a result of the limited number of studies that demonstrated quantitative outcomes, this study conducted quantitative data analysis of repeated measures.

Method

Participants

The research participants were 4th and 5th grade students who were recruited from an elementary school within the Passaic Public Schools district located in Passaic, New Jersey. Initially, forty-nine students (33 males and 16 females) received referrals to the study through either their homeroom teacher or the art teacher. Eight of the forth-nine students were eligible for special education and related services. All forty-nine students were invited to partake in a pretest session to determine if they were appropriate for the study. Thirty-six students (25 males and 11 females) completed the pretest measures. Eight parents did not give parental consent for the pretest session, four participants who had parental consent did not attend the pretest session, and one student was asked to leave during the pretest administration because he was cheating. Twenty-eight students (N = 14 in each group; 21 males and 7 females in total) met the eligibility criteria for the study. Participants were assigned to either the experimental group or the waitlist comparison group through matched pairs according to nonverbal IQ scores, achievement scores, eligibility for special education and related services, grade level, and gender.

Seventeen students completed the intervention program (experimental group N = 9; waitlist comparison group N = 8). Two participants' parents did not give parental consent to participate in the program and therefore could not attend the program sessions, three participants who had parental consent never attended any of the program sessions, two participants were asked to leave the study because of disrespectful and disruptive behavior, and four participants did not attend the posttest session. All participants received the treatment program. Four of the participants were female, while thirteen were male. Nine

students were in the 4th grade and eight were in the 5th grade. The participants ranged in age from nine years, eight months to eleven years, seven months. The in-school special services that the participants received were as follows: one participant received special education resource room instruction for reading and speech and language therapy; 1 participant received special education resource room instruction for reading only; and two participants received speech and language services only. Additionally, four participants were diagnosed with Attention Deficit Hyperactivity Disorder (ADHD).

The ethnic background of the participants was as follows: thirteen participants were of Hispanic decent; two participants were of African American decent; 1 participant was of Indian decent; and 1 participant was of Egyptian decent. According to data provided by the school district, socioeconomic status of the groups ranged from lower-middle class to below the poverty line. The majority of the students were from single parent homes. Most of the participants were from Spanish speaking homes whose parents had limited English proficiency. The participants' demographic information for both the treatment group and the waitlist comparison group are included in Table 1.

Table 1

Participant Demographic Information

	Experimental Group	Waitlist Comparison Group
1. Mean Age	10.7	10.5
2. Number of 4th Graders	6	3
3. Number of 5th Graders	3	5
4. Number of Females	3	1
5. Number of Males	6	7
6. Number receiving Special Education Services	1	1
7. Number receiving Speech and Language Services	1	1
8. Number Diagnosed with ADHD	2	2
9. Hispanic Students	6	7
10. African American Students	2	0
11. Indian Students	1	0
12. Egyptian Students	0	1

Procedure

Procedures for selecting the participants included sending recruitment letters with referral forms to general education teachers and special area teachers in the 4th and 5th grades at an elementary school (Pre-K through 5th grade) in Passaic, New Jersey. The letter explained the purpose of the study, the recruitment process, and the characteristics of interests (strong non-verbal skills, visual-spatial skills, and poor academic achievement). A copy of the recruitment letter and teacher referral form are included in Appendix A.

After the students were referred, a pretest session was conducted. During this session the referred students completed the pretest measures (Culture Fair Intelligence Test, Cattell, 1973; Orthographic Choice Task, Olsen, Wise, & Rack, 1994; Phonological Choice Task, Gayan & Olsen, 2001; and Self-Perception Profile for Learning Disabled Student, Renick & Harter, 1988). The purpose of the pretest session was to determine if the referred students displayed above average intelligence, well developed visual-spatial skills, and poor academic achievement. Parents of the participants received a letter in both English and Spanish prior to the pretest session that provided a description of the pretest measures, a description of the enrichment program, and full disclosure of the purpose of the research project (Appendix B). The parental checklists (Appendix J and K) were also sent home with instructions for parents to return the checklists to the school prior to the pretest session. Written, parental consent was obtained from each student's parent prior to the pretest session. During the pretest session, the participants were told that they were taking the tests to see if they would be a "good fit" for a research program that was examining individual learning styles.

After the pretest session was completed, each test protocol was scored and eligibility was determined. Participants who received a standard scored of 110 or above on the Culture

Fair Intelligence Test and demonstrated poor academic achievement (either through displaying a low score on the Orthographic Choice Task and/or Phonological Choice Task, or through teacher report, and/or the Parental Checklists) were invited to participate in this study. Once eligibility had been determined, the participants were assigned to either the treatment group or the waitlist comparison group.

Group assignment was determined through matched pairs according to nonverbal IQ scores, achievement scores, eligibility for special education and related services, grade level, and gender. The waitlist comparison group began the intervention approximately six weeks after the treatment group. A second parental letter in both English and Spanish was sent home to each eligible participant's parents, which notified them that their child had matched the eligibility criteria and that their child was invited to participate in the enrichment program free of charge (Appendix C). Additionally, a Letter of Informed Consent was sent in both English and Spanish to the parents of each eligible participant (Appendix D). Written parental consent was obtained from each participant prior to beginning the treatment. Each eligible participant received a student letter that explained the purpose of the program and made it clear that they would be completing pre and post measures (Appendix E). Parents of participants that did not meet the eligibility criteria for the study were notified through a letter in both English and Spanish (Appendix F).

Participants completed a ten-week, Type III based enrichment program titled, "Leonardo's Laboratory" (Eli Whitney Museum, n.d.). The enrichment program was held at an elementary school in Passaic, NJ during after school hours. Each enrichment session was two hours in length, one time per week for ten weeks. An art instructor facilitated Leonardo's Laboratory enrichment projects with the assistance of one additional instructor. Both

instructors received training through the Eli Whitney Museum in the content, delivery of service, project assembly, and materials used for the Leonardo's Laboratory program. The instructions and presentation of each project followed the Leonardo's Laboratory manual. A weekly schedule was followed that presented the projects according to degree of complexity and required skill. (Appendix G).

To ensure quality control, two spot checks were conducted by a master's level graduate student. A checklist was provided that outlined the foundation of Type III enrichment based activities as well as the specific delivery of service aspects for Leonardo's Laboratory (Appendix H). The quality controller observed two program sessions (one during the third week of the program and again during the eighth week of the program).

After the completion of the program, the posttest measure, Self-Perception Profile for Learning Disabled Students (SPP-LD) was administered in a group format. In order to control for reading abilities, the directions and all of the questions were read aloud.

Enrichment program.

Leonardo's Laboratory (PACE Center, n.d.) uses experimental building projects that were derived from creative as well as practical challenges. The building projects are based on sketches discovered in Leonardo Da Vinci's notebooks. The enrichment projects in this program were aimed at developing skills for approaching and completing projects. Specifically, the program was designed to help gifted students with learning difficulties develop skills in planning, preparation, time scheduling, exploring, and follow-through. The program also attempted to aid in fostering academic self-perceptions. The design of the program was to introduce the students to a new challenge each session, which was to construct a new enrichment project based on Leonardo Da Vinci's designs. Some examples

of these projects were a rubber-band powered car, a pinball machine, a robot drum, a macrochip controller, an orrery, a castle with a catapult, and an mechanical arm (Appendix I).

Measures

The key constructs of interest in this study were above average intelligence, visual-spatial skills, academic achievement, and academic self-perceptions. Above average intelligence, visual-spatial skills, and academic achievement specifically pertained to the eligibility criteria for participation in the treatment program, while academic self-perceptions was the key element that was measured pre and post intervention.

Above average intelligence was defined as intellectual ability resulting in above average scores on an intelligence test, while visual spatial skills were defined as the ability to use visual discrimination. The Culture Fair Intelligence Test (Cattell, 1973) was used to measure intelligence and to measure visual-spatial skills. Intelligence and visual spatial skills was examined by showing the student a visual pattern with a part missing. The participant had to choose from a set of options the piece that completes the pattern.

The Culture Fair Intelligence Test is a well-established instrument used to assess intelligence with reliability scores ranging from .87 (consistency over items), .80 (consistency of parts), and .84 (consistency over time) (Cattell, 1973). Concept validity on the Culture Fair Intelligence Test is .85, while concrete validity is .77 (Cattell, 1973). The Culture Fair Intelligence Test consists of three scales, however for the purpose of this study Scale 2 was utilized because it corresponds with the age group of interest (Scale 2 is used for ages 8-13). The Culture Fair Intelligence Test has four subscales, which are as follows: Test 1-Series, number of items = 12, time allotted = 3 minutes; Test 2-Classification, number of items = 14, time allotted = 4 minutes; Test 3-Matrices, number of items = 12, time allotted = 3 minutes;

Test 4-Conditions, number of items = 8, time allotted = 2 and one half minutes. The IQ score was obtained after hand scoring all four subtests to obtain four raw scores. The four raw scores were added together to obtain a total raw score, which was converted into a normalized, standard score IQ with a mean of 100 and a standard deviation of 16. The obtained IQ score was converted into a percentile equivalent. Prior studies have used this measure to identify nonverbal intelligence (spatial abilities), while demonstrating results yielding good reliability and validity scores (Amador-Campos & Kirchner-Nebot, 1999; Dayi, Okuyan, & Tan, 2002; Karnes & Whorton, 1988; Tan, 1990).

Academic achievement was determined through the participant's reading skills, the parent's and teacher's perception of the participant's deficit area(s), and the parent's perception of the participant's ability to learn and gain new information. Two instruments were used to measure reading skills: a) Orthographic Choice Task (Olsen, Wise, & Rack, 1994) and b) Phonological Choice Task (Gayan & Olson, 2001). The Learning Checklist (PACE Center, n.d.) was used to measure the parent's perception of their child's deficit area(s) and their perception of their child's ability to learn and gain new information. Teacher input pertaining to academic skills was obtained through a teacher referral form.

The Orthographic Choice Task (Olsen, Wise, & Rack, 1994) is a measure of orthographic processing skills that consists of a forced-choice decision between a word and a phonetically identical pseudohomophonic non-word. For example, the child must chose between "take---taik," and "coat --- cote." The task requires the participant to recognize the correct orthographic pattern for the word independent from its phonology. The task contains 80 trials with a wide range of target-word frequencies and orthographic regularity. The scoring was completed by summing-up each participant's number of correct responses. The

internal-consistency reliability for this task was .81. Prior studies have displayed good validity and reliability when using this instrument to help determine reading abilities (Compton, 2002; Gayan & Olsen, 2001).

The Phonological Choice Task (Gayan & Olsen, 2001) is a measure of phonological processing skills that consists of 30 items in which a forced-choice decision between a non-word that would sound like a common word if read aloud and two non-words that would not sound like a known word. For example, the child must chose between "nite – kile – hote." The scoring was obtained by summing-up the number of correct responses. Prior researchers (Gayan & Olsen, 2001) yielded good validity and reliability of this measure.

The Learning Checklist (PACE Center, n.d.) was used to assess the parent's perception of their child's deficit area(s) and their child's ability to learn and gain new concepts. This instrument was rated by each participant's parent and it consists of 21 items. The first 17 items are rating items ranging from Below Average to Above Average and are divided into two sections (School Achievement = 10 items and Other Areas of Achievement = 7 items). The School Achievement section required parents to rate their child in areas, such as accuracy for word reading and reading comprehension, while the Other Areas of Achievement section examined supplementary areas, such as coming up with new ideas, solving new or unusual problems, and hands on activities (drawing, painting, etc.). The remaining four items are open-ended questions such as, "Please briefly describe any other skills that your child demonstrates." The rating items were scored by summing-up the scores from each section and the open-ended questions were used as additional information to help when determining academic achievement. This instrument was developed for the purpose of the Leonardo's Laboratory studies. No information regarding validity or reliability is

available, as this measure was created for the purposes of this study. Both the English and Spanish versions of the Learning Checklist can be found in Appendix J.

The teacher referral form was used to obtain teacher input regarding academic skills. The referral form explained the purpose of this study and listed the students' characteristics of interest (strong nonverbal skills, good visual-spatial skills, and weak academic achievement). The referral form was developed for the purpose of this study, therefore no information regarding validity or reliability is available.

Academic self-perceptions were defined as a child's view of self in relation to his/her academic environment. The Self-Perception Profile for Learning Disabled Students (SPP-LD) (Renick & Harter, 1988) was used to measure academic self-perception (Appendix K). All ten subscales (General Intellect Ability, Reading Competence, Writing Competence, Spelling Competence, Math Competence, Social Acceptance, Athletic Competence, Behavioral Conduct, Physical Appearance, and Global Self-Worth) of the SPP-LD were administered. The General Intellect Ability subscale includes items that calculate the extent to which students perceive themselves to be smart, good learners, and bright in school. The Reading Competence subscale includes items that measure the degree to which students perceive themselves as being good readers and capable of reading books and stories. The Writing Competence Ability subscale assesses the amount in which students view themselves as being able to write good sentences and paragraphs to create a story, believe themselves to be good writers, and the ease with which they feel they can write good stories. The Spelling Competence measures the way in which students perceive themselves as being spellers, whether they feel they can spell most words, and the ease at which they can spell most words. The Math Competence subscale includes items that calculate the ease with which students

believe that they can do mathematics problems in school, thought that they were good at mathematics, and the degree to which they believed that they understood mathematical concepts. The Social Acceptance subscale investigates the degree in which students feel that they are accepted by their peers or the degree to which they feel popular. The Athletic Competence subscale examines the extent that students feel competent while engaging in athletic activities. The Behavioral Conduct subscale assesses the degree that students like the way that they behave, act the way in which they are supposed to, and avoid getting into trouble. The Physical Appearance subscale measures if students are happy with the way that they look, if they are pleased with their height, weight, body, face, and hair, and if they feel that they are good looking. The Global Self-Worth subscale assesses the extent in which students like themselves as persons.

Items of the SPP-LD were administered in a group format. To control for reading level, the SPP-LD administration instructions suggest that each question be read aloud. Each item requires that the students select one of two statements that best characterizes themselves. For example, "Some kids know how to spell most words they come across" but "Other kids find it hard to spell most words." After selecting a statement, children are then asked to rate the statement as really true or sort of true. Responses of really true yield a score of 4 points in response to a positive statement and 1 point in response to a negative statement. Likewise, responses of sort of true yield a score of 3 points in response to a positive statement and 2 points in response to a negative statement. Five items compose the General Intellect Ability, Social Acceptance, Athletic Competence, Behavioral Conduct, Physical Appearance, and Global Self-Worth subscales, while the remaining competence scales are comprised of four items each (Reading Competence, Writing Ability, Spelling Competence, and Math

Competence). The raw score for each subscale is the average value of points scored across the items. The internal consistency reliabilities for this measure as reported in the SPP-LD manual (Renick & Harter, 1988) were .81 for General Intellect Ability, .86 for Reading Competence, .78 for Writing Competence, .89 for Spelling Competence, .88 for Math Competence, .81 for Social Acceptance, .82 for Athletic Competence, .83 for Behavioral Conduct, .82 for Physical Appearance, and .83 for Global Self-Worth. The SPP-LD has been used in prior studies to measure academic self-perception and has yield good reliability scores in these studies (Bluechardt & Shephard, 1995; Carlisle & Chang, 1996; Jordan, 2004; Smith & Stiehr-Nagle, 1995).

Results

Prior to conducting the evaluation component of the analysis, the reliability of the Self-Perception Profile for Learning Disabled Children (SPP-LD) measure was assessed. Specifically, the ten pretest subscale scores were submitted to an internal consistency reliability analysis. Cronbach's alpha coefficient for this analysis ($\alpha = .57$) indicated that the measure lacked internal consistency and reliability. Visual inspection of the corrected item-total correlations in this analysis found that two items tapping the participants' perception of their mathematical skills and their athletic abilities were not positively correlated with the remaining eight items. A second reliability analysis conducted after deleting these two items improved the reliability of this measure ($\alpha = .73$). In the interest of maintaining the integrity of the SPP-LD, the evaluation analysis was initially conducted using the full ten-item version of the SPP-LD and then repeated after deleting the two offending items. The results that followed are based on the original, ten-item version of the SPP-LD because they are identical to the results produced by the revised eight-item version.

For the purposes of demonstrating the effectiveness of the intervention program, an analysis of covariance (ANCOVA) was conducted for two reasons. First, it was determined that there were initial pretest score differences on one of the subscales (perceived general intellectual ability) of the SPP-LD that specifically pertained to the hypothesis. Secondly, as a means of increasing power to compensate for the small sample size in this study, a one-way ANCOVA was conducted. The perceived general intellectual ability posttest scores were used as the dependent variable, while the corresponding perceived general intellectual ability pretest scores were used as a covariate. As indicated in Table 2, both the effects of the pretest scores ($F = 12.55$, $df = (1,16)$, $p = .02$) and the grouping variable ($F = 6.86$, $df = (1,16)$, $p = .01$) (i.e. treatment vs. waitlist comparison) are statistically significant. Substantively, these findings indicate that after adjusting for any pretest differences between the experimental and waitlist comparison groups, there is a statistically significant mean difference between the posttest scores.

Table 2

One-way Analysis of Covariance (ANCOVA) for Perceived General Intellectual Ability

Source	Sum of Squares	df	Mean Square	F-ratio	P
Group	0.71	1	0.71	6.86	.019
IQ Pretest	1.31	1	1.31	12.55	.003
Error	1.67	16	0.10		

Discussion

This study provided a comprehensive depiction of GLD students in relation to academic self-perceptions. Certain objectives that will influence the definition, identification, treatment, and future experimental research of GLD students were found. For example, the definition that led to the identification of GLD students in this study was successful, as students who demonstrated domain specific abilities (Sternberg, 1998, 1999, 2001, 2002, 2003) and domain specific disabilities were appropriately identified. Abilities were conceptually viewed as changeable characteristics that were not predetermined or stagnant attributes of an individual (Sternberg 2002, 2003). The notion of enhancing noncognitive factors in order to produce effects upon cognitive ability development was explored (Bandura, 1986, 1997; Dorsey & Jackson, 1995; Meyer, Talbot, Stubblefield, & Poon, 1998; Turner & Lindsay, 2003). With the implementation of this concept as well as a multicomponent assessment process (i.e. test of nonverbal intelligence, academic measures, parental input, and teacher input), GLD students were successfully identified, received intervention, and produced gains in perceived general intellectual ability (i.e. perception of how smart they are).

Commensurate with expectation, the hypothesis was supported in this study. The implemented enrichment program (Type III enrichment) produced positive outcomes in academic self-perceptions, especially in the area of perceived intellectual abilities. This study has important implications, as GLD students' noncognitive factors (i.e. academic self-perceptions) can be enhanced through the enrichment of an area of strength. This finding substantially adds to the possibly significant influence of noncognitive factors upon increasing cognitive factors. Perceived general intellectual functioning can play a role in the acquisition of cognitive factors that influence academics such as memory, perceptual abilities,

performance speed, attention, concentration, reading abilities, mathematical concept formation, etc. (Cariago-Lo, Enarson, Crandall, Zaccaro, & Richards, 1997; Efklides, Papadaki, Papantoniou, & Kiosseoglou, 1997; Little, Das, Carlson, & Yachimowicz, 1993). Therefore, the influence of academic self-perceptions should be further examined to determine its exact impact upon cognitive factors as well as to determine its significance over time and across different age groups.

Another goal of the study was to further establish the effectiveness of Type III enrichment with GLD students. The previous GLD program studies reviewed by this researcher (Baldwin & Gargiulo, 1983; Baum, 1988; Baum, Cooper, & Neu, 2001; Baum, Renzulli, & Hebert, 1995; Bees, 1998; Olenchak, 1995; Shevitz, Weinfeld, & Jeweler, 2003; Udall & Maker, 1983) failed to demonstrate empirical support for the efficacy of enrichment activities with GLD students. This study demonstrated the importance of addressing the unique educational programming needs of the GLD population (i.e. addressing strengths to help compensate for weaknesses) through tailored enrichment activities (Renzulli, 1977; Renzulli & Reis, n.d.; Renzulli & Reis, 1994). Specifically, improved academic self-perceptions were witnessed as a result of the enrichment intervention program.

The assumed explanation for the increase in perceived intellectual abilities is most likely the result of the success that each participant felt with the completion of each project, especially as the projects' complexity and depth of skill increased throughout the 10 week program. However, it is also possible that the witnessed gain in the perception of intellectual functioning may be accredited to the lessons that coincided with each enrichment project. For example, one of the aspects of Leonardo's Laboratory was to include anecdotes related to the life and times of Leonardo Da Vinci. More specifically, a great deal of emphasis was placed

upon the concept that Leonardo Da Vinci experienced great difficulty with his academics throughout his limited schooling, however he was an extremely intelligent person who developed many inventions that we still use in modern society. Many of the students in this study may have related to the troubles that Leonardo Da Vinci experienced when he was a student. Therefore, these students were able to recognize that even though they experience academic hardships, their true intellectual abilities may not be reflected by their grades in school.

Another possible explanation for the occurrence of increased intellectual ability perceptions may be related to the idea that some of the GLD students may have been aware that in order to meet the eligibility criteria for this enrichment program they needed to obtain a certain score on an intelligence measure. In other words, some students' gains in intellectual ability perceptions may be attributed to the notion of being selected for the enrichment program instead of being the result of successfully completing the program. Although the participants were not told at any time during the pretest session or throughout the program that certain intellectual eligibility requirements were necessary, the eligibility criteria was disclosed to the parents in the first parent letter that explained the purpose of the pretest session (Appendix B). Consequently, some parents may have relayed this information to their child or some children may have read the parent letter firsthand. In order to control for this research contaminant in the future, it may be helpful to ask parents not to tell their child the eligibility criteria for the program or alternatively to exclude the eligibility IQ score from the parent letter.

The significant gain in academic self-perception was only witnessed in the perception of general intellectual functioning. This finding suggests that the participants in this study

viewed themselves as more intelligent after receiving the treatment program. In contrast to the general intellectual abilities variable, none of the other nine variables that were measured (i.e. perceptions of reading abilities, writing abilities, spelling abilities, math abilities, social acceptance, athletics, physical appearance, behavioral conduct, or global self-worth) displayed significant gains subsequent to participating in the treatment program. In other words, this suggests that the participants did not view themselves as more proficient in academic areas such as reading, writing, spelling, or math after completing the treatment program. Furthermore, although the perceptions of social status, athletic abilities, physical appearance, and behavioral conduct were not specific elements of interest at this time, no gains in these areas were noted.

The fact that the other nine variables of the SPP-LD did not display significance is compelling, as the students in this study viewed themselves as smarter while they did not see themselves as more proficient in any academic area (i.e. reading, writing, spelling, or math). This is a significant finding for the GLD field of study because it displays that GLD students can view themselves as generally more intelligent without actually improving their academic achievement or the perception of their academic achievement. Hence, this study further supports the influence and importance of noncognitive factors, such as academic self-perceptions, on the perception of cognitive development and the possible influence that noncognitive factors may have upon changing or altering abilities.

Future Research Considerations

One potential future research consideration in the area of GLD studies includes the re-administration of posttest measures six months after the completion of the treatment to assess the long-term effects of the enrichment program. By conducting posttest measures six months

later it could be determined if Leonardo Laboratory's effects on general intellectual ability perceptions remained stable over time and to witness if any of the other nine subscales of the SPP-LD changed over the six month period. Additionally, if the gains in perceived intellectual ability remained significant six months after the completion of the program, the validity and reliability of Leonardo's Laboratory effects would be greatly increased.

Another viable future research consideration is to select a sample with a larger age span. For example, incorporating middle-school aged participants would allow for a more comprehensive assessment of GLD students' academic self-perceptions as well as provide an additional age group to broaden the assessment of abilities as developing competencies. It would be beneficial to the field of GLD research to investigate if an enrichment program that focuses on an area of strength produces the same results on the academic self-perceptions of general intellectual functioning in a sample of middle-school aged students. Likewise, a sample with a larger age-span could lead to further support for the positive effects of noncognitive factors such as academic self-perceptions in relation to developing competencies.

Additional future research considerations should focus upon the enrichment of other noncognitive factors (i.e. motivation, parental support, peer acceptance, athletic abilities, etc.) to witness if these factors produce effects upon the development of competencies and abilities. If it was determined that noncognitive factors significantly influenced abilities, it would significantly assist instructional accommodations, curriculum decisions, and intervention programs within the field of GLD (Cariago-Lo et al., 1997; Turner & Lindsay, 2003). Although the curriculum and intervention program literature somewhat focuses on enhancing strengths and addressing weaknesses (Baldwin & Gargiulo, 1983; Baum, 1988;

Bireley, 1995; Higgins & Nielsen, 2000; Korinek, 1992; Laycock, 1992; Udall & Maker, 1983), limited attention has been given to the effects of enhancing noncognitive factors (Dorsey & Jackson, 1995; Meyer et al., 1998; Turner & Lindsay, 2003). The role of noncognitive factors could substantially improve the delivery of academic services to the GLD population and is an area that deserves further attention.

Summary and Conclusions

In summary, the GLD students in this study demonstrated significant gains in academic self-perceptions, specifically in perceived general intellectual abilities, while no other measured areas displayed significance subsequent to treatment. The fact that no other measured academic areas including perceived reading, writing, spelling, or mathematical abilities demonstrated significant gains from pre to post intervention suggests that the participants did not identify any of their academic subjects as improved subsequent to receiving the treatment program. In contrast, the participants did perceive themselves as "generally" more intelligent subsequent to completing the treatment program. This finding is significant because it suggests that GLD students' academic self-perception can be altered without actually producing an increase in academic achievement or the perception of academic achievement. Therefore, the results from this study yield additional support for the influence of noncognitive factors (i.e. academic self-perceptions).

The results found in this study have played a significant role in the future of GLD studies as well as in the future plans for curriculum decisions and intervention programs. Future research needs to be conducted to lend additional support towards the concept of abilities as developing competencies that can be changed with the appropriate interventions. Through the establishment of increased empirical support demonstrating significant results in

changing domain specific abilities after enhancing noncognitive factors, the GLD field could more effectively meet the needs of the GLD population. Subsequent to increased empirical support, GLD curriculum and intervention programs could consider the addition of addressing noncognitive factors, such as academic self-perceptions, to further provide for the domain specific needs of GLD students. By simultaneously addressing strengths and weaknesses, GLD students can increase their gifts and learn to compensate for their learning deficits.

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Appendix A

Recruitment Letter and Teacher Referral Form

THE LEADER IN GLOBAL EDUCATION

FAIRLEIGH DICKINSON UNIVERSITY

PSY.D. PROGRAM IN SCHOOL PSYCHOLOGY

Teaneck-Hackensack Campus
1000 River Road, T-WHI-01
Teaneck, New Jersey 07666
201-692-2300 Voice
201-692-2304 Fax

Dear Educator,

In collaboration with Yale University's Center for the Psychology of Abilities, Competencies, and Expertise (PACE Center) and the Eli Whitney Museum, we are developing a gifted enrichment program that will begin in February 2005. This gifted enrichment program titled, "Leonardo's Laboratory," will be offered free-of-charge through Fairleigh Dickinson University at School # 3 in Passaic, NJ. Leonardo's Laboratory is part of a project in which the concept of gifted children with learning difficulties will be explored. The program will offer opportunities for students to explore their strengths and their imperfect skills from a unique and fresh perspective. Leonardo's Laboratory will include experimental building projects that develop practical and creative skills as well as thinking strategies. Assessments at the beginning and end of the program will measure the usefulness of the experience.

Specifically, we are interested in working with children in the 4th or 5th grade who demonstrate the potential for exceptional creative and/or spatial abilities, but who have difficulties in reading, writing, or math. Eligibility for the enrichment program will be based on an initial scheduled session at School # 3 where an evaluation will be conducted to determine if the student meets the criteria of this particular research program.

If you feel that this program is appropriate for your student(s), we ask that you provide Amy Demant, Learning Consultant with the student's name. A parental letter will be sent home to each referred student's parents/guardians in order to obtain parental permission. The program will be held after school, one day a week for ten weeks.

If you have any questions regarding this project, please do not hesitate to contact the program coordinator involved in this study:

Megan Toomey-Lynch — Phone (973) 801-6368
Program Coordinator
Fairleigh Dickinson University

In order to refer a student to the gifted learning-disabled enrichment program, please provide Amy Demant with the student's name. You may do so by putting a note in Amy Demant's mailbox located in the main office or by contacting her at (973) 591-8557.

Thank you for your interest and participation.

Sincerely,

Megan Toomey-Lynch

Megan Toomey-Lynch, M.Ed., Ed.S.

Leonardo's Laboratory
Teacher Referral Form

Student's Name _____

Teacher _____

Grade _____

Age _____

Areas of Strengths _____
_____
_____

Areas of Weakness _____
_____
_____

Additional Comments _____
_____
_____

- **When completed, please return to Amy Demant, Learning Consultant**

Appendix B

Parent Letter for Pretests – both English and Spanish Versions

THE LEADER IN GLOBAL EDUCATION

FAIRLEIGH DICKINSON UNIVERSITY

PSY.D. PROGRAM IN SCHOOL PSYCHOLOGY

Teaneck-Hackensack Campus
1000 River Road, T-WHI-01
Teaneck, New Jersey 07666
201-692-2300 Voice
201-692-2304 Fax

Dear Parent,

A new enrichment program will be offered at School #3. This program will be offered free-of-charge through Fairleigh Dickinson University in collaboration with Yale University's Center for the Psychology of Abilities, Competencies, and Expertise (PACE Center) and the Eli Whitney Museum beginning in March 2005. This program is part of a project in which the concept of gifted children with learning difficulties will be explored. Specifically, we are interested in working with children in the 4th or 5th grade who demonstrate the potential for exceptional creative and/or spatial performance, but who have difficulties in reading, writing, or math.

In order to determine if your child will be eligible to participate in this program we will need to conduct pretests. The pretests will include standardized measures of achievement, measures of problem-solving skills, measures of spatial and creative abilities, and self-perception measures. Two of the pretests are parental checklists that you will need to fill-out and return to School #3. Specifically, your child will need to receive a score of 120 or above on a test of nonverbal intelligence and demonstrate academic weakness in order to be invited to participate in the enrichment program. The program will include experimental building projects that develop practical and creative skills as well as thinking strategies.

Additionally, any information that is obtained through you and all of your child's responses will be kept confidential. Furthermore, your child will not be identified in any publication resulting from this study.

In order to allow us to conduct the pretests, we need your consent. We need you to indicate your willingness to allow your child to participate in the pretests by signing the bottom of this letter and returning this form to Amy Demant at School #3.

The pretests are scheduled for Tuesday, March 8, 2005 from 3-4:15 pm at School # 3.

If you have any questions regarding this project, please do not hesitate to contact the program coordinator involved in this study:

Megan Toomey-Lynch, M.Ed., Ed.S. Phone (973) 801-6368
Program Coordinator
Fairleigh Dickinson University

_____ _____ _____

Date Print Name Signature of participating parent or guardian

Child's Name _____

THE LEADER IN GLOBAL EDUCATION

FAIRLEIGH DICKINSON UNIVERSITY

PSY.D. PROGRAM IN SCHOOL PSYCHOLOGY

Teaneck-Hackensack Campus
1000 River Road, T-WHI-01
Teaneck, New Jersey 07666
201-692-2300 Voice
201-692-2304 Fax

Estimados padres,

Un nuevo programa de enriquecimiento será ofrecido en la Escuela # 3. Este programa se ofrecera` gratis por la Universidad de Fairleigh Dickinson en colaboracion` con el Centro para la Psicologia de Aptitudes, Capacidades, Y Maestría (centro de PACE) de la Universidad de Yale Y el Museo de Eli Whitney Y comienza el Marcha de 2005. Este programa es parte de un proyecto en el cual el concepto de los niños dotados y con dificultades de aprender sera` explorado. Especificamente, estmos interesados trabajar con los niños en el cuarto o quinto grado que demuestran el potencial para el funcionamiento excepcional creativo y/o espacial, pero quienes tienen dificultades en la lectura, la escritura, o las matemáticas.

Para determinar si su hijo(a) llena los requisitos para este programa, necesitaremos conducir las prepruebas. Estas prepruebas incluyen las medidas estandardizadas del logro, medidas de las habilidades de resolver problemas, medidas de las capacidades espaciales y creativas, y medidas de autopercepción. Dos de las prepruebas son listas de comprobación parentales que usted tiene que completar y devolver a la Escuela # 3. Especificamente, su hijo(a) tiene que recibir una cuenta de 120 o más en una prueba de inteligencia no verbal y demostrar debilidad académico para ser invitado a participar en este programa de enriquecimiento, El programa incluira` los proyectos experimentales que desarrollan las habilidades práctices y creativas asi como las estrategias del pensamiento.

Además, cualquiera información que se obtiene por usted y por todas las respuestas de su hijo(a) seran mantenida confidencial. Además, su hijo (a) no sera` identificado en ninguna publicación resultando de este estudio.

Para permitirnos realizar las prepruebas, necesitamos su consentimiento. Le necesitamos indicar su buena voluntad de permitir a su hijo(a) a participar en las prepruebas firmando el fondo de esta carta y devolviendo esta forma al Amy Demant (CST) en la Escuela # 3.

Si usted tiene cualquiera pregunta con respeto a este proyecto, por favor no vacila llamar ala coordinadora del programa implicado en este estudio:

Megan Toomey-Lynch
Coordinadora del Programa
la Universidad de Fairleigh Dickinson

Telefono: (973) 801-6368

(*) El prepri será el 8 de marzo de las 3:00 las 4:15 e la escuela #3

Fecha _____ Nombre Impreso _____ Firma del padre, madre o del tutor que participa _____

Nombre de Studnet _____

Appendix C

Parent Letter for Eligibility – both English and Spanish versions

THE LEADER IN GLOBAL EDUCATION

FAIRLEIGH DICKINSON UNIVERSITY

PSY.D. PROGRAM IN SCHOOL PSYCHOLOGY

Teaneck-Hackensack Campus
1000 River Road, T-WHI-01
Teaneck, New Jersey 07666
201-692-2300 Voice
201-692-2304 Fax

Dear Parent,

Congratulations! Your child _____ has been invited to join the gifted enrichment program that is offered at School # 3 free-of-charge through Fairleigh Dickinson University in collaboration with Yale University's Center for the Psychology of Abilities, Competencies, and Expertise (PACE Center) and the Eli Whitney Museum beginning on Tuesday, March 22, 2005. The program will meet once a week for ten weeks from 3:00-4:45 PM. The schedule of meeting dates is enclosed in this letter. This program is part of a project in which the concept of gifted children with learning difficulties will be explored. Specifically, we are interested in working with children in the 4th or 5th grade who demonstrate the potential for exceptional creative and/or spatial performance, but who have difficulties in reading, writing, or math.

This program will offer opportunities for children to explore their strengths and their imperfect skills from a unique and fresh perspective. The program will include experimental building projects that develop practical and creative skills as well as thinking strategies. Assessments at the beginning and end of the program will measure the usefulness of the experience. Eligibility for the enrichment program was based on an initial scheduled session where an evaluation was conducted to determine if your child met the criteria of this particular research program.

If you agree to allow your child to participate in the free program, we ask you to return the attached consent form and fill-out the 2 parental checklists. Your child's participation will include a free-of-charge program and assessments. The assessments will include standardized measures of achievement, measures of problem-solving skills, measures of spatial and creative abilities, and self-perception measures. These measurements will be given at the beginning and end of the program. These assessments will not exceed 1 hour in length. Your child will receive, free-of-charge, an art and ingenuity program that was developed through the Eli Whitney Museum.

If you have any questions regarding this project, please do not hesitate to contact the program coordinator involved in this study:

Megan Toomey-Lynch, M.Ed., Ed.S. Phone (973) 801-6368
Program Coordinator
Fairleigh Dickinson University

In order to indicate your willingness to include your child in this program, please read and sign both copies of the Letter of Informed Consent to Parents. One copy is for your records, while the other copy should be returned to Amy Demant at School #3. Additionally, <u>please return the 2 parental checklists</u> to Amy Demant at School #3.

Thank you for your interest and participation.

Sincerely,

Megan Toomey-Lynch

Megan Toomey-Lynch, M.Ed., Ed.S.

THE LEADER IN GLOBAL EDUCATION

FAIRLEIGH DICKINSON UNIVERSITY

PSY.D. PROGRAM IN
SCHOOL PSYCHOLOGY

Teaneck-Hackensack Campus
1000 River Road, T-WH1-01
Teaneck, New Jersey 07666
201-692-2300 Voice
201-692-2304 Fax

Estimados padres:

Felicitaciones! Su hijo(a) _____ ha sido invitado(a) a participar en el programa de enriquecimiento de talento que sera ofrecido gratis en la Escuela #3 por la Universidad de Farileigh Dickinson en colaboracion con el centro para la psicología de Aptitudes, Capacidades, y Maestría (centro de PACE) de la Universidad de Yale y el Museo de Eli Whitney el cual comenzara el 22 de marzo del 2005. El programa se llevara a cabo una vez por semana por diez semanas de 3:00-4:45 P.M. El horario de las fechas de la reunión se incluye en esta carta. Este programa es parte de un proyecto en el cual el concepto de los niños dotados que presentan dificultades de aprender sera explorado. Especificamente, estamos interesados en trabajar can los niños del cuarto o quinto grado que demuestran el potencial para el funcionamiento excepcional creativo y/o especial, pero quien tienen dificultades en la lectura, la escritura, o las matematicas.

Este programa ofrecera a los niños las oportunidades de explorar sus fuerzas y sus habilidades imperfectas desde una perspectiva unica y fresca. El programa incluira los preyectos experimentales que desarrollan las habilidades practicas y creativas así como las estrategías del pensamiento. La evaluacion al inicio y al final del programa mediran la utilidad de la experiencia. El ser escogido para el programa de enriquecimiento estara basada en una session inicial fijada donde una evaluacion cumple con los criterios de este programa de investigacion particular.

Si nos sentimos que este programa sea apropiado para su hijo (a), invitaremos a su hijo (a) a participar en el programa y les pedimos devolver la forma de consentimiento adjunta. La participacion de su hijo (a) incluira un programa gratis y les tasiciones. Las tasaciones incluiran las medidas estandardizadas del logro, medidas de las habilidades de resolver problemas, medidas de las capacides especiales y creativas, y medidas de autopercepcion. Estas evaluaciones seran dadas al principio y al fin del programa. Estas evaluaciones no duraran mas de una hora. Su hijo (a) recibira, gratis, un programa del arte y la ingeniosidad desarrollado por el museo de Eli Whitney. Si usted tiene cualquiera pregunta con respeto a este proyecto, por favor no vacile en llamar a la coordinatora del programa involucrada en esta estudio:

Megan Toomey-Lynch — Teléfono: (973) 801-6368
Coordinatara del Programa
La Universidad de Fairleigh Dickinson

Para indicar su Buena voluntad de incluir a usted y a su hijo (a) en este programa, por favor lea y firme las dos copias de la Carta del Consentimiento informado a los Padres. Una copia es para sus documentos mientras la otra copia se debe devolver a Amy Demant en la Escuela #3. Además, devuelva por favor las 2 listas de comprobación parentales al Amy Demant en la escuela # 3.

Gracias por su interes y participacion.

Sinceramente,

Megan Toomey-Lynch, M.Ed., Ed.S

Appendix D

Letter of Informed Consent – both English and Spanish versions

THE LEADER IN GLOBAL EDUCATION

FAIRLEIGH DICKINSON UNIVERSITY

PSY.D. PROGRAM IN SCHOOL PSYCHOLOGY

Teaneck-Hackensack Campus
1000 River Road, T-WHI-01
Teaneck, New Jersey 07666
201-692-2300 Voice
201-692-2304 Fax

Letter of Informed Consent to Parents

I agree to allow my child, _____, to participate in this study whose purpose is a research project to understand the idea of giftedness and learning disabilities.

I understand that this study consists of my child completing several tests (assessing conventional academic abilities, problem-solving skills, creative abilities, and self-perception), me completing a survey about my child's abilities at the beginning and end of the program, and my child participating in a program developed by the Eli Whitney Museum in collaboration with Yale University's Center for the Psychology of Abilities, Competencies, and Expertise (PACE Center) provided by Fairleigh Dickinson University at no cost to me. I understand that the program will be provided to my child 1 time per week for 2 hours for the duration of 10 weeks. I understand that the assessments will be given to my child both prior to and at the completion of the program and will take approximately 1 hour to 1 hour and 15 minutes to complete. I understand that my child will complete a short weekly self-report about how he/she felt about each project. The self-report will take approximately 10 minutes to complete at the end of each session.

I have been informed that there are no expected discomforts or risks associated with my child's participation in this study.

I have been informed that I may decline to answer any questions and withdraw my child from the study at any moment without penalty of any kind.

I have been informed that all of my and my child's responses will be kept confidential and that my child will not be identified in any publication resulting from this study.

I have been informed that the program coordinator will answer questions regarding the study and its procedures. The program coordinator can be reached at the following number:

Megan Toomey-Lynch M.Ed., Ed.S. Phone (973) 801-6368
Program Coordinator
Fairleigh Dickinson University

_____ _____ _____

Date Print Name Signature of participating parent or guardian

I certify that I have presented the above information to the subject and secured his/her consent.

_____ _____

Date Signature of the Investigator

THE LEADER IN GLOBAL EDUCATION

FAIRLEIGH DICKINSON UNIVERSITY

PSY.D. PROGRAM IN SCHOOL PSYCHOLOGY

Teaneck-Hackensack Campus
1000 River Road, T-WHI-01
Teaneck, New Jersey 07666
201-692-2300 Voice
201-692-2304 Fax

Carta del Consentimiento Informado a los Padres

Consiento en permitir a mi hijo(a), _____, a participar en este estudio el cual el fin es un proyecto de investigacion para entender l idea de los dotados y las incapacidades de aprender.

Entiendo que este estudio consiste en mi hijo(a) completando varios examenes (que determinan las capacidades academicas convencionales, las capacidades de resolver problemas, las capacidades visuales-espacials, y autopercepcion), yo haciendo una encuesta de las capacidades de mi hijo(a) al principio y al fin del programa, y mi hijo(a) participando en un programa desarrollado por el Museo de Eli Whitney en colaboracion con el Centro para la Psicologia de Aptitudes, Capacidades y Maestria (Centro de PACE) de la Universidad de Yale proporcionado por la Universidad de Fairleigh Dickinson y no me cuesta nada. Entiendo que el programa sera proporcionado a mi hijo(a) una vez a la semana para z horas para la duracion de 10 semanas. Entiendo que las tasaciones seran dados a mi hijo(a) antes de y a la terminacion del programa y durara aproximadamente 1 hora para terminar.

Me han informado de que no hay ningunos malestares ni riesgos previstos asociadoes con la participacion de mi hijo(a) en este estudio.

Me han informado de que puedo rehusar a contestar cualquiera pregunta y retirar mi hijo(a) del estudio cuando quiero sin ninguna pena.

Me han informado de que todas mis respuestas y aquellas de mi hijo(a) seran mantenidas confidenciales y que mi hijo(a) no sera indentificado en ninguna publicacion resultando de este estudio.

Me han informado de que la coordinadora del programa contestera cualquieras preguntas con respecto a este estudio y sus procedimientos. Se puede poner en contacto con la coordinadora del programa al numiero siguiente:

Megan Toomey-Lynch
Coordinadora del Programa
la Universidad de Fairleigh Dickinson

Telefono: (973) 801-6368

_____ _____ _____

Fecha Nombre Impreso Firma del padre, madre o del que participatutor

Yo certifico que he presentado la informacion de arriba al sujeto y he conseguido su consentimiento.

_____ _____

Fecha Firma del Investigador

Appendix E

Student Letter

THE LEADER IN GLOBAL EDUCATION

FAIRLEIGH DICKINSON UNIVERSITY

PSY.D. PROGRAM IN SCHOOL PSYCHOLOGY

Teaneck-Hackensack Campus
1000 River Road, T-WHI-01
Teaneck, New Jersey 07666
201-692-2300 Voice
201-692-2304 Fax

Dear Student,

A program is being developed through Fairleigh Dickinson University for students who have been identified as having gifts and learning difficulties. Specifically, the program is for children in 4th or 5th grade who have creative and/or spatial abilities, but who have difficulties in reading, writing, or math.

With the help of Yale University and the Eli Whitney Museum, we are developing a program beginning in March of 2005 to allow you to explore your creative or spatial abilities, while at the same time developing your problem solving skills. This program will involve art and ingenuity (innovation) projects (i.e. painting, sculpture, model design, and building). To help us develop this program, we will ask you to complete a certain numbers of surveys, which include:

- An academic skills measurements similar to what you take in school
- A problem-solving measurement (which looks at how you solve problems)
- A spatial measurement (which measures your ability during "hands-on" projects)
- A self-perception measure (which measures how you think about yourself)

You will complete these measures again at the end of the program to see how the program has helped you to develop in these areas.

If you have any questions regarding this project, please call the program coordinator involved in this study:

Megan Toomey-Lynch, Program Coordinator (phone # 973-801-6368)

Thank you for your participation!

Sincerely,

Megan Toomey-Lynch

Megan Toomey Lynch, M.Ed. Ed.S.

Appendix F

Rejection Letter – both English and Spanish versions

THE LEADER IN GLOBAL EDUCATION

FAIRLEIGH DICKINSON UNIVERSITY

PSY.D. PROGRAM IN
SCHOOL PSYCHOLOGY

Teaneck-Hackensack Campus
1000 River Road, T-WHI-01
Teaneck, New Jersey 07666
201-692-2300 Voice
201-692-2304 Fax

Dear Parent,

Although your child demonstrated good skills, we will not be inviting him/her to join our enrichment program at this time. The decision is based upon the selection criteria for this particular research program and is not based upon your child's current academic performance. Thank you for allowing us the opportunity to meet your child.

If you have any questions pertaining to this decision, I may be reached at (973) 801-6368.

Sincerely,

Megan Toomey-Lynch, M.Ed., Ed.S.
Program Coordinator
Fairleigh Dickinson University

THE LEADER IN GLOBAL EDUCATION

FAIRLEIGH DICKINSON UNIVERSITY

PSY.D. PROGRAM IN
SCHOOL PSYCHOLOGY

Teaneck-Hackensack Campus
1000 River Road, T-WH1-01
Teaneck, New Jersey 07666
201-692-2300 Voice
201-692-2304 Fax

Estimados padres:

Aunque su niño demostró buenas habilidades, no invitaremos a el/ella nuestro programa del enriquecimiento en este tiempo. La decisión se basa sobre los criterios de selección para este programa de investigación particular y no se basa sobre el funcionamiento académico actual de su niño. Gracias por la oportunidad de conocer a su niño.

Si usted tiene algunas preguntas sobre esta decisión, puede llamarme a (973) 801-6368.

Sinceramente,

Megan Toomey-Lynch, M.Ed., EdS.
Coordinatara del Programa
La Universidad de Fairleigh Dickinson

Appendix G

Leonardo's Laboratory Schedule

Leonardo's Laboratory
2005 Schedule

Pretests

Session 1 – Rubberband Powered Car

Session 2 – Pinball Machine

Session 3 – Marble Stair

Session 4 – Robot Drum

Session 5 – Leonardo's Stage

Session 6 – Macrochip Controller

Session 7 – Orrery

Session 8 – Castle

Session 9 – Catapult

Session 10 – Automatic Arm

Posttests

Appendix H

Leonardo's Laboratory Checklist

Leonardo's Laboratory Checklist

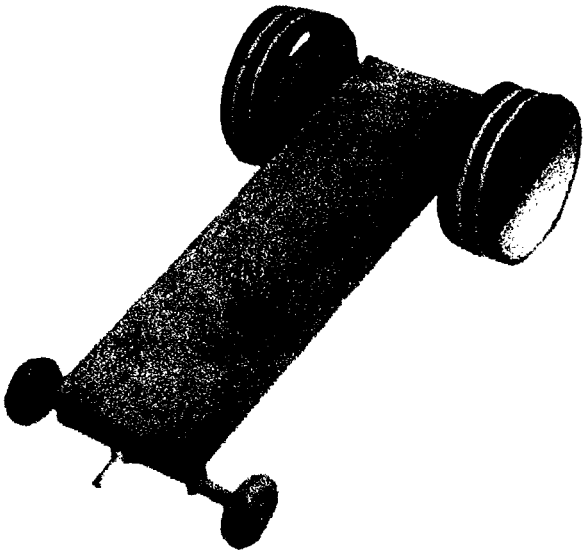
Directions: Please read each sentence below and circle the appropriate response based upon your observation.

1) Did the students work independently (at times) to investigate the problem (creating the project)? Yes / No
2) Did the students use creativity to construct an artistic production? Yes / No

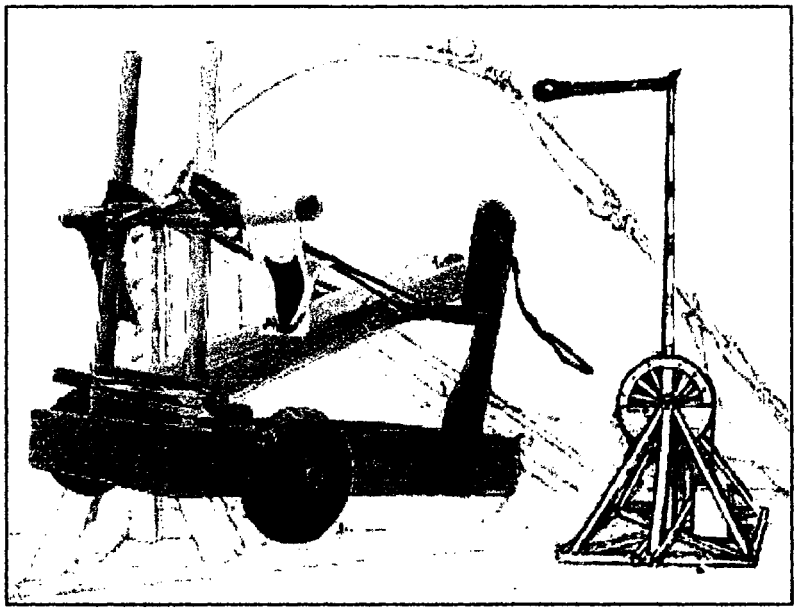
3) Where the students provided with opportunities for the utilization of interests, knowledge base, and task commitment? Yes / No
4) Where the students presented with advanced level content and processes in the area of interest (Leonardo's projects)? Yes / No
5) Where the students provided with self-directed learning opportunities, planning/organizational opportunities, and resource utilization opportunities? Yes / No
6) Where the students provided with the opportunity to learn time management skills? Yes / No
7) Where the students provided with the opportunity for feelings of creative accomplishment? Yes / No
8) Where the students provided with the opportunity to develop self-confidence? Yes / No
9) Were the students given the opportunity to make his/her mark on the project (i.e. choices that made the project his/hers)? Yes/No
10) Were the students given the ability to integrate materials (i.e. add color, etc.)? Yes / No
11) Were the students given the suggestion to go back and correct mistakes and reorient themselves (if needed)? (i.e. some kids have to go back and rebuild a project many times, however it is then the process over the content that is examined) Yes / No
12) Were positive statements made by the facilitators regarding either the process or the outcome of the projects? Yes / No
13) Was a verbal self-assessment provided (i.e. asking students how pleased or displeased they were with their projects; what they could have done differently)? Yes / No
14) Overall, was a positive learning environment provided? Yes / No
15) Overall, did the researchers serve as facilitators rather than lecturers? Yes / No

Appendix I

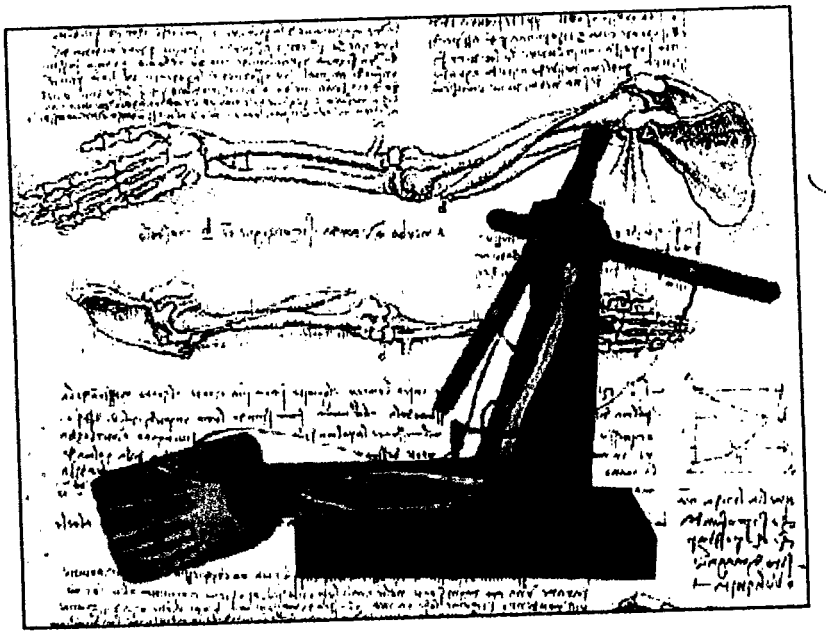
Sample projects from Leonardo's Laboratory



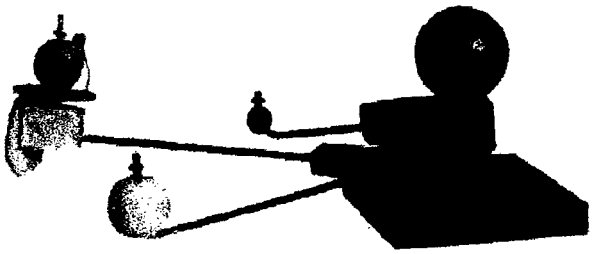
Rubber Band Powered Car



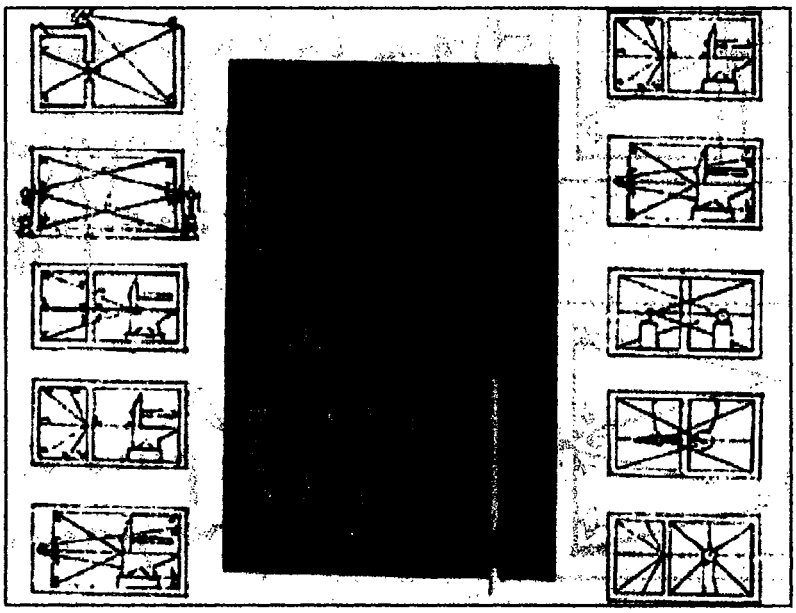
Catapult



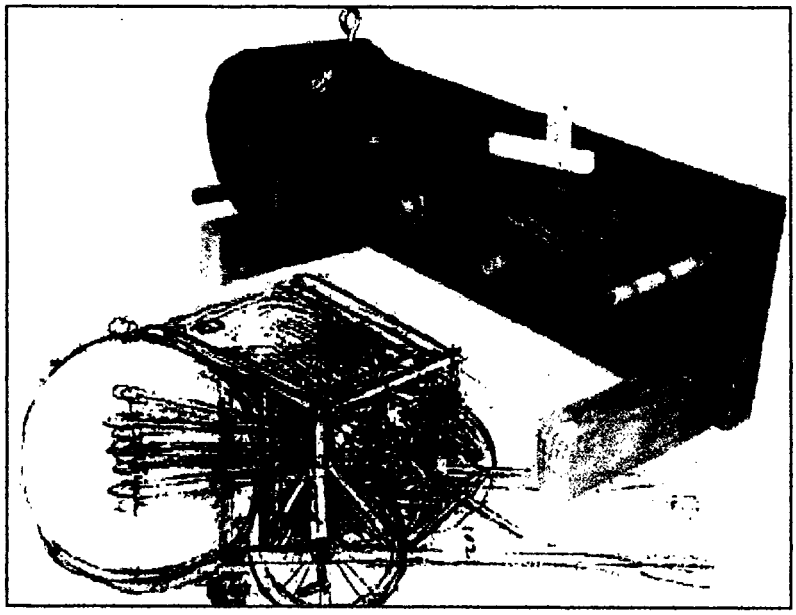
mechanical Arm



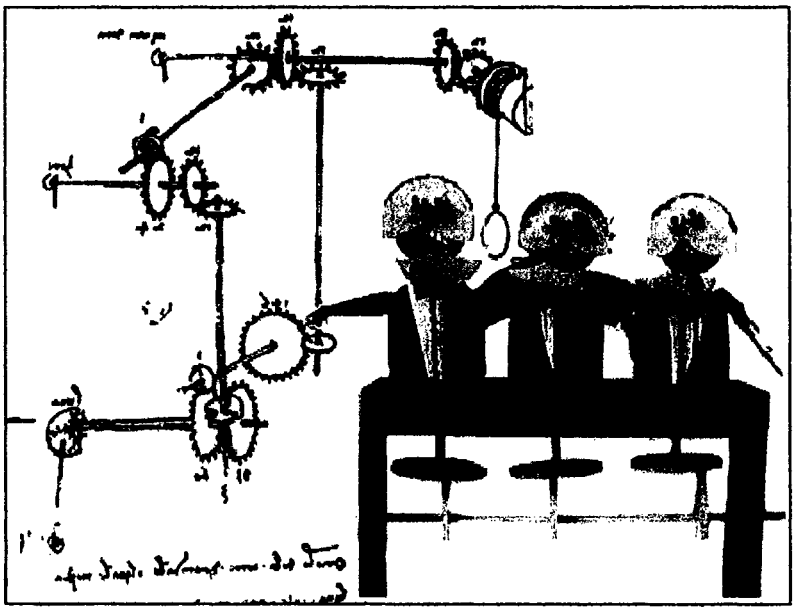
Orrery



Pinball Machine



Robot Drum



Macrochip Controller

Appendix J

Learning Checklist (PACE Center, n.d.) – both English and Spanish versions

Basic Data Sheet

The following information will be used to communicate with you about this program. We will use the information to send you the parent survey materials described in the cover letter, and any additional communications about the program. This information will not be shared with anyone outside the program. Please return this Basic Data Sheet with the signed Letter of Informed Consent to Parents on the first day of the program

Parent Name (please print):_____

Child's Name (please print):_____

Child's Gender: _____ Child's Date of Birth (m/d/y): _____

Child's Current Grade at School: _____

Street Address (where you prefer to receive project information):

_____

City:_____ State:_____ Zip Code:_____

Phone Number:_____ Best time to call:_____

E-mail
(optional):_____

Please describe any relevant health concerns, including food allergies and any other allergies:

_____

For this study, we are hoping to find participating students who have a range of skills and difficulties. Please be as accurate as possible in answering these questions. Thank you.

	Below Average	Average	Above Average
School Achievement			
Accuracy of Word Reading			
Reading Comprehension			
Spelling			
Writing Content (having ideas)			
Writing Organization (ability to make the writing understandable to a reader)			
Writing Conventions (punctuation, grammar)			
Math Computation			
Math Problem Solving			
Social Studies			
Science			

Other Areas of Achievement			
Coming up with new ideas			
Solving new or unusual problems			
Building with Legos, K'nex, or other building tools			
Hands-on activities (drawing, painting, etc.)			
Practical problem-solving			
Engaging in real life tasks (e.g., household projects)			
Making and keeping friends			

1. Please describe any special services that your child receives either at school or privately (e.g., tutoring, resource room, speech and language therapy, self-contained special education classroom, enrichment or gifted program, occupational therapy).

2. Please briefly describe any other skills that your child demonstrates.

3. Please briefly describe any other difficulties that your child experiences.

4. Please describe anything else you think is relevant regarding your child's learning.

Hoja de Datos Básicos

La información siguiente será utilizada para comunicarse con uds. acercade este programa. Utilizaremos la información para enviarles los materiales descritos en la carta adjunta, y otras comunicaciónes adicionales sobre el programa. Esta información no será compartida con ninguna persona fuera del programa. Favorde devolver esta "Hoja de Datos Básica con la "Carta del Consentimiento Informado a los Padres" inmediatamente.

Nombre delos padres (por favor, con letras impresas):_____

Nombre del niño(a) (por favor, con letras impresas):_____

Genero del niño(a):_____ Fecha de nacimiento (mes/dia, ano):_____

Grado Actual rn la Escuela del niño(a): _____

Direccion (donde prefiere ud. recibir la informacion del proyectos): _____
_____

Ciudad_____ Estado _____ Codigo Postal _____

Numero de Telefono _____ El major tiempo para llamarles _____

Describa por favor cualquiera preocupación pertinente por la salud, incluyendo alergias de alimento y otras allergias:
_____
_____
_____

ID # _____

Para este estudio, espermos encontrar a los estudiantes participantes quienes tienen una gama de habilidades y de dificultades. Por favor conteste a estas preguntas lo mas exactamente possible. Gracias.

	Bajo promedio	Satisfactorio	Muy bien
El Logro Escolar			
Exactitud de la Lectura de Palabras			
Comprension de la Lectura			
Ortografia			
Contenido de la Escritura (ideas)			
Organizacion de la Escritura (capacidad de hacer la escriture compressible a un lector)			
Convenciones de la Escritura (puntuacion, gramatica)			
Computo de la Matematicas			
Solucion de los Problemas de las Matematicas			
Estudios Sociales			
Ciencia			

Otras áreas del logro			
Propone nuevas ideas			
Soluciona los problemas nuevos o descomunales			
Construye con Legos, K'nex, u otras herramientas para construccion			
Actividades con las manos (dibujar, pintar, etc.)			
Soluciona los problemas practices			
Se ocupa en las tareas de la vida real (e.g., proyectos de la casa)			
Hace y mantiene los amigos			

5. Describa por favor cualquier servicio especial que su niño recibe o en la escuela o en privado (e.g., tutor particular, ayudo del recurso, terapia de la palabra o del lenguaje, clase de la educación especial, programa del enriquecimiento, terapia laboral).

6. Describa brevemente por favor cualquierotra habilidad que demuestre su hijo(a).

7. Describa brevemente por favor cualquier otra dificultad que tiene su hijo(a).

8. Describa por favor cualquier otra cosa que ud. piensa sea pertinente con respecto al aprender de su hijo(a).

Appendix K

The Self Perception Profile for Learning Disabled Students (SPP-LD)

What I Am Like

Name _____ Age ____ Birthday _____ (Month/Day) Group _____

Boy or Girl (circle which)

SAMPLE SENTENCE

	Really True for me	Sort of True for me				Sort of True for me	Really True for me
(a)	☐	☐	Some kids would rather play outdoors in their spare time	BUT	Other kids would rather watch T.V.	☐	☐
1.	☐	☐	Some kids are *sure* they are pretty smart in school	BUT	Other kids are *not* so sure they are all that smart in school.	☐	☐
2.	☐	☐	Some kids find it *hard* to make friends	BUT	For other kids it is pretty easy.	☐	☐
3.	☐	☐	Some kids *can* read most stories and books pretty easily	BUT	Other kids have a *hard time* reading stories and books.	☐	☐
4.	☐	☐	Some kids *don't* do well at new outdoor games	BUT	Other kids are *good* at new games right away.	☐	☐
5.	☐	☐	Some kids can write good stories or papers pretty easily	BUT	Other kids find it *hard* to write good stories or papers.	☐	☐
6.	☐	☐	Some kids often do *not* act the way they are supposed to	BUT	Other kids usually act the way they know they are supposed to.	☐	☐
7.	☐	☐	Some kids can do their math pretty easily	BUT	Other kids have a *hard time* when it comes to math.	☐	☐
8.	☐	☐	Some kids wish that something about their face or hair looked *different*	BUT	Other kids *like* their face and hair the way they are.	☐	☐
9.	☐	☐	Some kids know how to spell most words they come across	BUT	Other kids find it *hard* to spell most words.	☐	☐
10.	☐	☐	Some kids are *unhappy* with themselves	BUT	Other kids are pretty *pleased* with themselves.	☐	☐

Continued on next page...

	Really True for me	Sort of True for me			Sort of True for me	Really True for me
11.	☐	☐	Some kids feel that they are just as smart as others their age	BUT	Other kids *aren't so sure* and *wonder* if they are as smart.	☐	☐
12.	☐	☐	Some kids would like to have a lot more friends	BUT	Other kids have as many friends as they want.	☐	☐
13.	☐	☐	Some kids are really good readers	BUT	Other kids have a *hard time* with their reading.	☐	☐
14.	☐	☐	Some kids wish they could be a lot better at sports	BUT	Other kids feel they are good enough at sports.	☐	☐
15.	☐	☐	Some kids can easily write good sentences and paragraphs to make a nice story	BUT	Other kids have *trouble* writing sentences and paragraphs in order to make a good story.	☐	☐
16.	☐	☐	Some kids usually get into trouble because of the things they do	BUT	Other kids usually *don't* do things that get them into trouble.	☐	☐
17.	☐	☐	Some kids are good at math.	BUT	Other kids have a *hard time* with math.	☐	☐
18.	☐	☐	Some kids wish their physical appearance (how they look) was *different*	BUT	Other kids *like* their physical appearance the way it is.	☐	☐
19.	☐	☐	Some kids have *problems* with their spelling	BUT	Other kids can spell most words pretty easily.	☐	☐
20.	☐	☐	Some kids are happy with themselves as a person	BUT	Other kids are often *not* happy with themselves.	☐	☐
21.	☐	☐	Some kids are *not* very good learners in school	BUT	Other kids *are* good learners in school.	☐	☐
22.	☐	☐	Some kids are always doing things with a lot of kids	BUT	Other kids usually do things by themselves.	☐	☐
23.	☐	☐	Some kids have *trouble* with their reading	BUT	Other kids do *well* in reading.	☐	☐
24.	☐	☐	Some kids do very *well* at all kinds of sports	BUT	Other kids *don't* feel that they are very good when it comes to sports.	☐	☐

Continued on next page...

	Really True for me	Sort of True for me			Sort of True for me	Really True for me
25.	☐	☐	Some kids find it *hard* to write good stories or papers	BUT	Other kids can write good stories or papers.	☐	☐
26.	☐	☐	Some kids behave themselves very well	BUT	Other kids often find it *hard* to behave themselves.	☐	☐
27.	☐	☐	Some kids have *trouble* doing math problems	BUT	Other kids do *well* at their math problems.	☐	☐
28.	☐	☐	Some kids think that they *are* good looking	BUT	Other kids think that they are *not* very good looking.	☐	☐
29.	☐	☐	Some kids have *trouble* spelling a lot of words	BUT	Other kids can spell a lot of words pretty easily.	☐	☐
30.	☐	☐	Some kids *like* the kind of person they are	BUT	Other kids often wish they were someone else.	☐	☐
31.	☐	☐	Some kids sometimes feel kind of *dumb* when it comes to doing their schoolwork	BUT	Other kids feel that are pretty *bright* when it comes to doing their schoolwork.	☐	☐
32.	☐	☐	Some kids are *popular* with others their age	BUT	Other kids are *not* very popular.	☐	☐
33.	☐	☐	Some kids read pretty *fast*	BUT	Other kids are pretty *slow* readers.	☐	☐
34.	☐	☐	Some kids think they could do *well* at just about any new athletic activity	BUT	Other kids are afraid they might *not* do well at a new athletic activity.	☐	☐
35.	☐	☐	Some kids have a *hard time* writing good sentences and paragraphs	BUT	Other kids *can* write good sentences and paragraphs.	☐	☐
36.	☐	☐	Some kids usually follow rules about how they are to behave	BUT	Other kids find it *hard* to follow these rules.	☐	☐
37.	☐	☐	Some kids find it *hard* to understand math.	BUT	Other kids can understand math pretty *easily.*	☐	☐
38.	☐	☐	Some kids are *not* happy with the way they look	BUT	Other kids *are* happy with the way they look.	☐	☐

Continued on next page...

	Really True for me	Sort of True for me				Sort of True for me	Re Tr for
39.	☐	☐	Some kids have a *hard* time with their spelling	**BUT**	Other kids do *well* in spelling.	☐	☐
40.	☐	☐	Some kids are very *happy* being the way they are	**BUT**	Other kids wish they were *different.*	☐	☐
41.	☐	☐	Some kids feel that they are very *good* at their schoolwork	**BUT**	Other kids *worry* about whether they can do the schoolwork assigned to them.	☐	☐
42.	☐	☐	Some kids have *a lot* of friends	**BUT**	Other kids *don't* have very many friends.	☐	☐
43.	☐	☐	Some kids feel that they are *better* than others their age at sports	**BUT**	Other kids *don't* feel they can play as well.	☐	
44.	☐	☐	Some kids do *not* like the way they behave	**BUT**	Other kids usually *like* the way they behave.	☐	
45.	☐	☐	Some kids like their body the way it is	**BUT**	Other kids wish their body was *different.*	☐	
46.	☐	☐	Some kids are *not* very happy with the way they do a lot of things	**BUT**	Other kids think the way they do things is *fine.*	☐	

WHO I AM LIKE

NAME_____

The questions you just answered asked you to compare yourself to other kids. We are interested in knowing which group of kids you were comparing yourself to or thinking about when you answered the questions.

These are some of the groups you might have been thinking about when you answered the questions:

1. Other students in your resource room or learning lab.

2. Other students in your regular classes.

Please write in the number of the group you were thinking about when you answered the questions in each of the following areas:

_____ How smart you are in school.

_____ How well you do in reading.

_____ How well you do in writing.

_____ How well you do in spelling.

_____ How well you do in math.

_____ How accepted you feel by other kids.

_____ How well you do at athletic activities.

_____ How well you behave.

_____ How much you like the way you look.