INCUSION IN SECONDARY SCHOOLS: SOCIAL INTERACTION AND PERSONALITY DEVELOPMENT OF STUDENTS WITH DYSCALCULIA IN BUEA-SUB DIVISION, SOUTH WEST REGION OF CAMEROON

Patrick Fonyuy Shey, Ph.D
Department of Educational Psychology,
University of Buea, Cameroon,
Email: patrico5us@gmail.com

Abstract

This study on inclusion in secondary schools: social interaction and personality development of students with dyscalculia in Buea-Sub Division in the South West Region of Cameroon sought to investigate how social interaction (communication, cooperation, competition and play) in an inclusive setting can affect the development of personality (self-esteem, conscientiousness, agreeableness and extraversion) by students with Dyscalculia. The design adopted for the study was quasi experimental and the type used was the Pre-Test Post-Test Non-randomized Experimental and Control groups. The study made used of a sample of twenty four (24) form three students (13 females and 11 males) selected purposively from two secondary schools (Bilingual Grammar School, Molyko and Saint Theresa International Bilingual Comprehensive College, Molyko) in Buea Sub-Division. A modified Likert-scale of four response options was used as the instrument for data collection. The data collected were subjected to quantitative analysis. The results revealed that social interaction had a significant impact on personality development of students with Dyscalculia. It was realised that communication skills had a significant impact on self-esteem as at pre-test for the experimental group the average score was 26.917 significantly different from 28.917 recorded at post test for the experimental group. Skills in cooperation were also seen to significantly affect personality development of students with dyscalculia as the average score for the experimental group was 26.083 that rose to 28.917 at post test for the experimental group. Play equally had a significant impact on extraversion of students with dyscalculia as the average score for experimental group was 24.750 that rose to 26.167 at post-test. Competition was revealed not to have a significant impact on agreeableness of students with dyscalculia. Based on the results, it was therefore recommended that students with dyscalculia should be provided with a relaxed and welcoming atmosphere within and out of an inclusive classroom where their feelings are incorporated into the learning programme by teachers, school administrators as well as other students. This will help the students with dyscalculia to feel as part of any social environment in which they find themselves.

Key Words: Inclusion, secondary school, social interaction, personality development and students with dyscalculia.

Introduction

The world is becoming less tolerant to exclusionary and discriminatory practices, including discrimination against persons with disabilities. This is due to increasing knowledge as well as growing awareness of universal human right issues. Increased global accountability and commitment to the rights of persons with disabilities was manifested by the adoption in the year 2006 of a Convention and optional Protocol on the Rights of Persons with Disabilities (UNCRPD) by the United Nations Organisation. The United Nation Convention on the Rights of Persons with Disabilities (UNCRPD) is a comprehensive instrument which provides all necessary guidance for national laws and policies to ensure non-discrimination, equality of opportunity, full participation and social inclusion of persons with disabilities in all countries. Over the past decade wide agreement globally has encouraged the development of inclusive education by advocating the inclusion of learners with diverse educational needs in the same classrooms.

However, the existing literature on dyscalculia is replete with research indicating that students with dyscalculia tend to struggle with socio-emotional problems which hamper their personality (Elias & Tobias, 1996; Gresham, Sugai & Horner, 2001; Ross, Powell & Elias, 2002; Kuhne & Wiener, 2000; Nowicki, 2003; Romasz, Kantor & Elias, 2004; Bryan, Burstein & Ergul, 2004; Elksnin & Elksnin, 2004). Indeed, deficits in social and emotional interactive abilities for students with dyscalculia with corresponding effects on their personality development have been observed in research conducted in the United States and in nations across the globe, including Canada (Whitley, Lupart, & Beran, 2007), China (Yuehua, 2004), and Norway (Holden & Gitlesen, 2007).

Therefore, it is imperative that educational planning teams consider the socio-emotional needs with its related effects on the personality development of students with dyscalculia. Assisting young students with dyscalculia to learn through positive social interaction with other students may help them acquire skills from which they will benefit throughout their life.

The Inclusive Classroom at the Secondary Level

Provision of special needs education within the secondary phase of schooling is a complex topic in the special education and curriculum field. Various reports (European Agency studies on provision of special education in Europe, 1998, 2003) suggest that inclusion generally develops well in the primary education phase, but in the secondary phase serious problems emerge. It can be argued that increasing subject specialisation and the different organisational strategies in secondary schools result in serious difficulties for student inclusion at the secondary level. This situation is reinforced by the fact that generally, the gap between students with Special Educational Needs and their peers increases with age. Furthermore, in many countries, secondary education is usually characterised by a “streaming” model: students are placed into different streams (or class groupings) on the basis of their perceived levels of achievement. Coleman, (2000) argues that planning time, concerns about caseload, inadequate preparation, and meager professional development have loomed as barriers to complete access to the general education curriculum for students with disabilities.

Mastropieri and Scruggs (2001) have identified the complexity of schooling at the secondary level as a serious impediment to inclusion. Gaps in student skills are more pronounced in secondary schools which often employ "teacher centered" strategies for learning (Cole & McLesky, 1997). There are wide-ranging demands on time, particularly for students with disabilities given the need for learning various important skills (Cole & McLesky, 1997). Also, secondary-level teachers display a less positive attitude toward educational inclusion than do elementary teachers

(Mastropieri & Scruggs, 2001). While pinpointing the skill of collaboration as critical for secondary special educators, Foley and Mundschenk (1997) identified the deficiencies in the general education skills set, among them are the lack of necessary skills to adapt instruction or to integrate specific strategies. General Education teachers' knowledge and use of Universal Design for Learning, for example, can ensure greater access to the general education curriculum (Udvari-Solner, Villa, & Thousand, 2005).

Although school-wide stories of success with inclusion exist (Cole & McLesky, 1997; Hunt, Staub, and Alwell, 1994; Luster & Durrett, 2003; Peetsma, Vergeer, Karsten, & Roeleveld, 2001), time, vision, leadership, strong professional development, and reshaping teacher attitudes remain powerful considerations. The ability to mentor new teachers remains a competency for all teachers, general and special educators, practicing inclusion (Voltz, 2001), but schools are faced with hiring professionals who may or may not be successful collaborators in co-teaching arrangements.

In spite of these difficulties, many secondary educators create opportunities for inclusion for the children they serve. Co-teaching at the secondary level has developed into the preferred model for providing inclusion for students with disabilities (Keefe & Moore, 2004; Kloo & Zigmond, 2008).

Other successful practices include administrative support, ongoing professional development, collaboration, communication, instructional responsiveness, and expanded authentic assessment approaches (Villa, Thousand, Neville, & Liston, 2005). "Layered curriculum" at the secondary level has emerged as a brain based potential planning model for differentiating instruction (Nunley, 2004). The need for a "continuum of instruction" developed by teachers who practice flexibility and collaboration underscores the argument made by Mercer, Lane, Jordan, Allsopp, and Eisele (1996) that professional choices are the hallmark of inclusive practice. Collaboration skills have been identified time and again as necessary for quality inclusive practices to be realized (Foley & Mundschenk, 1997; Walther-Thomas, Bryant, & Land, 1996). Using interviews with principals and special education teachers, Olson, Chalmers, and Hoover (1997) documented the competencies necessary for general education inclusion teachers at the secondary level. Among the attributes reported, inclusive general educators displayed tolerance, reflection, responsibility, warmth, and acceptance. They accepted responsibility for all students, enjoyed good working relationships with co-teachers, and adjusted their expectations for students with disabilities (Olson, et al, 1 997). Hamill, Janzten, and Barguerhuff (1999) found in their survey of practicing educators that collaboration and flexibility were the most important competencies for inclusion teachers, secondary included.

The concept of Dyscalculia

There exists a variety of definitions of dyscalculia but the differences in definitions reflect the different theoretical and research perspectives of different experts. Some experts define dyscalculia in terms of an underlying presumed genetic, constitutional or neuro-anatomical immaturity in specific areas of the brain (Kosc, 1974). Some definitions of dyscalculia are more general and do not presuppose any genetic or underlying neuro-anatomical substrate. Dyscalculic learners may have difficulty understanding simple number concepts, lack an intuitive grasp of numbers, and have problems learning number facts and procedures. Even if they produce a correct answer or use a correct method, they may do so mechanically and without confidence (Field, Jette & Martin, 2006).

Traditionally, the defining features of dyscalculia have been poor retrieval of arithmetic facts from memory and the perseverant use of immature calculation strategies (Geary and Hoard 2005). However, a growing body of behavioural and neuro-imaging evidence, emerging over the last decade, suggests that dyscalculia may be rooted in impairments of a neurobiological system for processing numerical magnitudes (the total number of items in a set) and that it is this impairment that, over the course of learning and development, gives rise to the difficulties in the retrieval of arithmetic facts. Debate still exists, however, as to the role of domain general cognitive factors, such as working-memory and spatial attention, in the aetiology of dyscalculia.

Research reveals that many people have difficulty with maths. Some of these difficulties may be associated with lower than average levels of intellectual ability, absence from school, less than adequate teaching, personality factors or emotional reactions to maths. With regard to students whose attainment in subjects other than maths is average or above, estimates of the prevalence of dyscalculia range from 3% to 7% of the population. Of those students diagnosed as dyslexic about 40% to 60% are also dyscalculic (McDermott, Goldman, & Varenne, 2006; Ong-Dean, 2006; Reid & Knight, 2006).

It should be noted that research on dyscalculia is less developed than research on dyslexia. Despite the evident importance of numerical and mathematical skills for life success and a prevalence rate equivalent to that of developmental dyslexia (Shalev, Auerbach, Manor & Gross-Tsur, 2000), dyscalculia has been chronically understudied, with studies on dyslexia outnumbering those on dyscalculia by 14:1 right up to the year 2007 (Gersten, Clarke & Mazzocco 2007). The consequence of this under-attention is that the cognitive causes of dyscalculia are currently poorly understood. It should be noted also that dyscalculia often co-occurs (comorbid) with other learning difficulties such as Developmental Dyslexia and Attention Deficit Hyperactivity Disorder (ADHD).

Social Interaction and Personality Development of Students with Dyscalculia

In as much as social interaction amongst students remain of paramount significance as it a key component of their personality development irrespective of whether placed in inclusive or mainstream settings, children with dyscalculia are more vulnerable to socio-emotional problems within and out of the classroom which interfere with their personality development. These socio emotional problems comes as a result of frustration due to their difficulties, feeling of being left behind when compared to their peers, anger and self-doubt when their progress is slowed down just to name a few.

It has also been hypothesized that deficiencies in social perception may adversely affect how individuals with dyscalculia view themselves, resulting in lowered self-concepts (Shey, 2014). Cordoni (1978, cited in Shey, 2014), found significant deficits in the self concepts of college students with learning disabilities including dyscalculia. She suggested that self-concepts might be related to ineffective interpersonal skills. According to Kronick (1978), personality develops through experiences with others, becoming more focused during adolescence and adulthood as work relationship and more intimate social interactions takes place. Thus, deficiencies in social interactions may have more pervasive effects on psychological well-being during adolescence and early adulthood.

Opportunity for social interaction with others is very important for the development of all students. Through social interaction, students begin to establish a sense of “self” and to learn what others expect of them (Geary, 2006). As mentioned by Shaywitz (2006), social interaction for very young

children primarily occurs within the family. As students grow and develop, they become more and more interested in playing and interacting with other students. When playing with others, students learn appropriate social behaviours, such as sharing, cooperating, and respecting the property of others. In addition, while interacting with their peers, students continuously advance in communication, cognitive, and motor skills.

Most opportunities for social interactions among students occur during play. The opportunity to play with others is critical if a student is to develop appropriate social skills. Mpofu, Peltzer, Shumba, Serpell, & Mogaji (2005), are of the opinion that encouraging children with disabilities and those without disabilities to play together is an extremely important part of instruction in integrated secondary schools. The student must have the opportunity to play together if they are to become friends. These friendships will help children without disabilities to form positive, accepting attitudes toward persons with disabilities in general and those with dyscalculia in particular. In addition, the student with dyscalculia will have the opportunity to learn age-appropriate social skills. Students who learn appropriate social skills often have a higher self-esteem and show a greater willingness to interact with their environment as they grow. Improved social and emotional interaction serve to prevent high-risk behaviours, such as substance abuse, delinquency, and violence (Elias, Lantieri, Patti, Walberg & Zins, 1999; Ross, Powell & Elias, 2002; Wilson, Gottfredson & Najaka, 2001), and is also associated with positive school-related outcomes, positive self-esteem, social acceptance, problem solving skills, stress management, and academic success (Elksnin & Elksnin, 2004; Zins, Weissberg, Wang & Walberg, 2004).

Greenberg, Weissberg, O'Brien, Zins, Fredericks, Resnik & Elias (2003), found that effective social and emotional instruction improves students' abilities to recognize and manage emotion, understand and appreciate the perspectives of others, establish positive goals, make responsible decisions, and cope with interpersonal conflicts. Long-term positive life outcomes are also associated with social and emotional interaction of students with dyscalculia, including high school completion, healthy marriage, stable family, and employment success (Elias et al., 2000; Elksnin & Elksnin, 2004; Zins et al., 2004).

The Problem

Dyscalculia (mathematical learning disability) is now understood as existing throughout the life span. Problems may become more complex as young adults manoeuvre the demands of new roles and responsibilities. An ability to understand and adapt to the changing effects of this diagnosis through socialisation, is a prerequisite to positive personality and achievement. Research on personality development of students with dyscalculia is limited and for learning to be meaningful to these students, all aspects of their personality should be well catered for. Socio-emotional challenges are a threat to the personality of dyscalculic students as it interferes with their learning. Research shows that disparity exists in personality development of students with dyscalculia and students without disabilities. Students with dyscalculia require a balance in their socio-emotional abilities so as to make learning meaningful as they socially interact with their peers in or outside the classroom. Difficulties in social interaction within and out of the classroom for students with dyscalculia leave them often with poor self concepts, inability to manage their feelings and resulted frustrations. It is therefore observed that students with dyscalculia face socio-emotional challenges that hamper their personality, adequate participation in the teaching/learning process and as such have difficulties making learning meaningful. It is against this backdrop that a research was proposed on social interaction and personality development of secondary school students in Buea-Sub Division

Method

Design of the Study

This study employed the quasi-experimental design and the type used was the Pre-Test Post-Test Non-randomized Experimental and Control groups.

Table 1: Pre-test Post-test Design with Non-randomized Experimental and Control groups

Group independent	Pre-test	Experimental	First formative evaluation	Second formative evaluation	Post-test
G1	X1	Y	X2	X3	X4
G2	X2				X4

Y represents the independent variable which was also known as the experimental variable. The experimental variable has been conceived into a group of opinion statements (activities) relating to each indicator of the variable. Each of the activities showed personality skills that were to be developed relating to a variable and hypothesis. X1, X2, X3, and X4 represented the dependent variable before and after the manipulation of the independent variable Y. In this study, it represents the pre-test, first formative evaluation, second formative evaluation and post-test respectively, administered before and after the experimental treatment. G1 and G2 represent the experimental and control groups respectively.

Participants

The purposive sampling technique was used in selecting the schools, class and the human sample used in this study. This method was chosen because the researcher could only work with dyscalculic students and therefore identified Bilingual Grammar School Molyko (BGS) and Saint Theresa International Bilingual Comprehensive College Molyko (STIBCCOL) as suitable for the study due to their large populations from where an unbiased sample (sample with similar characteristics to the population) could be drawn.

The human sample of the study therefore consisted of 24 Form Three students with Dyscalculia aged between 12-16 years selected from the two schools mentioned above. The reason for selecting students of this age group was because social interaction is very common and effective amongst students of this age group and they easily interact with one another intentionally. Also, intervention at this age proves very effective in the rehabilitation of children's personality.

Measures

The instrument used in this study to collect data was a scale (Questionnaire) developed by the researcher. This scale matched with the variables under study and answered the research questions. The scale was made up of 36 items measuring communication, cooperation, competition and play alongside their respective indicators of the dependent variable which included self-esteem, conscientiousness, agreeableness and extraversion on a four-point modified Likert scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). This four-option point scale was

later collapsed into two point scale of Agree (A) and Disagree (D) during data analysis. The items on the scale were classified according to sections. Section A was made up of demographic information consisting of 6 items. Section B carried items based on research questions with each research question having 9 items. A master plan of activity was also developed and used as a training manual for students in the experimental group.

The test-retest method was conducted to check reliability of the instrument used for data collection. A reliability coefficient at 0.05 level was used to calculate the internal consistency of the instrument and to show the relationship and consistency between the two sets of scores obtained from the two groups. Instances where the internal consistency asassumption were violated were only with the component competition and agreeableness with Alpha values of 0.357 for the experimental group at pre-test and 0.478 at post-test but when the pre-test and post-test were combined, Alpha value rose to 0.640.

The variance was relatively moderate indicating relatively homogenous subsets but in the experimental group, increases in variances were consistently observed at post-test and this for all the conceptual components indicating that students responded differently to the intervention.

Procedure

At the beginning of the training program, all participants were assigned numbers and divided into two groups (the experimental and the control group). Identifications number N1, N2, N3, N4, N5, N6, N7, N8, N9, N10, N11 and N12 were assigned for the twelve students that constituted the experimental group in the two schools since no names appeared on the data collection instrument. After assigning identification numbers to the students, a pre-test was administered to the twelve (12) students (six from each school) in the experimental group and the other twelve (12) students assigned to the control group.

The twelve (12) students assigned to the experimental group went through a training program that was focused on social interaction as a means of improving personality development for students with dyscalculia. The social interaction activities that were designed for the study were based on four components which included; communication, cooperation, competition and play. The training program ran for six (6) weeks, three (3) times a week. Each lesson lasted for forty (40) minutes. At the beginning of each class, previously taught skills were rehearsed for five (5) minutes to investigate if the students properly assimilated them. A new social interaction variable and skill acquisition was taught for twenty-five (25) minutes. Practice of the newly learned skill took place for ten (10) minutes.

After the first three (3) weeks of training the first formative evaluation was administered to the students. This was to determine whether there was an improvement in the personality development through social interaction after three weeks of the intervention programmes. The study was discontinued for one (1) week in order to determine whether the students could practice the social interaction skills without direct instruction and out of the classroom. After the one (1) week break, the second formative evaluation was given to the students in order to determine if they were able to sustain what they have learnt and practice in class and eventually practice them in other environments. The researcher continued the training programme for two (2) weeks after which a post-test was administered to the students at the end of the training programme. The post-test was administered to both the experimental and the control groups. The post-test on both groups was to determine if the training was effective and also to be able to make a comparison of the effects of the

study on both groups where one (the experimental group) was passed through an intervention programme(training) and the other (control group) did not receive any training.

Analyses

Quantitative methods were employed in analyzing the data collected. A pre-designed EpiData Version 3.1 database which has in-built consistency and validation checks was used to enter the data. Further consistency, data range and validation checks were also performed in SPSS version 21.0 to identify invalid codes.

Ethical Issues

Ethical considerations were considered by the researcher during the programme to ensure that whatever was noticed was used solely for the purpose of this study and nothing else. To ensure this, the researcher took the following measures to protect the respondents:

First and foremost, the researcher obtained permission from the authorities of the two schools used in the study who acted as the guardian of the students and sought their consent and knowledge as well as help where needed. For reasons of confidentiality, names of the participants are not mentioned anywhere in this study.

The researcher equally ensured that the environment in which the study was carried out was very safe and comfortable for the students, a natural setting (school environment) was used during the programme. This was done to protect the participants from physical or psychological harm, discomfort or danger that could arise due to research procedures.

The researcher also ensured that no participant was deceived. Students were not going to be forced by any means to participate in the study. In order to avoid deception, the researcher took time to explain to the students the relevance of the different activities carried out and how they could be beneficial to them, the researcher and the school community.

Results

Communication and Self-esteem Skills Acquisition

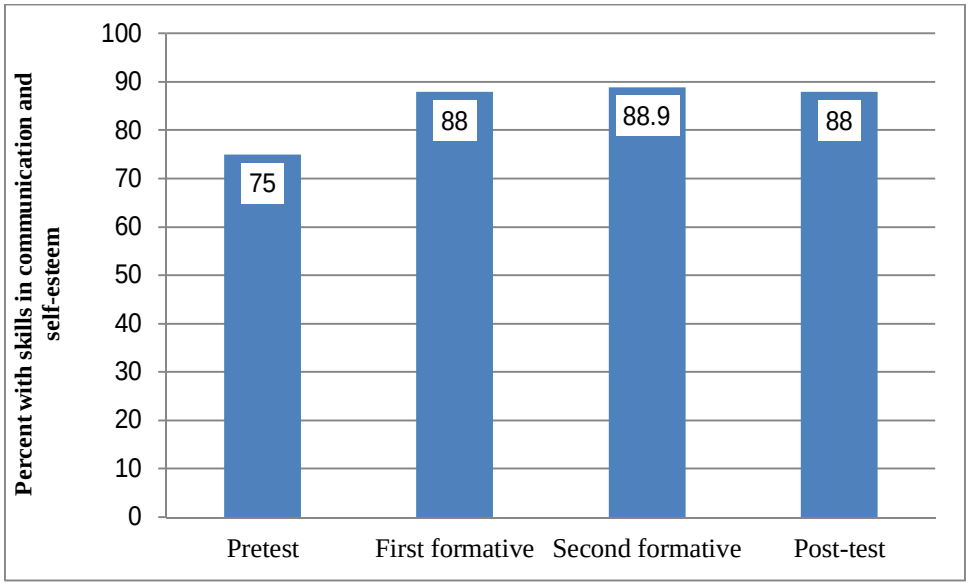

Figure 1: Communication and Self-esteem Skills Acquisition from Pre-test to Post test

The proportion of students, who had the skills increased from 75% at pre-test to 88% at the first formative evaluation, rose slightly to 88.9% at the second formative evaluation and stagnated at 88% at post test.

Table 2: Students' Skills in Communication and Self-esteem by Background Indicator

Background indicators	Categories	No Progression	Progression	N	Cramer's V
Gender	Male	57.1% (4)	42.9% (3)	7	V= 0.598
	Female	0.0% (0)	100.0% (5)	5	P= 0.038
Age	12- 14	22.2% (2)	77.8% (7)	9	V= 0.408
	15-16	66.7% (2)	33.3% (1)	3	P= 0.157
Type of School	Government	28.6% (2)	71.4% (5)	7	V= 0.120
	Private	40.0% (2)	60.0%(3)	5	P= 0.679

Students' acquisition of skills in communication and self-esteem was significantly dependent of gender as female acquired the skills more than the male with a progression rate of 100% (5) as compared to 42.9%(7) for the male.

Table 3: Communication and Self-esteem Skills Compared within and between Experimental and Control groups

Group		Pre-test	Post-test
Experimental	N	12	12
	Mean	26.917	28.917
	Median	27.000	28.000
	Minimum	22.00	27.00
	Maximum	32.00	32.00
	Std. Deviation	3.801	1.621
Control	N	12	12
	Mean	24.250	23.417
	Median	25.000	23.500
	Minimum	12.00	12.00
	Maximum	29.00	30.00
	Std. Deviation	4.181	4.680
Mann-Whitney U		U=53.000 P=0.291	U=14.000 P=0.000

At pre-test, the average score for the experimental group was 26.917 not significantly different from the 24.250 recorded with the control group ($P>0.05$). But at post test, in the experimental group, the score rose to 28.917, significantly higher ($P<0.01$) as compared to that of the control group that decreased slightly to 23.417. The null hypothesis was therefore rejected given that at post-test unlike the pre-test, the score was significantly higher in the experimental group.

Cooperation and Consciousness Skills Acquisition

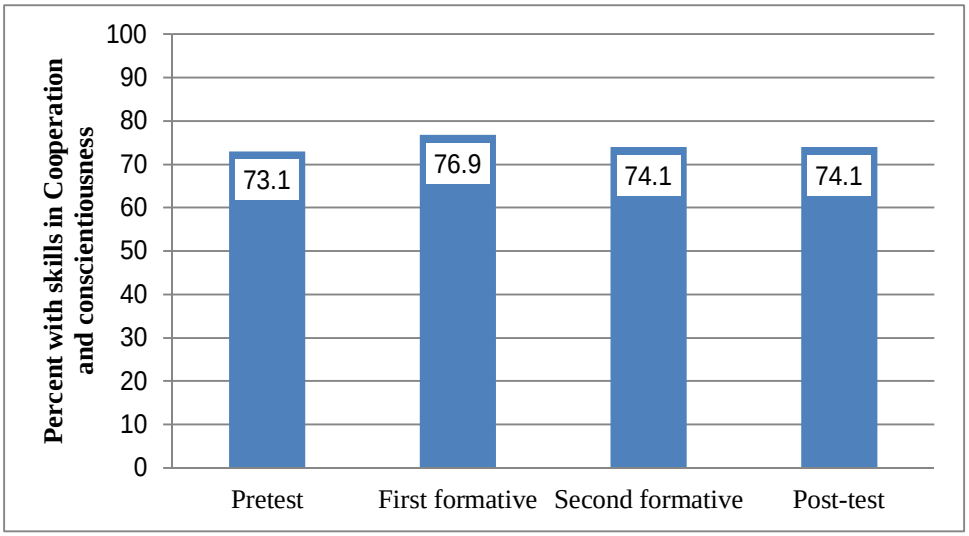

Figure 2: Cooperation and Consciousness Skills Acquisition from Pre-test to Post test

The proportion of students who had the skills increased from 73.1% at pre-test to 76.9% at the first formative evaluation, dropped slightly to 74.1% at the second formative evaluation and stagnate at 74.1% at post test.

Table 4: Students Skills in Cooperation and Conscientiousness by Background Indicator

Background indicators	Categories	No Progression	Progression	N	Cramer's V
Gender	Male	28.6% (2)	71.4% (5)	7	V= 0.378
	Female	0.0% (0)	100.0% (5)	5	P= 0.190
Age	12- 14	11.1% (1)	88.8% (8)	9	V= 0.258
	15-16	33.3% (1)	66.7% (2)	3	P= 0.371
Type of School	Government	28.6% (2)	71.4% (5)	7	V= 0.371
	Private	0.0% (0)	100.0%(5)	5	P= 0.258

Female Students had a progression rate of 100% comparatively with 71.4% for the male. Those who were between the ages 12-14 also had a progression rate of 88.8% compared to the 66.7% recorded by those who were between 15-16 years. As far as the type of school is concern, students from the private school (STIBCCOL) recorded a 100% progression; meanwhile those in the government school (BGS) recorded a 71.4% progression rate.

Table 5: Cooperation and Consciousness Skills Compared within and between Experimental and Control groups

Group		Pre-test	Post-test
Experimental	N	12	12
	Mean	26.083	28.917
	Median	26.000	28.000
	Minimum	23.00	27.00
	Maximum	33.00	32.00
	Std. Deviation	2.745	1.62135
Control	N	12	12
	Mean	24.500	23.417
	Median	26.000	23.500
	Minimum	13.00	12.00
	Maximum	30.00	30.00
	Std. Deviation	4.523	4.679
Mann-Whitney U		U=63.000 P=0.630	U=14.000 P=0.000

At pre-test, the average score for the experimental group was 26.083, not significantly different from the 24.500 recorded with the control group ($P>0.05$). But at post test, in the experimental group, the score rose to 28.917, significantly higher ($P<0.01$) as compared to that of the control group that decreased slightly to 23.417. The null hypothesis was therefore rejected given that at post-test unlike the pre-test, the score was significantly higher in the experimental group.

Competition and Agreeableness Skills Acquisition

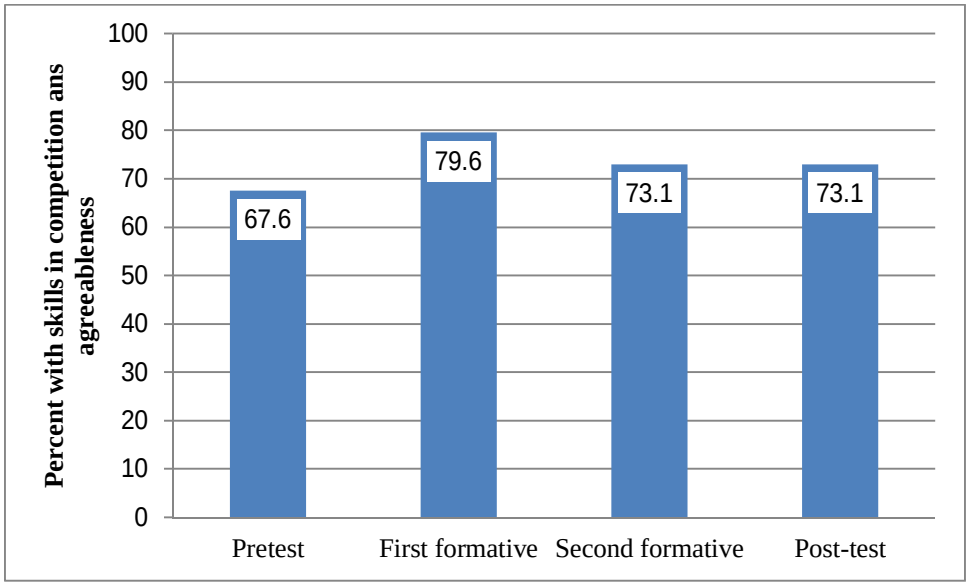

Figure 3: Competition and Agreeableness Skills Acquisition from Pre-test to Post test

The proportion of students who had the skills increased from 67.6% at pre-test to 79.6% at the first formative evaluation, dropped slightly to 73.1% at the second formative evaluation and stagnate at 73.1% at post test.

Table 6: Students Skills in Competition and Agreeableness by Background Indicator

Background indicators	Categories	No Progression	Progression	N	Cramer's V
Gender	Male	28.6% (2)	71.4% (5)	7	V= 0.314
	Female	60.0% (3)	40.0% (2)	5	P= 0.279
Age	12- 14	55.6% (5)	44.4% (4)	9	V= 0.488
	15-16	0.0% (0)	100.0% (3)	3	P= 0.091
Type of School	Government	57.1% (4)	42.9% (3)	7	V= 0.371
	Private	20.0% (1)	80.0%(4)	5	P= 0.198

Students' acquisition of skills in competition and agreeableness was not dependent of any of the background indicators therefore implying that the entire cohort had almost the same level of receptiveness or adjustment (P>0.05).

Table 7: Competition and Agreeableness Skills Compared within and between Experimental and Control group

Group		BsPre	BsP
Experimental	N	12	12
	Mean	25.500	27.333
	Median	26.500	27.000
	Minimum	19.00	23.00
	Maximum	30.00	32.00
	Std. Deviation	3.451	3.366
Control	N	12	12
	Mean	25.000	23.750
	Median	26.000	24.500
	Minimum	9.00	11.00
	Maximum	34.00	30.00
	Std. Deviation	7.173	5.864
Mann-Whitney U		U=67.000 P=0.799	U=44.000 P=0.114

At pre-test, the average score for the experimental group was 25.500 not significantly different from the 24.000 recorded with the control group (P>0.05). But at post test, in the experimental group, the score rose to 27.333, though not significantly higher (P>0.05) as compared to that of the control group that decreased slightly to 23.750. The null hypothesis was therefore retained given that at post-test unlike the pre-test, the score was not significantly different between the experimental and the control group.

Play and Extraversion Skills Acquisition

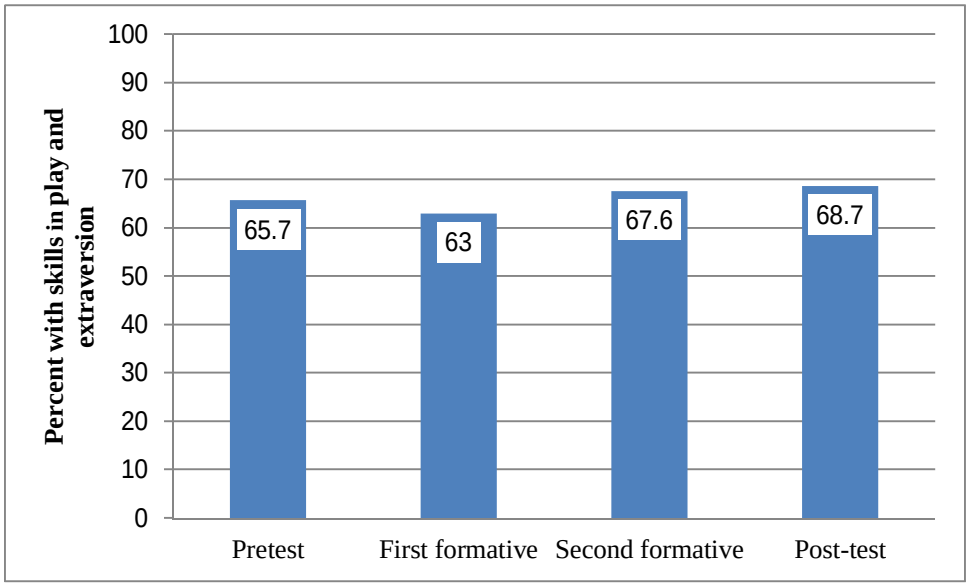

Figure 4: Play and Extraversion Skills Acquisition from Pre-test to Post test

The proportion of students who had the skills decreased from 65.7% at pre-test to 63.0% at the first formative evaluation, increased to 67.6% at the second formative evaluation and to 68.7% at post test.

Table 2: Students Skills in Play and Extraversion by Background Indicator

Background indicators	Categories	No Progression	Progression	N	Cramer's V
Gender	Male	42.9% (3)	57.4% (4)	7	V= 0.371
	Female	80.0% (4)	20.0% (1)	5	P= 0.198
Age	12- 14	66.7% (6)	33.3% (3)	9	V= 0.293
	15-16	33.3% (1)	66.7% (2)	3	P= 0.310
Type of School	Government	71.4% (5)	28.6% (2)	7	V= 0.314
	Private	40.0% (2)	60.0% (3)	5	P= 0.276

Students' acquisition of skills in play and extraversion was not to a greater extent dependent of any of the background indicators therefore implying that the entire cohort had almost the same level of receptiveness or adjustment (P>0.05).

Table 9: Play and Extraversion Skills Compared within and between Experimental and Control group

		BsPre	BsP
Experimental	N	12	12
	Mean	24.750	26.167
	Median	24.000	26.500
	Minimum	20.00	23.00
	Maximum	30.00	30.00
	Std. Deviation	2.989	2.082
Control	N	12	12
	Mean	23.167	22.250
	Median	24.000	22.000
	Minimum	12.00	10.00
	Maximum	29.00	28.00
	Std. Deviation	5.219	4.673
Mann Whitney U test		U=64.000 P=0.671	U=28.000 P=0.010

At pre-test, the average score for the experimental group was 24.750 not significantly different from the 23.167 recorded with the control group (P>0.05). But at post test, in the experimental group, the score rose to 26.167, significantly higher (P<0.05) as compared to that of the control group that decreased slightly to 22.250. The null hypothesis was therefore rejected given that at post-test unlike the pre-test, the score was significantly higher in the experimental group.

Discussion

From the results of the study, it was revealed that communication had an effect on the development of self-esteem of secondary school students with Dyscalculia. This was evident as there was progress in skills as the proportion of students in the experimental group who had the skills increased from pre-test to first formative evaluation, rose slightly at the second formative evaluation and stagnates at post test. This incremental change in experimental group from pre-test through first and second formative evaluations and stagnation at post test was not witnessed in the control group. Though there was a slight increase from pre-test to post test in the control group, this could be due to the fact that these students after each period of training were seen interacting with the students of the control group and they could have discussed what was taught during the training period with them. This result is in line with the ideas of Kanga, Uusiatti and Maatta (2006), who observed that aspects of social interaction such as communication, competition and cooperation had a measure positive effect on the self esteem, conscientiousness and agreeableness of children with dyslexia and dyscalculia.

From the analyzed data, it was also revealed that cooperation amongst secondary school students with Dyscalculia significantly affects the development of conscientiousness in them. The change in cooperation skills suggested that with intense counselling, this aspect of their personality (conscientiousness) can be rehabilitated. However, comparing the post test results of the experimental group to that of the control group showed evidence and a comprehensive difference in the effects of cooperation skills on conscientiousness development of secondary school students with Dyscalculia. With the control group there was no major change between the pre-test and post test. This result still fals in agreement with the findings of Kanga, Uusiatti and Maatta (2006), who observed that aspects of social interaction such as communication, competition and cooperation had a measure positive effect on the self esteem, conscientiousness and agreeableness of children with dyslexia and dyscalculia.

Result of this study also shows that as far as competition and agreeableness are concern, no significant changes were witnessed between the post test results of the experiment group and that of the control group. In the experimental group, majority of the items analysed did not show any major difference in the acquisition of skills. The few that witnessed increase in the acquisition of skills could not cause a significant increment progression between the two tests. This was attributed to the fact that this category of students struggle with socio-emotional challenges and always show little or no interest in competitive activities for the fear that they will be laughed at for failure to perform well. However, the slight changes that occurred in the pre-test and post test of experimental group insinuated that these students could be rehabilitated or rejuvenated into regaining their emotional freedom through continuous and intensive counselling. With the control group, no major change was witnessed in the pre-test and post test. From the result, even though there were slight changes, it was at a decrease rate when the post test results were compared between the experimental and the control group. This result was therefore contrary to the findings of Rothmann and Coetzer (2003) argue that *a*greeable individuals value getting along with others. They are generally considerate, kind, generous, trusting and trustworthy, helpful, and willing to compromise their interests with others. Agreeable people also have an optimistic view of human nature. These characteristics are present in students with Dyscalculia, but they face challenges demonstrating them for the reason of fear or frustration that will result from their failure.

The results of this study also revealed that play had a significant effect on extraversion of secondary school students with Dyscalculia as it was proven by the incremental difference between the post test results of the experimental group and that of the control group. This is in line with an empirical study carried out by Keen, Rodger & Doussin (2007) which shows that play helped to improve on the ability of communication and also furnish extroversive characteristics of children with learning disabilities as they interact with their peers in their respective environments. This was observed in students as when they were encouraged to interact with each other in the group and by putting more emphasis on its importance, the students found it interesting

Concluding Remarks

In as much as personality traits do not exist in a vacuum, they are only meaningful if they are considered together with situations where they lead to the expressions of behaviours. Simply put, personality and situations are intimately intertwined in the generation of behaviour. The main issue on personality and social relationships is concerned with how we can study the interplay of personality traits, social situations and behaviours.

From the literature review, data collected and the results of this study, one can clearly state that as far as inclusion of children with Dyscalculia in secondary school is concern, social interaction has a great influence on their personality. The study clearly reveals that communication, cooperation and play have paramount effects on the personality development of secondary school students with Dyscalculia while competition has no effect on their personality development. However, with intensive and longer period of intervention, improvement in the development of a positive competitive spirit by secondary school students with Dyscalculia could be more noticeable and comprehended. The study therefore recommends that a relaxed and welcoming atmosphere within and out of the classroom should be provided for students with dyscalculia where their feelings are incorporated into the learning programme by teachers, school administrators as well as other students. This could be a step in overcoming the challenges these students face thus improving on their personality and their overall success.

REFERENCES

Bryan, T., Burstein, K., & Ergul, C. (2004). The social-emotional side of learning disabilities:

A science-based presentation of the state of the art. , 27 (1), 45-51.

Coleman, M. R. (2000). Bright futures for exceptional learners: Conditions for special education teaching technical report. Chapel Hill, NC: Frank Porter Graham Center; Arlington, VA: *Council on Exceptional Children*. (ERIC Document Reproduction No. ED457632)

Cole, C. M. & McLesky, J. (1997). Secondary inclusion programs for students with mild disabilities. Focus on Exceptional Children, 29(1), 1-15. Elias, M., Lantieri, L., Patti, J., Walberg, H., & Zins, J. (1999). Looking past Columbine:Violence is preventable. *Education Week*. (Unpublished).

Elias, M., Bruene-Butler, L., Blum, L., & Schuyler, T. (2000). Voices from the field: Identifying and overcoming roadblocks to carrying out programs in social and emotional learning/emotional intelligence. *Journal of Educational & Psychological Consultation*, 11, 253-272.

Elias, M., & Tobias, S. (1996). *Social problem solving: Interventions in the schools*. New York: The Guilford Press.

Elksnin, L., & Elksnin, N. (2004). The social-emotional side of learning disabilities. *Learning Disability Quarterly*, 27 (1), 3-8.

European Agency for Development in Special Needs Education / Meijer, C.J.W. (Editor) (2003). *Inclusive education and classroom practices*. Middelfart, Denmark: European Agency for Development in Special Needs Education.

European Agency for Development in Special Needs Education / Meijer, C.J.W. (Editor) (1998). *Integration in Europe: Provision for pupils with special educational needs*. Middelfart, Denmark: European Agency for Development in Special Needs Education.

Field, M. J., Jette, A. M., & Martin, L. (2006). *Workshop on disability in America, a new look: Summary and background papers*. Washington, DC: Institute of Medicine of the National Academies, National Academies Press.

Foley, R. M. & Mundschenk, N. A. (1997). Collaboration activities and competencies of secondary school special educators: A national survey. Teacher Education and Special Education , 20(1), 47-6

Geary, D.C. (2006). Development of mathematical understanding. In: Kuhl D, Siegler RS, Damon W, editors. *Cognition, Perception, and Language*. 6. Vol. 2. New York: John Wiley & Sons; 777–810.

Geary, D. C., & Hoard, M. K. (2005). Learning disabilities in arithmetic and mathematics: Theoretical and empirical perspectives. In J. I. D. Campbell (Ed.), *Handbook of mathematical cognition* (pp. 253-267). New York: Psychology Press.

Gersten, R., B. Clarke, and M. M. M. Mazzocco. 2007. Historical and contemporary perspectives on mathematical learning disabilities. In *Why Is Math So Hard for Some Children?*, ed. D. B. Berch and M. M. M. Mazzocco. Brookes Publishing.

Greenberg, M., Weissberg, R., O'Brien, M., Zins, J., Fredericks, L., Resnik, H., & Elias, M. (2003). Enhancing school-based prevention and youth development through coordinated social, emotional, and academic learning. *American Psychology*, 58(6-7), 466-74.

Gresham, F., Sugai, G., & Horner, R. (2001). Interpreting outcomes of social skills training for students with high-incidence disabilities. *Exceptional Children*, 67, 331-344.

Hamill, L. B., Jantzen, A. K., & Barguerhuff, M. E. (1999). Analysis of effective educator competencies in inclusive environments. *Action in Teacher Education* , 2/(3), 21-37.

Holden, B. & Gitlesen, J. (2007). Challenging behaviour in children and adolescents with learning disabilities. Norsk Psykologforening, 44, 22-27.

Hunt, P., Staub, D., & Alwell, M. (1994, Winter). Achievement by all students within the context of cooperative learning groups. The Journal of the Association for Persons with Severe Handicaps, (1 9), 290-301.

Keefe, E. B. & Moore, V. (2004). The challenge of co-teaching in inclusive classrooms at the high school level: What the teachers told us. *American Secondary Education*, 32(3), 77-88.

Keen, D., Rodger, S. & Doussin, K. (2007). A pilot study of the effects of a social-pragmatic intervention on the communication and symbolic play of children with autism. *Autism.* 11(1), 63-71.

Kloo, A. & Zigmond, N. (2008) Co-teaching revisited: Redrawing the blueprint. Preventing School Failure , 52(2), 1 2-20.

Kosc, L. (1974). Developmental dyscalculia. *Journal of Learning Disabilities, 7*, 159–162.

Kuhne, M., & Wiener, J. (2000). Stability of social status of children with and without learning disabilities. *Learning Disability Quarterly*, 23, 64-75.

Kronick, D. (1978). An examination of psychosocial aspects of learning disabled adolescents. *Learning Disability Quarterly*, 1 (4), 88-93.

Luster, J. L. & Durrett, J. (2003, November). Does educational placement matter in the achievement of students with disabilities? Paper presented at the annual meeting of the Mid-South Educational Research Association, Biloxi, MS.

Mastropieri, M. A. & Scruggs, T. E. (2001). Promoting inclusion in secondary classrooms. Learning Disability Quarterly ; 24(4), 265-274.

Mercer, C. D., Lane, H. B., Jordan, L., Allsopp, D. H., & Eisele, M. R. (1996). Empowering students and teachers with instructional choices in inclusive settings. *Remedial and Special Education*, 17 (4), 226-236.

Mpofu, E., Peltzer, K., Shumba, A., Serpell, R., & Mogaji, A. (2005). School psychology in sub Saharan Africa: results and implications of a six-country survey. In C. R. Raynolds and C. Frisby (Eds.), *Comprehensive handbook of multicultural school psychology* (pp. 1128-1151). New York: Wiley.

Nowicki, E. (2003). A meta-analysis of the social competence of children with learning disabilities compared to classmates of low and average to high achievers. *Learning Disabilities Quarterly*, 26 (3), 171-188.

Nunley, K. F. (2004). Layered curriculum: The practical solution for teachers with more than one student in the classroom. Kearney, NE: Kathie F. Nunley.

Olson, M. R., Chalmers, L., Hoover, J. H. (1997). Attitudes and attributes of general education teachers identified as inclusionists. *Remedial and Special Education* , 18 (1), 28-35.

Ong-Dean, C. (2006). High roads and low roads: Learning disabilities in California, 1976–1998. *Sociological Perspectives*, *49*, 91-113.

Peetsma, T., Vergeer, M., Karsten, S. & Roeleveld, J. (2001). Inclusion in education: Comparing pupils' development in special and regular education. Education Re-View, 53(2), 125-135.

Reid, D. K., & Knight, M. G. (2006). Disability justifies exclusion of minority students: A critical history grounded in disability studies. *Educational Researcher*, *35*, 18-23.

Romasz, T., Kantor, J., & Elias, M. (2004). Implementation and evaluation of urban school-wide social-emotional learning programs. *Evaluation and Program Planning*, 27, 89-103.

Rottman, S & Coetzer, E. P. (2003). The big five personality dimensions and job performance. *South African Journal of Industrial Psychology*, 29(1), 68-74.

Ross, M., Powell, S., & Elias, M. (2002). New roles for school psychologists: Addressing the social and emotional learning needs of students. *School Psychology Review*, 31, 43-52.

Russell, R. L., & Ginsburg, H. P. (1984). Cognitive analysis of children's mathematical difficulties. *Cognition & Instruction, 1*, 217–244.

Shalev, R. S., J. Auerbach, O. Manor, and V. Gross-Tsur (2000). Developmental dyscalculia: Prevalence and prognosis. *Eur Child Adolesc Psychiatry* 9 Suppl 2 (Dc) II58–64.

Shaywitz, S.E & Shaywitz, B. A. (2006). Dyslexia at an early age and its impact on early socio emotional development. In Tremblay, R.E, Barr, R. G, Peters R. DeV, (eds). Encyclopedia *on Early Childhood Development*. Montreal, Quebec: Centre of Excellence for Early Childhood Development; 1-6.

Shey, P. F. (2014). Sensitivity to others' feelings and development of peer relation skills by students with learning disabilities. *Africa Journal of Special Education* 2 (1).

Udvari-Solner, A., Villa, R. A., Thousand, J. S. (2005). Access to the general education curriculum for all: The Universal Design for Learning process. In Villa, R. A., & Thousand, J. A. (Eds.) *Creating an inclusive school* (pp. 1 34-1 55). Alexandria, VA: Association for Supervision and Curriculum Development.

Villa, R. A., Thousand, J. S., Nevin, A., & Liston, A. (2005). Successful inclusive practices in middle and secondary schools. American Secondary Education, 33 (3), 33-50.

Voltz, D. L. (2001). Preparing general education teachers for inclusive settings: The role of the special education teachers in the professional development school context. *Learning Disability Quarterly*, 24(4), 288-296.

Walther-Thomas, C. S., Bryant, M. & Land, S. (1996). Planning for effective co-teaching: The key to successful inclusion. *Remedial and Special Education*, 17 (4), 255-264.

Whitley, J. Lupart, J. & Beran, T. (2007). The characteristics and experiences of Canadian students receiving special education services for a learning disability. *Exceptionality Education Canada*, 17, 85-109.

Wilson, B. D., Gottfredson, C.D & Najaka, S. S. (2001). School-based prevention of problem behaviors: A Meta-Analysis. *Journal of Quantitative Criminology*, 17(3), 247-272.

Yuehua, T. (2004). Etiological hypotheses of social skills deficits in children with learning disabilities. *Psychological Science*, 27, 1199-1201.

Zins, J., Weissberg, R., Wang, M., & Walberg, H. (2004). Building academic success on social and emotional learning: *What does the research say?* New York, NY: Teachers College Press.