



## ABSTRACT

AN INVESTIGATION INTO THE FACTORS THAT CONTRIBUTE TO THE POOR  
PERFORMANCE OF GRADE 4 STUDENTS IN G4NT EXAMINATION IN TWO  
SCHOOLS IN NORTH TRELAWNY, JAMAICA

by

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Chair: Gloria Gregory, PhD

## ABSTRACT OF GRADUATE STUDENT RESEARCH

### Thesis

Northern Caribbean University

Department of Graduation Education and Leadership

Title: AN INVESTIGATION INTO THE FACTORS THAT CONTRIBUTE TO THE  
POOR PERFORMANCE OF GRADE 4 STUDENTS IN G4NT  
EXAMINATION IN TWO SCHOOLS IN NORTH TRELAWNY, JAMAICA

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Date completed: June 2014

### Problem

The goal of this study was to investigate the factors that contribute to the under-achievement of Grade 4 students in Grade 4 Numeracy Test in two schools in north Trelawny, Jamaica.

### Method

A sample size of 116 Grade 4 students completed the questionnaire. Statistical Software for the Social Sciences (SPSS, version 20) software was used to analyze the data. T-test and ANOVA were used to compare the means of the demographic data.

## Results

It was discovered that there was a statistically significant difference between Students' Achievement in G4NT and Parents' Level of Education. There were no statistically significant difference between Students' Achievement in the standardized Grade 4 Numeracy Test with Gender, School Type, Religious Orientation, and Family Type.

## Conclusion

The factor analysis of the items on the questionnaire revealed that there are three major factors that contribute to students' under-achievement in Grade 4 Numeracy Test. These included: Teacher's Competence, Home Environment/Parental Involvement, and Homework. Pearson's correlation found that there was a weak negatively statistically significant relationship between Students' Under-achievement in the Grade 4 Numeracy Test and Homework. The other factors of Teacher Competence and Home Environment/Parental Involvement did not have any statistically significant relationship with Students' Under-achievement in the Grade 4 Numeracy Test.

Northern Caribbean University  
College of Education and Leadership  
Department of Graduate Education and Leadership

AN INVESTIGATION INTO THE FACTORS THAT CONTRIBUTE TO THE  
UNDER-ACHIEVEMENT OF GRADE 4 STUDENTS IN G4NT EXAMINATION IN  
TWO SCHOOLS IN NORTH TRELAWNY, JAMAICA

A Thesis  
Presented in Partial Fulfilment  
of the Requirements for the Degree  
Master of Arts in Education

by  
Mervyn Sinclair

Mandeville, Jamaica

June 2014



Northern Caribbean University  
College of Education and Leadership  
Department of Graduate Education and Leadership

The undersigned certify that they have read, and recommend to the College of Graduate Education and Leadership for acceptance, a **thesis** titled **An Investigation into the Factors that Contribute to the Under-Achievement of Grade 4 Students in G4NT Examination in Two Schools in North Trelawny, Jamaica** submitted by **Mervyn Sinclair** in partial fulfillment of the requirements for the degree of MASTER OF ARTS IN EDUCATION.

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## CHAPTER 1

### INTRODUCTION

This initial chapter explores the background to the problem, statement of the problem, rationale, significance and purpose of the study, research questions and hypotheses. The chapter concludes with the presentation of limitations and delimitations and the definition of key terms.

#### **Background to the Problem**

Governments worldwide have recognized the new mathematics age in which we exist and must compete (Benjamin, 2012, para. 1). Consequently, Benjamin continues, students' achievement in mathematics has been a discussion that appears to be recurring all around the world and governments have taken steps to review their mathematics education programmes to ensure that their citizens are competent and competitive in the global village. In Jamaica, student performance in mathematics is almost at a crisis proportion. This position is manifested in the alarming statistics from the Ministry of Education for the 2011 sitting of the Grade Four Numeracy Test (G4NT), which showed that of the 45,654 students, only 22,469 (49.2%) actually mastered all the concepts on the examination (Benjamin, para. 4).

In agreement with Benjamin (2012), Hill (2011) added that Jamaica is in crisis as it relates to mathematics proficiency of its citizenry. She stated, "Consistently poor performance in mathematics, especially in the public school system, has educators



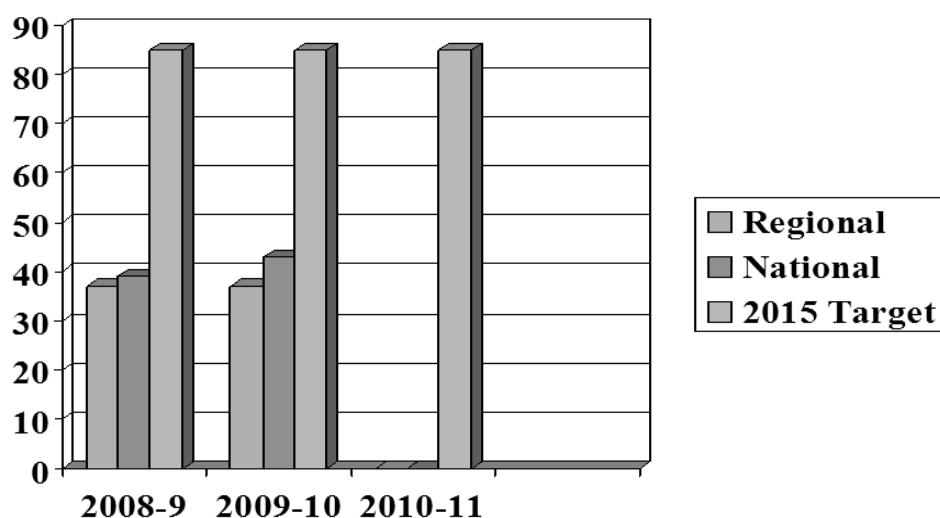
desperately searching for answers. If not addressed swiftly, this deficiency in numeracy has broad implications for the future competitiveness of the Jamaican workforce” (para. 1). In recognition of the dilemma, the Jamaican Minister of Education in 2010 made the decision to publish the results of the G4NT and in so doing has placed mathematics education at the primary school level back in focus (Benjamin, para. 2). The G4NT, which is the litmus test, is administered in the last term of each school year to students registered in private and public primary educational institutions across the island of Jamaica. The examination is so structured that it consists of three strands. These strands include number (number representation and operation), geometry and measurement, and algebra and statistics. For students to attain mastery in this examination they would have mastered all three strands and to attain mastery of any of the strands students would need to attain at least 50% of the available marks for items relevant to the strand. According to Benjamin, non-mastery occurs when students fail to master any of the strands.

In response to the numeracy deficiency, The Mathematics and Numeracy policy (2003) was drafted. It states:

In Jamaica, there is concern about the unsatisfactory performance of students of Mathematics at all levels of the system. Poor attitudes to the subject are evident among many students, and some view mathematics as being of little use to them outside of school. In addition to this is a concern that an insufficient number of persons in the society are equipped with the skills and understandings required to function effectively in life after school and are unable to apply the mathematics they learn in unfamiliar contexts. The fact that there have been no commonly

agreed principles, aims and objectives for mathematics education in Jamaica has only served to exacerbate the problem. (p. 3)

The results of the G4NT for the years 2008-2010 are shown (see Figure 1).



*Figure 1.* Graph showing students' achievement in the G4NT in examination (Director's report, Region 3, Ministry of Education, 2011).

It is evident from Figure 1 that in 2008-2009 the percentage of students who mastered the test nationally stood at 38%, which is 47% below what was expected by the Ministry of Education. The statistics for region 3 which comprises Trelawny and St. Ann was even more disappointing with a mastery rate of only 36%. The 2009-2010 statistics showed slight improvements; the regional mastery rate went up by 2% and national went up by 4%. Conversely it could be read that in 2008-2009 a significant percentage of students failed the G4NT examination nationally, 62% and 58% in 2009-2010. The region statistics was much worse with 64% of students failing in 2008-2009 and 62% in

2009-2010. The figure succinctly illustrates that as a country we have a major problem with numeracy.

The under-achievement of students in numeracy has broad implications for the future competitiveness of the Jamaican workforce (Hill, 2011, para.1). It was for this reason that it was important that a study be done to ascertain the factors that are contributing to the poor performance of students in mathematics at the Grade 4 level.

### **Statement of the Problem**

The poor performance of students nationally in numeracy is a major concern and in particular the under-achievement of these students at the Grade 4 level.

### **Rationale**

Many educators, mostly at the primary school level, have expressed their opinions on students' poor performance in the subject of mathematics. In addition, the researcher, who has been an educator and administrator with over a decade of experience teaching mathematics to students from the primary school through tertiary level, has also observed many challenges in the area of mathematics. These challenges include some students having deficiencies in their basal conceptual knowledge of mathematics basic principles and algorithms, and others having negative attitudes toward the subject at the primary level.

In observing the problem of poor performance of students in the subject of mathematics at the primary level, the researcher has noted that students' achievement has consistently been low. The researcher has also noted that many students, parents, and other stakeholders are not interested in mathematics and as such contribute to the general negative performance in mathematics over the years. It is against this background, and

the paucity of research in the specific area of students' achievement in G4NT examination in Jamaica, that the researcher conducted this research. This research needed to be conducted as it is expected to be of significance to stakeholders.

### **Significance of the Study**

Sagor (2000) opined that topics for research should meet three criteria. First, they should be issues or phenomena that are of particular relevance to the work of the researcher. Second, they must be about matters of personal passion for the researcher. Third, they should be issues/phenomena which will result in improvement in teachers' performance and or students' achievement (p. 47).

It is hoped that students, teachers, parents, and all other stakeholders will benefit from the results of this research. The findings could allow educators, students, and parents to glean useful information as to how academic achievement in mathematics can be improved. The Ministry of Education could use the findings from this research to validate or appraise existing policy directives and programmes. These perceived benefits gave precedence to the purpose of this study.

### **Purpose of the Study**

The purpose of this research was to determine selected factors influencing the under-achievement of students in mathematics at the two schools in North Trelawny that are offering primary school level education. To achieve the purpose of the study, the researcher posed four questions and proposed 10 hypotheses.

### **Research Questions**

The following research questions guided the process:

1. What is the difference in students' achievement in mathematics at the Grade 4 level based on:
  - a. Gender
  - b. School Type
  - c. Family Type
  - d. Religious Orientation
  - e. Mother's Level of Education
  - f. Father's Level of Education
2. Is there a relationship between students' achievement in mathematics at the Grade 4 level and homework?
3. Is there a relationship between students' learning in mathematics at the Grade 4 level and teachers' competence?
4. Is there a relationship between students' achievement in mathematics at the Grade 4 level and home environment/parent involvement?

**Null Hypotheses (Ho)**

1. There is no significant difference in students' achievement in mathematics at the Grade 4 level based on their Gender.
2. There is no significant difference in students' achievement in mathematics at the Grade 4 level based on School Type.
3. There is no significant difference in students' achievement in mathematics at the Grade 4 level based on Family Type.
4. There is no significant difference in students' achievement in mathematics at the Grade 4 level based on Religious Orientation.

5. There is no significant difference in students' achievement in mathematics at the Grade 4 level based on Mother's Level of Education.
6. There is no significant difference in students' achievement in mathematics at the Grade 4 level based on Father's Level of Education.
7. There are no statistically significant relationships among Homework, Teachers' Competence, and Home Environment/Parental Involvement with Students' under-achievement in mathematics at the Grade 4 level.
8. There is no statistically significant relationship between Homework and Students' under-achievement in mathematics at the Grade 4 level
9. There is no statistically significant relationship between Teachers' Competence and Students' under-achievement in mathematics at the Grade 4 level.
10. There is no statistically significant relationship between Home Environment/Parental Involvement and Students' under-achievement in mathematics at the Grade 4 level.

#### **Alternate Hypothesis (H1)**

1. There is a significant difference in Students' Achievement in mathematics at the Grade 4 level based on their Gender
2. There is a statistically significant difference in Students' Achievement in mathematics at the Grade 4 level based on School Type.
3. There is a statistically significant difference in Students' Achievement in mathematics at the Grade 4 level based on Family Type.

4. There is a statistically significant difference in Students' Achievement in mathematics at the Grade 4 level based on Religious Orientation.
5. There is a statistically significant difference in Students' Achievement in mathematics at the Grade 4 level based on Mother's Level of Education.
6. There is a statistically significant difference in Students' Achievement in mathematics at the Grade 4 level based on Father's Level of Education.
7. There are statistically significant relationships among Homework, Teachers' Competence and Home Environment/Parental Involvement with Students' Achievement in mathematics at the Grade 4 level.
8. There is a statistically significant relationship between Homework and Students' under-achievement in mathematics at the Grade 4 level
9. There is a statistically significant relationship between Teachers' Competence and Students' under-achievement in mathematics at the Grade 4 level.
10. There is a statistically significant relationship between Home Environment/ Parental Involvement and Students' under-achievement in mathematics at the Grade 4 level.

### **Limitations and Delimitations**

Some of the limitations of the study included minimal financial resources, the possibility of dishonesty of respondents and background of respondents. The results from the study cannot be generally applied to the population of North Trelawny only suggestions can be conjured.

Some delimitations included the type and number of research questions, the selection of the variables of interest, type of theoretical framework, and sampling of only two schools in North Trelawny; a primary and a preparatory school.

### **Definition of Terms**

The following terms were used throughout the study:

**Academic achievement.** Praveen, Noor-Ul-Amin and Nazir (2013) stated that academic achievement is the attaining ability or degree of competence in school tasks usually measured by standardized tests and expressed in grades or units based on pupil's performance.

**Collaboration.** Collaboration is working jointly with others in an intellectual endeavor and is premised on participation by equals in instructional decisions (Newell-McLymont, 2007, p. 7).

**Concept.** A concept organizes classes of objects or knowledge. The category should have a name, examples should exist from which attributes can be generated, a range can be described, and the name should be defined in terms of its attributes –rule (Green & Henriquez-Green, 2007).

**Concept attainment.** Boulware and Crow (2008) contend that concept attainment is an indirect instructional strategy that uses a structured inquiry process. It is based on the work of Jerome Bruner. In concept attainment, students figure out the attributes of a group or category that has already been formed by the teacher. To do so, students compare and contrast examples that contain the attributes of the concept with examples that do not contain those attributes. They then separate them into two groups. Concept attainment, then, is the search for and identification of attributes that can be used to distinguish examples of a given group or category from non-examples.



**Concept formation.** Concept formation provides students with an opportunity to explore ideas by making connections and seeing relationships between items of information. This method can help students develop and refine their ability to recall and discriminate among key ideas, to see commonalities and identify relationships, to formulate concepts and generalizations, to explain how they have organized data, and to present evidence to support their organization of the data involved (Boulware & Crow, 2008).

**Cooperative learning (CL).** Cooperative learning can be defined as a concept that has five critical attributes or characteristics. Those critical attributes are (a) positive interdependence, (b) individual accountability, (c) group processing, (d) social skills, and (e) face-to-face interaction (Johnson & Johnson, 1994).

**Direct teaching of concepts.** Direct teaching of concept is a deductive process to teach facts, concepts, and generalizations (Green & Henriquez-Green, 2007).

**Grade Four Numeracy Test (G4NT).** This is a nationally administered test to all Grade 4 students in Jamaica to ascertain their numeracy skills (Buddo, 2011, para. 3).

**Homework.** This is any task assigned by school teachers intended for students to carry out during non-school hours (Cooper, 1989).

**Peer coaching.** The use of teachers helping teachers through clinical supervision has been labeled peer coaching (Glickman, Gordon, & Ross-Gordon, 2007, p. 308).

**Parental involvement.** “This combination of level of commitment and active participation is what makes an involved parent (Vandergrift & Greene, 1992, p. 57).

**Private preparatory school.** A privately owned school that offers education to students from Grades 1 – 6.

**Public primary school.** A government owned or sponsored school that offers education through Grades 1 – 6.

**Professional development.** This is a means of providing teachers with the occasion to reflect and shape new knowledge and beliefs about content, pedagogy, and the way their students learn (Newell-McLymont, 2007).

**Study group.** A study group is a team of three to six participants who meet together to implement newly learned teaching practices, try innovative problem solving, and to improve achievement in classrooms. The groups set up guidelines for instruction, plan lessons, share materials, and watch one another try innovations (Birchak et al., 1998).

**Teacher competence.** Teacher competence speaks to professional practice, leadership and management, and effectiveness. As it relates to professional practice, it is expected that the teacher seizes every opportunity to improve on his or her own professional practice in order to provide quality learning. In terms of leadership and management, it is expected that the competent teacher has the ability to win the hearts and minds of students, parents, and colleagues and lead them to higher learning while managing their expectations so that they are achievable. The criteria of personal effectiveness speaks to the teacher understanding the importance of developing oneself in order to be able to provide support for others. It also speaks to the teacher's ability to maintain high standards of personal and professional integrity when tasked to conduct duties and responsibilities (Low, Taylor, Joseph, & Atienza, 2009).

**Summary**

This initial chapter presented the background of the study, detailed the problem of the study, provided the rationale, outlined the significance, expressed the purpose, and presented a listing of the research questions and hypotheses. The chapter concluded with the presentation of some of the limitations and delimitations and definition of terms.

In Chapter 2, the review of literature will be presented; in Chapter 3 the methodology is will be discussed; in Chapter 4 the analysis of the data will be presented; and Chapter 5 provides the conclusion and recommendations of the study.

## CHAPTER 2

### REVIEW OF LITERATURE

The chapter details the theoretical framework and highlights the cognitive developmental stages of humans. It also expounds on some selected factors that apparently could contribute to the poor performance of students in mathematics at the primary level. The chapter concludes with a summary.

#### **Theoretical Framework**

The researcher is an advocate for the constructivism theoretical framework and therefore he chose to look at this research through that framework. Constructivism posits that learning is an active process. The learner throughout the process constructs new ideas and or concepts as a result of his current or past knowledge and experience (Bruner, 1996). In agreement with Bruner, Palincsar (1998) posits that individuals construct their own cognitive structures as they interpret their experiences in particular situations. The basic principles of constructivism include (a) instruction must be concerned with the experiences and contexts that make the student willing and able to learn (readiness), (b) instruction must be structured so that it can be easily grasped by the student (spiral organization), and (c) instruction should be designed to facilitate extrapolation and or fill in the gaps (going beyond the information) (Bruner, 1973). Construction of knowledge occurs because of cognitive structures (Piaget, 1970). These he explained are patterns of physical or mental action that trigger specific acts of intelligence. These correspond to

the stages of child development.

According to Piaget (1970), the four development stages are (a) sensorimotor, (b) pre-operations, (c) concrete operations, and (d) formal operations. In explaining the sensorimotor stage, which is ages 0-2 years, he stated that intelligence takes the form of motor actions. The second stage of intelligence, pre-operation period (3-7 years), is intuitive in nature. At the third stage, concrete operational (8-11 years), intelligence is logical and is based upon concrete referents. At the formal operations stage (12-15) thinking involves abstractions. This sequence of cognitive stages of thinking builds on and incorporates preceding stage(s) as it becomes more organized and adaptive and less tied to concrete events (Woolfolk, 2004). Piaget saw the social environment as an important factor in development but did not believe it was the main vehicle for changing thinking (Moshman, 1997). Vygotsky opines that social interaction, cultural tools, and activity actually shape individual development and learning (Woolfolk, 2004). His concept of zone of proximal development is particularly relevant to the learning process as it speaks to how children can solve problems with the help (scaffolding) of adults or abled peers (Wink & Putney, 2002).

In highlighting the application of his cognitive theory, Piaget (1970) purported specific recommendations for each stage of development. For instance, he contends that children in the sensorimotor stage of cognitive development should be provided a rich and stimulating environment, which should include many objects for students to interact with and manipulate. At the concrete stage, the stage at which most Grade 4 students are in, learning activities should include problems of classification, ordering, location, and conservation using objects. Constructivists recommend that educators: (a) embed

learning in complex, realistic, and relevant learning environments; (b) provide for social negotiation and shared responsibility as part of learning; (c) support multiple perspectives and use multiple representations of content; (d) nurture self-awareness and an understanding that knowledge is constructed; and (e) encourage ownership in learning (Woolfork, 2004, p. 327).

The core principle of constructivism is the construction of knowledge and therefore factors such as Homework, Teacher Competence, and Home Environment/Parental Involvement are important in assessing students' achievement (Cooper, Robinson, & Patall, 2006; Ellis, 2001; Low et al., 2009; Sullivan & Glanz 2005). Other factors such as Gender, School Type, Family Type, Religious Orientation, and Parents' Level of Education are also considered predictors of success in numeracy (Beller & Gafni, 1996; Alesia, 2012; Marsh, 1990, Fagan, 2006; Siegel, 2011).

**Homework.** A study done by Cooper et al. (2006) found that homework has a positive effect on students' achievement in academics. The study which dealt with the comparison of homework with no homework shows that the typical student who was exposed to homework would score 23 percentile higher on tests of knowledge. Marzano and Pickering (2007) contend that research provides strong evidence that homework benefits students' achievement if used appropriately. They propose that teachers should assign purposeful homework, design homework to maximize the chances that students will complete, involve parents in appropriate ways, and monitor the amount of homework assigned. They further contend that the most important advantage of homework is that it extends learning beyond the school day.

Cooper (2007) noted that homework should have different purposes at different grade levels. For instance, he stated homework for students at Grade 4 should foster positive attitudes, habits, and character traits; permit appropriate parent involvement; and reinforce learning of simple skills introduced in class. Cooper (2007) also spoke to time allocation as it relates to daily homework. He suggested that research findings support the common “10-minute rule” (p. 92). This rule states that the length of homework assignments should take about 10 minutes multiplied by the student’s grade level.

Good and Brophy (2003) warn teachers that they should be cognizant of the volume of homework assigned. They advocate that homework should be realistic in length and difficulty and should be based on students’ abilities to work independently. Therefore, 5 to 10 minutes per subject might be appropriate for 4th graders, whereas a greater time allocation might be appropriate for college-bound high school students (p. 394).

The timely completion of assignments, especially mathematics assignments, greatly enhances students’ academic performance (Haynes & Chalker, 1997). According to Bishop (1996), the 10 benefits of homework are that it: (a) teaches students about time management; (b) teaches students how to set priorities; (c) helps teachers determine how well the lessons are being understood by their students; (d) teaches students how to problem solve; (e) gives students another opportunity to review the class material; (f) gives parents a chance to see what is being learned in school; (g) teaches students that they may have to do things—even when they don’t want to; (h) teaches students how to take responsibility for their part in the educational process; (i) teaches students how to

work independently; and (j) teaches students the importance of planning, staying organized, and taking action.

Bempechat (2004) contends that homework plays a critical long-term role in the development of children's achievement and motivation. The author further postulated that homework provides children with time and experience to develop positive beliefs about achievement as well as strategies for coping with mistakes, difficulties, and setbacks.

Bennett and Kalish (2006) have divergent views from Bempechat (2004) as it relates to the importance of homework. They provide evidence that indicate that too much homework is harmful to the students' health and family time. They contend that teachers are not well trained to assign homework. They therefore suggest that individuals and parent groups insist that teachers reduce the amount of homework, design more valuable assignments, and avoid homework altogether over breaks and holidays. Kohn (2006) concludes that the research fails to demonstrate a statistically significant relationship between Homework and Students' Academic Achievement and therefore concludes that Homework is an ineffective instructional tool.

Marzano and Pickering (2007), after extensive analysis of the body of work done on homework, conclude that most research highlights the importance of homework to students' academic achievement; all be it with many prescriptive measures rather than the wholesale way that teachers often approach the use of homework.

**Teachers' competence.** Dr. Tamika Benjamin, National Mathematics Coordinator in the Ministry of Education, was quoted by Hill (2011) as saying:



Where you have a weak teacher teaching your youngest students, then you will have problems. Mathematics is not a subject where you just pop in at a level and you are fine. If the foundation isn't there, then the student is going to struggle.

(para. 7)

She further mentioned that to solve this problem we need to equip and empower our teachers and look at pedagogy.

In addition Foster-Allen (as cited in Virtue, 2011), who is a past chief inspector of the National Educational Inspectorate in Jamaica and Permanent Secretary in the Ministry of Education, said "Student teachers who are barely attaining competence at teacher training institutions across the island are causing serious concerns among stakeholders in the education system" (para 1). Similarly, Virtue cited Turner, past president of the Jamaica Independent Schools' Association, as saying that: "Teacher quality matters. In fact it is the most important factor influencing student achievement" (Virtue, para.7). He further commented that: "Jamaica needs a wide range of empirical studies that will examine the impact of teacher characteristics and teacher effectiveness, in order to draw conclusions about the extent to which these characteristics are linked with teacher performance" (Virtue, para. 7). These comments highlight the need and usefulness of research in the advancement of education in this country.

Numerous studies have been done to look at the effectiveness of teachers as it relates to the use of methodology. Ellis (2001), one of the prominent researchers in teaching methodology and educational innovations, reported that of the 12 most researched educational innovations studied, cooperative learning is the most effective teaching strategy and hence the need for teachers to use it as their primary teaching

strategy. Kagan (1999), one of the chief proponents for cooperative learning, identified 17 benefits of cooperative learning. These are: (a) academic achievement, (b) ethical/race relations, (c) self-esteem, (d) empathy, (e) social skills, (f) social relations, (g) class climate, (h) responsibility, (i) diversity skills, (j) higher level thinking skills, (k) individual accountability, (l) equal participation, (m) increased participation, (n) social orientation, (o) learning orientation, (p) work place skills, and (q) self-knowledge and self-realization.

Even though (Kagan, 1990; Johnson & Johnson, 1994) reported some disadvantages of the use of cooperative learning, the consensus among researchers is that it is one of the most successful educational innovations in recent years (Slavin, 1999). Green and Henriquez-Green (2008) contend that cooperative learning has an especially effective set of teaching processes that promote all of the cognitive processes listed by Bloom's Taxonomy. In addition, he stated that cooperative learning promotes thinking and reasoning skills. Cooperative learning can be used with nearly any age group and any subject matter, thus validating the fact that students' achievement in mathematics can be improved with the use of cooperative learning (Marzano, Pickering, & Pollock, 2001).

In addition to cooperative learning, it was noted that study groups, peer coaching, direct instruction, concept attainment, and concept formation were also very effective in improving the teaching and learning process (Birchak et al., 1998; Boulware & Crow, 2008; Glickman et al., 2007; Green & Henriquez-Green, 2007). Through study groups teachers have reported that they have developed personally and professionally. Teachers get to share ideas with peers, provide a healthy working environment, and foster a sense of cohesiveness (Birchak et al., 1998).

Phillips and Glickman (as cited by Glickman et al., 2007) contend that peer coaching and teacher collaboration significantly increase teachers' conceptual levels. They further posit that peer coaching stimulates teachers' growth toward higher developmental levels.

**Home environment/parent involvement.** Glickman et al. (2007) also stated that when parents are engaged, they have a better idea of how to assist their children's learning. Improved relationships with parents have meant less stress for members of the school community. When they feel included, parents are willing to stand up for the school's commitment to raise student-learning standards. This trust and commitment is invaluable, and well worth our school's effort to involve parents in the decision-making process.

Parental influence cannot be undervalued. Carson (2008) opines that his mother was the single most important factor that caused him to do well academically. Bordon and Winter (2007) also contend that parental involvement in the lives of their children have caused them to excel academically. They further emphasized that parents should actually be the first teachers. Words of encouragement from loved ones, especially parents and siblings, can cause students to accelerate academically (Maxwell, 2002).

Freire (2003) stated:

Education is suffering from narrative sickness. The outstanding characteristic of this narrative education, then, is the sonority of words, not their transforming power. 'Four times four is sixteen'. The student memorizes, and repeats this phrase without perceiving what four times four really means. (p. 71)

He therefore postulated a problem-posing education, in which dialogue is indispensable to the act of cognition which unveils reality. Problem-posing education makes critical thinkers. He strongly affirms parents' role in allowing their children to discover themselves through dialogue and encouragement and therefore encourage in their children self-confidence, self-efficacy, and self-esteem. It is suggested by Lerner (2003) that parents of children with learning disabilities have a key role to play in their education. Parental involvement to a great extent determines students' success (Olsen & Fuller, 2012).

White (1982) also underscored the importance of home education. She strongly believed that parents must take their job as their children's first educators very seriously. She lamented the fact that children will malfunction if parents relegate on their role as teachers. Sullivan and Glanz (2005) agree that the parents are very pivotal in determining students' academic success; parents should confer with teachers on a regular basis, volunteer to serve on school committees, voice their opinions on educational matters, and take part in programmes offered by the school.

Brown (1992) recognized the significant impact parental involvement had on his academic as well as his outlook on life. He suggested that his mother built his self-confidence and thus empowered him. Kiyosaki (1998) affirmed that his parents taught him to exercise his mind and therefore he became a critical thinker and this further lead to academic success.

Studies done by Epstein and Sheldon (2000); Klebanov and McCormick (1998); Rumberger, Ghatak, Poulos, Rilter, and Dornbusch (1990); and Vandiver (2003) all found that the home environment greatly affects students' academic performance. In

essence research findings have indicated that parental support for student achievement as well as parental involvement in school activities has had a positive impact on student academic success (Hoover-Dempsey & Sandler, 1995).

Epstein (2001) and Epstein and Becker (1982) conducted a succession of studies to ascertain the conditions under which parental involvement enhances homework. Their findings underscore the importance of parents in accelerating the academic achievement of students and therefore they recommend the use of interactive homework where parents are not passive but active participants in the process. In this process parents are given clear guidelines about their roles, teachers do not expect parents to be experts as it relates to content or the teaching of content and parents are encouraged to ask questions that help students clarify and summarize what they have learned. Good and Brophy (2003) postulate in regard to parental involvement that students should show and explain their written work and or other products completed during school hours to their parents and get their reactions.

### **Demographic Terms**

A study of gender differences revealed that the only significant differences in mathematics achievement for children, ages 9 to 13 years, were in favor of boys (Beller & Gafni, 1996). However most other research done at the primary school level does not indicate that achievement in mathematics is based on gender (Fennema, 1974; 1980; Leder, 1985; Peterson & Fennema, 1985).

In highlighting the demographic data on school type Alesia (2012) contended that private schools at the primary level – preparatory schools – have always outperformed public primary schools in Jamaica. The results of all national assessments show these

preparatory school students achieve far higher rates in all the subject areas. She presented the following as possible challenges for the public primary schools: (a) external problems such as crime are more likely to affect these students, (b) the need for improved monitoring of teachers, (c) large student-teacher ratio, (d) low parental involvement and education level, (e) parents' lack of resources, and (f) the diversity in parenting style, which has implications for behaviour management in the classroom.

As it relates to the demographic data on family type, Marsh (1990) concluded that even if children have the same academic abilities, children from two-parent families are three times more likely to stay in school and achieve academically than children from single-parent families. He opined that in the single-parent family structure, single parents who are overburdened with the task of trying to attain financial viability, spend less time assisting children with homework, are inconsistent with disciplinary measures, and lack parental control. The end result is lower academic achievement.

Fagan (2006), in providing information on the demographic item of religious orientation, stated that academic achievement is positively affected by religious practice. Mathematics scores correlated positively with more frequent religious practice. He further contended that the greater the parents' religious involvement, the more likely their children will be motivated to pursue advanced courses, spend more time on homework, establish friendships with academically oriented peers, and avoid cutting classes. He also concluded that students in religious schools invariably exhibit a higher level of academic achievement than their peers in secular schools. Parents' level of education, according to a study conducted by Siegel (2011), affected students' academic achievement.

**Search Strategy**

In order to collect information, the following strategies were used. Firstly the physical libraries at Northern Caribbean University and the University of the West Indies, Mona campus were explored. To get additional information, electronic searches were done using the World Wide Web as my primary source. The electronic databases used were HW Wilson, EBSCO, ERIC, and Google scholar. The primary search engine used was Google. In searching the databases key words, phrases, and all smart limiters to help in focusing the search were utilized. Parameters were also set to limit search to education and full text articles.

**Summary of the Chapter**

The literature presented shows the developmental stage of typical Grade 4 students, performance expectations, and some of the factors that contribute to students' achievement in mathematics through the theoretical framework of constructivism. It also manifests a gap in research in the area of students' achievement in mathematics at the Grade 4 level in Jamaica and therefore this research is expected to contribute to the body of knowledge in the area of mathematics education at the Grade 4 level.

The next chapter, the methodology, will establish how the research was conducted.

## CHAPTER 3

### METHODOLOGY

This chapter details the research process, research type, design, method, research context, procedure, instrumentation, and sampling techniques used in the collection of data. It also presents the legal and ethical considerations.

#### **The Process**

The research perspective that was used throughout this study is quantitative. This perspective speaks to statistics and objectivity in the expression of data analysis (Glatthorn & Joyner, 2005). McMillan and Schumacher (2006) further stated that objectivity is obtained by the numbers, statistics, structure, and control. They also contend that there are two sub-classifications for quantitative designs; experimental and non-experimental. This research is a non-experimental correlation research.

#### **Research Type**

The research type that was conducted is correlational research. Glatthorn and Joyner (2005) stated that correlational studies are designed to analyze the relationships between two or more variables. They further stated that correlational studies may show a direct relationship between two factors but cannot prove causation (p. 42).



## **Design**

The research design that was used in conducting this study is correlational (Creswell, 2008, p. 360). The study sought to establish relationships between the variables.

The particular type of correlational design that was used is the confirmatory research design. Johnson and Christensen (2008) stated that the confirmatory method which is a top-down or theory-testing approach to research has three steps. The first step is the stating of a hypothesis which is usually based on existing theory. The second step is the collection of data to test the hypothesis empirically. The third step is the acceptance or rejection of the hypothesis on the basis of the data (Johnson & Christensen, p.19). Creswell (2008, p. 376) postulated that to conduct a proper correlational study, the researcher should identify the individuals to study, specify two or more measures for each individual, collect data, monitor potential threats to the validity of the scores, analyze the data using the correlational statistics for continuous or categorical data, and interpret the strength and the trend of the direction of the results.

In this study a model composed of three independent variables (Parental Involvement, Teachers' Competence, and Homework) and one dependent variable (Mathematics Academic Achievement) was constructed.

## **Method**

The research method that was used for data collection is survey (questionnaire) since the researcher wanted to assess opinions, perceptions, and attitudes of the respondents (Glatthorn & Joyner, 2005, p. 45). Some benefits of using the survey method, according to CSU open access educational web site (1993-2011), are that it is

relatively inexpensive, many questions can be asked about a given topic, flexibility in the mode of data collection, flexibility in deciding how the questions will be administered, and high reliability is easy to obtain. In addition surveys are also useful in describing the characteristics of a large population. The website further stated that survey's standardized questions make measurement more precise; standardization ensures that similar data can be collected from groups then interpreted comparatively (between-group study).

The questionnaire was structured and designed to investigate and capture some of the factors that were affecting students' achievement in mathematics in North Trelawny at the Grade 4 level. The questionnaire was administered to Grade 4 students at a Primary school and a Preparatory school. In administering the instrument, the researcher read and explained each question on the instrument for the respondents so as to ensure that the respondents were cognizant of what was requested of them. The questionnaire was then collected and the data arranged and then analyzed using the SPSS software (version 20).

### **Instrumentation**

The questionnaire was created by the researcher who designed it to pattern the Likert Scale (Linacre, 2002). The questionnaire used a 4-point scale instead of the Likert 5-point scale (Dawes, 2007). The researcher deliberately used the 4-point scale so as to prevent the respondents from taking a neutral position. The questionnaire was therefore so structured that respondents had to take a deliberate position. The options to the questions included strongly agree, agree, disagree, and strongly disagree. The questionnaire consisted of six questions which were aimed at capturing demographic

data. There were 30 items which were prepared to capture students' views and opinions on what were some of the factors affecting students' achievement in Mathematics at the Grade 4 level.

The questionnaire was first piloted and subjected to the Cronbach's reliability alpha test to ensure reliability. The Reliability statistics table, when generated, specified the Cronbach's Alpha reading to be 0.73. According to the SPSS manual (IBM Corp., 2011), Cronbach's alpha reading of 0.70 and above indicate reliability. Cronbach's Alpha reading of 0.73 can be read to be saying that 73% of the questions accurately measured the desired outcomes. The instrument was administered to 16 respondents from the Grade 4 cohort. After the administration of the questionnaire, the data were encoded and inputted in the SPSS (version 20) Analysis software. When the factor loading was done, there was the indication that the Total Variance Explained for the instrument was 94.6%. This finding indicates that 94.6% of what the instrument wanted to test was tested. It was also revealed that there were eight factors, according to the respondents, that affected the performance of students in mathematics at the Grade 4 level. In terms of ensuring validity, the appropriate sample size was considered and obtained (Merriam, 1998). Johnson and Christensen (2008) and Sullivan 2010 suggested that sample size of 100 and above are appropriate.

### **Research Context**

Johnson and Christensen (2008) suggested that a sample size of 120 respondents was large but appropriate and therefore the researcher sought to obtain a sample size of 120 respondents. The researcher however obtained four less than was desired. Sullivan

(2010) postulated that 100 is an appropriate sample size and hence the sample size of 116 Grade 4 students was an appropriate sample size.

### **Sampling Techniques**

To achieve this desired sample size, the researcher selected a primary school and a preparatory after doing cluster sampling. The preparatory and primary schools were referred to as clusters and hence the use of cluster sampling in selecting the students. Sullivan (2010) suggested that cluster sampling is an effective sampling method since it reduces travel time, is economical, and does not require the researcher to obtain a detailed frame.

In explaining cluster sampling, Sullivan (2010) suggested that small groups should be formed from the population and then a simple random sample done. All members of the selected group should be surveyed. In the researcher's case, all the Grade 4 students who provided permission slips which were signed by parents or guardians were included. The Regional Office of the Ministry of Education at Brown's Town, Jamaica afforded data on students' achievement in the G4NT examination over a three year period and the schools provided the last G4NT results.

### **Research Sites**

Two research sites were selected for this study.

**Public primary school.** The public primary school consisted of 560 students, 16 teachers, one guidance counsellor, one vice principal, and a principal. There were three Grade 4 classes; consisting of 104 students and three teachers.

**Private preparatory school.** The private preparatory school consisted of 113 students, six teachers, and a principal. A teacher was assigned to a grade and there were six grades. The Grade 4 class consisted of 32 students.

### **Procedure**

The researcher included the entire population of Grade 4 students who had signed permission slips. The schools were randomly selected in that all the names of the public schools that provided Grade 4 education in North Trelawny were placed in a hat and thoroughly mixed. After the mixing, a name was selected and all the Grade 4 students from that selected school were allowed to participate in the survey. The preparatory school was selected in like manner. This type of sampling method is referred to as equal probability selection method (Johnson & Christensen, 2008, p.225).

To gain access to the participants, the researcher wrote to the principals of the participating primary and preparatory schools requesting permission. Upon receiving permission, the researcher met with the principals and students and informed them of the study and their roles in the study. Students were given permission slips for their parents to complete and return. For the second visit, the questionnaires were administered to the students who were given parental permission.

### **Research Sample**

The respondents for the research included 116 students. Eighty-four (72%) of the respondents were Grade 4 students from the public primary school system and 32 (28%) of the respondents were Grade 4 students from the private preparatory school system. The age of the respondents ranged from 8 to 10 years old.

## **Data Analysis**

The data were analyzed using the SPSS version 20. It was used to provide the statistical description for the demographic data. It also provided the Pearson's correlation statistics, factor loading, *t* test, and one way ANOVA. The data collection and analysis were done based on the importance of the research questions. SPSS analysis software generated tables, charts, and graphs in an effort to make the analysis easier to comprehend.

## **Legal and Ethical Issues**

The researcher sought permission to access the research sites by writing formally to the principals of the schools. The letter stated the nature and purpose of the study. It was also stated explicitly that the integrity of the schools would be vigorously maintained in that the researcher would ensure that the schools remain anonymous by the creation of fictitious names for the schools. The students were required to obtain signed consent forms prior to their inclusion in the study so as to eliminate any litigating issues.

The intended respondents were informed that their participation should be seen as voluntary and as such they could withdraw at any time if they were not comfortable being part of the study. The researcher also applied to the Institutional Review Board of the Northern Caribbean University to get approval. Approval was granted.

## **Summary of the Chapter**

The chapter detailed the research orientation, research context, procedures, instrumentation, and methods. It also spoke to sample size and how the collected data was analyzed. It was concluded with ethical and legal consideration.

The next chapter will establish how the collected data were arranged and analyzed.

## CHAPTER 4

### DATA ANALYSIS

This chapter details the data analysis process which was conducted through the use of the SPSS version 20 data analysis software.

#### **Statistics Description**

The instrument was administered to 116 students who were at the grade 4 level at the time of administration. The demographic data were analyzed first and included Gender, School Type, Family Type, Religious Orientation, Mother educational level, Father educational level and G4NT results.

The tables below provides information on the frequency distribution of the demographic data. Table 1 presents frequency distribution for gender of the respondents who took part in the study.

Table 1

#### *Frequency Distribution for Gender of the Respondents*

|       |         | Frequency | Percent | Valid Percent | Cumulative<br>Percent |
|-------|---------|-----------|---------|---------------|-----------------------|
| Valid | Males   | 64        | 55.2    | 55.2          | 55.2                  |
|       | Females | 51        | 44.0    | 44.0          | 99.1                  |
|       | 99.00   | 1         | .9      | .9            | 100.0                 |
|       | Total   | 116       | 100.0   | 100.0         |                       |



The table showing the frequency distribution of the data indicates that of the 116 respondents, 64 (55.2%) were males and 51 (44%) females and hence signify that the respondents were predominantly males. One (0.9%) respondent did not indicate his/her gender.

Table 2

*Frequency Distribution for Data on the Type of Schools the Respondents Attended*

|                         | Frequency | Percent | Valid Percent | Cumulative<br>Percent |
|-------------------------|-----------|---------|---------------|-----------------------|
| Primary School          | 84        | 72.4    | 72.4          | 72.4                  |
| Alid Preparatory school | 32        | 27.6    | 27.6          | 100.0                 |
| Total                   | 116       | 100.0   | 100.0         |                       |

Table 2 showing the demographic statistics for school type illustrates that of the 116 respondents, 84 (72.4%) respondents were from the primary school system and 32 (27.6%) respondents attended a preparatory school.

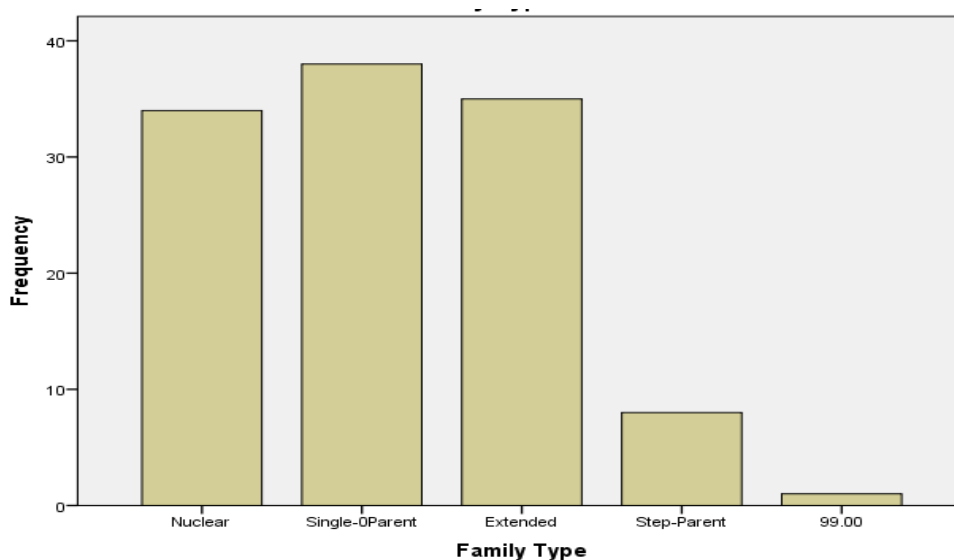
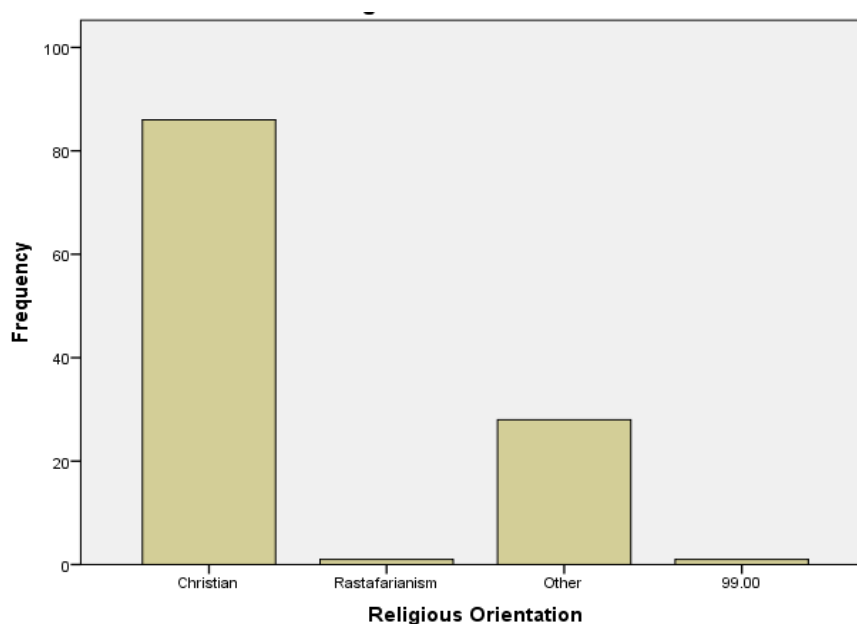


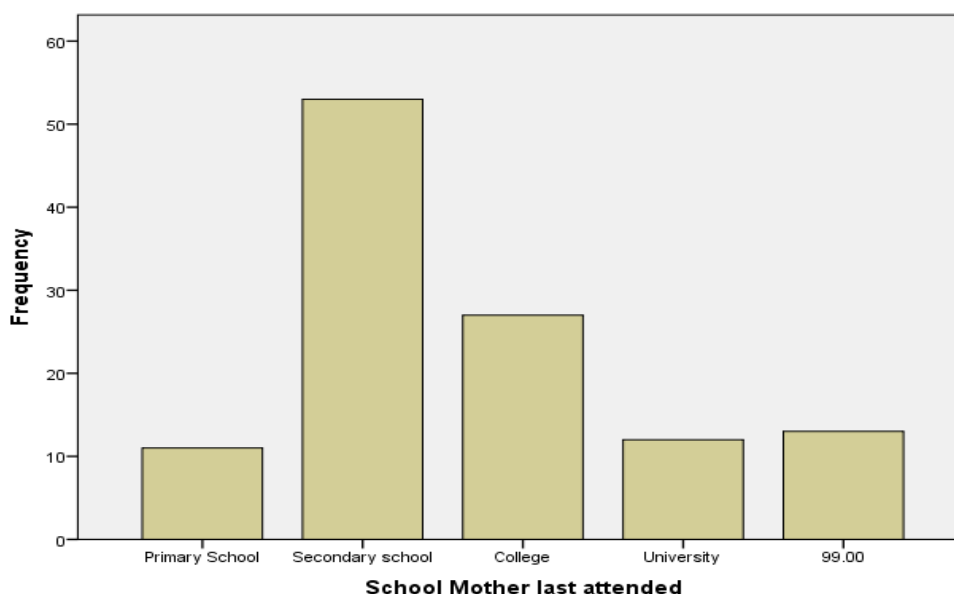
Figure 2. Graph showing the frequency distribution for data about the family type of the respondents.

Figure 2 showing frequency distribution for Family Type indicates that 34 (29.3%) of the respondents were from nuclear families, 38 (32.8%) respondents were from single-parent families, 35 (30.2%) of the respondents were from extended families, and eight (6.9%) were from step-parent families. One person did not indicate her family type.



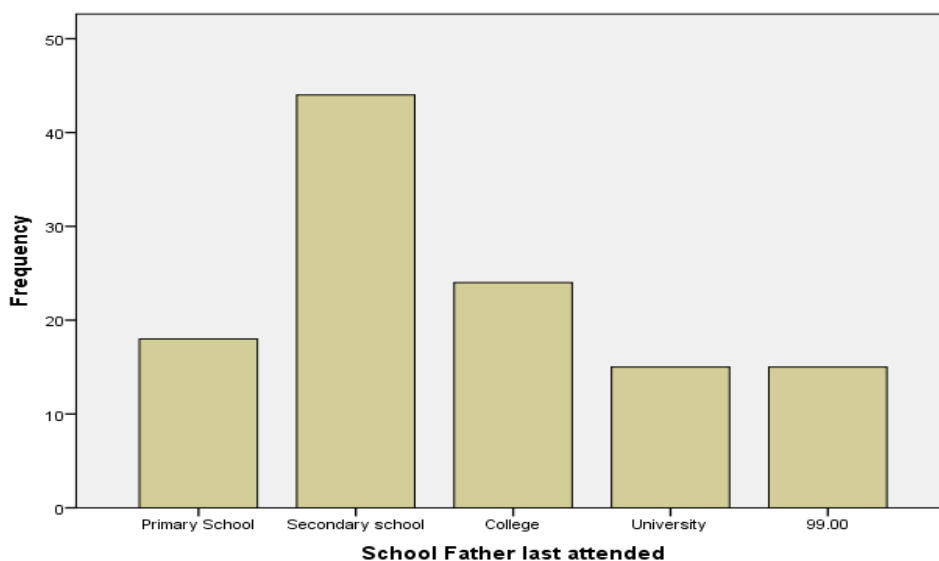
*Figure 3.* Graph showing the religious orientation of the respondents.

The graph showing the frequency distribution for religious orientation indicates that of the 116 respondents 86 (74.1%) of the respondents were practicing Christians, one (0.9%) respondent was practicing Rastafarianism, and 28 (24.1%) respondents other religions. One (0.9%) person did not indicate her religious orientation.



*Figure 4.* Graph showing the frequency distribution of the last school that the respondents' mothers attended.

The graph showing the frequency distribution for mother's level of education reveals that of the 116 respondents 11 (9.5%) respondents reported that their mothers did not attend school after the primary school level. 53 (45.7%) respondents reported that their mother last contact with formal schooling occurred at the secondary school level. Twenty-seven (23.3%) respondents stated that their mothers attended college. Twelve (10.3%) respondents said their mothers attended university. Thirteen (11.2%) respondents did not indicate the last interaction their mothers had with the formal educational system.



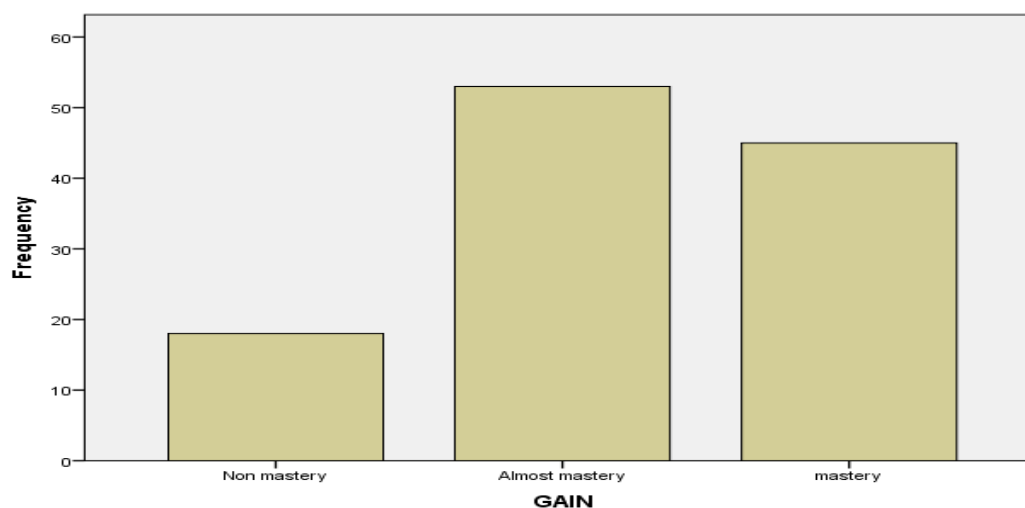
*Figure 5.* Graph showing frequency distribution for the last school respondents' fathers attended.

The graph showing the frequency distribution for father's level of education reveals that of the 116 (100%) respondents 18 (15.5%) indicated that their fathers attended only primary school. A significant amount, 44 (37.9%) respondents stated that their fathers' last interaction with the formal educational system was at the secondary level. Twenty-four (20.7%) respondents reported that their father attended college. Fifteen (12.9%) respondents stated that their fathers attended university and a similar number of respondents did not know which school their fathers last attended (see Figure 5).

Table 3

*Frequency Distribution about the Performance of the Respondents in the General Attainment in Numeracy Test*

|                         | Frequency | Percent | Valid<br>Percent | Cumulative<br>Percent |
|-------------------------|-----------|---------|------------------|-----------------------|
| Non mastery             | 18        | 15.5    | 15.5             | 15.5                  |
| Almost<br>Valid mastery | 53        | 45.7    | 45.7             | 61.2                  |
| Mastery                 | 45        | 38.8    | 38.8             | 100.0                 |
| Total                   | 116       | 100.0   | 100.0            |                       |



*Figure 6. Graph showing frequency distribution about the achievement of respondents in the Grade Four Numeracy test.*

Table 4 and Figure 6 show the frequency distribution for students' achievement in the G4NT examination. The data indicate that of the 116 respondents 18 (15.5%) respondents achieved Non Mastery, 53 (45.7%) respondents achieved Almost Mastery and 45 (38.8%) respondents achieved the Mastery.

## Analysis

The researcher conducted t-test and ANOVA on the demographic data to ascertain statistically significant difference between Students' Achievement in the G4NT and:

### a. Gender (t-test)

$H_0$ : There is no difference in Students' Achievement in the G4NT based on Gender.

Table 4 indicates that there was no statistically significant difference in Students' Achievement in G4NT based on their Gender,  $t(113) = .112, p = .911$ . Therefore the null hypothesis was accepted and the alternate hypothesis rejected. The mean score for males in the G4NT was 2.25 and the mean score for females in the G4NT was 2.24. The difference in mean scores between males and females was a mere 0.01. This data revealed that both males and females had very similar scores. On average they were attaining almost mastery.

Table 4

*Independent Sample Test between Gender and Achievement in G4NT*

|                         | F    | Sig. | T    | Df  | Sig. (2-tailed) | Mean Difference |
|-------------------------|------|------|------|-----|-----------------|-----------------|
| Equal variances assumed | .338 | .562 | .112 | 113 | .911            | .01471          |

### b. School Type (t-test)

$H_0$ : There is no difference in Students' Achievement in the G4NT based on School Type.

Table 5 indicates that there was no statistically significant difference in Students' Achievement in G4NT and the School Type,  $t(114) = 1.351, p = 0.197$ . The null hypothesis was therefore accepted and the alternative hypothesis rejected. The mean score for public school students in the G4NT was 2.18 and the mean score for private school students in the G4NT was 2.37. The difference in mean scores between public school students and private school students was 0.19. This data revealed that on average the students from both the public and private schools achieved almost mastery.

Table 5

*Independent Samples Test for School Type and Achievement in the G4NT*

|                         | F    | Sig. | T      | Df  | Sig. (2-tailed) |
|-------------------------|------|------|--------|-----|-----------------|
| Equal variances assumed | .000 | .992 | -1.351 | 114 | .179            |

c. Family Type (ANOVA)

$H_0$ : There is no difference in Students' Achievement in the G4NT based on Family Type.

Table 6 reveals that there was no statistically significant difference in Students' Achievement in G4NT based on Family Type as determined by one-way ANOVA  $F(4,111) = 1.375, p = 0.247$ . The null hypothesis was therefore accepted and the alternate hypothesis rejected.

Table 6

*ANOVA Statistics for Students' Achievement in G4NT and their Family Type*

|                | Df  | Mean Square | F     | Sig. |
|----------------|-----|-------------|-------|------|
| Between Groups | 4   | .669        | 1.375 | .247 |
| Within Groups  | 111 | .487        |       |      |
| Total          | 115 |             |       |      |

d. Religious Orientation (ANOVA)

$H_0$ : There is no difference in Students' Achievement in the G4NT based on Religious Orientation.

Table 7 indicates that there was no statistically significant difference in Students' Achievement in G4NT based on Religious Orientation as determined by one-way ANOVA ( $F(3,112) = 2.178, p = 0.095$ ). The null hypothesis was therefore accepted and the alternative hypothesis rejected.

Table 7

*ANOVA statistics for Students' Achievement in G4NT and their Religious Orientation*

|                | Df  | Mean Square | F     | Sig. |
|----------------|-----|-------------|-------|------|
| Between Groups | 3   | 1.042       | 2.178 | .095 |
| Within Groups  | 112 | .478        |       |      |
| Total          | 115 |             |       |      |

e. Mother's Level of Education (ANOVA)



$H_0$  : There is no difference in Students' Achievement in the G4NT based on Mothers' Level of Education.

Table 8 indicates that there was a statistically significant difference in Students' Achievement in the G4NT based on Mother's Level of Education as determined by one-way ANOVA  $F(4,111) = 9.239, p = 0.000$ . The null hypothesis was therefore rejected and the alternative hypothesis accepted.

Table 8

*ANOVA Statistics for Students' Achievement in G4NT and their Mothers' Level of Education*

|                | Df  | Mean Square | F     | Sig. |
|----------------|-----|-------------|-------|------|
| Between Groups | 4   | 3.542       | 9.239 | .000 |
| Within Groups  | 111 | .383        |       |      |
| Total          | 115 |             |       |      |

Table 9 indicates that there is a direct proportional relationship with Students' Achievement in the G4NT and Mothers' Level of Education. The poorest results for students in the G4NT came from homes where the mothers' level of education was at the primary school level. The Students' Achievement in the G4NT got better in relationship with the subsequent increase in Mothers' Level of Education.

Table 9

*Post Hoc Comparison among the Means for the Values for Mothers' Level of Education and Students' Achievement in the G4NT*

| G4NT                        |                             |    |                         |        |        |
|-----------------------------|-----------------------------|----|-------------------------|--------|--------|
|                             | School Mother last attended | N  | Subset for alpha = 0.05 |        |        |
|                             |                             |    | 1                       | 2      | 3      |
| Tukey<br>HSD <sup>a,b</sup> | Primary School              | 11 | 1.6364                  |        |        |
|                             | Secondary school            | 53 | 2.0566                  |        |        |
|                             | 99.00                       | 13 | 2.0769                  | 2.0769 |        |
|                             | College                     | 27 |                         | 2.6667 | 2.6667 |
|                             | University                  | 12 |                         |        | 2.7500 |
|                             | Sig.                        |    | .258                    | .058   | .995   |
| Tukey B <sup>a,b</sup>      | Primary School              | 11 | 1.6364                  |        |        |
|                             | Secondary school            | 53 | 2.0566                  |        |        |
|                             | 99.00                       | 13 | 2.0769                  |        |        |
|                             | College                     | 27 |                         | 2.6667 |        |
|                             | University                  | 12 |                         | 2.7500 |        |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 16.283.

b. The group sizes are unequal. The harmonic mean of the group sizes is used.

Type I error levels are not guaranteed.

f. Father's Level of Education (ANOVA)

$H_0$ : There is no difference in Students' Achievement in the G4NT based on

Father's Level of Education.

Table 10 indicates that there was a statistically significant difference in Atudents' Achievement in the G4NT based on Fathers' Level of Education as determined by one-way ANOVA ( $F(4,111) = 12.260, p = 0.000$ ). The null hypothesis was therefore rejected and the alternative hypothesis accepted.

Table 10

*ANOVA Statistics for Students' Achievement in G4NT and their Fathers'*

*Level of Education*

|                | Df  | Mean Square | F      | Sig. |
|----------------|-----|-------------|--------|------|
| Between Groups | 4   | 4.345       | 12.260 | .000 |
| Within Groups  | 111 | .354        |        |      |
| Total          | 115 |             |        |      |

Table 11 indicates that there is a direct proportional relationship with Students' Achievement in the G4NT and Fathers' Level of Education. The poorest results for students in the G4NT came from homes where the fathers' level of education was at the primary school level. The Students' Achievement in the G4NT correlated positively in relationship with the subsequent increase in Fathers' Level of Education.

Table 11

*Post Hoc Comparison among the Means for the Values for Fathers' Level of Education and Students' Achievement in the G4NT*

|                          |                             | GAIN |                         |        |        |
|--------------------------|-----------------------------|------|-------------------------|--------|--------|
|                          | School Father last attended | N    | Subset for alpha = 0.05 |        |        |
|                          |                             |      | 1                       | 2      | 3      |
| Tukey HSD <sup>a,b</sup> | Primary School              | 18   | 1.6667                  |        |        |
|                          | 99.00                       | 15   | 2.0667                  | 2.0667 |        |
|                          | Secondary school            | 44   | 2.0909                  | 2.0909 |        |
|                          | College                     | 24   |                         | 2.5833 | 2.5833 |
|                          | University                  | 15   |                         |        | 2.9333 |
|                          | Sig.                        |      | .173                    | .056   | .352   |
| Tukey B <sup>a,b</sup>   | Primary School              | 18   | 1.6667                  |        |        |
|                          | 99.00                       | 15   | 2.0667                  |        |        |
|                          | Secondary school            | 44   | 2.0909                  |        |        |
|                          | College                     | 24   |                         | 2.5833 |        |
|                          | University                  | 15   |                         | 2.9333 |        |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 19.741.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

### Reliability Statistics

Table 12, which shows the reliability statistics for the data collected from students, reveals that the 30 items on the instrument used to collect the data had a combined Cronbach's Alpha of 0.983, which indicates that 98.3% of the questions accurately measured the desired outcomes. All 30 items on the instrument were found to be reliable. The Cronbach's Alpha for the questions ranged from 0.982 to 0.984 (SPSS Manual).

Table 12

*Reliability Statistics (p-value) for Data for Students*

| Reliability Statistics |                                              |            |
|------------------------|----------------------------------------------|------------|
| Cronbach's Alpha       | Cronbach's Alpha Based on Standardized Items | N of Items |
| .983                   | .986                                         | 30         |

### Factor Analysis

Table 13 indicates that 91.949% of what the instrument wanted to test was tested.

Table 13

*Total Variance Explained*

| Component | Total Variance Explained |               |              |                            |               |              |                          |               |              |
|-----------|--------------------------|---------------|--------------|----------------------------|---------------|--------------|--------------------------|---------------|--------------|
|           | Initial Eigenvalues      |               |              | Extraction Sums of Squared |               |              | Rotation Sums of Squared |               |              |
|           |                          |               |              | Loadings                   |               |              | Loadings                 |               |              |
|           | Total                    | % of Variance | Cumulative % | Total                      | % of Variance | Cumulative % | Total                    | % of Variance | Cumulative % |
| 1TeaC     | 21.516                   | 71.721        | 71.721       | 21.516                     | 71.721        | 71.721       | 12.120                   | 40.400        | 40.400       |
| 2HE/PI    | 4.169                    | 13.898        | 85.619       | 4.169                      | 13.898        | 85.619       | 9.708                    | 32.361        | 72.762       |
| 3H/W      | 1.899                    | 6.330         | 91.949       | 1.899                      | 6.330         | 91.949       | 5.756                    | 19.188        | 91.949       |

Extraction Method: Principal Component Analysis.

Table 14 presents the 30 items and three factors. Each item had three factor loadings. The highest loading indicated under which factor the item belonged. Factor one had 13 items, factor two had 12 items, and factor three had five items. These headings gave rise to the three variables: Teacher's Competence, Home Environment/Parental Involvement, and Homework.

Table 14

*Factors Extracted from the Support Questionnaire*

|     | Factor                                       | Items                                                    | Cronbach's Alpha |
|-----|----------------------------------------------|----------------------------------------------------------|------------------|
| I   | Teachers' Competence<br>Effects of Inclusion | 18, 19, 20, 21, 22,<br>23, 24, 25, 26, 27,<br>28, 29, 30 | 0.89             |
| II  | Home Environment/<br>Parental Involvement    | 1, 2, 3, 4, 5, 6, 7,<br>8, 14, 15, 16, 17                | 0.80             |
| III | Homework                                     | 9,10,11,12,13                                            | 0.90             |

## Correlation

Table 15 indicates that after the use of Pearson correlations, there were no statistically significant relationships between the students' under-achievement in the G4NT and Teacher's Competence ( $p = -.062$ ,  $p < .509$ ). The correlation between students' under-achievement in the G4NT and Home Environment/Parental Involvement showed no statistically significant relationship ( $p = -.152$ ,  $p < .104$ ). A weak negatively statistically significant relationship was found between students' under-achievement in G4NT and Homework ( $p = -.234$ ,  $p < .011$ ).

Table 15

*Pearson Correlation Coefficient Bivariate between the Variables from the Data Collected*

|           | G4NT                |        |
|-----------|---------------------|--------|
| Teacompe  | Pearson Correlation | -.062  |
|           | Sig. (2-tailed)     | .509   |
|           | N                   | 116    |
| HomEvipar | Pearson Correlation | -.152  |
|           | Sig. (2-tailed)     | .104   |
|           | N                   | 116    |
| Homework  | Pearson Correlation | -.234* |
|           | Sig. (2-tailed)     | .011   |
|           | N                   | 116    |
| G4NT      | Pearson Correlation | 1      |
|           | Sig. (2-tailed)     |        |
|           | N                   | 116    |

## Null Hypothesis ( $H_0$ )

1. There is no statistically significant relationship between Homework and Students' Under-achievement in mathematics at the Grade 4 level.

The effect size of  $-.234$  ( $r^2 = -.234$ ) and significant level of  $.011$  ( $p = .011$ ) indicate a negatively statistically significant relationship between Homework and Students' Under-achievement in mathematics at the Grade 4 level and hence the rejection of the null hypothesis.

2. There is no statistically significant relationship between Teachers'

Competence and Students' Under-achievement in mathematics at the Grade 4 level.

Based on the small effect size of  $-.062$  ( $r^2 = -.062$ ) and significant value of  $.509$  ( $p = .509$ ), it is evident that students' under-achievement in mathematics at the Grade 4 level cannot be sufficiently explained by the level of the Teachers' Competence and therefore indicating that there is no statistically significant relationship between Teachers' Competence and Students' Under-achievement in mathematics at the Grade 4 level and hence the retention of the null hypothesis.

3. There is no statistically significant relationship between Home Environment/ Parental Involvement and Students' Under-achievement in mathematics at the Grade 4 level.

The small effect size of  $-.152$  ( $r^2 = -.152$ ) at significant value of  $.104$  ( $p = .104$ ) indicate that there is no statistically significant relationship between Home Environment/Parental involvement and students' under-achievement in mathematics at the Grade 4 level. There is therefore the need to retain the null hypothesis.

### **Alternate Hypothesis ( $H_1$ )**

1. There is a statistically significant relationship between Homework and Students' Under-achievement in mathematics at the Grade 4 level.

The effect size of  $-.234$  ( $r^2 = -.234$ ) and significant level of  $.011$  ( $p = .011$ ) indicate a negatively statistically significant relationship between Homework and Students' Under-achievement in mathematics at the Grade 4 level and hence the acceptance of the alternative hypothesis

2. There is a statistically significant relationship between Teachers' Pedagogical Competence and Students' Under-achievement in mathematics at the Grade 4 level.

Based on the small effect size of  $-.062$  ( $r^2 = -.062$ ) and significant value of  $.509$  ( $p = .509$ ) it is evident that Students' Under-achievement in mathematics at the Grade 4 level cannot be sufficiently explained by the level of the Teachers' Pedagogical Competence and therefore indicating that there is no statistically significant relationship between Teachers' Pedagogical Competence and Students' Under-achievement in mathematics at the Grade 4 level and hence the rejection of the alternative hypothesis.

3. There is a statistically significant relationship between Home Environment/ Parental Involvement and Students' Under-achievement in mathematics at the Grade 4 level.

The small effect size of  $-.152$  ( $r^2 = -.152$ ) at significant value of  $.104$  ( $p = .104$ ) indicate that there is no statistically significant relationship between Home Environment/Parental Involvement and Students' Under-achievement in mathematics at the Grade 4 level. There is therefore the need to reject the alternate hypothesis.



**Summary of the Chapter**

The chapter started with the analysis of the demographic statistics. It also presented the analysis of the correlation statistics for the variables. It was concluded with the retention and or rejection of the null and alternative hypotheses.

The next chapter will provide the researcher's discussion, interpretation, summary, and recommendations.

## CHAPTER 5

### DISCUSSION, INTERPRETATION, SUMMARY AND RECOMMENDATIONS

This concluding chapter presents the researchers' discussion, interpretation, summary, and recommendations. The demographic data revealed that the gender of students had minimal relationship to their achievement in the G4NT. The boys had a mean difference of .01 over the girls. This is basically indicating that boys scored marginally better than girls in the G4NT. The t-test analysis for type school indicates that there is a mean difference of .17 in favour of the private preparatory school students over public primary school students. This result is saying that students from private preparatory on average perform marginally better in the G4NT in comparison to students from the public primary school. It could however be argued that the result was always going to be skewed in favour of the private preparatory based on the small sample size. There were only 32 private school respondents of the sample size of 116 students. This marginal difference was therefore not statistically significant and hence there was no profound correlation on students' achievement in the G4NT. As it relates to family type and religious orientation, there was no statistically significant difference in students' achievement in G4NT with these predictors. These findings are in contrast to Marsh's (1990) and Fagan's (2006) findings on family type and religious orientation. There was however significant difference in Students' Achievement in G4NT and the educational level of their parents. Students of parents who attended colleges and universities scored

much better than students whose parents attained only primary school education. This finding could be indicative of the quality of parental involvement, emphasis placed on education, and the work ethics encouraged by these parents.

The data collected from students when analyzed using the SPSS (version 20) software revealed that the bivariate listing had three factors. These factors when extracted included the variables of Homework, Teachers' Competence, and Home Environment/Parental Involvement. Homework speaks to difficulty level, completion, corrections, and Feedback. Table 14 indicates that 6.3% of Students' Achievement in mathematics at the Grade 4 level is attributed to the Homework variable. Teachers' Competence according to Low et al. (2009) involves professional practice, leadership and management, and effectiveness. Weakness or strength in any or all of these sub-components is therefore contributing to 71.7% of Students' Achievement in mathematics at the Grade 4 level as highlighted in Table 14. The Home Environment/Parental Involvement variable contributed 13.9% to students' achievement in mathematics at the Grade 4 level.

Pearson's correlation analysis on the variables of the data given by the students revealed that there was a negatively statistically significant relationship between Homework and the Under-achievement of students in the G4NT examination. The correlation is in line with Cooper et al. (2006); Marzano and Pickering (2007); Cooper (2007); and Good and Brophy (2003) asserts that homework has a positive effect on students' academic achievement. The negative correlation indicates that an improvement in the Homework variable will result in a decrease in Students' Under-achievement in G4NT. Homework is an important variable as it relates to Students' Achievement in

mathematics at the Grade 4 level as was also revealed through the factor analysis on Table 14.

Pearson's correlation did not identify Teachers' Competence to have a statistically significant relationship with Students' Under-achievement in numeracy at the Grade 4 level. However it should be noted that, according to the data collected from the students, Teachers' Competence is an important variable in getting students to perform at their optimum in mathematics at the Grade 4 level. In fact Teachers' Competence, according to the factor analysis, was highlighted as the most prominent variable that contributes to the performance of students in mathematics at the Grade 4 level. The Pearson correlation indicates a negative strength in the relationship between Students' Under-achievement in G4NT and Teachers' Competence. This result indicates that there is a reciprocated relationship between the two variables; improvement in Teachers' Competence seems to result in a decrease in Students' Under-achievement in G4NT.

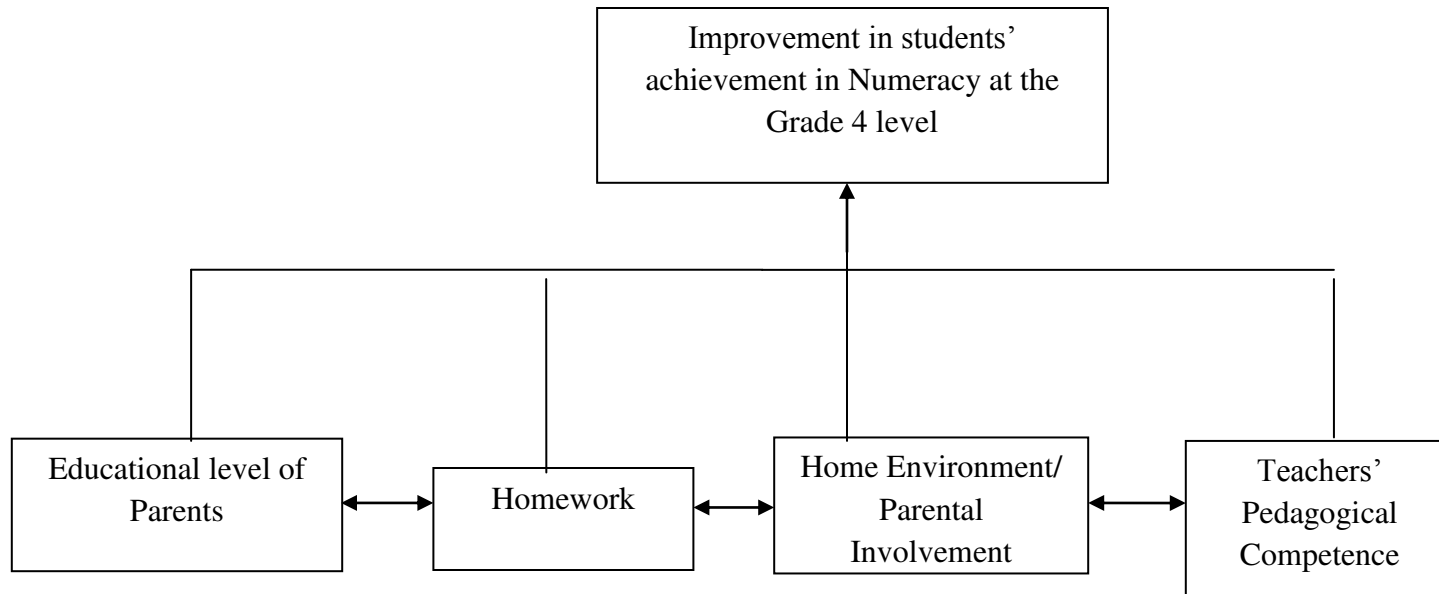
The variable of Home Environment and Parental Involvement made a contribution to Students' Under-achievement in G4NT examination but its' worth was not sufficient to be considered statistically significant. Home Environment/Parental Involvement was found to be the second most prominent variable that contributes to Students' Achievement in mathematics at the Grade 4 level. The Pearson correlation analysis showed a negative correlation, which indicates a reciprocated relationship; improvement in Home Environment/Parental Involvement seems to result in decrease in Students' Under-achievement in G4NT.

## Summary

The factor analysis revealed that collectively the three variables: Homework, Teachers' Competence, and Home Environment/Parental involvement account for 92% of the reasons for students' under-achievement in numeracy at the Grade 4 level. It is therefore important that more attention be given to these variables now. These variables, if collectively dealt with, could be the catalyst needed to accelerate students' achievement in numeracy at the Grade 4 level. Parents' educational level also had a statistically significant difference on students' achievement in G4NT.

The study revealed that variables such as Parent Level of Education, Teachers' Competence, Home Environment/Parental Involvement, and Homework are contributing variables that affect students' performance in numeracy at the Grade 4 level as highlighted in Figure 7. Improvement in these variables seems to result in students' achievement in mathematics at the Grade 4 level. Variables such as School Type, Family Type, Gender, and Religious Orientation did not affect students' performance in numeracy at the Grade 4 level.

The researcher, after completing the study, is of the view that much more research should be done on the research topic so as to widen the scope of information.



*Figure 7.* Diagram illustrating the relationship among the factors that were identified as contributing to students' achievement in mathematics at the Grade 4 level.

## **Recommendations**

The researcher's recommendations are few in number but are based on his findings. The recommendations are as follows:

1. Emphasis should be placed on Homework, Teachers' Competence, and Home Environment/Parental Involvement.
2. Teachers should give challenging mathematics homework, which they should correct and provide timely feedback.
3. Administrators should ensure that there are adequate opportunities for teachers to improve on their professionalism, leadership, and effectiveness.
4. Teachers should ensure that they are cognizant of the best practices and trends in the teaching of mathematics and apply them.
5. Parents should always seek to uplift themselves educationally as academic achievement of students seems to be aligned to parents' level of education.
6. Parents should get more involved in the life of their children and the school. They should also ensure that they provide a home environment that is conducive to learning.
7. Further studies should be conducted at the Grade 4 level to ascertain the mitigating factors which are affecting students' achievement in mathematics.
8. Studies should be conducted on G4NT test to ascertain age level appropriateness.

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## APPENDICES

## APPENDIX A

### Students' Questionnaire

What is your gender : ☐ Male ☐ Female

a. Type of school you attend: ☐ Public Primary ☐ Private Preparatory

b. Family type: ☐ Nuclear ☐ Single-Parent ☐ Extended ☐ Step-Parent

c. Religion orientation: ☐ Christian ☐ Islam ☐ Rastafarianism ☐ Other

d. Which school did your mother last attend: ☐ Primary ☐ Secondary ☐ College ☐ University

e. Which school did your father last attend : ☐ Primary ☐ Secondary ☐ College ☐ University

|                                                            | NEVER | SELDOM | OFTEN | ALWAYS |
|------------------------------------------------------------|-------|--------|-------|--------|
| 1. My parent(s) spent time assisting me                    | 1     | 2      | 3     | 4      |
| 2. My home is nice and comfortable                         | 1     | 2      | 3     | 4      |
| 3. I am supervised when watching television                | 1     | 2      | 3     | 4      |
| 4. My parent(s) supervise me when I am doing my assignment | 1     | 2      | 3     | 4      |
| 5. My parent(s) ensure I go to school regularly            | 1     | 2      | 3     | 4      |
| 6. My parent(s) attend P.T.A. meeting regularly            | 1     | 2      | 3     | 4      |
| 7. My parent(s) speak to my teacher weekly                 | 1     | 2      | 3     | 4      |

|                                                                                                     |   |   |   |   |
|-----------------------------------------------------------------------------------------------------|---|---|---|---|
| 8. My parent(s) spend the appropriate time assisting me with my mathematics assignment              | 1 | 2 | 3 | 4 |
| 9. My parent(s) know whenever I have mathematics assignments                                        | 1 | 2 | 3 | 4 |
| 10. My mathematics assignments are challenging                                                      | 1 | 2 | 3 | 4 |
| 11. My parent(s) ensure I complete my mathematics assignments                                       | 1 | 2 | 3 | 4 |
| 12. My teacher always corrects my assignments                                                       | 1 | 2 | 3 | 4 |
| 13. My teacher provides feedback after correcting mathematics assignments                           | 1 | 2 | 3 | 4 |
| 14. I get sufficient mathematics homework                                                           | 1 | 2 | 3 | 4 |
| 15. I get daily mathematics assignments                                                             | 1 | 2 | 3 | 4 |
| 16. My teacher enjoys teaching mathematics                                                          | 1 | 2 | 3 | 4 |
| 17. My teacher motivates me to learn mathematics                                                    | 1 | 2 | 3 | 4 |
| 18. I like mathematics                                                                              | 1 | 2 | 3 | 4 |
| 19. My teacher sometimes behaves as if he/she likes to teach mathematics                            | 1 | 2 | 3 | 4 |
| 20. I am rewarded by my teacher and parent(s) for completing my mathematics assignment successfully | 1 | 2 | 3 | 4 |
| 21. My teacher assists me with my assignment when I am frustrated                                   | 1 | 2 | 3 | 4 |
| 22. My parent(s) seek help for me to complete my mathematics assignments when I become frustrated   | 1 | 2 | 3 | 4 |
| 23. When I get good grades for mathematics homework my parent(s) do something special               | 1 | 2 | 3 | 4 |
| 24. My teacher makes the teaching of mathematics interesting                                        | 1 | 2 | 3 | 4 |

|                                                                                                |   |   |   |   |
|------------------------------------------------------------------------------------------------|---|---|---|---|
| 25. My teacher uses students' grouping to teach mathematics                                    | 1 | 2 | 3 | 4 |
| 26. My teacher ensures that there is understanding of concepts before she/he continues         | 1 | 2 | 3 | 4 |
| 27. My teacher makes the teaching of mathematics fun and interesting                           | 1 | 2 | 3 | 4 |
| 28. My teacher uses different ways to teach concepts/topics in mathematics                     | 1 | 2 | 3 | 4 |
| 29. My teacher encourages students to help to teach other students mathematics concepts/topics | 1 | 2 | 3 | 4 |
| 30. My teacher encourages us to think                                                          | 1 | 2 | 3 | 4 |



## APPENDIX B

### **Letter Requesting Consent from School**

Mervyn Sinclair  
321 Hague Heights,  
Hague Housing Scheme,  
Falmouth P.O., Trelawny  
Jamaica, W.I.

Date:

The Chairman  
C/o The Principal  
No Name Primary School  
1000 Street, Falmouth P.O.  
Trelawny

Dear Sir:

Re: Proposed study

I, Mervyn Sinclair, write to secure permission to conduct a study at the No Name Primary School. The purpose of this study is to complete requirements for a Masters of Arts in Education degree (Curriculum and Instruction emphasis) at the Northern Caribbean University.

The study will seek to identify factors that are causing and accelerating the poor performance of students in the G4NT examination.

Actual implementation of this study is to last for appropriately three (3) weeks from April 1, 2012 to April 21, 2012. The grade 4 students will be the main participants for the study. Parents of the grade 4 students will be informed about the research and their written permission sought.

Please be assured that all ethical considerations will be observed in all aspects of the research process. The integrity of your school will be maintained. Honesty will be exercised in the reporting of the findings.

Your written approval is anticipated.

Yours respectfully,

---

Mervyn Sinclair

## APPENDIX C

### **Letter Requesting Consent from Parent**

Mervyn Sinclair  
321 Hague Heights,  
Hague Housing Scheme,  
Falmouth P.O., Trelawny  
Jamaica, W.I.

Date:

To Whom It May Concern

Re: Proposed study

I, Mervyn Sinclair, write to secure permission from you to allow your child to participate in a study that will be conducted at his/her school. The purpose of this study is to complete requirements for a Masters of Arts in Education degree (Curriculum and Instruction emphasis) at the Northern Caribbean University.

The study will seek to identify factors that are causing and accelerating the poor performance of students in the G4NT examination.

Actual implementation of this study is to last for appropriately three (3) weeks from April 1, 2012 to April 21, 2012. The grade 4 students will be the main participants for the study.

Please be assured that all ethical considerations will be observed in all aspects of the research process. Honesty will be exercised in the reporting of the findings.

Please complete and return the attached permission slip.

Yours respectfully,

---

Mervyn Sinclair

## APPENDIX D

### Permission Slip

Mervyn Sinclair  
321 Hague Heights,  
Hague Housing Scheme,  
Falmouth P.O., Trelawny  
Jamaica, W.I.

Date:

Dear Parents/Guardian,  
Your child/ward \_\_\_\_\_ has been selected to be a participant in a study which will be conducted by Mervyn Sinclair at your child's school from April 1, 2012 to April 21, 2012. The purpose of this study is to complete requirements for a Masters of Arts in Education degree (Curriculum and Instruction emphasis) at the Northern Caribbean University.

I, \_\_\_\_\_ give permission for my child/ward  
(Name of Parent/Guardian)  
\_\_\_\_\_ to participate in the study.

\_\_\_\_\_  
Signature of Parent/Guardian

## **VITA**

|                                  |                                                                          |
|----------------------------------|--------------------------------------------------------------------------|
| <b>Name:</b>                     | Mervyn Delroy Sinclair                                                   |
| <b>Place of Birth:</b>           | Mandeville, Manchester                                                   |
| <b>Schools Attended:</b>         | Western Carolina University<br>Mico Teachers' College                    |
| <b>Awards:</b>                   |                                                                          |
| <b>2002-2004</b>                 | B.Sc. in Education                                                       |
| <b>2001-2002</b>                 | Certificate in School Administration &<br>Management                     |
| <b>Professional Experiences:</b> |                                                                          |
| <b>2006 – Present</b>            | Principal<br>Salt Marsh Primary School                                   |
| <b>2000 – 2005</b>               | Head of Mathematics Department<br>Braeton Primary and Junior High School |