

## Students' Attitudinal Variables as Correlates of Achievement in Secondary School Mathematics in Barbados

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*This study was designed to determine the relationship between and amongst variables: students' perceptions of mathematics usefulness, parents' involvement and mathematics teacher influence on achievement in mathematics. A sample of 170 4<sup>th</sup> and 5<sup>th</sup> form students who comprised of 116 girls and 54 boys participated in this study. Two instruments were used for data collection. Data analysis involved the interpretation of frequencies, t-test and regression analysis. Results of the frequencies showed that students had positive perceptions of the usefulness of mathematics and the influence of their mathematics teachers. However they displayed negative perceptions of their parents' involvement in reference to their achievement of mathematics. The results also showed there was no significant differences amongst male and female students on any of the three variables as it pertained to mathematics achievement. Mathematics usefulness ( $t = -.770$ ;  $df = 168$ ;  $p = .442$ ), teacher influence ( $t = 1.120$ ;  $df = 168$ ;  $p = .228$ ) and parental involvement ( $t = -.728$ ;  $df = 168$ ;  $p = .467$ ). Additionally the contribution of the three variables though small contributed to mathematics achievement accounting for 6.2% ( $R \text{ square} = 0.062$ ,  $P < 0.05$ ) of the total variance. Also, all the variables except students' perceptions of parental involvement contributed significantly to mathematics achievement with students' perception of their mathematics teacher contributing the most and students' perception of parental involvement, the least. Hence teachers ought to continue to encourage and show interest in the progress of their students and provide the necessary intervention students might require to enhance their problem solving skills; which would directly improve students' performance in mathematics. Likewise parents should become more involve in their children education in mathematics and be more aware of the challenges they encountered in the subject.*

**Key words:** students' perceptions, teacher influence, parental involvement, mathematics usefulness and mathematics achievement

### Background

Literature is replete of the claims of how important mathematics is. For instance, Igboke (2003) in recognizing the linkages of mathematics to science and technology asserts that without mathematics there will be no science and without science there will be no technology, and without technology there will be no modern society. In other words, mathematics is the precursor of science and technology; and a requisite element in modern societal development. Financial systems, system of measurement, and many other aspects of life encountered daily; along with the ability to carry out basic computations are highly dependent upon mathematics. Individuals who are unable to carry out these basic mathematical functions, or lack the understanding of how

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mathematics is used to construct and develop the things around them find themselves severely disadvantaged.

Unfortunately, many of the students in secondary institutions are exhibiting poor attitudes toward mathematics and perhaps, as a consequence, there has been a decline in mathematics achievement in Barbados and the wider Caribbean. Data collected from the Caribbean Examination Council (CXC) confirms this worrisome trend.

Table 1:  
*Percentage Passes in Mathematics in the Caribbean (2006 – 2011)*

| Year | Total Entries | Number of students receiving passes grades 1-3 | Percentage (%) passes at grades 1-3 |
|------|---------------|------------------------------------------------|-------------------------------------|
| 2006 | 98,951        | 33,739                                         | 34%                                 |
| 2007 | 101,892       | 32,343                                         | 32%                                 |
| 2008 | 105,040       | 40,267                                         | 38%                                 |
| 2009 | 106,684       | 39,535                                         | 37%                                 |
| 2010 | 122,451       | 43,936                                         | 36%                                 |
| 2011 | 118,517       | 36,752                                         | 31%                                 |

Source: CXC Statistical Bulletin (2011)

Table 1 above, shows the total number of passes for the periods January and May, of all the entries in the subject of mathematics in the Caribbean during the last six years. In the above table Grade I, Grade II and Grade III represent passing grades. This table shows that of the 653,535 entries for the six year period 226,572 students received a passing grade. This statistic represents a 35% pass rate of the students who would have been entered for mathematics.

Table 2  
*Percentage Passes in Mathematics in Barbados (2006 – 2011)*

| Year | Total Entries | Number of students receiving passes grades 1-3 | Percentage (%) passes at grades 1-3 |
|------|---------------|------------------------------------------------|-------------------------------------|
| 2006 | 4,999         | 2,160                                          | 43%                                 |
| 2007 | 4,962         | 2,027                                          | 41%                                 |
| 2008 | 5,124         | 2,478                                          | 48%                                 |
| 2009 | 5,120         | 2,266                                          | 44%                                 |
| 2010 | 5,036         | 2,257                                          | 45%                                 |
| 2011 | 4,820         | 1,886                                          | 39%                                 |

Source: CXC Statistical Bulletin (2011)

The data in Table 2 shows the number of passing grades of students entered in Barbados for the subject mathematics during the periods January and May. Passing grades are identified in the same way as shown in Table 1. Data in Table 2 reveals that for the same six year period, there were 13,074 students receiving a passing grade. Hence, of the 30,061 students entered during that six year period, approximately 43% of the entrants received a passing grade.

The statistics from both tables show that for the six year period, the pass rate for the Caribbean and Barbados was below fifty percent. This has dire implications not only for Barbados but for the wider Caribbean, because of the importance of mathematics to local and regional development. Hence there is a need carry out an investigation in to the perceive factors that impact on students' mathematics achievement with the intention of understanding the nature of their interaction and to what extent they contribute underachievement in mathematics.

Factors often highlighted as being important in impacting on students' attitude towards mathematics are parental support, teacher qualities as perceived by the students and mathematical usefulness. Bolaji (2005) in a study of the influence of students' attitudes towards mathematics found that the way in which teachers implemented their methodologies and strategies along with their personalities, greatly accounted for the positive attitude displayed by students. The white paper on education (July, 1995) sought the views of Barbadian secondary school children as it related to how teachers could improve their teaching methods to promote students' interests and attitudes. About 25% of the responses suggested that teachers needed to work on improving their relationship with students as well as being more understanding. Some 23.9% said that teachers needed to listen more attentively and show a greater degree of patience. Studies done by Georgewill (1990) found that teachers, who were untrained and lacked a cordial relationship with their students negatively impacted on their students' attitude and performance in mathematics. He further stated that where a cordial relationship existed between teachers and their students, these students felt more comfortable in asking questions and as a result better understood the subject.

The way in which the concepts of mathematics are conveyed to students can also contribute to the way that students perceive its usefulness. Liegl (2012) is of the view that students may not see the example as the reasoning to how mathematics content and processes being presented is useful or important to them. He further stated that the challenge is not to necessarily show that mathematics is important to society as it is to show how important and useful mathematics can be to the students. In a study conducted by GoodyKoontz (2008) also lends support to Liegl (2012) as he revealed that many students were of the belief that explanations and examples used in the class should highlight the usefulness of mathematics. In interviews conducted by GoodyKoontz, students suggested that if mathematics is taught in such a way where they can see the connection of mathematics and the real world through real life scenarios, it would help them to learn the subject better and develop more favourable perceptions towards the discipline in the future.

As it relates to parental involvement, research has shown that parents' involvement positively affected the children academic performance (Fan and Chen, 2001). Fennstein and Symons (1999) concurred with this premise and concluded that parental involvement definitely has a positive effect on academic achievement in both primary and secondary schools. Usually, parents are more involved in their children's education because of the dreams and aspirations they have for them to achieve and become productive citizens. Jacobs and Harvey (2005) defined parental aspirations as the quality and level of education they would like their children to attain from secondary education through to postgraduate university. According to Ma (2001) these aspirations by parents and their perceptions of mathematics have contributed immensely to how their children perceive themselves as it relates to participating and achieving at an advance level in mathematics.

Other factors besides parental influence, teacher influence and mathematical usefulness—such as peer influence, socio-economic status and motivation—play a role in affecting secondary students' attitudes. However, since the former have gained more attention locally these three factors will be examined specifically in this study.

**Statement of the Problem**

This study seeks to determine the extent to which students' attitudinal factors (perceived mathematics usefulness, perceived mathematics teacher influence and perceived parental support) jointly and individually contribute to achievement in mathematics, with a view towards offering possible suggestions to improve mathematics achievement.

**Research Questions**

In an attempt to investigate students' mathematics achievement, this study will be guided by the following questions.

1. What is the perception of the students on mathematics usefulness, mathematics teacher and parental support?
2. Is there a significant difference in the perceptions of male and female students as it relate to mathematics usefulness, mathematics teacher and parental support?
3. What is the joint contribution of students' perception of mathematics usefulness, mathematics teacher and parental support to mathematics achievement?
4. What are the relative contributions of mathematics usefulness, mathematics teacher and parental support to mathematical achievement?

**Methodology****The Research Design**

The research design employed was a descriptive survey design, which assumed the characteristics of an ex- post facto study in which the existing status of the independent variables were only determined during data collection without any manipulation of the variables by the researcher.

**Sampling and Sampling Procedures**

There were four secondary schools randomly selected from the twenty-two secondary schools in Barbados for the purpose of conducting this research. The sample of students used from these schools consisted of fourth and fifth year students. The ages of these students in the sample ranged from 14-17 years. Students of these forms would have been chosen because they would have passed the qualifying mathematics exam and would be now in preparation for their CXC Mathematics examination. The sample of this study consisted of 170 students of which 54 were boys and 116 girls. The sample of 170 students was so chosen that they were selected at a rate of 43 students per school.

**Instrumentation**

There were two instruments used to collect data for the purpose of this study. These are:

- (i) *The modified Fennema-Sherman (2008) Mathematics Attitude Scale*
- (ii) *The Mathematics Achievement Test*

### The Modified Fennema-Sherman (2008) Mathematics Attitude Scale

For the purpose of assessing students' attitudes towards mathematics, a Modified Fennema-Sherman Mathematics Attitude Scale was used. This scale contained items which allowed the researcher to determine students' attitude by investigating three components of students' attitudes towards mathematics outlined in chapter one. These were:

- (i) *Mathematical usefulness*
- (ii) *Students' perception of teacher influence*
- (iii) *Students' perception of parental influence*

The mathematics attitude scale employed the likert scale format which consisted of the categories: Strongly Agree, Agree and Undecided, Disagree and Strongly Disagree. Table 3 below show how the attitudinal variables within the mathematics attitude scale were broken down according to the number of questions for each.

Table 3:  
*Components of attitude towards mathematics and the items which measure these components*

| Items | Components of attitude towards mathematics |
|-------|--------------------------------------------|
| 1-11  | Mathematical Usefulness                    |
| 12-23 | Teacher influence                          |
| 24-31 | Parental influence                         |

Again, The Modified Fennema-Sherman (2008) Mathematics Attitude Scale was employed to measure students' perception of parental and teacher influence. Students were asked to respond to 12 items for the teacher attitude scale and 8 items for the parental attitude scale. The items 12-23 investigated the students' perception of their teacher's influence. These items specifically sought to find out the teachers' interest in students; teachers' confidence in students ability; and also the teacher's enjoyment in the teaching of mathematics as perceived by the students. Similarly, items 24-31 investigated parental support as perceived by the students. On the parental support scale characteristics such as parents' enjoyment of mathematics; the ability of parents to help their children with mathematics; the perceived usefulness of mathematics by the parents; and general encouragement given by the parents was investigated. The Crombach alpha reliability coefficients of ( $\alpha = 0.74$ ) and ( $\alpha = 0.71$ ) were obtained for the modified Fennema-Sherman (2008) Mathematics Attitude Scale and the Mathematics Achievement Test respectively.

### Procedure

Permission to carry out the research for the study in the four secondary schools used in the process was first sought from the Ministry of Education. After permission was granted an official letter was sent to the principals of each of the four Secondary schools outlining the purpose of the research along with the instruments that would be used in the data collection process. Once the principals were satisfied that the research was legitimate and was solely for academic purposes, dates were set to bring the instruments to each school for the data to be collected. On the specified day for data collection, the researcher gave specific instructions for the

questionnaire to be done first and the CXC Multiple Choice papers to be done after the completion of the questionnaires.

### **Data Analysis**

For research question 1, descriptive statistics were run so as to determine and report on the means and standard deviations from the tallied scores of the likert scale, for each variable from the questionnaire used, t- test was used for research question 2 and regression analysis for questions 3 and 4.

### **Results**

#### **Research Question 1**

#### **What is the perception of the students on, Mathematics usefulness, Mathematics teacher and Parental support?**

Table 4 addressed students' perception of mathematics usefulness by showing the number of respondents and percentages in relation to their level of perception as identified by the likert scale. The table took in to consideration the eleven questions on the attitude scale which sought to gauge to what degree the students perceived the usefulness of mathematics in their lives, from negatively as well as positively worded statements, where the positive statements sought to attain the positive views of the students applicability of mathematics in their lives, while the negatively worded questions sought to achieve the converse. The results from the table revealed that the students over all showed a positive perception on this particular variable.

However in further analysis of table 4 when the questions were compared, similar responses were observed. For example question 1 sought to find out if knowing mathematics will help the students earn a living and as seen in the table some 90% of the students agreed. However question 7 sought to find out if Mathematic would not have been important to their life's work and some 68% of the respondents agreed, which accounted for more than half who also agreed. Reasons for such variant responses by the students could have been as a result of their career choices and their perception on life in general, where they recognized the need for mathematics was not a major requirement for employment but they still appreciated its importance.

Table 5 further substantiated these findings in Table 4 as it showed the mean scores and standard deviations for the variable mathematical usefulness according to gender. The results from this table showed that indeed the perception among females and males as it pertained to mathematical usefulness was positive, with males ( $M=45.1481$ ,  $SD = 7.71279$ ) and females ( $M=44.1552$ ,  $SD = 7.87799$ ). However it must be noted that the perceptions of males with reference to the variable was slightly more positive.

Table 4  
*Students' perceptions of mathematical usefulness*

|           | <b>Mathematics Usefulness</b>                                                        | <b>SA</b> | <b>A</b>  | <b>U</b>  | <b>D</b>  | <b>SD</b> |
|-----------|--------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|
| <b>1</b>  | Knowing mathematics will help me earn a living                                       | 98(57.6%) | 62(36.5%) | 8(4.7%)   | 2(1.2%)   |           |
| <b>2</b>  | I'll need mathematics for my future work                                             | 83(48.8%) | 52(30.6%) | 26(15.3%) | 7(4.1%)   | 2(1.2%)   |
| <b>3</b>  | Math is a worthwhile, necessary subject                                              | 84(49.4%) | 64(37.6%) | 18(10.6%) | 2(1.2%)   | 2(1.2%)   |
| <b>4</b>  | I will use mathematics in many ways as an adult                                      | 66(38.8%) | 63(37.1%) | 30(17.6%) | 11(6.5%)  |           |
| <b>5</b>  | I'll need a good understanding of Math for my future work.                           | 66(38.8%) | 65(38.2%) | 28(16.5%) | 10(5.9%)  | 1(.6%)    |
| <b>6</b>  | I study Math because I know how useful it is.                                        | 55(32.4%) | 67(39.4%) | 26(15.3%) | 15(8.8%)  | 7(4.1%)   |
| <b>7</b>  | Math will not be important to me in my life's work                                   | 64(37.6%) | 53(31.2%) | 27(15.9%) | 14(8.2%)  | 12(7.1%)  |
| <b>8</b>  | I don't expect to use much Math when I get out of school                             | 59(34.7%) | 49(28.8%) | 33(19.4%) | 23(13.5%) | 6(3.5%)   |
| <b>9</b>  | I see mathematics as something I won't use very often when I get out of high school. | 60(35.3%) | 51(30%)   | 24(14.1%) | 23(13.5%) | 12(7.1%)  |
| <b>10</b> | Doing well in Math is not important for my future                                    | 73(42.9%) | 48(28.2%) | 28(16.5%) | 13(7.6%)  | 8(4.7%)   |
| <b>11</b> | Math is not important for my life                                                    | 70(41.2%) | 63(37.1%) | 22(12.9%) | 7(4.1%)   | 8(4.7%)   |

Table 5  
*Students' perceptions of Mathematical Usefulness according to gender*

| <b>Sex of Student</b> | <b>Mean</b> | <b>N</b> | <b>Std.Deviation</b> |
|-----------------------|-------------|----------|----------------------|
| <b>Female</b>         | 44.1552     | 116      | 7.87799              |
| <b>Male</b>           | 45.1481     | 54       | 7.71279              |
| <b>Total</b>          | 44.4706     | 170      | 7.81682              |

Table 6  
*Students' perceptions of their teacher influence in mathematics*

|    | Perception of Teacher                                                                                          | SA        | A         | U         | D         | SD       |
|----|----------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|----------|
| 1  | My teachers have been interested in my progress in Math                                                        | 6(32.9%)  | 74(43.5%) | 6(15.3%)  | 10(5.9%)  | 4(2.4%)  |
| 2  | I would talk to my math teachers about a career that uses math.                                                | 17(10%)   | 52(30.6%) | 53(31.2%) | 38(22.4%) | 10(5.9%) |
| 3  | My teachers have encouraged me to study more Math.                                                             | 44(25.9%) | 82(48.2%) | 21(12.4%) | 17(10%)   | 6(3.5%)  |
| 4  | My teachers want me to take all the Math I can.                                                                | 27(15.9%) | 45(26.5%) | 52(30.6%) | 35(20.6%) | 11(6.5%) |
| 5  | Math teachers have made me feel I have the ability to go on in mathematics                                     | 50(29.4%) | 66(38.8%) | 32(18.8%) | 13(7.6%)  | 9(5.3%)  |
| 6  | My teachers think I'm the kind of person who could do well in Math                                             | 56(32.9%) | 74(43.5%) | 28(16.5%) | 5(2.9%)   | 7(4.1%)  |
| 7  | Getting a teacher to take me seriously in Math is a problem                                                    | 60(35.3%) | 56(32.9%) | 31(18.2%) | 18(10.6%) | 5(2.9%)  |
| 8  | It's hard to get Math teachers to respect me                                                                   | 68(40%)   | 58(34.5%) | 31(18.2%) | 8(4.7%)   | 5(2.9%)  |
| 9  | I have a hard time getting teachers to talk seriously with me about Math                                       | 62(36.6%) | 62(36.6%) | 31(18.2%) | 13(7.6%)  | 2(1.2%)  |
| 10 | My teachers think advanced Math will be a waste of time for me                                                 | 60(35.3%) | 57(33.5%) | 36(21.2%) | 12(7.1%)  | 5(2.9%)  |
| 11 | I feel that Math teachers ignore me when I try to talk about something serious                                 | 63(37.1%) | 66(38.8%) | 24(14.1%) | 12(7.1%)  | 5(2.9%)  |
| 12 | My teachers would not take me seriously if I told them I was interested in a career in science and mathematics | 72(42.4%) | 55(32.4%) | 27(15.9%) | 12(7.1%)  | 4(2.4%)  |

Table 7  
*Students' perceptions of their teacher influence according to gender*

| <b>Sex of Student</b> | <b>Mean</b> | <b>N</b> | <b>Std.Deviation</b> |
|-----------------------|-------------|----------|----------------------|
| <b>Female</b>         | 46.3793     | 116      | 7.87915              |
| <b>Male</b>           | 44.7778     | 54       | 8.36585              |
| <b>Total</b>          | 45.8706     | 170      | 8.04689              |

Table 6 and 7 above displayed the results of the students' perceptions on how their teacher influenced their liking for mathematics and encouraged them to pursue it, by taking into consideration the twelve items on the attitude scale computing this variable. From the results shown in Table 6, students showed a positive perception of their teacher influencing their liking for mathematics and their decision to pursue mathematics at a higher level. However results showed that for statements that could have been considered as being negative, the students' responses were similar to the positively worded questions. This can be seen when comparing for example statements 3 and 9. Statement 3 sought to determine whether teachers encouraged students to study mathematics at a higher level and some 70% of the respondents agreed.

Likewise, statement 9 sought to determine if students had any challenges getting teachers to talk to them seriously about mathematics and 70% also agreed that they encountered challenges. Statements 2 and 12 also revealed some interesting findings, where only 40% of the students agreed that they would talk to their mathematics teacher about a career in mathematics, while about 75% of the respondents agreed that they would talk to their teacher about a career in mathematics. Hence although the general perceptions of the students were positive, there were issues of negative perceptions as it pertained to some of the items, which could have contribute to poor attitudes and simultaneously a decline in mathematics achievement.

Table 7 shows the means and standard deviations of males and females as it pertains to this same variable teacher influence. From the table results showed males having (M=44.7778, SD=8.36585) and females having (M=46.3793, SD=7.87915). From the data presented, it shows that the perceptions of females on this particular variable were slightly more positive than that of their male counterparts.

Table 8  
*Students' perception of Parental Involvement*

|          | <b>Perception of Parents</b>                                                                | <b>SA</b>  | <b>A</b>  | <b>U</b>  | <b>D</b>  | <b>SD</b> |
|----------|---------------------------------------------------------------------------------------------|------------|-----------|-----------|-----------|-----------|
| <b>1</b> | My father seems to enjoy doing mathematics                                                  | 22(12.9%)  | 9(17.1%)  | 62(36.5%) | 26(15.3%) | 31(18.2%) |
| <b>2</b> | My mother seems to enjoy doing mathematics                                                  | 19(11.2%)  | 31(18.2%) | 50(29.4%) | 35(20.6%) | 35(20.6%) |
| <b>3</b> | My father would usually be able to help with my Mathematic homework problems if I asked him | 17(10%)    | 42(24.7%) | 36(21.2%) | 39(22.9%) | 36(21.2%) |
| <b>4</b> | My mother would usually be able to help with my Mathematic homework problems if I asked her | 25(14.7%)  | 50(29.4%) | 24(14.1%) | 41(24.1%) | 30(17.6%) |
| <b>5</b> | My parents / guardians are usually interested in helping me with my mathematics homework    | 28(16.5%)  | 61(35.9%) | 30(17.6%) | 34(20%)   | 17(10%)   |
| <b>6</b> | My mother thinks that learning mathematics is important for me                              | 84(49.4%)  | 56(32.9%) | 23(13.5%) | 2(1.2%)   | 5(2.9%)   |
| <b>7</b> | My father thinks that learning mathematics is very important for me                         | 73(42.9%)  | 46(27.1%) | 39(22.9%) | 4(2.4%)   | 8(4.7%)   |
| <b>8</b> | My parents / guardians want me to do well in mathematics classes                            | 114(67.1%) | 38(22.4%) | 12(7.1%)  | 1(.6%)    | 5(2.9%)   |

Table 9  
*Students' perception of parental involvement according to gender*

| <b>Sex of Student</b> | <b>Mean</b> | <b>N</b> | <b>Std.Deviation</b> |
|-----------------------|-------------|----------|----------------------|
| <b>Female</b>         | 27.3276     | 116      | 5.49114              |
| <b>Male</b>           | 27.9815     | 54       | 5.35703              |
| <b>Total</b>          | 27.5353     | 170      | 5.44161              |

Table 8 and 9 above display the results of the students' perceptions on how they viewed their parents' involvement in terms of assisting them with their homework, encouraging and lending support as it pertained to doing mathematics at a higher level, by taking in to consideration the eight items that formed the sub scale on the attitude scale computed to form this variable being analyzed. From the results shown in Table 8, students' perceptions of their parents' involvement in the subject were negative over all. Further analysis of this table showed that for statements 2 and 3 where students' perceptions were sought as it pertained to their

mothers and fathers liking for the subject, approximately 30% of them agreed they liked doing it. This figure represented a small percentage of the respondents and could have been seen as one of the reasons for the negative perceptions.

Statements 6 and 7 were also compared, as they sought to determine to what extent parents saw mathematics as being important to their children. The table showed that 81% of the respondents agreed that their mothers thought that mathematics was important to them, while 70% thought their fathers were of the belief that mathematics was important to them. These findings accounted for some 11% difference when mothers and fathers views on the subject were compared, with mothers more seeing the importance of mathematics to their children's lives. It must be noted that although both mothers and father did not like doing mathematics, they acknowledged the importance and relevance of the subject. However these particular views would not have impacted too much on the outcome since the perceptions were generally negative.

Table 9 confirmed these results as it showed the means and standard deviations of males and females to this same variable parental involvement. From the table results showed that males had ( $M=27.9815$ ,  $SD=5.35703$ ) and females had ( $M=27.3276$ ,  $SD=5.49114$ ). However further inspection of the results from Table 9 showed that the perceptions of females on this particular variable were negative while for the males a positive perception was revealed.

## **Research Question 2**

**Is there a significant difference in the perceptions of male and female students on Mathematics usefulness, Mathematics teacher and Parental support?\**

Table 10  
*Students' means and standard deviations for the Independent Samples t- test*

|                                                           | <b>Sex of Student</b> | <b>N</b> | <b>Mean</b> | <b>Std. Deviation</b> |
|-----------------------------------------------------------|-----------------------|----------|-------------|-----------------------|
| <b>Students' perceptions of mathematical usefulness</b>   | Females               | 116      | 44.1552     | 7.87799               |
|                                                           | Males                 | 54       | 45.1481     | 7.71279               |
| <b>Students perceptions of their teachers</b>             | Females               | 116      | 46.3793     | 7.87915               |
|                                                           | Males                 | 54       | 44.7778     | 8.36585               |
| <b>Students' perceptions of their Parents involvement</b> | Females               | 116      | 27.3276     | 5.49114               |
|                                                           | Males                 | 54       | 27.9815     | 5.35703               |

Table 10 above shows the means and standard deviations computed for males and females students' perceptions for the attitudinal variables mathematical usefulness, parental involvement and teacher influence. An independent samples t-test was conducted to compare the scores of mathematical usefulness, teacher influence and parental involvement for males and

females. The results from this test conducted revealed that no significant difference was found amongst the variables mathematics usefulness ( $t = -.770$ ;  $df = 168$ ;  $p = .442$ ), teacher influence ( $t = 1.120$ ;  $df = 168$ ;  $p = .228$ ) and parental involvement ( $t = -.728$ ;  $df = 168$ ;  $p = .467$ ).

### Research Question 3

**What is the joint contribution of students' perception of mathematics usefulness, mathematics teacher and parental support to mathematics achievement?**

Table 11

*Joint contribution of the independent variables mathematics usefulness, mathematics teacher and parental support to mathematics achievement*

| <b>Multiple R = 0.250</b>           |                |     |             |       |                   |
|-------------------------------------|----------------|-----|-------------|-------|-------------------|
| <b>Multiple R Square = 0.062</b>    |                |     |             |       |                   |
| <b>Adjusted R square = 0.045</b>    |                |     |             |       |                   |
| <b>Standard Error = 6.494</b>       |                |     |             |       |                   |
| <b>Analysis of variance (ANOVA)</b> |                |     |             |       |                   |
| <b>Model</b>                        | Sum of Squares | df  | Mean Square | F     | Sig.              |
| <b>Regression</b>                   | 465.570        | 3   | 155.190     | 3.680 | .013 <sup>b</sup> |
| <b>Residual</b>                     | 7001.024       | 166 | 42.175      |       |                   |
| <b>Total</b>                        | 7466.594       | 169 |             |       |                   |

Table 11 shows the three variables mathematics usefulness, parental involvement and teacher influence, when taken together yielded a Multiple Regression coefficient (R) of 0.250, a Multiple R Square of 0.062 and Adjusted R Square of 0.045. From the results recorded the interpretation that can be made is 6.2% of the variance in mathematics achievement can be explained by the combined influence of the three variables. The table also shows that the analysis of variance for the multiple regression data produced on the F – ration of 3.680 which is significant at the 0.05 level. This indicates that the effectiveness of the predictor variables in predicting mathematics achievement could not have occurred by chance. However it ought to be stated that even though the multiple regression coefficient (R) of 0.250 is small for the total contribution of the predictor variables the data shows that their contribution is significant since ( $p < 0.05$ ).

**Research Question 4**

**What are the relative contributions of mathematics usefulness, mathematics teacher, parental support to mathematical achievement?**

Table 12

*Relative contributions of the predictor variables of mathematics achievement of students in Barbados*

| Unstandardized Coefficient                                        | Standardized |           |       |        |      |
|-------------------------------------------------------------------|--------------|-----------|-------|--------|------|
| Coefficient                                                       |              |           |       |        |      |
| Model                                                             | $\beta$      | Std.Error | Beta  | T      | Sig  |
| Constant                                                          | 10.999       | 3.933     |       | 2.796  | .006 |
| Students' perceptions of mathematical usefulness                  | -.152        | .075      | -.179 | -2.014 | .046 |
| Students perceptions of their mathematics teachers                | .231         | .071      | .279  | 3.240  | .001 |
| Students' perceptions of their Parents involvement in mathematics | -.007        | .095      | -.006 | -.079  | .937 |

In Table 12 above, the beta weights provided an indication of the relative contributions for each of the predictor variables in predicting mathematics achievement. The table showed that the variables mathematics usefulness and teacher influence are both significant at the 0.05 level but that of parental involvement is not significant. The table further showed that the variable

**Discussion**

Research question one sought to find out the perceptions of students to Mathematic usefulness, parental involvement and their perception of the influence of their mathematics teacher. The results of each of these three variables were discussed according to the relevant literature.

**Students' Perceptions of Mathematics Usefulness**

The results showed that for this variable the students' perceptions were positive which accounted for approximately 90% of the respondents. These findings were supported by Fan, et al (2005) who found that of 1215 Singapore secondary students sampled on the usefulness of mathematics, the data showed that students believed mathematics was useful (91%), the number of students who thought that it was important (89%), and learning mathematics is not wasting their time (84%). In another study conducted by Kislenko & Lepik (2005) further support of the findings was evident as results showed that (86%) of students from this study conducted, agreed that mathematics was important and (77%) of the respondents acknowledged the usefulness of mathematics in their lives. From these results it was clear that students did have very positive perceptions of mathematics as being important, useful and relevant in their everyday lives. The reason for such positive perceptions could have been attributed to the fact that students have realised that from embracing mathematics, there are many career opportunities that can be afforded to them as they sought to improve their way of living and developing themselves into future successful individuals.

### **Students' perceptions of their Mathematics Teachers**

Students' perception of their mathematics teacher encapsulated the extent to which the teacher was accessible, approachable, enjoyed teaching mathematics and had a good teacher student rapport. The results for this particular variable showed that the perception of the students were positive which accounted for approximately 91% of the respondents. These results therefore suggested that the majority of students agreed that their teachers had met the criteria and were influential in being able to motivate them to attain some level of success in mathematics and also pursue the subject at a higher level. These findings were supported by research conducted by Bolaji (2005) which showed that the influence of students' attitude towards mathematics were significantly based on the teachers' method of mathematics teaching and his personality, which greatly accounted for the students' positive perceptions and attitude towards mathematics. Also in a study done by Gunes & Gokcek (2011), by which they sought the perceptions of students concerning their attitudes towards mathematics as the teacher being the main factor. The results showed that students showed positive attitudes towards mathematics and had positive perceptions of their teachers who were friendly, warm, supportive, attached importance to their lesson in all aspects and also being able to attract and maintain students' attention. However in this same study, the students developed negative attitudes and also had negative perceptions of the teacher when the teacher punished students as a response to failure in problem solving, being boring, asking hard questions, making them anxious or perceived to be unfair. The study further revealed that students' attitudes and perceptions became negative when the teacher's instruction was poor and showed a poor command of the content area. These findings reaffirm the need for teachers to exhibit the characteristics needed for students to adopt good attitudes towards Mathematics and simultaneously improve mathematics achievement.

### **Students' Perceptions of their Parents' Involvement**

The results for this variable showed that the students' perceptions of their parents' involvement were negative; which accounted for approximately 80% of the respondents. This means that the students did not think that their parents' involvement was that significant to their achievement in mathematics. In a study done by Bishop and Forgasz (2006) that sought to distinguish between direct and indirect parental influence, argue that direct parental influence, such as helping children with mathematics difficulties, had a less important impact on students' mathematics performance. These findings of Bishop and Forgasz supported the findings of this study, since the characteristics not seen as important to the students were also defined for this variable. However, as it pertained to indirect parental influence such as parental encouragement, parental expectation and parents' attitudes towards mathematics. The findings showed that the students' perceived these characteristics as having a significant impact on their attitudes towards mathematics. These particular findings however contradict the findings of this study, as these mentioned characteristics were considered not to be significant to the students' achievement in mathematics. As the data revealed some of the characteristics showed to have positive perceptions amongst students while other characteristics did not. This could be solely due to the fact that the students within this study have taken responsibility for their own studying and future and did not need the motivation and assistance from their parents.

### **Differences in Males' and Females' Perceptions of Mathematics Usefulness**

When the data was tested using an independent samples t-test to determine whether there was a significant difference amongst girls and boys as it pertains to mathematical usefulness. The

results from table 10 revealed that there was no significant difference found between boys and girls on mathematics usefulness ( $t = -.770$ ;  $df = 168$ ;  $p = .442$ ). These findings are supported by Murimo (2012) who also sought to make the same determination, as to whether if there were any gender differences as it pertains to the same variable. The results showed that no significant difference was found, however the mean scores of the boys were greater than that of the girls for mathematics usefulness the same as for this study. In another study conducted by Farooq & Shah (2008) on students' attitudes towards mathematics of which 685 students were sampled, also found that there was no significant difference amongst male ( $M = 36.79$ ) and female ( $M = 37.34$ ) students on mathematics usefulness ( $t = 1.091$ ). It must be noted also that the standard deviations though large were approximately the same which might account for the results. Reasons for these findings can be attributed to the fact that no longer is mathematics seen as a male dominated discipline but is rather pursued by females as well, as they identify the value of mathematics to having a good career and improving other aspects of their lives. It can also be that traditionally mathematics that was mainly taught by males is now being taught by more females, hence contributing to females having more positive perceptions of the usefulness of Math.

### **Differences in Males' and Females' Perceptions of Mathematics Teachers**

The results from this study showed that there was no significant difference among male and female students' perceptions of their mathematics teachers ( $t = -.770$ ;  $df = 168$ ;  $p = .442$ ). These findings were also supported by research done by Farooq & Shah (2008) who found no significant difference amongst male and female students on the same variable with means of ( $M = 39.59$ )( $M = 40.29$ ) respectively and ( $t = 2.298$ ). These findings showed that male and female students share the same perceptions of their mathematics teachers and as a result mathematics achievement according to gender was not solely determined by the perceptions of their mathematics teacher.

### **Differences in Males' and Females' Perceptions of Parental Support**

From the test conducted on the data the results revealed that there was no significant difference between male and female students' perception of their parents' involvement as it pertains to mathematics achievement ( $t = -.728$ ;  $df = 168$ ;  $p = .467$ ). These findings are supported by those of Kleanthous & William (2010) who explore the perceived parental influence on students' achievement in mathematics among 563 students in Cyprus. The findings revealed that the perceived parental influence was not statistically significant to students' mathematics achievement. However the findings of these studies contradicted those of Olatoye & Agbatogun (2009) who in their study found that parental involvement significantly influenced the mathematics achievement of students. It can be assumed that the reason why there was no significant difference found among the male and female students, can be due to the fact that they all come from similar households where the parents were not actively involved in their children's academic pursuits. Hence the children take on the responsibility of their own achievement without any main intervention from the parents. This interpretation is supported by the low means of both male ( $M = 27.9815$ ,  $SD = 5.35703$ ) and female ( $M = 27.3276$ ,  $SD = 5.49114$ ) students on this variable. This analysis further substantiates the beliefs of Olatoye & Agbatogun (2009), that if parents play more of an integral role in their children's academics mainly in mathematics and Science, the high fail rate in mathematics would be eradicated as a result of the students being stimulated through motivation and encouragement.

### **The Relative and Joint Contributions of Mathematics Usefulness, Mathematics Teacher, Parental Involvement to Mathematics Achievement**

The results showed that the contribution of the variables mathematics usefulness, Influence of the mathematics teacher and parental involvement had a Multiple R Square of 0.062 which equated to 6.2% of the variance in mathematics achievement, with a Multiple Regression coefficient (R) of 0.250 which was significant at ( $p < 0.05$ ). As was seen the multiple regression coefficient though significant was small. One possible reason for such a small coefficient can be attributed to the fact that there are other variables that also contribute to mathematics achievement along with what has been under consideration for this study.

The results further showed that how students perceived their teacher was determined to be the best predictor for this study as it pertained to mathematics achievement. This particular finding contradicted that of Pederson, Elmore, and Bleyer (1986) who found that parent's attitudes were more significant predictors of student achievement in mathematics than other factors. According to Yee and Eccles (1988), student effort was more important than apparently innate ability in students' success in mathematics and parents played a significant role in the effort of their children. In studies done by Larwin & Jordan (2010) found that literacy amongst all other variables was the best predictor to mathematics achievement, which also contradicted the findings of this study. Base on the fact that teacher influence was identified as the best predictor, showed that the students do think that it was important for their teacher to be able to communicate with them, have a good understanding of the subject matter and encourage them to like mathematics and pursue it at a higher level are significant to their achievement in mathematics. This result further underscores Rowe (2003) as he asserts that the places where students are expected to be taught are schools, which are the most functional parts of the educational system. Therefore the need for effective schools and effective teachers are more important than any kind of school resources.

### **Conclusion**

The findings of this study showed that students had positive perceptions of their teachers and the usefulness of mathematics, however perceptions of their parental involvement was negative. Therefore it's recommended that:

- Teachers ought to continue to encourage and show interest in the progress of their students and provide the necessary intervention students might require to enhance their problem solving skills; which would directly improve students' performance in mathematics.
- Students are regularly informed as to the importance and relevance of mathematics to their everyday lives.
- Parents become more involve as it pertains to their children education in mathematics and be more aware of the challenges they encounter in the subject.

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