

Running Head: STUDENTS' ATTITUDES ABOUT MATH

Students' Attitudes about Math at the High School Level

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### Abstract

The purpose of this study was to observe whether or not senior (grade 11 and 12) math students' motivational levels and the value that they placed on math would increase if a weekly communication occurred between parents and their math teacher. The communication would give the parents information about their child's present mark in math class and marks on any recent assessments (quiz and test), upcoming assessment dates, possible solutions to increase their child's present math mark (rewrites, etc.) and recent attendance. This study was done in two different math classes: Math 12 Applications (middle stream in grade 12) and Math 11 Principles (highest stream in grade 11) and included 35 student participants. The study occurred from September 28<sup>th</sup> until November 9<sup>th</sup>, 2010 at Alberni District Secondary School. A questionnaire (Appendix C) was completed by the participants three times during the time-series study and the means from the study were analysed to see if change occurred. Positive change occurred in students' motivation to study for quizzes and tests, and the value that they placed on math in and outside of school.

## Table of Contents

<b>Abstract</b> .....	II
<b>Table of Contents</b> .....	III
<b>List of Tables</b> .....	V
<b>List of Figures</b> .....	VI
<b>Chapter 1: Problem to be Investigated</b> .....	1
A. Purpose of the Study .....	1
B. Justification of the Study .....	1
C. Research Question and Hypothesis .....	3
D. Definition of Terms.....	3
E. Brief Overview of Study .....	3
<b>Chapter 2: Background and Review of Related Literature</b> .....	5
<b>Chapter 3: Procedures and Methods</b> .....	13
A. Description of the Research Design .....	13
B. Description of the Sample .....	13
C. Description of the Instruments Used .....	14
D. Explanation of the Procedures Followed .....	14
E. Discussion of Validity .....	15
F. Justification of the Methods of Analysis Used .....	16
<b>Chapter 4: Findings/Results</b> .....	18
<b>Chapter 5: Summary and Conclusions</b> .....	26
A. Brief Summary of the Research Question and Results .....	26

- B. Discussion of the Implications of the Findings .....27
- C. Limitations .....28
- D. Suggestions for Further Research .....29
- References** ..... 31
- Appendices** .....32
  - A. Student Consent Form .....32
  - B. Research Project information .....33
  - C. Student Questionnaire .....34

## List of Tables

<b>Data Table 1:</b> Summary of student questionnaires.....	19
<b>Data Table 2:</b> Summary of each question depending on time interval.....	20
<b>Data Table 3:</b> Motivational mean and value of math mean.....	21
<b>Data Table 4:</b> Percent change.....	22

List of Figures

**Figure 1:** Representation of each question.....23

**Figure 2:** The motivational means depending on time interval.....24

**Figure 3:** The value of math means depending on time interval.....24

## Chapter 1: Problem to be Investigated

### *A. Purpose of the Study*

The author of the present study observed attitudes and perceptions that high school math students had about math and the corresponding course work. The purpose of his study was to determine if an intervention of regular teacher/parent communications would lead to an increased level of motivation as reported by secondary math students.

The math students' level of motivation was in relation to completing math assignments and in studying for tests and quizzes. The students were also asked to report on how they valued math as a subject and their perceived value of math in the real world. Therefore, a secondary purpose of this study was to measure a *change* (if occurred) in the value that the students placed on math. Essentially, students were asked to report if this value increased after their parents received weekly teacher communications.

### *B. Justification of the Study*

#### *Problem.*

The present study was developed in response to low achievement in math in School District #70. School District #70 stated in their achievement contract for 2009-2010 that, "there continues to be an unacceptable proportion of students Not Yet Meeting grade level expectations for Numeracy, which jeopardizes their success in developing more complex mathematical concepts and applying numeracy concepts in real situations" (School District #70, 2009, p. 57). Moreover, if one considered the students that were enrolled in Grade 10 in 2007-2008, only 54.4% of those students received credit for a grade ten math course (School District #70, p. 22). There existed a problem

in that 45.6% of the students in Grade 10 did not complete a math credit in their Grade 10 year.

*Justification.*

There was research to support the relationship between levels of student motivation and student achievement. According to Gottfried, Marcoulides, Gottfried and Oliver (2009) academic motivation plays a particularly important role with regards to learning and achievement because of its inherent relatedness to cognitive processing and mastery. Significant to this present study was the assertion that the steepest decline in academic motivation occurred in math as students moved up in grade level (Gottfried et al.).

Furthermore, School District #70 had a Provincial Review Team spend time in schools and then the team made four recommendations for the district. The third recommendation that emerged was that this district should “continue to support schools in their efforts to improve parental involvement” (School District #70, 2009, p. 14). The Review Team acknowledged that there was low parental involvement in this district and stated that this was a problem.

In conclusion, School District #70 (2009) clearly stated that there was a problem in the math achievement at the high school level prior to this study, and that this problem was significant to this district (School District #70, p. 58). A Provincial Review Team stated that there was a problem in this district with parental involvement (School District #70, p. 15). Gottfried et al. (2009) stated that there existed a relationship between increased levels of motivation and increased academic achievement. Therefore, there was reason to research in what ways secondary students' attitudes towards math could be

increased in this district.

### *C. Research Question and Hypothesis*

The research question asked by the author of the present study was: To what extent, if any, would weekly communications from teacher to parent, lead to math students' increased: i) levels of motivation with regard to studying and completing homework, and ii) value placed on math? The hypothesis was that students' attitudes towards math would increase as well as the value the students placed on math, if parents were given specific information about their student in relation to the math class.

### *D. Definition of Terms*

There were key terms from the research question that needed to be defined. Parents were defined as the caregivers for the living space where the student usually resided. The weekly communication occurred primarily by e-mail but also included phone calls if computer access was not available. The weekly communication included the previous week's attendance and assessment marks, overall student grade, upcoming assessment dates, assigned homework for the week, and suggestions on how a student could improve their present math mark.

### *E. Brief Overview of Study*

The study was limited to two high school math classes at Alberni District Secondary School between September 28<sup>th</sup> and November 9<sup>th</sup>, 2010. Students were asked if they wanted to participate in a research project and those that wanted to became the subjects. A questionnaire was given to the subjects and they answered each question on a scale from zero (not at all) to four (very motivated/very important). The questionnaire initiated a student response about motivation to complete math assignments, motivation

to study and prepare for quizzes and tests; and also subjects were asked about the value that they placed on math as a subject. After that, the teacher of these classes began a weekly communication with the parents of every student in those two classes. This communication continued for ten weeks. The same questionnaire was given to the subjects at the half-way mark of the study and also at the end of the study. The subjects' answers were then analyzed to determine if there was any change in their motivational levels or on the value that they placed on math class and math in the real world.

## Chapter Two: Background and Review of Related Literature

The purpose of this study was to observe whether or not senior math students' motivational levels and the value that they placed on math would increase if a weekly communication occurred between parents and their math teacher. The following literature related directly to the present study.

Jeynes (2007) extensively reviewed previously published American-based research on the relationship between parental involvement and secondary school student achievement. Jeynes used a quantitative style of meta-analysis on 52 previously published studies to determine if parental involvement did improve the educational outcomes of secondary students. Jeynes then considered four research questions and used the meta-analysis to develop conclusions about each one (Jeynes). The four questions were: i) to what extent does parental involvement affect achievement outcomes in urban children, ii) do programs of parental involvement affect urban student achievement, iii) what are the specific aspects of parental involvement that help urban students the most and iv) what is the relationship between parental involvement and educational outcomes across racial and gender groups (Jeynes)? Jeynes' conclusions from the meta-analysis were that parental involvement had a positive impact on children's academic achievement across all racial and gender groups. Jeynes also claimed that parental involvement programs do indeed affect student achievement; parental expectations and parental style affected student achievement the most.

Jeynes (2007) included 52 studies that involved over 300 000 students in this meta-analysis. However, only one of the studies was published after the year 2000 and five of the studies were published prior to 1990. As already mentioned, the author

attempted to answer four questions and therefore had many variables to define (Jeynes). A few examples of these variables were specific parental involvement, general parental involvement and parental style. The definition given for general parental involvement was a specific measure of parental involvement, as distinguished from other measures of parental involvement used in this study. This definition was one example of a variable that was difficult to comprehend in this study and this lack of concrete wording limited the overall effectiveness of the findings. Jeynes' findings could have been more effective had he considered fewer variables and fewer research questions. However, it should be noted that the researcher compiled data and drew conclusions from a wealth of previously published research (Jeynes). Therefore, Jeynes made an important contribution to understanding the relationship between parental involvement and academic achievement.

Jeynes (2007) found significant evidence to support the relationship that parental involvement positively influences academic achievement. This was significant to the present study because the researcher communicated with parents and it was assumed that this may increase parental involvement in their students' math class.

Fan and Williams (2009) studied various dimensions of parental involvement and the influence that this involvement has on grade 10 students' motivation. Fan and Williams used questionnaire answers from 15,325 adolescents and their parents as their sample. This American data came from the Educational Longitudinal Study of 2002 (Fan and Williams). The researchers calculated the means of 18 variables which included maths self-efficacy, engagement, maths intrinsic motivation and parent-school communication.

Their most significant findings showed that both parents' educational aspirations

and school-initiated contact with parents on benign issues had a strong influence on students' motivational levels (Fan and Williams, 2009). This study examined whether or not some facet of the parent-child relationship can predict achievement motivation in a grade ten student. The authors contributed significantly to the contemporary research by using adolescents as the subjects and by focusing on eight dimensions of parental involvement. A significant finding was that benign communication between school and parents increase students' motivational levels; however, communication that concerns students' poor performance or behaviour problems have strong negative effects on student motivation (Fan and Williams).

Therefore, the authors contributed to the contemporary research; however, there are limitations on causality if you consider the parent-child relationship as one that is complex and multifaceted. Also, the authors used a cross-sectional study; a longitudinal study would be useful to compare the findings over time. Considerations for further study might include researching whether or not the impact of parental involvement on student motivation decreases significantly as the student matures.

Fan and Williams' (2009) research was significant to the present study because they found that the type of communication between parents and teacher either hindered or increased student motivation. Students that had a low math grade at the beginning of the present study may have felt that the parent-communication was negative and this may have hindered their motivational levels.

Potvin, Deslandes and Leclerc (1999) examined the influence of family demographic characteristics and the relationship they had on student achievement. In particular, Potvin et al. isolated variables such as the socioeconomic status of families,

family size and structure, parents' education levels, parenting style and parental involvement to see if these could be used as predictors for student academic achievement. In order to examine the influence in question, Potvin et al. gave a questionnaire to 525 students from 2 schools in Quebec and then did a qualitative analysis on the students' answers. Potvin et al. reported a positive correlation between parents' education levels and school grades, and a negative correlation between family structure and academic achievement. For example, students whose parents had recently divorced achieved less at school. However, parents who showed affective support, parental warmth and involvement with school also showed a positive correlation with student achievement regardless of whether students came from broken or intact homes, and from highly educated or less educated parents (Potvin et al.).

Potvin et al. (1999) relied on research methods that one of them, Deslandes, had previously published. Potvin et al. stated that, "in a previous report, we provided evidence of a positive relationship between each of the three parenting style dimensions (i.e., warmth, supervision and psychological autonomy granting) and school achievement" (Potvin et al., p. 142). The results could have been more persuasive had the findings from Potvin et al. not been published previously by one of the three authors. In fact, Potvin et al. explicitly stated that they were relying on the methods and definitions from the past research (Potvin et al., p. 143). The possibility of researcher bias in a particular study could have been minimized had Potvin et al. altered their study significantly from past ones. Furthermore, Potvin et al.'s findings all came from students' self-reporting of information and the results could have been more meaningful had they also contained a questionnaire for parents.

This study analysed various family structures and the influence that each structure had on student achievement. The influence of parents on student achievement was significant to the present study because the present study's purpose was to initiate parent-teacher communication and to explore the possibility of an increase in parental involvement.

Sirvani (2007) considered the effect of parental involvement on students' mathematics achievement at the high school level. Sirvani examined two experimental math classes and two control group classes at one Texas high school. The parents of the students from the two experimental groups received bi-weekly monitoring sheets that contained students' homework and test grades. This copy was to be signed by the parents and returned to the teacher. This occurred for a period of 12 weeks. Sirvani analysed students' test scores during the 12 weeks to observe if there was an improvement in academic achievement. Sirvani claimed that the findings suggested that the experimental group outperformed the control group in both test and homework achievement scores. Sirvani concluded that the data revealed that many parents want to help their children and this would be easier if they were aware of their children's academic problems.

Sirvani (2007) did mention that a study with a larger sample size would make the results more conclusive. Furthermore, the review of literature consisted primarily of research that was over ten years old. Finally, it should be noted that Sirvani's research was completed over 12 weeks and a longer study would have made the findings more conclusive. There was much previously published research on parental involvement at the elementary level, and Sirvani did make a contribution to understanding the relationship between parental involvement and student achievement at the high school level.

Sirvani's research is significant to the present study because it studied the effect of parental involvement on high school math students' achievement. The present study will use a similar sample group of high school math students and their parents.

Furthermore, one of Sirvani's conclusions was that parents wanted to be involved with their child's math education but were unsure how to, and teacher communication gave them information about how to be involved. The present study intended to give the parents information so that they could also get involved in their child's math education.

Hardre, Davis and Sullivan (2008) discussed succinctly the relationship that may exist between high school students' motivational levels and the teachers' perception about their students' academic levels. Hardre et al. created their own questionnaire for teachers, the Perceptions of Student Motivation (PSM) questionnaire, and gave it to 75 teachers in the United States and 404 teachers in an East Asian nation. They analysed the means of 20 questions on the PSM questionnaire that surround the issue of teachers' perceptions of student motivation.

The importance of knowing teachers' perceptions of student motivation precipitates from the relationship between teacher perceptions and actions (Hardre et al., 2008). The authors contributed to the research on student motivation as their study considered the importance of teacher perceptions and their corresponding actions. The authors found that teachers' actions were related to their perception of their students' motivational levels. For example, the authors argued that teachers' actions are defined by what they perceive in their classes and this includes students' motivational levels. Hardre et al. also discussed the difficulty in measuring students' motivational levels either by interview or questionnaire. The authors stated that a sound questionnaire was

recommended to measure these levels and furthermore they published an exemplary questionnaire in their appendix.

However, the authors only tested their questionnaire on two groups: 75 teachers in a Southwest state in the United States and 404 teachers in an East Asian Nation. The cultural differences that may exist in these two specific regions were not discussed in detail in this study and this may have influenced the validity of the research. However, the questionnaire was comprehensive and could also be used as a teacher self-assessment about one's own perception about the levels of student motivation in any given class.

Hardre et al.'s study (2008) was significant to the present study because they analysed students' lack of motivation, students' actual motivational levels and the relationship these have on teachers' perceptions and the corresponding teacher actions. For example, if teachers perceive higher student motivational levels in their classes they may instruct differently. This study was a rationale for attempting to increase student motivational levels in the classroom. The researcher of the present study intended to observe if motivational levels increased and Hardre et al.'s analysis of students' actual motivational levels was significant to the present study.

Hoang (2007) stated one factor that influences students' motivational levels was the level of parental involvement. The nature of this involvement was significant as it could increase the students' motivation with their learning or inhibit motivation. Hoang stated that this study was designed to expand upon the existing research on the relation between parenting practices and motivation. In other words, was there a parenting style that fosters optimal motivation? The parenting styles considered were authoritative, authoritarian and permissive. Hoang questioned 140 algebra students from California

aged 14 to 17 about their motivational levels and the type of parenting that they received. Hoang stated that a relationship existed between authoritative parents, who act both democratic and nurturing, and the child's desire to learn for the sake of learning (Hoang). There existed a negative correlation between the child's desire to learn and permissive parents. Significantly, Hoang suggested that a relationship existed between students who believe their parents to be personally involved and the students being motivated to perform in order to avoid feelings of inferiority.

Hoang (2007) contributed to the research about the relationship between parental involvement and students' motivational levels. Suggested further studies might include doing this same study with more participants from various geographical areas. One significant conclusion from this research was that students engaging in academic tasks for the sake of learning also tended to feel more autonomous from their parents and the parental influence was less. However, students from authoritative parents had significantly higher levels of motivation than those from authoritarian and permissive families. Hoang's research was significant to the present study because Hoang concluded that parental involvement motivated students to work harder in their studies.

### Chapter 3: Procedures and Methods

#### *A. Description of the Research Design*

The purpose of this study was to observe whether or not senior (grade 11 and 12) math students' motivational levels and the value that they placed on math would increase if a weekly communication occurred between parents and their math teacher. The participating students completed a questionnaire (Appendix C) on September 28<sup>th</sup>, October 19<sup>th</sup> and November 9<sup>th</sup>, 2010. On September 30<sup>th</sup>, 2010, a weekly communication began between parents and teacher. This was the first of eight weekly communications.

The research design of the present study was a time-series study. The subjects completed a pre-test, a test half-way through the study and a post-test in the form of a questionnaire (Appendix C). Data analysis was done on the means to determine if change had occurred in either the students' levels of motivation with respect to math or the value that the students placed on math. Data analysis was also done on each question separately to observe if any significant change had occurred on any one aspect: motivation to complete homework (Q1), motivation to study for quizzes (Q2), motivation to study for tests (Q3), value of math in school (Q4) and value of math outside of school (Q5).

#### *B. Description of the Sample*

The sample was 35 grade 11 and 12 math students from Alberni District Secondary School in School District # 70. All the students volunteered to be participants in this study. The two classes were Applications of Math 12 and Math 11 Principles. The Applications of Math class was the middle level math stream, and Principles is the highest level stream offered in the British Columbia curriculum. All the subjects had the same math teacher and both classes began in September 2010. In total, there were

approximately 50 math students in the two classes.

### *C. Description of the Instruments Used*

An anonymous paper-based questionnaire (Appendix C) was given to the students three times during the study. Each question was answered on a horizontal line scaled from zero (not at all) to four (very motivated/very important). Each of the five questions was given a value from zero to four and means were calculated for each question in each of the three time periods:  $T_0$ ,  $T_1$  and  $T_2$  using Microsoft Excel.

The participants were asked to rate their level of motivation towards some specific component of math or math class in the first three questions. The average of the means of the first three questions was also calculated for each of the three time periods:  $T_0$ ,  $T_1$  and  $T_2$ . The participants were then asked about the value the students placed on math in school and outside of school in the last two questions of the questionnaire. The average of the means of the last two questions were also calculated for each of the three time periods:  $T_0$ ,  $T_1$  and  $T_2$ .

### *D. Explanation of the Procedures Followed*

The purpose of this study was to observe whether or not senior (grade 11 and 12) math students' motivational levels and the value that they placed on math would increase if a weekly communication occurred between parents and their math teacher. The procedures followed related directly to the present research question.

On September 20, 2010, the researcher asked all the students from two math classes if they would like to participate in a research study. The researcher explicitly stated that any student could leave the study at any time without penalty. Those students that were interested were given a consent form (Appendix A) they returned later that

week and those students became the participants of the present study. On September 28, the participants were given a questionnaire (Appendix C) during the lunch period and this formally began the research study. The completed questionnaires were immediately placed in a sealed envelope and placed in the locked school administration safe until the end of the study. This initial testing period was titled  $T_0$  during the study and this was written on the front of the sealed envelope.

On September 30, 2010, the first of eight weekly communications was sent home to parents. Every student in both classes received this communication regardless of whether they were a research participant. The weekly communication included the student's present grade, recent attendance, dates of future quizzes or tests, and teacher suggestions on how to increase achievement. Suggestions on how a student might increase their achievement included re-writing of test or quiz options, tutorial recommendations and the corresponding tutorial times. This communication continued each week. On October 19, the researcher gave the same questionnaire (Appendix C) to the research participants during lunch, and on November 9, the participants again received the questionnaire and this ended the research period. The research period was eight weeks in total. Each time the participants' completed questionnaires were immediately placed into a sealed envelope and placed directly into the locked safe.

#### *E. Discussion of Validity*

The questionnaire contained five questions: the subject of the first three questions was motivation and math; the other two questions' subject was the value of math as reported by students. Therefore, the questionnaires related directly to the researcher's purpose in this study. The questionnaires were anonymous and the researcher was present

when students completed the questionnaires. The researcher asked the students to complete the questions as accurately as possible and only to answer the questions that they felt comfortable to respond to. The researcher immediately placed the completed questionnaires into a sealed envelope, and the envelope was placed in a locked safe.

#### *F. Justification of the Methods of Analysis used*

##### *Data Analysis.*

The three sealed envelopes labeled  $T_0$ ,  $T_1$  and  $T_2$  were collected by the researcher from the locked safe and analysed in an administrators office at the end of the study.  $T_0$  represented the initial test time,  $T_1$  was the second test time and  $T_2$  was the final set of completed questionnaires. The researcher analysed the students' questionnaires by dividing questions one, two and three into the subcategory of motivation and questions four and five were analysed separately in the subcategory of the value of math. Therefore, a separate analysis occurred on students' levels of motivation and on the value the students placed on math. However, the five questions were also analysed separately to determine if significant change occurred within each individual question.

The actual data analysis was done on the means of each question (refer to Data Table 2). The researcher determined the percent change that occurred in the means during the study for each of the five questions (refer to Data Table 4). A data analysis was also done on the average of the means of Q1, Q2 and Q3 and an average of the means of Q4 and Q5 (refer to Data Table 3). Questions Q1, Q2 and Q3 asked about student motivation to do math related tasks. Questions Q4 and Q5 were questions that related to the value that the students placed on math. The researcher did a further analysis on the percent increase in the average mean from Q1, Q2 and Q3 (refer to Data Table 4). A parallel

analysis was done on the average mean from Q4 and Q5 in order to determine the percent increase during the study (refer to Data Table 4).

If the means had increased by 10% during the duration of the study, then the researcher concluded that meaningful change had occurred. If the means during the study had increased by 30%, then the researcher concluded that very meaningful change had occurred. In summary, the means for student levels of motivation (Q1, Q2 and Q3) were analysed independently from the means for the value placed on math (Q4 and Q5), and each individual question was analyzed independently as well.

*Justification.*

The data analysis outlined above related directly to the purpose of the present study. The purpose of the study was to determine if students' motivation to do math or the value that the students' placed on math increased during the study. The calculation of the means and the corresponding analysis done on the means allowed the researcher to determine if change had occurred.

## Chapter 4: Findings and Results

The purpose of this study was to observe whether or not senior (grade 11 and 12) math students' motivational levels and the value that they placed on math would increase if a weekly communication occurred between parents and their math teacher. The participating students completed a questionnaire (Appendix C) on September 28<sup>th</sup>, October 19<sup>th</sup> and November 9<sup>th</sup> 2010. On September 30<sup>th</sup>, 2010, a weekly communication began between parents and teacher. This was the first of eight weekly communications.

In Data Table 1, the researcher summed all the student responses to each question for each of the three time periods:  $T_0$ ,  $T_1$ , and  $T_2$ . Each student response was given a mark from zero to four (Appendix C). A zero was recorded for an answer of "not at all" and the score increased by one at each increment for a maximum of four which represented "very important/motivated." Also the number of participants were calculated based on the number of questionnaires received at each of the three time periods:  $T_0$ ,  $T_1$ , and  $T_2$ .

Data Table 1: Summary of student questionnaires

	Q1	Q2	Q3	Q4	Q5
$T_0$ total score	74.75	67.25	83.25	84.25	56.75
$T_0$ number of participants(n)	29	29	29	29	29
$T_1$ total score	72.5	73.25	94	101.5	69.25
$T_1$ number of participants(n)	32	32	32	32	32
$T_2$ total score	73	79.5	94.25	96.5	63.75
$T_2$ number of participants(n)	29	29	29	29	29

Data Table 1 was a summary of the data from the students' questionnaires. Question 3 (Q3) and Question 4 (Q4) have higher total scores than the other three questions for all the three time periods:  $T_0$ ,  $T_1$ , and  $T_2$ . The researcher asked the question about student motivation to study for math tests in question 3 (Q3). In question 4 (Q4), the researcher asked the students the value they placed on math at school (Appendix C). The actual difference will be documented in Data Table 2.

In Data Table 2, the researcher calculated each mean for each of the five questions depending on which of the three time intervals,  $T_0$ ,  $T_1$ , and  $T_2$ , the student response came from. All data used to make the calculations in Data Table 2 was from

Data Table 1. Each mean was calculated by dividing the total score for each question by the total number of participants during that specific time period.

Data Table 2: Summary of each question depending on time interval.

	Q1 (mean)	Q2 (mean)	Q3 (mean)	Q4 (mean)	Q5 (mean)
$T_0$	2.578	2.319	2.870	2.905	1.957
$T_1$	2.266	2.280	2.940	3.172	2.164
$T_2$	2.517	2.741	3.250	3.328	2.199

The means increased in all the questions during the study with the exception of the first question. The first question asked if students felt motivated to complete homework assignments (Appendix C).

In Data Table 3, the means of the first three questions Q1, Q2 and Q3 (Data Table 2) were summed together and divided by three for each of the three time periods:  $T_0$ ,  $T_1$ , and  $T_2$ . These three questions all related to student motivation (Appendix C) and this mean will be referred to as the motivational mean for each of the three time periods:  $T_0$ ,  $T_1$ , and  $T_2$ . Question 4 and question 5 relate to the value that students place on math in school and outside of school. The means of question 4 and question 5 were also summed together and divided by the total number of student responses for each of the three time periods:  $T_0$ ,  $T_1$ , and  $T_2$ .

Data Table 3: Motivational mean and value of math mean depending on time interval

	Average of the means of Q1, Q2 and Q3 (Motivational mean)	Average of the means of Q4,Q5 (Value of math mean)
$T_0$	2.591	2.431
$T_1$	2.495	2.668
$T_2$	2.837	2.765

The means for Q1, Q2 and Q3 were summed together and divided by three to give the overall motivational mean for each time period. The means for Q4 and Q5 were summed together and divided by two to give the overall value of math mean for each of the three time periods. Both the motivational mean and the value of math mean increased during the study.

In Data Table 4, the change in each question during the study was documented as either a percentage increase or a percentage decrease. Furthermore, the percent change in the average of the motivational means (Q1, Q2 and Q3) was also calculated as was the percent change in the average of the value of math mean (Q4 and Q5).

Data Table 4: Percent Change

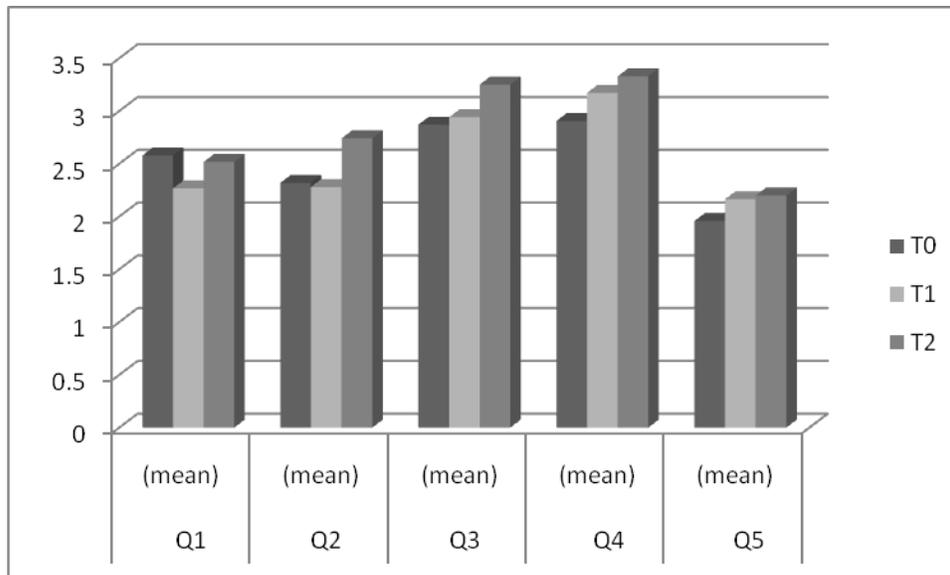
	Summary of Question(s)	Numeric change in means during the study	Percent change of means during the study
Q1	Motivation to complete homework	2.578 to 2.517	Decrease by 2.4%
Q2	Motivation to prepare for math quizzes	2.319 to 2.741	Increase by 18.2%
Q3	Motivation to prepare for math tests	2.870 to 3.250	Increase by 13.2%
Q4	Importance of math at school	2.905 to 3.328	Increase by 14.6%
Q5	Importance of math outside of school	1.957 to 2.199	Increase by 12.4%
Q1, Q2, Q3	Overall motivation in math class activities	2.591 to 2.837	Increase by 9.5%
Q4, Q5	Overall value of math	2.431 to 2.765	Increase by 13.7%

In this study, change was deemed meaningful if the means increased by 10% or more. Therefore, motivation to prepare for math quizzes (+18.2%), motivation to prepare for math tests (+13.2%), the importance of math at school (+14.6%), the importance of math outside of school (+12.4%) and the overall value the students' placed on math (+13.7%) all indicated meaningful change. The students' motivation to complete homework (-2.4%) was the only question that decreased during the study. The largest

increase occurred in the participants' motivation to prepare for math quizzes (+18.2%).

Figure 1, Figure 2 and Figure 3 were visual representations of the findings in Data Table 4. Figure 1 showed the change over the duration of the study for each of the five questions.

Figure 1: Representation of each question depending on the time interval.



This figure displayed each question individually to show the change in each question during the study. Q2 (motivation to study for quizzes) increased by 18.2%, Q3 (motivation to study for tests) increased by 13.2%, Q4 (importance of math at school) increased by 14.6% and Q5 (importance of math outside of school) increased by 13.7%. However, Q1 (motivation to complete homework) decreased by 2.4% during the course of the study.

Figure 2: The motivational means depending on the time interval.

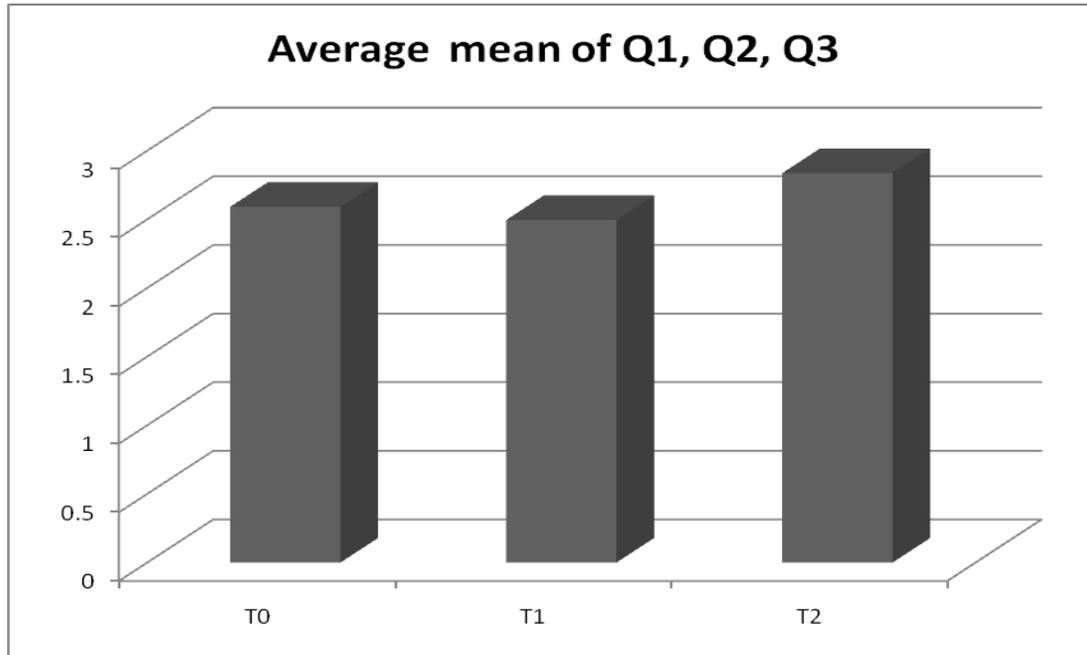


Figure 2 displayed an overall increase in the motivational means (Q1, Q2 and Q3) as reported by the students. The increase was 9.5% over the course of the study.

Figure 3: The value of math means depending on time.

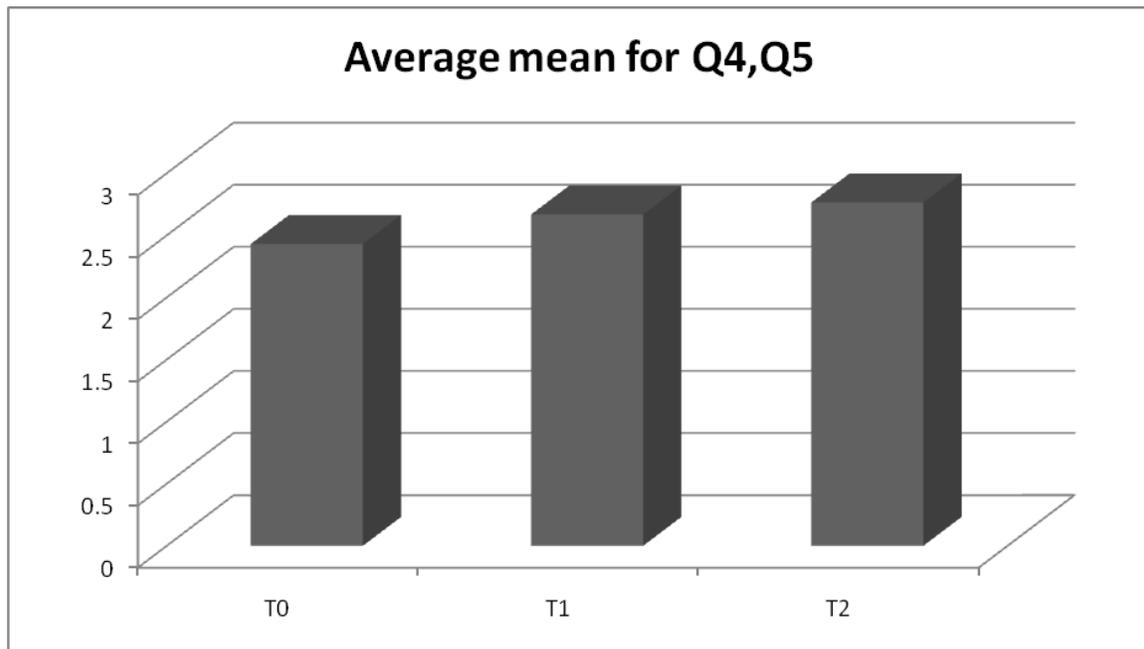


Figure 3 displayed the increase in the value of math mean (Q4, Q5) as reported by the

students. The increase was 13.7% during the study.

## Chapter 5: Summary and Conclusions

### *A. Brief summary of the research question being investigated, the procedures employed, and the results obtained*

The purpose of the study was to determine if students' motivation to do math or the value that the students' placed on math increased if a weekly communication occurred between parents and the students' math teacher. The participants were from a Math 11 Principles class and a Math 12 Applications class. The procedures employed to study this question was to give the student a questionnaire (Appendix C) three times to see if any meaningful change occurred in the means of the questions. The questionnaires were given out September 28<sup>th</sup>, October 19<sup>th</sup> and November 9<sup>th</sup> in 2010. During this time-series research project weekly communication did occur between the participants' parents and the participants' math teacher.

The results showed that motivation to prepare for math quizzes increased by 18.2%, motivation to prepare for math tests increased by 13.2%, the importance of math at school increased by 14.6%, and the importance of math outside of school increased by 12.4% during the course of this study. The researcher stated that meaningful change was an increase of at least 10%. Therefore, meaningful change occurred in students' motivation to prepare for math quizzes, students' motivation to prepare for math tests, the importance that student's placed on math at school, the importance that students' placed on math outside of school and the overall value the students' placed on math.

Students' motivation to complete homework decreased by 2.4% and was the only question that decreased during the study. The overall motivation mean increased by 9.5% and the overall value of math mean increased by 13.7%. The overall value of math mean

indicated meaningful change because it increased by at least 10%.

*B. Discussion of the implications of the findings-their meaning and significance*

The purpose of the study was to determine if students' motivation to do math or the value that the students' placed on math increased if a weekly communication occurred between parents and the students' math teacher. The participants were from a Math 11 Principles class and a Math 12 Applications class. The procedures employed to study this question was to give the student a questionnaire (Appendix C) three times to see if any meaningful change occurred in the means of the questions. The questionnaires were given out September 28<sup>th</sup>, October 19<sup>th</sup> and November 9<sup>th</sup> in 2010. During this time-series research project weekly communication did occur between the participants' parents and the participants' math teacher.

The findings were that some positive meaningful change occurred in these two senior classes between the dates September 30, 2010 and November 9, 2010. The results showed that motivation to prepare for math quizzes increased by 18.2%, motivation to prepare for math tests increased by 13.2%, the importance of math at school increased by 14.6%, the importance of math outside of school increased by 12.4% and the overall value of math increased by 13.7%. The only structural change that occurred in those two classes during that period was a weekly communication between students' parents and teachers.

Therefore, the central implication from the present study was that senior math teachers should strongly consider implementing weekly communication with students' parents. In only 8 weeks, the students reported an increase in motivation to prepare for quizzes and tests by 18.2% and 13.2% respectively. The students also reported that the

value that they placed on math in school and outside of school increased by 13.7%. The present study began because the researcher observed that many senior math students' motivational levels in math class were low and the researcher also observed that many students appeared to not value math. The results were positive and the researcher of the present study will communicate weekly to parents in all future classes.

The teacher also noted that many parents seemed pleasantly surprised to have all this knowledge about their child's present standing in math class. According to the teacher, many parents also stated that they were going to talk to their child about some aspect that came from the parent-teacher communication. According to Fan and Williams (2010) parents are more likely to communicate with and provide guidance to their children following an informational communication with a teacher and, as a result, benefit students' engagement and motivation of that class.

The one area where there was a decrease was in students' motivation to complete homework assignments. In this teacher's classes, homework was considered formative assessment and only contributed to a very small percentage of the students' overall mark. It was possible that students became less motivated over time to complete homework because it did not affect their overall mark significantly. The teacher reported that this decrease in student motivation to complete homework will result in a change to include homework as a larger part of the final mark in upcoming years.

### *C. Limitations*

A limitation of this study was the relatively small sample size. This study occurred in two math classes with 35 students and their parents. This relatively small sample, from the same school could have been influenced by many external forces in and

outside of the school such as the media, friends, or other teachers. The three sample sizes were 29, 32 and 29 out of a possible 35 participants. Having six, three and six students truant on the questionnaire completion dates may have influenced the data as well. Having different students not present during a questionnaire day could have altered the data significantly in a study with a relatively small sample of 35.

Furthermore, the three dates selected to do this study were selected randomly and factors such as assessments (tests or quizzes) that week, or proximity to report card dates could have influenced student motivation or the value they placed on math at any given time. It was possible that the increase in motivation and value may be connected to the fact that each time period was closer to the final exam, the end of the course, and the last reporting period. In conclusion, this study suggested that there may be a relationship between levels of student motivation and the value students place on math, and regular communication between parents and teacher.

Another limitation of this study was that all participants had the same math teacher. Both math classes in this study included homework as part of formative assessment and the homework did not factor into the final mark in either class. This may have been the reason that the students' motivation to complete homework decreased during this study. The fact that only one math teacher's classes were included in this study was a limiting factor on the strength of the findings. The findings suggest that there is a relationship between parent-teacher communication and students' levels of motivation and the value students' place on math; however, more research is needed.

#### *D. Suggestions for further research*

This study suggested that regular communication between teacher and parents might positively influence students' motivational levels and the value that they place on

math. A study that included a larger sample size of senior math students would offer further evidence about this possibility. Furthermore, a longer study for an entire semester would also enhance the evidence. This study was limited to senior math students but a further study for grade 9 and 10 math students would have some significance to this study as it would support or refute the idea that this may be a broader relationship across all age groups. The final study that may be pertinent is to also incorporate parents' beliefs about whether or not they believed that regular communication was useful to their students' education. The researcher of the present study did not determine what the parents did with the information they received from the daily communication. They may have communicated with their child about it or they may have done nothing. This is significant in developing a better understanding of student motivation and value placed on math and the relationship this may have with parental support.

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## Appendix

## A) Student Consent Form



## RESEARCH CONSENT FORM

## "STUDENTS' ATTITUDES ABOUT MATH AT THE HIGH SCHOOL LEVEL"

September, 2010

Sean Petersen  
 Master's of Education Student  
 Vancouver Island University  
[spetersen@sd70.bc.ca](mailto:spetersen@sd70.bc.ca)

Harry Janzen, Ph.D., Supervisor  
 Dean of Education  
 Vancouver Island University  
 (250) -740-6220

I am a student in a university-level research methods course. This course requires us to gain applied experience in designing and conducting research. As such, I have designed a research project to study the relationship between levels of motivation, the value that students' place on math and communication between teachers and parents.

During this study, you will be asked to complete three questionnaires on specific dates. The questionnaires will contain five brief questions about your level of motivation with respect to math class and the value that you place on math. Your participation will require approximately 15 minutes of time.

There are no known harms associated with your participation in this research. All records of participation will be kept strictly confidential, such that only I, and an administrator, will have access to the information. Data will be stored in a locked safe within the administrator's office. Data will be destroyed by fire at the end of the project, approximately September 2012. Electronic files will also be deleted at that time. The results from this study will be reported in a written research report and an oral report during a class presentation. Information about the project will not be made public in any way that identifies individual participants.

Your participation is completely voluntary. You may withdraw at any time for any reason without explanation and without penalty. You may choose to answer any question that makes you feel uncomfortable.

If you have any concerns about your treatment as a research participant in this study, please contact the VIU Research Ethics Officer, by telephone at 250-753-3245 (ext. 2665) or by e-mail at [reb@viu.ca](mailto:reb@viu.ca).

If you have any questions about the research project, or would like more information, please feel free to contact me at the e-mail address below:

Sean Petersen  
 Master's of Education Student  
 Vancouver Island University

[spetersen@sd70.bc.ca](mailto:spetersen@sd70.bc.ca)

I have read the above form, understand the information read, understand that I can ask questions or withdraw at any time. I consent to participate in today's research study.

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 Participant's Signature

---

 Date

## B) Research Project Information



VANCOUVER ISLAND  
UNIVERSITY

## RESEARCH PROJECT INFORMATION

“STUDENTS’ ATTITUDES ABOUT MATH AT THE HIGH SCHOOL  
LEVEL”

I am a student in a university-level research methods course. This course requires us to gain applied experience in designing and conducting research. As such, I have designed a research project to study the relationship between students’ levels of motivation, the value that students’ place on math and communication between teachers and parents.

During this study, you will be asked to complete three questionnaires on specific dates. The questionnaires will contain five brief questions about your level of motivation with respect to math class and the value that you place on math. Your participation will require approximately 15 minutes of time.

Your participation is completely voluntary. You may withdraw at any time for any reason without explanation and without penalty. You may choose to answer any question that makes you feel uncomfortable.

If you would like to participate, a consent form will be available at the beginning of lunch on September 23, 2010.

If you have any questions about the research project, or would like more information, please feel free to contact me at the e-mail address below:

Sean Petersen

Master’s of Education Student

Vancouver Island University

[spetersen@sd70.bc.ca](mailto:spetersen@sd70.bc.ca)

## C) Student Questionnaire



Instructions: Please answer the following questions by placing an X on the line graphs below.

- 1) How motivated are you to complete homework assignments from math class?

Not at all

Very motivated



- 2) How motivated are you to study for math quizzes?

Not at all

Very motivated



- 3) How motivated are you to study for math tests?

Not at all

Very motivated



- 4) Is math important to you at school?

Not at all

Very important



- 5) Is math important to you outside of school?

Not at all

Very important

