Lebanese Middle School Students' Attitudes toward Math as a Subject and toward Math Teachers

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Elissar Majed Hamzeh
Lebanese American University

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Student Name: Elissar Majed Hamzeh
I.D. #: 199809920
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Department: Education Department
School: School of Arts and Sciences
Approved by:
Project Advisor: Dr. Ketty Saroughim
Member: Dr. Iman Osta
Date: June 29, 2009
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Name: Elissar Majed Hamzeh

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To my great family
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Abstract

The purpose of this study was to examine the relationship between 7th, 8th, and 9th grade Lebanese students’ attitudes toward mathematics as a subject matter and their attitudes toward their math teachers. Another purpose was to investigate teachers’ perceptions of their students’ attitudes toward math as a subject and toward their math teachers. The three instruments used are questionnaires distributed to students, interviews conducted with teachers and observations of classroom climate. The results showed that there is a strong and significant positive correlation between students’ attitudes toward math as a subject and students’ attitudes toward their math teachers. The study also revealed that there are no significant gender differences in either the students’ attitudes toward math as a subject or toward their math teachers. Moreover, interviews with teachers showed that they perceived their students as having generally positive attitudes toward math as a subject and toward them as math teachers. Larger samples that include participants from all grade levels and from diverse schools are needed for generalizing the results on the national level.
CHAPTER ONE

Introduction

Context of the Problem

Several studies have revealed the positive influence that teachers have on their students’ learning (Biggs, 1989; Kember, 1997). Students’ attitudes significantly affect the teaching-learning process (Bryson & Hand, 2007). According to Babad (1993), “students are the main clients of the educational system” (p. 359). These “clients” provide distinctive information that might be more beneficial than any other data provided by observers, teachers, and coordinators about educational environments and classroom climates. Students are able to reveal a more comprehensive image of the classroom environment since they are the ones mostly concerned, whereas observers’ information might be limited due to their short stay in a classroom and due to the fact that teachers act their best during observers’ presence (Fraenkel & Wallen, 2006). In the past, studying classroom climate relied mainly on observations but at present, students’ attitudes and beliefs are considered to be the first source of information in assessing students’ learning environment (Babad, 1993; Telese, 1999).

There is an agreement in the literature on the significance of studying students’ attitudes as an influential factor on their motivation and cognitive processes (Muis, 2004). Specifically, in the field of mathematics, studying students’ attitudes has become as essential as assessing their mathematical knowledge (NCTM, 1989). Meleod (1992) argues that in the field of mathematics, affective issues such as students’ beliefs, attitudes, and emotions are equally as important as cognitive issues, such as achievement and instructional activities. Garofalo (1989) also emphasizes that mathematics education in school plays a significant role in the formation of attitudes and beliefs toward math as a subject and knowledge in general.
Research Questions

The following questions guide this study:

- What are Lebanese middle school students’ attitudes toward math as a subject?
- What are Lebanese middle school students’ attitudes toward their math teachers?
- What is the relationship between students’ attitudes toward learning mathematics as a subject matter and their attitudes toward their math teachers?
- How do Lebanese teachers perceive their students’ attitudes toward math as a subject and toward them as math teachers?

Purpose of the Study

Learning and achievement are influenced by numerous factors. One of the important factors is students’ attitudes toward certain subject matters, as well as their perceptions of their teachers’ styles of instruction. Abundant research has been conducted in the West on students’ attitudes toward the teaching styles and behaviors of teachers (Babad, 1993; Brok, Bergen, & Stahl, 2002; Marcus, 1991; Nichols, Jones, & Hancock, 2003) and their attitudes toward different subject matters (Gilroy, 2002; Stodolsky, Salk, & Glaessner, 1991).

However, few studies have attempted to investigate the relationship between both. The purpose of this study is to extend previous research by examining the relationship between the attitudes of middle school students toward mathematics as a subject matter and their attitudes toward their math teachers. Another purpose is to investigate teachers’ perceptions of their students’ attitudes toward math as a subject and toward them as math teachers.

Rationale and Significance

Abundant research has been conducted in the West on students’ attitudes toward mathematics and their attitudes toward their teachers. According to Bryson & Hand (2007), Kloosterman, Raymond, & Emmenaker (1996), Mcleod (1992), and Nickson (1992), investigating students’ attitudes toward math is significant in the field of mathematics.
In Lebanon, examining similar attitudes is also important. All students following the Lebanese curriculum study math as a mandatory subject in the middle school cycle (grades 7-9). High school students in grades 10-12, also study math as a mandatory subject. However in grades 11 and 12, students select the level of math difficulty and scope depending on the track they choose to follow. The number of math hours that students have to attend differs among the four program options available in the Lebanese curriculum. On a weekly basis, students in the “General Science” program attend 12 math hours, students in the “Life Science” program attend seven math hours, students in the “Sociology and Economics” program attend six math hours, and students in the “Humanities and Philosophy” program attend three math hours. The level of math difficulty increases as the number of hours attended increases. Students who pass the “Life Science” or “General Science” official examinations will have more chances of studying purely scientific majors in college because those students have the necessary math prerequisite knowledge. Therefore, Lebanese students’ positive attitudes toward learning math, such as perceiving its usefulness and having preference for the subject matter, are significant predictors of whether these students will choose to study high level of mathematics in grades 11 and 12 and consequently, are able to study purely scientific majors in college such as engineering and medicine.

Moreover, awareness of students’ attitudes is beneficial for Lebanese math teachers because understanding how students perceive math as a subject might help in identifying their needs and consequently, guides teachers to adjust their teaching methods and styles for effective teaching.

On the other hand, little research has been conducted on students’ attitudes and beliefs of the math subject in Lebanon. Therefore, research on this topic is necessary to help Lebanese math educators become aware of students’ attitudes and consequently, meet their
needs effectively. Given the significance of this topic, the researcher of the current study has decided to examine students’ attitudes of mathematics in middle school as these attitudes affect their math as a subject.

Operational Definitions of Variables

This study targets middle school students in grades 7-9 enrolled in Lebanese schools and following the Lebanese curriculum. As mandated in the national Lebanese curriculum, ninth graders have to pass the official “Brevet” examinations to be promoted to high school. Students following programs other than the Lebanese curriculum, such as the American curriculum, have the option to study math or not to study it. The researcher decided to exclude students in the non-Lebanese programs because they study math as an optional subject.

Math teachers in this study are the full time or part time teachers who teach the Lebanese math curriculum to grades seven, eight and nine in two schools in Greater Beirut area.

Attitudes were defined by Mcleod (1992) as “the affective responses that involve positive or negative feelings of moderate intensity and reasonable stability” (p. 581). The major concern of this study is students’ attitudes toward both mathematics learning and math teachers.

Attitudes toward learning math focuses on three main categories:

- The first category is the extent to which students like or dislike learning math. Students like math when they find it interesting, enjoyable, and challenging (Kloosterman et al., 1996).

- The second category involves students’ perceived usefulness of math. Usefulness of math signifies the relationship of math to future education, future career and everyday life situations (Kloosterman et al).
- The third and last category in this section is students’ perceived math difficulty, which includes students’ perceptions of whether they find studying math easy or difficult (Mcleod, 1992).

Attitudes toward math teachers include three categories as well:

- The first category is whether students like or dislike their math teacher.
- The second category tackles how math teachers make math easy to learn (Fenemma & Sherman, 1976).
- The third and last category is how teachers make math useful and enjoyable.

Classroom climate, in this study is practically defined as class dynamics, relationships between the students and their teachers, students’ participation in classroom activities, teachers’ methods of instruction (using a variety of instructional methods to teach a concept, and using interesting techniques to connect concepts to real life situations), students’ attentiveness and interest in the subject, and the presence or lack of discipline problems in the classroom.

Method

This study will include both qualitative and quantitative methods to collect and analyze data. The sampling procedure used is purposive and non-randomized. The study will include a correlational design to assess the relationship between the two main variables: attitudes toward math as a subject and attitudes toward math teachers. The study will also include a Chi square test to examine the gender differences in attitudes. Data will be collected through questionnaires given to students, interviews with teachers, and classroom observations.

Sampling

Two private schools in Lebanon participated in the study. For confidentiality reasons, the two schools will be given pseudonyms. These are: Diamond and Santal. Both
schools are located in the Greater Beirut area and cater to students predominantly from middle socio-economic class.

The participants in this study will be approximately 132 students in the middle school cycles, enrolled in grades seven, eight and nine. Their ages range between 12 and 15 years. All their math teachers will also be participating in the study as well.

Santal school is a private school that serves students from preschool through grade 12. The middle school offers both the Lebanese and the American tracks. Only the students studying the Lebanese curriculum will participate in the study. The middle school classes that teach the Lebanese curriculum include one section of grade seven, one of grade eight and one section of grade nine. Students in this school belong mostly to middle socio-economic class.

Diamond school is a private school that serves students from preschool to grade 12. Students in this school belong to high, middle, and low socio-economic backgrounds. The school follows the Lebanese curriculum only. The middle school includes three grade-seven sections, two grade-eight sections and two grade-nine sections. The researcher decided to choose randomly one section from each of grades seven, eight and nine, where the Lebanese curriculum is adopted. This procedure applies to both Diamond and Santal school.

Therefore, the total number of classes that will participate in the study is six. three classes from each school. All the students in these six sections will complete a questionnaire designed for the study.

All the math teachers teaching students in the six classes participating in the study will be interviewed. A separate interview will be conducted with the math teacher of each of the participating classes. Even if the same math teacher teaches more than one section of the participating classes, she/he will be interviewed about these different classes separately.
Therefore, the total number of interviews conducted in both schools will be six, three interviews in each school.

*Instrument*

Three instruments will be used to collect data for this research. The first is a questionnaire to be filled by the middle school students. Each questionnaire will include around forty items divided into three subsections.

The first section includes three categories that will focus on students’ attitudes toward learning math in school. The first category will consist of items such as, “Math is fun”, “I like math”, and “Math is my favorite subject”; these items will measure the extent to which students like or dislike math. The second category will include items such as “It is important to learn math in school” and “Math is useful in everyday life”; these items will measure students’ perceived usefulness of math. The third and last category in section two will measure students’ perceived math difficulty through items, such as “Mathematics is too hard to learn” and “Mathematics is an easy subject”.

The second section of the questionnaire will include items that assess students’ attitudes toward their math teachers. The first category will include items in the questionnaire, such as “I like my math teacher” and “My math teacher is my favorite teacher”; these items will measure students’ preference of their math teacher. The second category will include items such as “My math teacher makes math easy to learn” and “It is easy to understand math when my teacher explains it”; these items will measure how teachers make math easy to learn. The third and last category in section three will include items that measure how teachers make math useful, such as “My math teacher connects math to real life situations” (See sample questionnaire items in Appendix A).

The third section of the questionnaire will include items about personal information of the participants, such as their age, grade level, and gender.
The second instrument will be an interview with the math teachers. The interview will examine teachers' perceptions of their students' attitudes toward math as a subject and toward them as their math teachers. The first question will examine the relationship between the teacher and students. The second question will assess the teachers' perceptions of their students' attitudes toward their own teacher. The last three questions will examine the teachers' perceptions of their students' attitudes toward learning math (See sample interview questions in Appendix B).

The third source of data will be descriptive field notes. In each school, two classes out of the three participating classes in grades seven, eight and nine, will be chosen for observation. The selection of the classes will occur after analyzing the data from the questionnaires and the interviews; the selection will be based on the two classes including the highest percentage of students who either favor or dislike the math subject or the math teacher. Therefore, a total number of four classes will be observed: two in Diamond school and two in Santal school. There are major indicators of teachers' and students' attitudes revealed in their behaviors. The field notes will focus on these major indicators manifested in the classroom climate.

Procedures

The researcher will first take the permission of the school principals of both private schools to collect the data for this study. A copy of the questionnaire will be provided to each of the school principals before the initiation of data collection. Next, the questionnaires will be distributed to the students by a volunteer other than the researcher who will be conducting the classroom observation herself. This procedure will be followed to avoid observer's bias (Fraenkel, & Wallen, 2006). Then appointments for interviews will be made with the math teachers. Finally, the researcher will observe each of the classes selected
during two math sessions. The duration of each math session is one hour. Therefore each class will be observed for 120 minutes.

Validity and Reliability of the Instruments

The questionnaire will be piloted beforehand. In order to test the appropriateness and clarity of the items, ten students other than those participating in the study but with similar characteristics (i.e., age and grade level), will complete the questionnaires. Moreover upon securing the teachers’ permission, the interviews will be tape recorded and transcribed verbatim to enhance validity. Tape recording the interview will enable the researcher to participate naturally in the interview and record non-verbal expressions of the interviewed participants (Burns, 2000).

In this study, high levels of validity will be established using the triangulation method. Data will be gathered from three sources: questionnaires, interviews, and classroom observations. Item reliability will be controlled by rephrasing the same item content in different ways. For example, the questionnaire will include items such as “I like math” and “Math is the subject matter I like best” (Fraenkel, & Wallen, 2006).

Data Analysis

The data obtained from the questionnaires will be analyzed using SPSS program. Students’ scores on the first variable, the attitudes toward math as a subject will be correlated with their scores on the second variable, attitudes toward their math teachers. The questionnaire items are constructed on a Likert-type scale. The scale includes five possible alternative responses: “strongly agree”, “agree”, “undecided”, “disagree” and “strongly disagree”. Each alternative is given a score ranging from minus two (-2) to plus two (+2). The score of +2 is given to the response which indicates the most positive attitude toward the subject matter of math or toward the math teacher. For instance, items written in a positive manner such as “Math is fun”, the response “strongly agree” is given a score of
(±2), "agree" a score of (+1), "undecided" a score of zero (0), "disagree" a score of (-1), and "strongly disagree" a score of (-2). Whereas, items written in a negative manner, such as "Math is too hard", the option "strongly agree" is given a score of (-2), "agree" a score of (-1), "undecided" a score of (0), "disagree" a score of (+1), and "strongly disagree" a score of (+2). Each of the participant’s total score on the attitudes toward math as a subject and his/her total score on the attitudes toward the math teacher will be summed separately. The total scores will be divided by the number of items in each section to obtain the average scores because the number of items in the first section might not be equal to the number of items in the second section. Thus, each participant has two average scores: one representing his/her attitudes toward math and the other average score representing the students’ attitudes toward the math teacher. The higher the average score the more positively the student perceives math, and the math teacher. A correlational analysis will be performed to examine the relationship between students’ attitudes toward math and their attitudes toward the math teacher. A t-test of significance will be performed to examine gender differences. Data from the class observations will be compared with the data obtained from the student questionnaires and the data from interviews with the teachers. On the other hand, the data collected from teachers’ interviews will be used to answer the research question about teachers’ perceptions of their students’ attitudes.

**Ethical Considerations**

The information collected from the students will focus only on the subject of the research and will not touch on any other aspect of their life. All participants’ names will remain anonyms for confidentiality purposes. In this study, no psychological or physical harm will be incurred on any of the participants. Permission to collect the data for this study will be taken from the school principals of the schools participating in the study.
Limitations of the Study

The study is limited to the examination of two schools only and three grade levels. Therefore the sample is not representative of all the middle school population in Lebanon, nor is it representative of all grade levels. Other limitations include:

- The use of a questionnaire is limiting to the study for several reasons: the respondents will not have a chance to expand on or react verbally to an item of particular interest. Also the respondents may not be motivated to complete all the items of the questionnaire, and finally they might misinterpret the questions presented (Fraenkel & Wallen, 2006).

- Observations are limited to two sessions per each class, thus limiting the sample of students' and teachers' behaviors observed.
CHAPTER TWO

Introduction

To be able to compete in the international market, a nation must ensure that its educational system provides effective mathematics instruction to students. Several disciplines such as engineering, advertising, business, communications, and psychology require proficiency and adeptness in mathematics. In addition, more and more employers are favoring recruitment of individuals who demonstrate capacity to think critically. When students learn advanced mathematics in high school and college, they develop high levels of reasoning and problem-solving skills. This provides them with more career choices and employment opportunities, especially because nowadays employers favor hiring individuals who have these capacities (Gilroy, 2002).

According to Winard (2007), one of the major aspects of effective mathematics instruction is “creating love and appreciation of the subject” (p. 8). Jansen (2006) adds that a student is said to be learning mathematics in a constructive way when she/he tends “to see sense in mathematics, to perceive it as both useful and worthwhile, to believe that steady effort in learning mathematics pays off, and to see oneself as an effective learner and doer of mathematics” (p. 13).

This review of the literature explores studies conducted on affective learning, students' attitudes toward math as a subject and students' attitudes toward math teachers.

The Affective Aspect of Learning Mathematics

Several definitions of affective dimension of learning have been offered by experts and scholars. According to Mcleod (1992), affect is very essential in mathematics learning and “the affective domain refers to a wide range of beliefs, feelings, and moods that are generally regarded as going beyond the domain of cognition” (p. 576). As such,
investigating cognitive learning without attention to affective learning in the field of mathematics provides an imprecise image of mathematics learning (Mcleod, 1992).

For Immordino-Yang and Damasio (2007), affective learning complements cognitive learning. Students are not able to learn or relate their knowledge to their daily lives if this knowledge is not connected to their emotions. Specifically, these two scholars explain that during the learning process, students “tag emotions” to the knowledge they are acquiring, and teachers play a significant role in facilitating this tagging process.

Attitudes, beliefs, and emotions are the main affective factors usually examined in mathematics education research because these three factors were found to influence highly students’ reactions to mathematical experiences. Several studies have shown that students’ attitudes and beliefs are generally more stable than their emotions toward mathematics. According to Mcleod (1992), a student may have temporary positive or negative emotions whenever she/he is required to solve a new mathematics problem; the ability to understand the task determines which of these two types of emotions the student experiences (Mcleod, 1992). In addition, the likelihood that a student develops positive or negative attitudes toward mathematics is a function of the emotions the student experiences when she/he solves similar mathematical tasks. A higher frequency of positive emotions leads to positive attitudes toward mathematics, while negative emotions are associated with negative attitudes (Mcleod).

*Students’ Attitudes toward Math as a Subject*

For many years now, scholars have studied students’ attitudes toward subject matters because attitudes directly shape learning behavior and indirectly influence achievement (Muis, 2004). Studies have revealed that determining students’ attitudes toward mathematics is beneficial for teachers to improve instructional practices and enhance students’ positive attitudes toward mathematics in all grade levels (Gilroy, 2002; Mcleod, 1992).
On the other hand, some scholars underscore the importance of examining the effect of students’ attitudes toward mathematics during the middle school cycle (Gilroy, 2002). As Middleton & Spanias (1999) explain, during these school years students experience an unexpected change in difficulty of material they have to learn, and in teachers’ support. This change causes stable attitudes of liking or disliking the math subject that persist in high school and college. Furthermore, Mottet et al. (2008) stipulate that students at the middle school level start considering career choices. Students’ successes in middle and high school math, motivate them to pursue higher math education and select careers in the field of math.

Following the overview of scholars’ statements regarding the relationship between learning mathematics, attitudes, beliefs, and emotions, the following section will examine students’ beliefs about usefulness of math and their enjoyment of this subject matter; these are the two main components of students’ attitudes toward math as a subject that were shown to play a key role in students’ ability to succeed in solving mathematical tasks in school and later on in real life situations.

*Students’ beliefs about math usefulness*

Several studies have investigated students’ beliefs about mathematics usefulness (Eccles et al., 1993; Kloosterman, Raymond, & Emmenaker, 1996; Mason 2003; Schunk, 1991; Stipek, 1993). Results of these studies reveal that students are more motivated to exert efforts to learn mathematics, when they believe that it is useful and valuable. Other studies show that when math teachers emphasize meaningful math skills as relating math knowledge to real-life problem situations, students tend to form intrinsic motivation toward learning the subject (Middleton & Spanias, 1999). Furthermore Meleod (1992) reveal that students who believe in the usefulness of studying math are more likely to choose mathematics courses for their electives when they reach high school.
According to Gilroy (2002) however, many students throughout their school years are not conscious of how important mathematics is for their careers and for managing their personal lives. These students believe that the application of mathematics is limited to physics and engineering. The same study shows that teachers are responsible for students' ignorance because teachers' instruction does not often focus on the connection of mathematical concepts to students' lives. Therefore, math teachers are responsible for clarifying to students, parents, and counselors how math is related to numerous fields and careers.

Mason (2003) conducted a study in Italy to investigate students' beliefs of math and problem solving. The results of the study showed that the more students believed in math usefulness, the better their achievement was in math. On the other hand, students' beliefs that math is not useful, prevented those students from accessing stored information in the brain and consequently resulted in low math achievement. Also, the findings indicated that students' beliefs toward the usefulness of math decreased as they proceeded through their last five years of school. A significant gender difference was revealed in this study; females were more likely than males to believe in the importance of understanding rather than memorizing the procedures used in problem solving. The study also showed that females' math achievement was higher than that of males.

Along the same lines, Kloosterman et al. (1996) conducted a three-year qualitative longitudinal study to examine the changes in students' attitudes toward learning mathematics. Interviews were conducted with 29 elementary students for three consecutive years. The study investigated students' beliefs of usefulness of math, confidence in learning math, math ability, and their tendency to like or dislike math. The results showed that students in all elementary grade levels believed in mathematics usefulness. Students in grades one to three made "trite" comments of math usefulness, such as moving on to the
next grade level or getting into college. Whereas students in upper elementary grade levels, gave more “personal” comments and this was revealed through concrete examples of mathematics usefulness such as shopping, taxes, cooking, sports, and technical jobs.

Students’ enjoyment of math

Studies that investigate reasons for students’ like or dislike of mathematics show that students’ enjoyment of math increases when they succeed in it, when they have high math ability (Middleton & Spanias, 1999; Schoenfeld, 1989) and when teachers involve students in constructive learning and problem solving (Kloosterman et al., 1996; Schoenfeld, 1989). Caraisco-Alloggiamento (2008) and Kloosterman et al. (1996) also found that a significant relationship exists between students’ enjoyment of math, math confidence, math achievement and persistence against failure in the subject matter. The results also show that elementary students tend to enjoy mathematics more than middle school students. The studies conducted by Caraisco-Alloggiamento (2008) and Schoenfeld (1989) also reveal that when students enjoy math as a subject they are more likely to relate math achievement to effort rather than to ability.

In their study, Kloosterman et al. (1996) found that average students and high achievers demonstrate an enjoyment of math and have high confidence in learning the subject. Students with medium to high ability stated that they liked math as the material became harder and more challenging. Along the same lines, students reported that they enjoyed math when they were involved in problem solving and constructive learning. The results also revealed that students believed that anyone is able to learn mathematics and the main reason for their confidence was their high grades or the teachers’ positive feedback.

The study by Schoenfeld (1989) involved 230 mathematics students in 10th grade who had the option to take math courses in high school. Students filled questionnaires that examined the relationship between conceptions of math as a subject and students’
engagement in mathematics activities. The majority of students reported that they enjoyed
problem solving; and that part of this enjoyment was the result of their success in math.
Students also reported that they were interested in studying math and succeeding in it. The
reasons they reported for their interest were intrinsic (to gain critical thinking skills) rather
than extrinsic (to avoid looking dumb). Similarly, the results of this study showed that when
teachers convey to students the message that math makes a person think logically students
tend to believe that math is thought provoking, engages students in understanding, and helps
people to think more clearly in general. Motivation resulted from a belief that math’s
content was interesting, evoked clear thinking and contributed to academic success.

In a similar study, Caraisco-Alloggiamento (2008) investigated the relationships
between students’ math achievement, attitudes toward math, and math related attributes. The
sample consisted of 1721 fourth, sixth and eighth graders who responded to two surveys in
four public schools in New York. The results of the study showed that elementary students
in grade four revealed a higher level of math enjoyment than middle school students in
grades six and eight. Results also showed that students’ math attitudes and attributes had a
high impact on enjoyment of math as a subject and achievement. A noteworthy finding was
that students who reported high enjoyment of math as a subject outperformed students with
lower levels of math enjoyment. Also, students with positive attitudes toward mathematics
and more day-to-day communication with their parents were found to believe that effort
rather than ability contributed to success.

In another study that examined students’ attitudes toward math and the traditional
and non-traditional activities presented by math teachers in class, the results showed high
gender differences in attitudes toward math. Males held more positive attitudes and females
held more negative attitudes toward math while females were willing to work harder than
males to get higher grades despite their dislike of the subject (Telese, 1999). Also, this same
study revealed that similarities existed between attitudes of male and female students to mathematics: both male and female participants did not show great enthusiasm for math and were mostly indifferent about it as a subject; and students’ attitudes toward math differed significantly from one math course to the other. The researcher stipulated that the difference of students’ attitudes from one course to another might be due to the teachers themselves or to content preference of the course. Thus, positive attitudes toward specific math courses correlated with positive attitudes toward the instructors teaching these courses (Telese, 1999).

**Attitudes toward Math Teachers**

Several studies investigated the relationship between approaches and strategies that teachers use in the classroom and students’ attitudes toward teachers and the topic they teach (Mather, 1997; Middleton & Spanias, 1999).

According to Mather (1997) some students describe “a good math teacher” as one who is “knowledgeable, enthusiastic, patient, caring, creative, and flexible” and “has a sense of humor and believes that all students should, can, and will learn mathematics” (p. 15). Middleton and Spanias (1999) added that students mentioned feeling comfortable when their teachers encouraged understanding more than just solving problems accurately.

Studies by Mason, (2003), and Nichols et al. (2003) showed that students’ beliefs, attitudes, and goal orientation were highly affected by math teachers’ encouragement, instructional strategies, and assessment techniques. According to Gilroy (2002) and Mcleod (1992) students are more likely to take advanced courses in math and science when they like the mathematics (or science) teacher who encourages them to do so.

In the same vein, studies show that students blamed their teachers for unfavorable experiences in math (Middleton & Spanias, 1999; Nichols et al., 2003). Students conveyed that the negative emotions they felt toward math such as boredom, lack of interest, and math
anxiety were a result of humiliation by teacher and implementation of teacher-centered instruction that included few thought provoking activities.

Several scholars have expressed their viewpoints as to what teachers, including mathematics teachers, can do to secure that students gain positive attitudes toward the topic they are teaching, and thus enhance students’ learning of these topics (Gilroy, 2002; NCTM, 2000; Turner & Patrick in Jansen, 2006).

According to Commission Chair Senator John Glenn, the main solution to boost the performance of low achievers in mathematics is for teachers of this subject to change their instruction from a teacher-centered approach to a student-centered approach because this change was shown to enhance the engagement of students in mathematics (U.S. Department of Education, 2000).

The National Council of Teachers of Mathematics (NCTM, 2000) has emphasized that in order for teachers to secure a positive impact on students’ learning, they should focus on the process of “doing” rather than on “knowing that”, as well as engage students in problem solving activities that require creativity, reasoning, argumentation, communication, and critical self-assessment.

According to Gilroy (2002) and Turner et al. (cited in Jansen, 2006), when mathematics teachers train their students to analyze the process of problem solving by having them explore how and why a problem is solved in a certain way and discover alternative methods for solving it, they enhance students’ skills in approaching math, classroom participation, and mastery of the material. Gilroy (2002), Kunter et al. (2008), and Middleton & Spanias (1999) added that teachers could promote students’ understanding of difficult concepts in math by relating those concepts to the students’ own lives and culture.
Other experts underscore that teachers are able to make math meaningful to students when they engage them in classroom discussions, given that when students communicate about mathematics they acquire essential skills, such as analyzing the reasoning of others (NCTM, 2000; Motiet et al., 2008).

According to Kunter et al. (2008), teachers employing effective math instructional strategies are teachers who frequently engage students in advanced "cognitive activities" by activating their prior knowledge, adjusting activities to their level of understanding, and providing opportunities for self-evaluation. The study also found that teachers who adopt this approach are able to create a well-structured and socially supportive classroom environment.

Unfortunately, a study conducted by Middleton & Spanias (1999), shows that teachers have little awareness of the high effect of students' views of math and their math teachers on their motivation to learn the subject. The study also reveals that when teachers realize the importance of adopting a student-centered approach that addresses students' needs, they include challenging activities and multiple activity choices, place more emphasis on what makes math motivating, and present students with meaningful math activities. The results also show that students in such classrooms possess intrinsic motivation and positive attitudes toward math as a subject and are less likely to believe that math teachers are the main source of math solutions. Based on these findings, Middleton and Spanias, (1999) suggest that teachers should be trained to "fine-tune" their teaching methodologies to cater to their students' needs.

A recent study by Motiet et al. (2008) highlights new findings about students' perceptions of their math and non-math teachers' instructional communication behaviors. The participants were 497 nine graders at a school located in central Texas. Results revealed that there is no relation between students' perceptions of content relevance (linking course
content to other courses, relating instructional material to future careers, and reinforcing previous knowledge while introducing new concepts), teacher disconfirmation, and students’ study strategies. The results also indicated that students’ study strategies were positively related to students’ perceptions of teachers’ clarity behaviors (vocalizing pauses, using previews/reviews, verbal transitions, and signposts) and nonverbal immediacy (smiling, eye contact, and open body position). Another interesting finding was that teacher clarity, teacher’s content relevance behaviors and students’ study strategies were highly predictive factors of students’ affective learning in math/science subject matters and students’ decisions to pursue math/science in higher grade levels. However, these factors were found to be less predictive of non-math/science subject matters. The results also showed that students reported that their math/science teachers used slightly less clarity, nonverbal immediacy, and content relevance behaviors than non-math/science teachers. Students also reported that math/science teachers tended to exhibit slightly more disconfirming behaviors than teachers of other subject matter. As such, Mottet et al. (2008), conclude that training math teachers to reinvent positively their instructional behaviors by providing student control and stimulation might enhance students’ enjoyment of mathematics and encourage them to pursue higher studies in math-related majors, such as engineering.

Conclusion

The studies examined in this review showed the significance of students’ attitudes toward math during the middle school cycle. Students tend to take mathematics courses in high school and university, if a mathematics teacher from the middle cycles they like, encourages them to do so.

The studies reviewed above also highlight the important role of teachers’ methods and behaviors on students’ enjoyment of mathematics. In order for students to like
mathematics and be high achievers in this subject, teachers must use student-oriented approaches. Also, teachers should make the learning experience meaningful to students through tackling real-life problems that develop their critical thinking and show them the importance of mathematics for a successful career and well-being.

Research has also revealed that when teachers change instructional patterns, a change in students’ attitudes might occur. When mathematics teachers make an effort to interact in a constructive and positive way with students, students are more likely to enjoy mathematics, to feel motivated to learn new concepts and skills and to exert effort to perform well on tests and evaluations. As a result, future research should focus on effective teacher training to promote effective teaching strategies that enhance positive attitudes toward mathematics.

To conclude, it is important to note that few studies were found on the relationship between students’ attitudes toward mathematics and students’ attitudes toward their math teachers. Therefore, examining this relationship is needed to help math teachers modify their teaching methods to enhance their students’ attitudes toward math.
CHAPTER THREE

Method

This chapter describes the profile of students and teachers who participated in this study, as well as the methods and procedures used for data collection.

Participants

Students and teachers from two private schools in Greater Beirut (Lebanon) participated in this study. The original name of the two schools is replaced by a pseudonym. As such, in this study, one school is referred to as Santal and the other as Diamond.

The sample consists of 133 students from middle to high socio-economic backgrounds (69 males and 63 females) enrolled in grades 7, 8 and 9 and whose age ranges between 12 and 15 years.

The sample also consists of four math teachers, namely two teachers from each school. More specifically, one grade 7 math teacher and one grades 8 and 9 math teacher from each school participated in the study. All of the teachers have at least one degree related to mathematics, and a long experience in teaching mathematics to middle school students in schools in Lebanon that implement the Lebanese curriculum. The math teacher of grade 7 in Santal School has a Bachelor Degree in Mathematics and four years of experience. The math teacher of grades 8 and 9 in Santal School has a Dual Degree (a two-year college degree) and 20 years of experience in teaching math. The math teacher of grade 7 in Diamond School has a Bachelor Degree in Physics and 21 years of experience. The math teacher of grades 8 and 9 in Diamond School has a Bachelor Degree in Business Administration, a degree in teaching math from the Lebanese official teachers' college Dar al Mouallimin, and 43 years of experience.
Instruments

In order to investigate the relationship between students' attitudes toward math as a subject and students' attitudes toward their math teachers, the researcher asked students to fill a questionnaire, conducted semi-structured interviews with math teachers, and observed classroom climates. Items and questions included in the questionnaire and interview were constructed after reviewing the literature on students' attitudes toward math and students' attitudes toward math teachers.

The Questionnaire

The questionnaire consists of three sections divided as follows (see Appendix A):

- Section One includes 19 odd numbered items (i.e. items 1, 3, 5, etc.) that measure students' attitudes toward math as a subject.
- Section Two includes 19 even numbered items (i.e. items 2, 4, 6, etc.) that measure students' attitudes toward their math teachers.
- Section Three includes items on students' personal information (age, sex, grade level, and math average score).

Before starting the process of data collection, the questionnaire was piloted on ten students who were not included in the sample of the study. The purpose was to determine whether students might face difficulties in filling the questionnaire and whether any item needed to be reformulated in clearer and simpler terms.

The pilot test showed that all the items included in the questionnaire, except for item 36, were clear to students. Item 36 in its original form read as follows: “My math teacher seems interested in my progress in math”. Students had difficulty understanding the exact meaning of the word “progress”. Based on their feedback, the statement in this item was changed to “My math teacher seems interested in improvement of my math grades”.
The Interviews

The semi-structured interview included five questions that investigated the following (see Appendix B):

- Teachers’ perceptions of students’ attitudes toward math as a subject.
- Teachers’ perceptions of students’ attitudes toward them as their math teachers.

Procedures for Data Collection

In order to prepare for the process of data collection, the researcher started by visiting Santal and Diamond Schools and meeting with the principal of each school to inform them about the project and the procedure planned to collect data, namely to distribute questionnaires, conduct interviews, and observe classes. In addition, the researcher provided the principals with a sample of the questionnaire. Both principals granted the researcher permission to access the campus and collect data.

Shortly after meeting with the principal of each school, the school coordinator called to inform the researcher of convenient dates and times for conducting interviews with the teachers and distributing questionnaires to students.

Interviews with the two middle school math teachers in Santal School were scheduled. The first interview was conducted with the math teacher of grade 7 and lasted for 15 minutes. The second interview was conducted with the math teacher of grades 8 and 9 and lasted for 20 minutes (see Appendix C).

Interviews with the two middle school math teachers in Diamond School were scheduled. The first interview was conducted with the math teacher of grades 8 and 9 at and lasted for 15 minutes. The second interview was conducted with the math teacher of grade 7 and lasted for 15 minutes (see Appendix D).

In Santal School, all the students studying the Lebanese curriculum in grades 7, 8 and 9 students were chosen to complete the questionnaire because there were only 48
students enrolled in the middle school program who followed the Lebanese curriculum. In Diamond School however, one section was chosen randomly from each of grades 7, 8 and 9 to participate in the study. The number of students enrolled in those three sections was 85 students.

The questionnaires were distributed by a teacher from the school and not the researcher as a precaution to reduce bias in students' behaviors later on during observations. A total of 133 students enrolled in grades 7, 8 and 9 in both schools completed the questionnaire in their homeroom classes.

Then appointments were made for classroom observations. Observations to assess classroom climate were conducted in four classes; two in each school. Specifically, the researcher observed the two classes that had either the highest or lowest percentage of students who exhibited either positive or negative attitudes toward the math subject or the math teacher. In other words, observations were conducted in the classes of students who had either the highest or lowest T-score averages on the attitudes toward math variable or the attitudes toward math teacher variable.

In Diamond School, grades 7 and 8 students were chosen to be observed because analysis of questionnaires showed that 8th graders received the highest average scores on the attitudes toward math as a subject and the attitudes toward their math teachers and the 7th graders received the lowest average scores on attitudes toward math as a subject and the attitudes toward their math teachers. In Santal School, grades 7 and 8 were also chosen to be observed because the analysis of the questionnaire revealed that the 7th graders also received the lowest average T-scores on attitudes toward math as a subject and the attitudes toward their math teachers and 8th graders received the highest average T-scores on the attitudes toward math as a subject and the attitudes toward their math teachers.
Having determined which classes will be observed, the researcher contacted the middle school coordinator of Santal School and that of Diamond School to arrange for a schedule of classroom observations in the four selected classes, during regular school hours. Observations were conducted over a period of three days in Santal, and four days in Diamond. Each observation session lasted between 40 and 50 minutes; in other words, the total observation time ranged between 160 minutes and 200 minutes in each school.

To reduce researchers' bias in observations, overt behaviors and interactions between the math teachers and the students were recorded, rather than the researcher's interpretations of these behaviors. Moreover, the names of students mentioned in the observations were changed to safeguard confidentiality.

*Procedures for Reviewing the Literature*

The purpose of this study was to examine whether a correlation exists between Lebanese middle school students' attitudes toward math as a subject and their math teachers. Therefore, the review of literature investigated the importance of the affective aspect of learning mathematics, students' attitudes toward math as a subject, and students' attitudes toward their math teachers. The review of literature also examined the relationship between students' attitudes toward math as a subject and students' attitudes toward their math teachers. All reviewed literature sources were either books or journal articles.
CHAPTER FOUR

Results

Introduction

The aim of this study was to examine the relationship between students’ attitudes toward mathematics as a subject matter and their attitudes toward their math teachers. Another purpose was to investigate teachers’ perceptions of their students’ attitudes toward math as a subject and toward their math teachers. This chapter presents the results of the analysis of data collected in grades 7, 8 and 9 from two different schools in Lebanon, interviews with the math teachers of these two classes, and observations of students in these two grades during math classes.

Results of Questionnaires Filled by Students

Data analysis

The data from the questionnaires filled by the students were analyzed using the Statistical Package for Social Sciences (SPSS). The questionnaire was constructed on a Likert-type scale. The scale included five possible alternative responses: “strongly agree”, “agree”, “undecided”, “disagree” and “strongly disagree”. Each alternative was given a score ranging from -2 to +2. The score of +2 was given to the response which indicated the highest positive attitude toward the subject matter of math or toward the math teacher. The score of +1 indicated a moderately positive attitude toward math as a subject or math teachers. The score of 0 indicated a neutral attitude toward math as a subject or math teachers. The score of -1 indicated a moderately negative attitude toward math as a subject or math teachers. The score of -2 indicated the most negative attitude toward math as a subject or math teachers. Students’ total raw scores were converted into T-scores for the subsequent analyses.
The questionnaire consists of two sections; the first includes 19 items measuring students' attitudes toward math as a subject and the second includes 19 items as well measuring students' attitudes toward their math teachers. Students who received a positive T-score (0 < t ≤ 38) on the first section are considered to have positive attitudes toward math as a subject. Also, students who received a positive T-score on the second section are considered to have positive attitudes toward their math teachers. On the other hand, students who received a negative T-score (-38 ≤ t < 0) on the first section are considered to have negative attitudes toward math as a subject and a negative T-score on the second section are considered to have negative attitudes toward their math teachers.

A correlational analysis was then performed to examine the relationship between students' attitudes toward math and their attitudes toward the math teacher. A t-test of significance was also performed to examine gender differences in students' attitudes toward math as a subject and their attitudes toward their math teachers. Moreover, separate data analysis was performed for each of the classes in the participating schools to select two classes in which students had the highest or lowest mean scores of attitudes toward math as a subject or attitudes toward math teachers. These classes were selected for observation by the researcher. The results of the data from questionnaires filled by students are presented in Tables 1 through Table 6.

Correlation results

The results displayed in Table 1 reveal the means and standard deviations of students' attitudes toward math as a subject and students' attitudes toward their math teachers. As shown in Table 1, the mean scores of 13.76 on students' attitudes toward math as a subject and 15.84 on students' attitudes toward math teachers indicate that the students' attitudes on both variables ranged between neutral and moderately positive attitudes. Also, the scores of students' attitudes toward their math teachers are slightly higher than their
scores on the attitudes toward math as a subject, whereas the standard deviations of both variables were identical. The correlation results show a strong and significant positive correlation between students’ attitudes toward math as a subject and students’ attitudes toward math teachers, \( r = 0.774, p < 0.01 \).

*Students’ attitudes toward math as a subject and math teachers*

Analysis of students’ responses to the questionnaire reveals that most students in the sample of this study have positive attitudes toward math as a subject and math teachers. This is clearly illustrated in Table 2; 104 students showed positive attitudes toward math as a subject and only 29 students have negative attitudes. Similarly, 116 students have positive attitudes toward their math teachers and only 17 students have negative attitudes toward their math teachers.

*Gender differences*

To determine gender differences in students’ attitudes toward math as a subject, a t-test was performed. Table 3 presents the means and standard deviations of female and male students’ attitudes toward math as a subject. The mean values indicate that both females (M=14.75) and males (M=12.75) have positive attitudes toward math as a subject, that ranged between neutral and moderately positive. The results also reveal that the mean difference between female students’ attitudes toward math as a subject compared to the male attitudes toward math as a subject is not significant \( t (133) = 0.73, p = 0.468 \).

Similarly, Table 4 shows the means and standard deviations of female and male students’ attitudes toward math teachers. The mean values indicate that both females (M= 17.71) and males (M=14.10) have positive attitudes toward their math teachers that range between neutral and moderately positive. Also, the results show that the mean difference between female students’ attitudes toward their math teachers compared to the male attitudes toward their math teachers is not significant, \( t (133) = 1.45, p = 0.151 \).
Mean scores for the classes in the participating schools

Table 5 presents the means and standard deviations of students’ attitudes toward math as a subject and students’ attitudes toward math teachers of the three participating classes in Santal School. Grades 7 and 8 were chosen to be observed because grade 7 had the lowest mean scores for attitudes toward math as a subject (0.21) and attitudes toward their math teachers (0.81) and grade 8 had the highest mean scores for attitudes toward math as a subject (25.23) and attitudes toward math teachers (20.84).

Table 6 presents the results of the means and standard deviations of students’ attitudes toward math as a subject and students’ attitudes toward math teachers of the participating classes in Diamond School. Grades 7 and 8 were also chosen to be observed because grade 7 had the lowest mean scores for attitudes toward math as a subject (12.82) and attitudes toward math teachers (14.65) and grade 8 had the highest mean scores for attitudes toward math as a subject (20.96) and attitudes toward math teachers (25.44).

Teacher Interviews

The following section presents the results of the teachers’ perceptions of students’ attitudes toward math as a subject and toward them as their math teachers.

Interview with the 7th grade math teacher in Santal School

When asked about her relationship with her students, the 7th grade math teacher in Santal School said that despite some limitations, her relationship with students in this class is generally friendly and comfortable. In her opinion, her students do like her. On the other hand, she considers that students have some problems in math because they had two different math teachers the previous year.

According to this teacher, when students like their teacher, they tend to be motivated to learn and work hard. She added that it is the duty of the teacher to make students like the subject matter and want to learn it, while maintaining discipline in the classroom. A teacher
must know how to strike a balance between informal and formal interactions with students in the classroom, in such a way that students know that during a lesson they have to be attentive.

In the same vein, the teacher believes that her students like math in general. However, most students tend to have difficulties in math in grade 7 because of the transition to middle school. Unlike elementary school, students at this level start to deal with abstract mathematical notions and concepts.

The teacher elaborated on students’ motivation to learn. She believes that in many cases, when students face difficulties in understanding the lesson or solving problems, their motivation to learn math drops. In her opinion, students tend to like math more when they succeed in understanding it and solving problems correctly.

In the last part of the interview, the 7th grade math teacher in Santal school stated that throughout her teaching experience, she has noticed that students always ask about the connection of math to real life. To make the connection clear requires a personal effort from the teacher because the Lebanese curriculum does not include a great deal of real life problems. Therefore, to enable students to understand the importance of learning math, she often has to resort to searching the internet for activities that require students to use mathematical skills to solve problems related to real life situations (see Appendix C).

*Interview with the 8th and 9th grade math teacher in Santal School*

As far as grade 8 is concerned, the math teacher reported that he had few discipline problems with the students of this class. Although most of the grade 8 students are high achievers, some are undisciplined. Interestingly, the teacher compared students in his class to a gang that has three or four leaders. When asked whether he believed students liked him, the teacher found it rather difficult to answer this question. He stated that he predicted that
probably not many of the students would be on his side, and that if anything the girls liked
him best.

When it comes to students' attitudes toward learning math, the teacher had the
following to say. The teacher reported that, although there are a lot of theorems in grade 8
curriculum, 8th graders in his class find math easy because he uses several teaching
strategies to explain the material. He solves numerous exercises in class, explains the
homework when it is assigned, checks homework and discusses it with them in class, and
provides the students with a period of revision before exams.

The teacher added that he believes that although the students like to fool around in
class, they are interested in math. This is clearly illustrated, in his opinion, by the fact that
they struggle to get extra points. Students do not miss any opportunity to raise their average.
Hence, the level of participation in the class is very high. This is simply because students get
additional points for answering questions and solving problems in class.

The 8th grade math teacher in Santal believes that students at this level are aware of
the usefulness of math. He makes this statement based on the fact that when students are
given a problem that requires only abstract reasoning, they usually ask about how it is
connected to real life. The teacher reported that whenever students asked questions about the
relevance of math to real life, he always explains that math helps them build their logic and
improve their thinking skills to face different issues in life. The teacher also stated that he
tries to explain how math is used in construction and engineering.

As for grade 9, the teacher believed that the relationship with the students is a
friendly one and much better than that with 8th graders. In his opinion, there is harmony
between him and students in this class and students have positive attitudes toward him.

Concerning students' attitudes toward learning math, the teacher stated that he thinks
that 9th graders face less learning difficulties than 8th graders because in this grade level.
students do not have to learn many new notions and concepts. The teacher also reported that in general, 9th graders are more serious. Globally, most of the students are in class to learn. The teacher also reported that 9th graders are less preoccupied with the usefulness of math in their daily life. The students' main concern in grade 9 however, is passing the official exams (see Appendix C).

*Interview with the 7th grade math teacher in Diamond School*

When asked about his relationship with students, 7th grade math teacher in Diamond school answered: “It is OK”. He thinks that what students like about him is that he treats them equally. He encourages low, average, and high achievers to participate in class and he is always supportive of them all, yet students tend to consider him as a strict teacher. Early on in the school year he sets the rules and informs students of the consequences of breaking these rules. Another reason why he is able to maintain a good relationship with students is that he gives them short breaks every now and then by often telling a joke or an anecdote. He is convinced that students cannot remain serious throughout the entire class session; they need to have a break. This makes learning more pleasurable.

On the other hand, the teacher stated that students don't find grade 7 material easy because it is a transitory class from elementary. To make learning easier, he repeats the explanation several times and provides students with extra sheets to practice the material.

When asked whether he thinks that students like math or not, the 7th grade math teacher in Diamond school said that he believes that students like math because it is connected to their lives. They particularly like the chapter on statistics, where they enjoy conducting surveys about issues that concern them. The teacher also reported that although the curriculum does not include many connections to real life except for the statistics chapter, he always encourages students to relate the concepts they learn in math to their real life, and to other subject matters such as physics, chemistry and biology (see Appendix D).
Interview with the 8th and 9th grade math teacher in Diamond School

The 8th grade math teacher in Diamond school reported that his relationship with students is excellent because he is patient and cares for them. In his opinion, all students including the weak ones like learning math because he likes teaching it and because he encourages them to learn it.

The teacher however underscored that he is firm, especially with students who do not pay attention or students who start performing poorly out of carelessness. He explained that students are not bothered with this approach because they know that he is being firm for their own sake. The teacher added that, in general, 8th graders at Diamond school do like him; they try to please him and they hate it when he gets upset with them.

Concerning students’ attitudes toward learning math, the teacher stated that in his opinion, 8th graders find the material difficult only during the first two months of school. As the school year proceeds, students start finding the material easy because of the way he explains math. He also gives them confidence in their ability to solve the exercises and he considers them to be like his own children.

The teacher added that he believes that students are very interested in the usefulness of math as a subject because they ask many questions about how they could use math in real life. In return, he explains to them that math is related to everything in life, including cooking and shopping. For instance, he explains to them how the sequential process of math problem solving teaches them how to deal sequentially with other processes in life, such as cooking a meal.

As for grade 9, the math teacher in Diamond School stated that he believes his relationship with students in this class is also excellent. When asked about students’ attitudes toward learning math, the teacher reported that in his opinion, 9th graders find the material easy, because the program is a revision of notions, concepts and skills they already
learned in grade 8. The teacher believes that 9th graders like learning math as well because of his continuous encouragement. He added that 9th graders find the material to be “fun”, because they are familiar with the concepts and notions and already know how to solve the related exercises and problems. The teacher also makes learning math enjoyable to students in this grade by connecting the material to the students’ daily lives (see Appendix D).

Classroom Observations

Observations of grade 7 in Santal School

The two observations that took place in this class revealed that the teacher generally cares for her students. She gave all students a chance to participate. The 7th grade math teacher also made sure that they had grasped the concepts and checked individual understanding. When a student needed additional help, she offered to meet with him or her during the break to repeat the explanations. The teacher however had a lax attitude; there were no consequences for not solving the homework or for breaking the classroom rules.

Also it is important to note that, although the teacher seemed supportive and tried to help students to the best of her abilities, some students showed disrespect for her during the two sessions of observation. For instance, one student called her by her name without saying “Miss”. Another student argued with her for writing a negative comment on his paper. In addition, some students laughed when she told them to be quiet.

The observations also focused on the teachers’ instruction methods. The results showed that she presented students with multiple strategies to solve exercises, and when a student did not understand an exercise; she did not refuse to repeat the explanation for him/her. In addition, it is important to note that the teacher encouraged students to persevere on solving a difficult problem; she was patient and did not pressure or intimidate students who had difficulties understanding concepts.
The observations also revealed that the majority of the students were not attentive in class. Most students were having side conversations, fighting with one another, giggling, moving their chairs and desks, and throwing items to each other while the teacher was explaining the lesson. Furthermore, although the teacher encouraged participation, the majority of the students did not participate.

In the same vein, the observer noticed many discipline problems in this class. The students continuously broke classroom rules and did not heed the teacher’s requests when she asked them to stop talking or to raise their hands. At times, tired of the noise and lack of discipline, the teacher stopped explaining hoping the students would quiet down, but they just continued to talk out of order. At other times, the teacher pleaded with the students to calm down by whispering in their ears to be silent, but the students did not respond. The teacher also threatened the students many times that she would start giving them warnings or will kick them out of the classroom, but she did not do so. The only disciplinary actions that the researcher witnessed were that the teacher punished one student by giving him a written negative remark and she changed the seat of another student who was disturbing the class (see Appendix E).

Observations of grade 8 in Santal School

Observations conducted over two sessions in grade 8 at Santal School revealed the following regarding the relationship between the teacher and the students.

The teacher’s sense of humor was noteworthy. It helped keep a relaxed environment in the classroom without distracting students. Moreover, the teacher in this class spoke to students informally and he often called them nick names. For example, when he wanted to congratulate a student whose name is Fadi for answering correctly a question, he said: “Bravo Mr. Fool”. In addition, this teacher seemed to be supportive, which also helped create a relaxed environment. For example, in one observation session, he was very patient
with a student who was anxious while reciting. To calm the student down, the teacher told him that he could recite anything he knew about the material.

On the other hand, unlike the 7th grade math teacher, the 8th grade math teacher at Santal was firm and serious. When students misbehaved, they were penalized. At times he also resorted to sarcasm; especially when students were too noisy or talked out of turn. This method did yield the desired results; when the teacher ridiculed them, students were embarrassed and stopped misbehaving. On the other hand, when there was a reason to reward or congratulate students, the teacher generously gave them positive rewards such as extra points.

The observations also revealed that the teacher was keen on helping students to understand and solve problems to the best of his abilities. When he gave them a problem to solve, he always reminded them of the rules that are essential to reach the correct answer. He also guided students to pay attention to the given before they answered and when they asked questions, he encouraged them to “think” rather than gave them the answers to the questions straight away. In addition, the teacher presented students with multiple strategies for solving the exercises.

Concerning classroom management, the researcher did not witness any major discipline problem, based on the two observation sessions. In this class, students did not speak unless given the permission to do so, and when a student violated this rule, she/he was penalized by deducting points from their grades. On other instances, the teacher only threatened to punish undisciplined students; the threat was sufficient to get the students to start paying attention again. The only time that students were allowed to speak to each other was when they were working on solving math problems; otherwise the students were mostly quiet in this class.
Generally, 8th graders in Santal seemed to appreciate the teacher’s approach to conducting the class. They joked with the teacher and talked informally to him without being impolite. Moreover, they were attentive most of the time and they participated in activities (see Appendix E).

*Observations of Grade 7 in Diamond School*

The two classroom observations conducted in grade 7 at Diamond school during the math sessions showed that the teacher deals with the students in a flexible and lenient manner. He joked with the students and the students joked with him in return. At times, the teacher also ignored undisciplined behaviors. However, the teacher was firm concerning the students' performance. When a student received a low grade, the teacher wrote a comment to that effect on the students' agenda for his/her parents to see. Furthermore, he became upset when students were unable to remember concepts previously studied.

With regard to teaching methods, the teacher presented students with multiple strategies to solve problems. In addition, the teacher gave students several exercises to solve, explained the solution, gave them enough time to ask questions about every exercise and took the time needed to answer their questions. He also checked their understanding by asking questions.

With regard to students, during the first session, the majority of the students were not participating or concentrating on the lesson; they were either having side conversations, or reviewing their corrected exam papers or calculating their grades. During the second session however, students were more attentive. The increase in attentiveness might have resulted from the fact that the second session observed was the first session in the morning (7:40 a.m.) and because the students were aware that the teacher was presenting material related to the quiz he was about to give them during the same session.
Concerning classroom management, some discipline problems did take place during the observations in this class. The class was noisy throughout the two observation sessions. The teacher frequently ignored students' side conversations and did not mind repeating the explanations several times even for students who were not attentive; he continued to explain the lesson even when students were noisy and were not paying attention. On the other hand, the teacher was not consistent in disciplinary actions. He punished one student who was talking by making her stand at the back of the class, but just threatened another student with punishment without carrying out through with it (see Appendix F).

**Observations of Grade 8 in Diamond School**

Throughout the two observation sessions conducted in grade 8 at Diamond School, the math teacher was very firm and strict with the students. He did not joke, smile or laugh. When the teacher entered the classroom, the students became immediately quiet and maintained their silence throughout the session. The teacher did not tolerate any infractions. For example, when one student giggled, the teacher interrupted the lesson to see who was talking and the class was immediately silent again. In addition, the teacher scolded a student who gave a wrong answer and another who spoke out of turn.

During both observations, it was clear that the teacher’s behavior intimidated the students. One student became so anxious that he forgot what he wanted to ask. Instead of helping the student remember the question, the teacher grew impatient and said to the student in an intimidating tone “Ask my son! Three hours, it takes you three hours to ask a question!”

On the other hand, the teacher reacted in a supportive manner while interacting with students. He addressed them by saying “my son” and “my daughter”. In addition, he agreed to answer students’ questions individually, and when needed he corrected mistakes in a calm and supportive way. The teacher’s supportive attitude was also clear when he reassured the
students by saying that the problems they will be getting in the coming exam were similar to
the ones they were solving in class.

When the teacher was explaining something important, he would ask the students to
be attentive. Also, throughout the two sessions, the teacher made sure that everyone in the
class grasped the concepts he explained. As such, he gave students a variety of exercises,
easy and difficult, to be solved in class. He also included problems not found in the textbook
because “the book doesn’t include challenging problems” as he said. While students solved
the exercises individually, the teacher moved around the class to check on students’
progress. Before the students started solving exercises, the teacher revised the rules and the
steps required for approaching similar exercises, and sometimes he also wrote the rules on
the board.

The teacher made sure that low achievers understood what he was explaining.
During one of the sessions, he asked a student whom he referred to with a side conversation
with the researcher during the observation (see Appendix F) as “one of the weakest students
in the class” to solve a problem on the board. When she failed to solve the exercise, the
teacher guided her gradually to the correct answer. It is interesting to note that, by the end of
one session, the teacher started chatting and joking with the students, and he even allowed
them to talk with one another before the session ended.

In this class, the students were very attentive. When the teacher was explaining the
lesson, they paid attention and participated in class. They asked questions when they didn’t
understand the teacher’s explanation. In addition, during the two observation sessions, none
of the students came to class without having done the homework and they made sure to copy
the correct answers from the board.

As for the level of discipline in the class, except for one student who repeatedly
interrupted the teacher and his classmates, no misconduct was noted while the observations
were being conducted. To deal with this student, at times the teacher addressed him calmly and at other times, he scolded him or shouted at him. The rest of the students always raised their hands and did not speak out of turn (see Appendix F).

Conclusion

The results of this study revealed a high positive correlation between students’ attitudes toward math as a subject and their attitudes toward their math teachers. In addition, the results showed that students had positive attitudes toward both math as a subject and their math teachers. The results also revealed that no significant gender differences existed in students’ attitudes toward math as a subject and math teachers.

In the same vein, interviews conducted with four 7th, 8th and 9th grade math teachers at the two schools who participated in this study revealed that these teachers believed that students are generally interested in learning math given the essential role it plays in enhancing their daily lives. On the other hand, the teachers reported that the Lebanese curriculum rarely includes real-life problems needed to make students aware of the important skills they learn through math in their lives. Consequently, math teachers have to extend additional efforts to connect math to real life situations, in order to make the material accessible to students.

In general, the classroom observations corroborated the results. Students who had positive attitudes toward math as a subject and their math teachers were mostly attentive in class and responsive to the teacher. Those who had neutral attitudes showed discipline problems and were mostly uninterested in learning math.

The next chapter focuses on discussing the results presented in this chapter. The discussion will address the compatibility of the results of this study with the reviewed literature. Also, an attempt at explaining the results in relation to the Lebanese culture will be made.
CHAPTER FIVE
Discussion

Introduction

The purpose of this study was to examine the relationship between students’ attitudes toward math as a subject and their attitudes toward their math teachers. The study also investigated teachers’ perceptions of their students’ attitudes toward math as a subject and toward themselves as math teachers.

The results of the study revealed that there was a strong and significant positive correlation between students’ attitudes toward math as a subject and students’ attitudes toward their math teachers. The study also revealed that there were no significant gender differences in students’ attitudes toward math as a subject or toward their math teachers.

The results also showed that the 7th, 8th, and 9th grade math teachers who participated in this study recognized that their students generally hold positive attitudes toward math as a subject and toward them as math teachers.

In this chapter, the focus is on the analysis and interpretation of the results.

Students’ Attitudes toward Math as a subject and toward their Math Teachers

The results of this study were in harmony with results found in the literature; namely, they support the finding that positive attitudes toward specific math courses are correlated with positive attitudes toward the instructors teaching those courses (Telese, 1999).

Likewise, the results of this study revealed that the majority of the Lebanese students who participated in the study hold positive attitudes toward both math as a subject (M=13.76) and math teachers (M=15.84). These results were incongruent with the results of a study by Telese (1999), which underscores that students tend to be generally indifferent about math as a subject matter. One explanation for the difference between students’
attitudes toward math in two schools in Lebanon and students’ attitudes in a different
country and region of the world could be that teachers in the Lebanese culture tend to be
supportive on an individual basis with students. Thus, they develop a warm relationship
with students that exceeds the usual professional distant teacher/student relationship found
in other cultures.

In addition to the above, it is noteworthy to mention that this study also did not find
a significant difference between females’ and males’ attitudes toward math as a subject and
math teachers. This is incongruent with results found in the West by Telese (1999) and
Mason (2003) whose studies showed that male students tend to hold more positive attitudes
toward math as a subject. One explanation for this discrepancy might be related to the age
during which gender differences in math start appearing unlike the West where gender
differences start appearing in middle school, gender differences in Lebanon might not show
during this period of time. These might appear later or earlier in the elementary or secondary
school cycles. However, this claim must be supported by research and is not within the
scope of this study.

One interesting finding was concerning the positive attitudes that 8th graders had
toward their math teachers given that the teachers of these sections showed firmness and
were strict about violating classroom rules.

One likely explanation of this finding is that, as the semi structured interviews
revealed, the math teachers who participated in this study reported that they make notable
efforts to facilitate the learning process for students. Results from the classroom
observations of the grade 8 classes confirmed that teachers actually exert great effort to
facilitate the material. For example, they often repeated previously explained concepts and
skills to refresh students’ memory and guide them into solving problems correctly; they
presented students with multiple strategies to solve problems; they frequently pointed out to
students the relevance of what they learn during the session to their daily lives, and they generously provided positive reinforcements to encourage students’ participation. Moreover, the teachers in the above mentioned classes were also found to be supportive of individual students on the personal level. This is congruent with findings of the reviewed literature in this study, which revealed that teachers employing effective instructional strategies are teachers who engage students by activating prior knowledge, adjusting activities to students’ level of understanding and creating a well-structured and socially supportive classrooms (Kunter et al., 2008).

On the other hand, 7th graders in this study were found to hold attitudes that ranged between neutral and moderately positive toward math as a subject, even though the teachers in these classes were found to be lenient concerning classroom management. In both schools, 7th graders who participated in this study had the lowest mean scores for attitudes toward math as a subject and attitudes toward their math teachers. Many possible explanations could hold for interpreting these results. First, classroom observations of grade 7 classes in both schools revealed that these classes had major discipline problems (Lewis & Burman, 2008). In addition, both math teachers of the 7th grade classes who participated in this study revealed in the interviews conducted with them that 7th graders generally face difficulties in learning math because this grade marks a transition from the elementary cycle; students at this level start to deal with abstract mathematical notions and concepts. These results are congruent with the reviewed literature in which some researchers like Gilroy (2002) and Middleton & Spanias (1999) highlighted the importance of studying students’ attitudes toward math as a subject during the middle school cycle, because students at this level experience unexpected changes in the difficulty of the material that they have to learn.
neutral attitudes toward math as a subject \((M=0.21)\) and attitudes toward the math teacher \((M=0.81)\). These results were congruent with results from the observations of grade 7 in Santal School where students showed disrespect for the teacher, and where the teacher was unable to handle discipline problems.

**Suggestions and Recommendations**

The sample of this study was limited to 133 students taken from three grade levels in two private schools. In the future, researchers need to examine larger samples including students from other grade levels and different schools to generalize the results to the Lebanese population. Studies could also include samples from public schools for comparison purposes.

Furthermore, since gender differences regarding students' attitudes toward math as a subject and math teachers were not significant for Lebanese students in the middle school cycle, other studies could examine gender differences in math across the spectrum of grades; that is in the elementary and secondary cycles.

The instruments used in this study were questionnaires distributed to students, interviews conducted with teachers and classroom observations. Using other instruments such as interviews or focus group discussions with students, would provide a more in depth analysis of students' attitudes toward math as a subject and toward their math teachers.

In addition, there is a need for studies that investigate the reasons for the attitudes students possess toward math as a subject and toward math as a subject and math teachers in Lebanon. Research questions could focus on whether the Lebanese culture plays a role in developing positive or negative attitudes toward math as a subject and math teachers in Lebanese students.

Finally, findings of this study showed that students who held high positive attitudes toward math as a subject and math teachers were students in classes in which there were no
major discipline problems and where teachers were firm. This is an invitation for future research to address the relationship between classroom management and students’ attitudes toward math as a subject.
References


Cornel, (1999). I hate math! I couldn't learn it, and I can't teach it! *Childhood education, 75*, 225-231.


Nichols, W., Jones, J. & Hancock, D. (2003). Teachers' influence on goal orientation: Exploring the relationship between eighth graders' goal orientation, their
emotional development, their perceptions of learning, and their teachers' instructional strategies. *Reading Psychology*, 24, 57-85.


Table 1

*Correlation between students' attitudes toward math as a subject and their attitudes toward math teachers*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>$r$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes toward Math as a subject</td>
<td>133</td>
<td>13.76</td>
<td>14.98</td>
<td>0.774*</td>
</tr>
<tr>
<td>Attitudes toward Math Teachers</td>
<td>133</td>
<td>15.84</td>
<td>14.49</td>
<td></td>
</tr>
</tbody>
</table>

Note. * p < 0.01
Table 2

*Frequencies of students with positive and students with negative attitudes toward math as a subject and toward math teachers*

<table>
<thead>
<tr>
<th></th>
<th>Positive Attitudes</th>
<th>Negative Attitudes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Attitudes toward Math as a Subject</td>
<td>78.2</td>
<td>104</td>
</tr>
<tr>
<td>Attitudes toward Math Teachers</td>
<td>87.2</td>
<td>116</td>
</tr>
</tbody>
</table>
Table 3

*Gender differences in students’ attitudes toward math as a subject*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>64</td>
<td>14.75</td>
<td>13.59</td>
<td>0.73</td>
<td>0.468</td>
</tr>
<tr>
<td>Males</td>
<td>69</td>
<td>12.75</td>
<td>16.21</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4

*Gender differences in students' attitudes toward math teachers*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>64</td>
<td>17.71</td>
<td>13.06</td>
<td>1.45</td>
<td>0.151</td>
</tr>
<tr>
<td>Males</td>
<td>69</td>
<td>14.10</td>
<td>15.58</td>
<td></td>
<td></td>
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</tbody>
</table>
Table 5

*Means and standard deviations of the scores in each class participating in Santal School*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attitudes toward Math as a Subject</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 7</td>
<td>20</td>
<td>0.21</td>
<td>20.01</td>
</tr>
<tr>
<td>Grade 8</td>
<td>15</td>
<td>25.23</td>
<td>15.13</td>
</tr>
<tr>
<td>Grade 9</td>
<td>13</td>
<td>10.11</td>
<td>13.14</td>
</tr>
<tr>
<td><strong>Attitudes toward Math Teachers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 7</td>
<td>20</td>
<td>0.81</td>
<td>14.89</td>
</tr>
<tr>
<td>Grade 8</td>
<td>15</td>
<td>20.84</td>
<td>7.07</td>
</tr>
<tr>
<td>Grade 9</td>
<td>13</td>
<td>11.41</td>
<td>14.04</td>
</tr>
</tbody>
</table>
Table 6

*Means and standard deviations the scores in each class participating in Diamond School*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attitude toward Math as a Subject</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 7</td>
<td>26</td>
<td>12.82</td>
<td>15.41</td>
</tr>
<tr>
<td>Grade 8</td>
<td>34</td>
<td>20.96</td>
<td>10.55</td>
</tr>
<tr>
<td>Grade 9</td>
<td>25</td>
<td>13.31</td>
<td>14.79</td>
</tr>
<tr>
<td><strong>Attitude toward Math teachers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 7</td>
<td>26</td>
<td>14.65</td>
<td>15.46</td>
</tr>
<tr>
<td>Grade 8</td>
<td>34</td>
<td>25.44</td>
<td>8.21</td>
</tr>
<tr>
<td>Grade 9</td>
<td>25</td>
<td>18.06</td>
<td>14.19</td>
</tr>
</tbody>
</table>
APPENDIX A

Questionnaire for Students
Questionnaire

Read each statement carefully and decide how you feel about it. Check the box that best describes your position on each statement. This questionnaire is not part of your regular school work and will not affect your grades. Your answers to the questions will remain confidential and will not be shown to your teachers.

SA = Strongly Agree, A = Agree, NS = Not Sure, D = Disagree, SD = Strongly Disagree

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I like math.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>My math teacher makes math easy to learn.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Mathematics is too hard to learn.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>My math teacher thinks I could do well in mathematics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I enjoy learning math because I usually get high grades in it.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I like my math teacher.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>I never feel bored in the math class.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>My math teacher’s teaching methods keep me interested in math.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Math is useful in everyday life.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>My math teacher uses common examples to explain mathematical concepts.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Mathematics is not related to my life.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>My math teacher encourages me to study mathematics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>I know how useful mathematics is.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>I can talk to my math teacher about possible future jobs in mathematics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>I hate math.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>My math teacher presents challenging problems to solve in class.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>It is important to learn math in school.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>My math teacher uses different teaching methods to teach math.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>I might consider choosing mathematics as my future job.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>My teacher uses interesting methods to teach math topics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Mathematics is an easy subject.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>My teacher makes math fun to learn.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Math is my favorite subject.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>My math teacher does not mind explaining again concepts I didn’t understand the first time.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>I like attending math class.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>I understand math when my teacher explains it.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>I will need mathematics in the future for my work.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>My math teacher connects math to real life situations.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Mathematics is enjoyable and exciting to me.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>My teachers’ explanations makes math easier to understand.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
31 Math is fun.
32 I usually get along well with my math teacher.
33 Mathematics is a valuable and necessary subject.
34 My math teacher seems interested in improvement of my math grades.
35 I will use mathematics in many ways as an adult.
36 My math teacher explains many ways to solve math problems.
37 Math is interesting.
38 My math teacher explains how math is related to different jobs.

**Personal Information:** Age:

Gender:

Grade Level:

Math average (over 100):
APPENDIX B

Interview Questions for Math Teachers
1. How do you describe your relationship with your students?

2. If I were to ask the students about you as a math teacher what do you think their answers might be? In other words, how will your students perceive you?

3. Do your students believe that math is an easy or a difficult subject?

4. Do students in your class like math? Are students interested in learning math?

5. Are your students aware of the usefulness of math in their daily life?
APPENDIX C

Semi-Structured Interviews with Middle School Math Teachers in Santal School
Interview with the math teacher of grade 7:

The interviewer is E and the grade 7 math teacher is MT1.

E: How do you describe your relationship with your students?

MT1: It's kind of friendly. There is friendship, but there are limits. At the beginning of the year it was so hard because they already have problems in math from last year. The school changed two math teachers last year and students have the idea that math is a complicated subject but now it's working. So I am comfortable with them.

E: If I were to ask the students about you as a math teacher what do you think their answers might be? In other words, how will your students perceive you?

MT1: Ah ask them (with a giggle). We did discuss their attitudes toward me on teachers' day. They said they like me because I improve their math skills.

E: Do your students believe that math is an easy or a difficult subject?

MT1: Difficult. Especially in grade seven, because in grade 7 it's like a jump from something very concrete to something abstract, more abstract. The geometry is deeper. They change in the elementary period it's easier for them. The Lebanese curriculum is also harder than the American curriculum. It's more abstract. For example, for the Lebanese students they have to draw the figures, but in the American curriculum the figure is drawn. All they have to do is to take out the information, data from the tables. But the Lebanese students are asked to draw tables and figures.

E: Ok they find the subject difficult but do they like it?

MT1: Yes they like it. Yes, but the problem is that there is weakness and when the student is weak, he tends to be uninterested and to hide his weakness. But when he feels that his skill is improving he'll be more motivated.

E: So, it is success that basically makes them interested and motivates them?
MT1: Yes, if they get better grades, they start getting interested. But the weakness is the main barrier.

E: Are your students aware of the usefulness of math in their daily life?

MT1: They always ask me, what relation does it have with our real life? Why do we have to study about “X”? I try to connect it with the real life, if possible. I give activities. The curriculum does not include a lot of connections to real life. For example, in “Unknown” chapter there is an activity about a magician. Think of a number, you add them then subtract and you come to the same number (X+3-3+5....) and you come back to” X”. But there are some activities and I invent some activities. I use the internet. I try to make it near and close to them, because it is something abstract.

E: Thank you for your time.

MT1: You’re welcome. You know I think it is important when students like you, actually and even love you. They give more. It’s not enough to love you, but also know that you’re working for their best. Love alone is not enough; we are here for wasting our time. They have to feel you are serious during the work time. When we are doing a discussion, it means we are discussing. When we are studying, we are studying; we have to stop everything and to focus on our lesson. While we have to be attentive, I need your attention, circulating between them, sometimes touching them. I don’t sit there on my front desk, I also have conversations with them in the playground. There is time for everything.

Interview with the math teacher of Grades 8 and 9:

The interviewer is E and the grades eight and nine math teacher is MT2.

E: How do you describe your relationship with your students in grade 8?

MT2: Mainly I have a friendly relationship with my students.

E: In 8 and 9?
MT2: In 9, we are more friends. There’s a harmony in the class. Grade 9 students are here to learn more than students in grade 8. Grade 8 students like to play in class.

E: Why is that the case? Are grade 9 students more serious because they have official exams?

MT2: No, no. In grade 8, the students are just like that, it’s their character. I have some students who can’t sit on a chair. They want to talk and comment on everything that happens between the students. It’s only their character. It’s not anything personal between me and them. In grade 9 our relationship is very good. But in grade 8, I have some problems with them. For instance, I have a student who did something wrong at the beginning of the year and he didn’t apologize till today. His parents sent an apology letter but he didn’t say it before. He just apologized today.

E: What did he do?

MT2: He was so mean. He told me “you are obliged to repeat the explanation, even if I was playing”. In that mean way, you know what I mean. I do repeat the lesson more than once, but not when a student is playing. If the student says please repeat it, I have to give him that remark, that I will repeat it later on but not directly upon his request. And there happens the clash between me and them.

E: So, if I were to ask grade 8 students about you as a math teacher what do you think their answers might be? In other words, how will your students perceive you?

MT2: Not all of them will be on my side, yes there is a small clash. But I don’t know maybe not, nobody asked them about me before. There are some students, the real students, they don’t agree with the others, but they are few. But the majority will not be on my side, yes we have only four girls. Yes, three of the girls and two boys are good students in my class and the others not. You know it’s not an achievement problem many of them are high
achievers but it’s a discipline problem. You know this group specifically, from the time they have been in preschool till now, the school has had a problem with them.

E: What about grade nine? How do grade nine students perceive you?

MT2: We are in good relations.

E: Do grade 8 students believe that math is an easy or a difficult subject?

MT2: Easy. I try to facilitate the material. I put myself in the student’s shoes and try to re-understand the objective as if I didn’t know it before, so I facilitate it so that everyone will get it.

E: And in grade 9, do they also find it easy?

MT2: Also in grade nine, but you know grade eight is more essential than grade nine. If the concepts were understood in grade eight, they will be easier in grade nine. Grade nine is a repetition that is a bit advanced. Basically both find the subject easy. I do solve the exercises in class and explain the homework before they go. When they come back, I don’t grade the homework, I just check if they did it and then we discuss it in class. And before each quiz and exam, we take a period of revision: if they have questions we discuss them in class. The material is especially in grade 8 is not that easy there are a lot of theorems, but I try to make it as easy as possible, maybe in grade 9 yes.

E: Do students in grade 8 class like math? Are students interested in math as a subject?

MT2: Yes. They all share in class and I give them the privilege; if you do this, you take pluses and at the end of the term we count the pluses and the pluses end up to be ten percent of the grade, so they fight for their pluses. “Please how many pluses do I have? If I do this do you give me a plus?” I say “no”, and at the end of the class the one who does it will get a plus, and then they start shouting “Why? You didn’t tell us”. I remind them that everything is graded in class and they should know that and we are here to play.

E: What about grade nine? Are they also interested in the material?
MT2: Both 8 and 9 are interested. Only that side, in grade 8, is that they like to play. I have two or three students in grade 8, they are the leaders and around ten students who are followers, yes a gang (with a laugh).

E: Are your grade 8 students aware of the usefulness of math in their daily life?

MT2: Yes. Sometimes if the topic is a little bit abstract, they will ask “how can we connect it to real life?” And then I try to bring an example. The hardest example is analysis, you can analyze from the given to get to the proof especially in geometry, they ask me “how can these help us?” I say “in building your logic, how you think about each thing and how you face it in life”. We try to make this connection, that they may use it in constructions and engineering.

E: And in grade 9?

MT2: In grade 9 the questions about the usefulness of the material are less because they are interested in knowing the material and passing the official exams. In grade 8, they ask more questions “Why do we do this? Is it important in our life?”
APPENDIX D

Semi Structured Interviews with Middle School Math Teachers in Diamond School
Semi Structured Interviews with Middle School Math Teachers in Diamond School

Interview with the math teacher of grade 7:

The interviewer is E and the grade 7 math teacher in Diamond School is MT3.

E: How do you describe your relationship with your students?

MT3: We are ok. I encourage low achievers and average students to participate all the time to know if they have gained the concepts. Sometimes high achievers are annoyed because they think we don't care for them. So I talk to them aside and tell them that this is because I am aware that you know the answers of the questions but not of your friends, and they feel proud of themselves.

E: If I were to ask the students about you as a math teacher what do you think their answers might be? In other words, how will your students perceive you?

MT3: They know that I am strict. But this doesn't bother them because of the rules we set from the beginning of the year. Classroom rules reinforced. At the beginning of the year I talk to them and tell them now you are adults, there are rules that you have to know. This helps them know their limitations. These rules are written on the board, the English (classroom) teacher writes them on the bulletin board and I as a math teacher reinforce them, for example, you are not supposed to talk without raising your hand. This guides them of appropriate and inappropriate behaviors in class. Sometimes they are ready to concentrate for a whole period of two hours, but sometimes they get bored, so I tell them a math joke. I try to give them breaks but these would be connected to math. You know they tend to get bored if they are sitting and solving all the time.

E: Do your students believe that math is an easy or a difficult subject?

MT3: Grade seven material is not easy. It is a transitional period from elementary. In elementary they are used to solving only few line problems. Here they solve more difficult problems that fill a page. I give extra sheets to make sure that all students get the concept, as
a support for them. I explain the problems many times. Usually high achievers find the
material easy but low achievers need some help.

E: Do students in your class like math? Are students interested in math as a subject?

MT3: They like it because they find it interesting and they connect it to life, especially in the
Statistics chapter. For example, one student did a survey of favorite foods of students,
another student made a survey in the playground of whether students love math. They like
doing that a lot. That way they see how statistics is connected to their lives. One of the
students last year did a statistics on healthy and unhealthy foods found in the cafeteria, and I
showed the projects to the administration (usually I show them the projects that are
connected to the school life) and they banned the unhealthy foods that were provided in the
cafeteria. This year one of the students did a project about foods that students want to have
in the cafeteria.

E: So as you mentioned, they are interested when the material is connected to their lives. So
are they aware of the usefulness of math in their daily life?

MT3: I encourage them to relate it all the time. I don’t tell them the relations but I ask them
questions, so that while answering those questions they would find the relations
automatically. I also connect it to other subject matters. I ask them some physics, chemistry,
and even biology questions that require the use of rules they have learnt in math to solve
them. For example how do we measure the solar eclipse and lunar eclipse, they will reach
the place where they say ah! We can use angles to do that. I ask architecture questions,
“How do all the stairs have the same height? According to what?” and they start thinking
about GCD. I also ask them challenging questions & riddles, they go home & ask their
fathers and mothers, think about it for around two days before we discuss it in class. The
curriculum doesn’t include many connections to real life except for the chapter about
statistics but I do that all the time.
Interview with the math teacher in Grades 8 and 9:

The interviewer is E and the math teacher of grades 8 and 9 is MT4.

E: How do you describe your relationship with your students?

MT4: I say it’s an excellent one. It’s really great. We get along. The patience and support that you give is the main thing that makes your relationship good with your students. If students believe that you care for them, they will be motivated to learn. Teachers always ask me “What makes the students be so interested about your math class? What’s the secret?” Teaching math is a pleasure to me although I have been doing this for 40 years, but it’s because I enjoy teaching it, they enjoy learning it. Sometimes I am firm with some of them, those who are not paying much attention and with students whose performance started dropping. But they know it’s for their own sake, and they even appreciate so.

E: What about your relationship with grade 9 students?

MT4: Very well, also, just the same, it’s a very good relationship.

E: If I were to ask the students about you as a math teacher what do you think their answers might be? In other words, how will your students perceive you?

MT4: He smiled and said: I know they like me. If students know that you are on their side they will like you and they will exert a lot of effort to please you. You know what’s the greatest punishment that I might give any of my students? It’s when I tell him/her “I’m annoyed from you”. Not more than that. I don’t give punishments at all. this is the only word I say and they do anything not to let me be annoyed. Once one student came and said “please tell me that you are no more angry from me, because if you don’t I won’t be able to sleep tonight”. They know that I’m always on their side and if I tell them any negative comment, this is for their own sake, because I want them to learn.

E: And for grade nine?
MT4: The same they also like me. It’s the same with all my students.

E: Do grade eight students believe that math is an easy or a difficult subject?

MT4: Only first two months they find the material to be difficult, especially geometry. But later on, they get used to the material and it starts becoming easy. They start finding it easy, because I make it easy. I explain it a lot, but also I try to let them depend on themselves. I tell them “stop asking me same questions about problems, try to do it on your own. Use your previous knowledge and try to solve it on your own”. I try to challenge them, who can do it?

E: And in grade nine, how do the students find the material?

MT4: In grade nine, the program is like a revision. Because I teach the students in grade 8 everything they are supposed to know in grade 9. I prepare them for the material in grade eight very well, so they find the material very easy. Now, if you give the same test to students in grades 8 and 9, some students in grade 8 would be able to solve it better than those in grade 9.

E: Do students in grade 8 like math? Are students interested in math as a subject?

MT4: The major thing that makes the students like the subject is if they like their teacher. They are very interested and like it because I encourage them, even students who are weak. I always tell them that they can do it. I talk with them separately and I encourage them all the time. To me if I am able to reach 80% of the students and make them like the subject, this is enough. I tell them you are like my kids. The teacher is the one who makes his students like/dislike the subject matter.

E: Do grade 9 students also like math?

MT4: Grade 9, yes they also like it a lot. As I told you, it’s because I have prepared them last year for the material very well. So now for them it is fun because they are very good at it.
E: Are your students aware of the usefulness of math in their daily life?

MT4: They always ask this question, how will we use math? I tell them that math is related to everything we do like cooking, shopping. For example I tell them when they are frying an egg. First, you have to heat the frying pan. Second, you put the eggs on the pan. Third, you put salt. Fourth, you do so and so. This way they learn sequential process of solutions. I tell them you can’t start with step three, just like math solutions you have to do it step by step. Also, you have to take what you need from the given to reach a solution and not everything, just like when you are frying an egg you can’t use all the food ingredients that you have in your kitchen, you just take eggs, oil, and salt. I tell them don’t believe anything in math especially in geometry and take it for granted if you don’t see it anywhere. Even if I tell you this triangle is “isosceles triangle” don’t believe me unless you are able to see it somewhere else, unless you are able to compare it to other isosceles triangles you see outside the class, in the playground, on the street.

E: What about grade nine?

MT4: We also discuss similar examples. As we said before, because the material is similar to grade 9.
APPENDIX E

Classroom Observations in Santal School
Classroom Observations in Santal School

First observation of Grade 7:

- The teacher starts the class by distributing the corrected exams to the students. She mentions the students’ names while giving them their exams and comments on their grades. She says “Aya, average, you are not paying attention in class. Jad, bad presentation. Mira, improvement. Rani, good keep it up. Imad, good. Majd, good.”

- The teacher then says “I’ll check your homework now”. A student replies “which homework?” and the teacher doesn’t comment. Many students had not done the homework and the teacher told those students “this is not acceptable”. The teacher then asks “Did you find any difficulties with the homework? We will correct the homework now.” Some students are talking she looks at them and says “shhh”.

- The teacher then randomly chooses students to come to the board and solve the exercises of the homework and she reads each question aloud before they solve it. The exercises of the homework were taken from a worksheet, not from their textbook.

- The teacher reads the first exercise and explains it three times because many students commented that they didn’t understand. She gives the students two ways for the students to solve it. The teacher says “don’t talk without permission”. She asks another student “Did anyone explain for you at home? You were absent last time”. The teacher also looks at a student talking aside with her friend “Stop it Rana. The teacher then tells another student “don’t interrupt Hadi”. Before the teacher moves to the next exercise she says “So it’s factorized now. Got it? It’s easy, right?” The teacher then whispers to a student “Sami, what? Shsh”.

- The teacher then tells another student, Rani, who had not done the homework to solve the second exercise. The students then try to help their friend to solve the
problem but the teacher interrupts, “wait I want to see what he can do on his own, leave him. Do another one Rani, and no one other than Rani. Anyone who helps him will not go to the board to solve an exercise.” The teacher then explains the exercise Rani had solved by referring to the rule.

- The students then started solving true or false exercises. The teacher then tells the student solving the exercise on the board “why false? Justify”. Another student said “but you didn’t tell us to justify” and the teacher replies “you know you always have to justify”.

- The teacher tells the students “Pay attention, this is important and confusing a bit. Marwa, tell me why is this false?” the student replies “Miss I don’t know”. The teacher replies “Try to think. Ok who knows? Raise your hands. Jamal, do you know?” Jamal says “it’s true”. The teacher tells him “very nice! Continue wasting your time”. The teacher then comes close to two students sitting at the back and says in a low voice “why are you talking?” One of the two students says “Miss I was not talking, I swear I was not talking, really I was not talking”. The teacher walks away.

- Most of the students are not looking at the board during the class and having side conversations. Others had books and papers other than math in their hands. One student threw a book to his friend. The teacher tries to engage the students by asking them questions, but most of them are not raising their hands to participate.

- A student interrupts while the teacher is reading a question and the teacher says “Shh”.

- Then another student solves a new exercise on the board and the teacher reads it “7xy=7x (7y) is it true or false?” The student writes the solution 7xy=49xy is false. A student asks “how is this false?” The teacher explains “7=49 is it true?” the student says “no”. The teacher asks “So is this true?” The student says “I don’t
understand”. The teacher then says “What’s wrong with you? Why aren’t you concentrating” and she explains the exercise again.

- The teacher says “Rani turn to the board, I will give you and him a warning”. Rani talks again and the teacher says “one more time I see you turning, you and him will go out”. After a while the teacher gets closer to Rani and says “where are you copying your homework? Ok stand up and go sit there and copy”.

- The class becomes quiet for a while but students are still not looking at the board.

- The teacher looks at students at the back and says “Are you sleeping? Why do I have a feeling that you are sleeping?” Then after a while she stops explaining, looks at a group of other students who were talking, and frowns for seconds. They stop talking and she continues. After few minutes she tells a student who was talking “I don’t want to hear a sound”.

- The teacher says when she finishes explaining “Did you understand? Those who didn’t understand, tell me. Got it?” Only few students respond.

Second observation of grade 7:

- The class is back from the recess. The teacher is standing beside the front desk silently waiting for the students to settle down. She waits for a while, but the students don’t sit and continue talking. She says, “I’m still waiting for you, we are back from the recess.” The class is still noisy and then the teacher starts calling their names and telling them to settle. Some students are talking without permission, she says “Don’t talk without permission. I know we have a homework but before the homework, stop talking”. She walks to the back and whispers something to two students then says “Rasha and Ali next time I’ll give you a warning”.

- The class is less noisy. The teacher starts explaining a new lesson. She says “we’re going to start a new kind of factorization today”. Meanwhile, some students ask
questions and others talk while the teacher is answering. The teacher looks at students who are talking and says "For the first and last time, stop talking". The teacher continues explaining, then she looks at a student who was talking and writes a remark on his paper. That student starts complaining and the teacher says "don't complain". He replies "you give me a remark and you want me to be quiet, I don't understand".

- The teacher explains another method for the exercise she had solved. The class gets noisier. The teacher gets annoyed and says "raise your hands for the last time".

- A student is making noise with a plastic bottle. The teacher stops and looks at him in the eye. He throws the bottle to his friend Ahmad and Ahmad stands to throw it in the basket. The teacher then shouts "Ahmad, behave or you will be expelled from the class".

- The teacher explained an exercise and Rani says "I don't understand". Another student Amani interferes and says "Stop explaining teacher. this is easy, you explained a lot". Rani says "Sorry Amani did we bother you?" The teacher looks at Rani and he says "Why are you looking at me?" The teacher replied "You are not concentrating. It's not a conversation with Amani. I'll explain for the last time".

Many students interrupt while she's explaining. When she's done, she says "did you understand now? I don't understand where you're stuck? I will explain the next exercise. I think it will help you understand". The class is still very noisy and most of the students are distracted.

- The teacher then writes an exercise for the students to solve on their own.

Meanwhile some students start copying and others are talking aside, giggling, and pulling each other's hands. The teacher then says "whoever needs help raise your hand". She walks around to check whether students are solving. She says "Rani
what’s wrong?” he replies “Miss he took my pencil”. The class is noisy; the teacher gets annoyed and shouts “Stop, I’m sick of you”. She looks at Rani and says “Rani throw the gum”. The teacher comes next to a student and whispers “Are you working?”

- A student then calls the teacher by her name X. The teacher doesn’t comment, but another student says “her name is Miss X and not X.

- A student says “Miss, can you explain?” the teacher replies annoyingly “Miss raise your hand and I’ll come to you for the last time”. Some other students raise their hands and the teacher comes to their desks and answers them.

- Then the teacher calls a student to correct an exercise on the board. The teacher starts explaining “we notice something here”, then she pauses and says “stop it, you are continuously talking”. The teacher looks at the students for a while and turns away. Some students laugh at the back. The teacher doesn’t comment and continues the explanation but the class is still too noisy. She then shouts “what’s wrong with you today? Since when the class is like that? One more time and I’ll leave the class”.

- While the teacher was answering a student’s question, a student says “Miss”, and the teacher replies “Miss I’m talking to him, don’t interrupt”. Other students ask questions without raising their hands and the teacher answers their questions.

- The teacher chooses students to continue solving exercises on the board and asks them questions while they are solving. Some students are engaged in many side talks. Others are moving their desks and chairs, which is making a lot of noise.

- The teacher scolds a student who was talking for two seconds and continues.

- A student asks for permission to go wash her hands but the teacher doesn’t let her and says “shh”.
• A student asked a question that was asked before and she answered after saying “I explained this before, but I will explain it again”. Rani explains something to his friend while the teacher was talking. The teacher looks at them and says “I’m being so patient today”. She tells the student solving at the board to stop and looks at the class and says in a loud voice “how many times did I stop today? Let me see anyone not looking at the board. I’ll pass by and expel you out of the class”. The class then becomes silent.

• The teacher then asks Marwa to solve an exercise on the board. Marwa says “I don’t know how to continue teacher” and the teacher says “why did you wait till now to tell me that?” Marwa said, “I know some of them, and some of them no”. The teacher explains again to Marwa and says, “Do another exercise Marwa and no one other than Marwa”. A student interrupts to help Marwa and the teacher says “I just said no one other than Marwa”. When Marwa finishes, the teacher tells her “Come to me during the break and I’ll explain it to you”.

• The teacher then comes next to a student who was turning to the back, she holds him on his shoulder and turns him to the front.

• The bell rings. The teacher continues explaining an exercise and says “You understand Marwa?” The class is very noisy. Students stand, talk and fight. The teacher says “I’m still in class”.

First observation of grade 8:

• The teacher passes around to check the students’ homework and chats quietly with each of them, asking them few questions and commenting on their work. He tells a student “Did you know how to do it?” and the student nodded. The teacher asks a student a question but another student tries to answer, the teacher looks at the student
who had answered and said, “when you want to help your friend, at least answer correctly”.

- After checking the homework, a student asks “are you going to remove the minuses?” The teacher replies “now I will check my copybook and I will see who deserves to remove the minus”. The teacher then removed the minus for the students who had solved the homework correctly and didn’t for another who had solved it.

- The teacher addresses a student saying “Sit properly Akram on the chair”

- The teacher then mentions the names of few students and says “yesterday you were absent. I need to see the homework you were supposed to do for yesterday”. Nada said “which homework? Can I draw it now?” The teacher answered “I don’t think you have time to do it now”. The teacher checked the students’ copybooks and left Nada till the end “Nada it’s your turn, show me, ok you don’t have it. I’m sorry guys I’m not removing your minuses, the last chance is for tomorrow. If you don’t have a compass, you’ll get a warning. You have two choices; either you’ll remove the minuses or get a warning”. Nada said after a while “I finished, can you come and check it?” The teacher said “Tomorrow, we already wasted a lot of time”.

- The teacher then draws a figure on the board and asks the students questions to refresh their information of the chapter. The students raise their hands to answer.

The teacher then says “this is grade 6, we are in grade 8 now”. The teacher looks Bassel who was not paying attention and he was solving the exercise for Nada. The teacher looks at him and says “Bassel you are not doing a good job. If you stand outside and do some kind of charity; it would be better than drawing it for her”. Bassel replied “She did it but I’m correcting it for her”.

- The teacher asks the students to close their copybooks and recite the rules. The teacher says “All of you now are expecting that I will start with Rami, but Hala will
start”. Hala says “No sir, I will take zero anyway so please start with someone else”. The teacher asks her two questions and she answers only one.

- While reciting the rules, the teacher tells a student who did not answer directly “Why do I have to use a pair of pincers to remove the words”. Nada interrupted saying “I’m on”. The teacher replied sarcastically “You’re on the honor list”, and everyone laughs. After a while students are very quiet, looking at the teacher and most of them are raising their hands to recite the rules. The teacher asks the student a question and another student answered the question. The teacher directly gave that student a minus. The student who had answered said “Oh my God”. Then the teacher asks another student a question and the student stutters. The teacher tells him “Did you study?” and the student replies “I did but I don’t know how to recite”. The teacher says “say anything you know, anything you have studied. I want to give you a grade”. The student looks surprisingly at the teacher and recites something he already knows.

- The teacher looks at a student talking at the back and says “do you give us permission to continue?” The student replies “No sir, you are the one who gives permission here”.

- The teacher then writes “Correction of the Homework” on the board and “April S”. The students say “we are in May”. The teacher says “Why am I still in April?” A student replies “Because my birthday is in April”. The teacher replied “You didn’t invite us and you didn’t get us anything”.

- While the teacher was writing the correction of the first exercise on the board, a student said “Oh I didn’t pay attention to the D”. The teacher said “You want me to pay attention instead of you? You want us to change the question for you? Let’s e-
mail the writers of the book and let them change the question, what do you think?”
Everyone laughs.

- The teacher tells Akram “sit properly on the chair for the third time today”. After a while, makes him carry his chair for the rest of the session “If your chair is not able to hold you, you hold it”. The teacher also makes three other students carry their chairs consecutively when he sees them swinging.

- Most of the students participate after taking permission. The teacher asks a question and the students are not able to answer. Then after giving many students a chance to try, he tells them “guys remember the definition, what’s the definition?”

- The teacher asks a question about the measurement of a line and a student says “younger”. The teacher replies “You are still saying younger? Do we clap for you every time you say younger? Younger is less? Can I say you are less than me?

- All students are paying attention while the teacher writes the correction of the homework and the teacher chooses students to answer questions while he is solving. The teacher writes all the details of the solution on the board and makes sure the students understand before he moves to the next exercise.

- The class starts getting noisy, a group of students joke and laugh. The teacher says “anything wrong?” The students get quiet again.

- While the teacher was explaining an exercise a student said “teacher, you use rich words” and the teacher replies “I’m rich because you are my student”.

Second observation of grade 8:

- The teacher is writing the correction of the homework on the board while asking the students questions. Everyone is very attentive. The class is quiet.
• A student starts swinging on his chair. The teacher tells him “Are you planning to carry your chair today?” The student directly stops swinging.

• The teacher asks students to come to the board and solve the exercises. One of the students refuses to come to the board, so the teacher chooses someone else.

• When the teacher is done with the homework, he tells the students “Guys you have to practice on this. This is very important”.

• The teacher then assigns exercises for the students to solve as a class work and he passes around to check the students’ figures. All the students are sitting at their desks and solving the class work. They ask questions and the teacher answers. The teacher gives them hints on how to solve it “the first thing you do guys is draw the centers of the circles, ok?” A student asks a question and the teacher doesn’t answer but says “think”. One student asked the teacher to check his figure, the teacher says “check the distance between them is it 2?” The student says “ah no”, the teacher replies “I’m sorry you are solving something else”.

• The teacher nods for the students who show him correct solutions. A student tells the teacher “Look at my figure is it right?” The teacher replies from the front of the class “I see them from here to there, they are disjoint, repeat”.

• Then the teacher presents another exercise for the students to solve and says “Ok guys, this is a construction problem those who do it will get a plus grade”. Students start working and the teacher tells a student “Work alone Fadi.” While checking the students’ copybook the teacher said aloud “guys pay attention to the given. Sara and Khalil have a plus so far. Who else?” The teacher continues checking their work while encouraging them, he says to a student “Bravo continue”. Bahaa was helping Nadine, the teacher looked at her and said “Can we say that Bahaa did it for you?” He looked at Fadi’s work
and said "Bravo Mr. Fool". The teacher puts the pluses and students come to his desk to show him the solutions. Hala said "Hey I took a plus".

- The teacher assigns a homework when the class ends. He says "Read carefully and understand the problem before you solve the exercises. You should know the relation and apply the inequality. Good Luck".
APPENDIX F

Classroom Observations in Diamond School
Classroom Observations in Diamond School

First observation of Grade 7:

- Students coming back from the recess. Students are talking and joking with one another and with the teacher. The class is too noisy. The teacher says “Stop talking”.

- Teacher distributes graded quizzes to the students and smiles while giving some of them their papers. He tells some students to give him their copybooks, he writes a note on each. Students return to their seats with unhappy faces. One student starts crying. The teacher tells her “put away your test and take out your classroom copybook”. He repeats the remark several times before the student stops crying and takes out her copybook.

- The teacher claps his hands and repeats “stop talking” several times, but the students continue talking.

- The teacher chooses students to come and solve exercises from the textbook on the board one at a time. The rest of the students copy the exercises on their copy books. The teacher explains every exercise being solved by the students and gives students a chance to ask questions.

- The class is still too noisy. Students walk to the front of the class to ask their teacher about their grades. The teacher refuses to answer and tells them that he would do that on the other day.

- A student starts solving the second exercise. One student asks about first exercise. The teacher starts explaining it again and uses the other side of the board to give an example similar to the first exercise. Meanwhile, the student on the board continues to solve the second exercise.
• Every time an exercise finishes on the board. Many students raise their hands for permission to solve the coming exercises on the board. The teacher chooses students randomly regardless of their gender.

• A student asks the teacher a question, everyone giggles at the question he asked. Another student tells the teacher a joke. The teacher smiles and continues.

• The teacher asks a question to check understanding of a certain concept and most of the students reply together.

• Many side conversations taking place especially at the back of the class.

• The teacher repeats the explanation to one of the students by connecting it to real life. “$3x^2y^2 - 2x^2y^2$ equals what?” Then to make it easier, he represented the variable $x^2y^2$ by an apple and said “3 apples - 2 apples equals what?”

• Many students are repeatedly asking similar questions and the teacher is explaining many times.

• The class starts getting a bit noisy. The teacher reminds the students to pay attention, but many continue talking.

• A group of around five students at the back were whispering about an outing on Sunday.

• Every time an exercise is solved on the board the teacher asks “Any question on this exercise?” No one asks. Then when the teacher moves to the next exercise, students start asking about the first and the teacher answers them.

• One student at the back whispers “I’m bored we’ve been solving this exercise for half an hour”.

• The class started getting noisier. The teacher looks at a girl who was talking and says in a high tone “Go stand at the back of the class, it’s not up to you to concentrate the
time you want and stop concentrating the time you don’t want. Stand there and pay attention to the board”.

- Then the teacher addresses a student saying “Where’s the board? When the session is over, you will go with me to the directors’ office”. The student says in a hesitant voice “it’s not me it’s her, every time you think it’s me.”

- Majority of the students were talking and the teacher is still explaining on the board. The class ends, the teacher leaves the class without taking the student that he threatened to the director. Many students follow the teacher to ask about exams.

Second observation of grade 7:

- Teacher says “Sit in your place” and starts solving and explaining an exercise on the board. He chooses students to help him solve each step. He says “Wake up Jad”. The class is very quiet. A student says “this is hard”.

- The teacher then solves using a simpler method and a student asks “this is the easy way?” and the teacher replies “yes”.

- Many students don’t have copybooks on their desks but they are paying attention to the teacher.

- After solving the problem, the teacher holds a student’s copybook and says in a sarcastic tone smiling “Look how Sara solved this exercise, Bravo Sara, very clever student.” Sara laughs “no no sir, stop it sir bala jorsa”. He smiles.

- Many students start raising hands to solve problems on the board.

- The teacher says “Write the first exercise I solved on the class work copybook”. The students, who had not been writing, took out their copybooks and wrote the exercise. The teacher says “somebody is still sleeping”. A student responds “I’m not sleeping, I’m looking for my copybook”.

Asma, a student sitting at the back, says "Sir I'm not finding the copybook". Another student says "search Google and you'll find it". The teacher giggles and looks at the student. "Mr. I find it". Then another student says "I don't have a copybook". The teacher replies smiling "take one from Asma".

Students ask lots of questions and the teacher answers them. He guides the student that is solving the problem on the board. He asks her questions to make her discover the method on her own. Some students are copying the solutions and others discussing the problem with their friends. A student asks "teacher are you going to give us the quiz today?" The teacher ignores and continues working with the student on the board.

A student asks a question and the teacher responds "Not every time we study a lesson we forget the one before it, what's wrong? You forgot?"

The teacher then starts solving an exercise on the board. He says "pay attention". The teacher starts explaining to the students how they will solve the exercise, before solving it. Then he asks each student to say a step of the solution orally.

Many students raise their hands but the teacher chooses some students that are not raising their hands. The class is very quiet and the students are very attentive.

Students are either copying exercises on the copybook or discussing the exercises with each other.

A student asks a question and the teacher says "this is too much. You took this in grades five and six. Revise them at home. Every time you tell me I don't understand".

Then while the teacher was solving the last step of the problem, he said "ah this is hard, it's ok if I use a calculator." He takes a calculator from a student and calculates
something. Then a student comments “You see you are using a calculator, why aren’t we allowed to do so during the quiz?” The teacher smiles and continues.

- When the teacher finishes solving the exercise, he says “get ready for the quiz, hurry”. Students take out papers and they place a book between each two of them as a separator. The teacher writes two questions on the board. The teacher says “no questions”.

First observation of Grade 8:

- The teacher enters the class. He directly starts writing on the board before the class settles down. The class directly settles down and gets quiet within less than a minute. He starts asking questions and reviewing the rules. All the students are listening and paying attention to the board. They all raise hands and don’t speak unless they are given permission.
- Someone laughs while the teacher is explaining; the teacher says “who’s laughing?” He faces the students and everyone gets silent.
- The teacher gives the students an exercise to solve on their own. He circulates between the desks to make sure everyone is working. The teacher is serious.
- Students ask questions and the teacher comes to each of them and answers them silently. Some students also asked the teacher to check their answers after finishing their exercises. All students are trying to solve the problem and students sharing the same desk help one another to solve the exercise.
- One student asked a classmate “what’s your answer? How did you solve it?”
- The teacher asks a student “where have you reached?”
- Rami, a student in the class, interrupted the class, the teacher says in a high voice “Rami wait I need to help your friends”. Then Rami answered questions directed to
another student, the teacher shouted “Can you be quiet my son? I am asking your friend.”

- The class starts getting noisy; the teacher taps on the desk and everyone gets silent.
- The teacher chooses students randomly and asks each of them to say out loud one step, and he writes the solution on the board. He asks Rami to say a step and Rami replies in a high voice “Rami slowly, you will scare away our visitor”. Everyone laughs but the teacher doesn’t smile.
- The teacher then says “let’s go back to our sheet”. The students take out their sheets and start solving. The teacher says “start with number 17”, but most of them by then had already started. Students are noisy, but most of them are discussing the sheet with their classmates. The teacher asks a student “Adel, please tell me the steps for solving the proportion” and goes to the board to write the steps.

- The teacher asks a student to solve the problem on the board. He tells that student to solve the problem without holding her copybook. He comes next to me, and says “I told her to do that because I want her to solve it alone. She is one of the weakest students in the class and I know it’s not her who did it at home because she takes private lessons at home and I’m against that”. The student solves on the board and no one is allowed to help. The teacher shouts at Rami because he tried to interrupt. The teacher comes to the board and guides the student to finish the problem. The bell rings, the teacher gives the students a home work. Students prepare themselves to go home and start joking with the teacher, he laughs and jokes with them.

Second observation of grade 8:

- The teacher starts by writing the title of the chapter and the date on the board. He says “put down your homework please”.
• The teacher reads a problem and tells a student to come and solve it on the board. He moves around the class to check the students’ home works. The teacher revises with the students the rule they need to solve the problem. He asks the students “what’s the clue? We have one of the two doors to be opened, what are they?” The students reply “directly proportional or inversely proportional”. The teacher asks “what’s the clue word here?” The students reply “inversely proportional”. The teacher tells the student solving the exercise on the board “Explain for us what you’re doing in steps so we can understand”. A student says “directly?” The teacher says “who said directly? Are you in the class or no? Didn’t I just say inversely?” The teacher asks the student on the board “how did you get this?” Rami answers and the teacher says, “My son, she’s working not you”. The teacher asks the students to check their answers.

• Students explain the problems quietly to their classmates to help them understand it. All the students are involved in copying and discussing the exercises.

• The teacher explains to a student at her desk in a low voice “the key word is either inversely or directly proportional”.

• Some students ask the teacher to check the methods they have used and he moves around the class answering their questions. He explains to them separately how to correct the mistakes they have done.

• A student says “Can I solve?” The teacher says “No”, and chooses someone else to go to the board. The teacher says “Listen please, read the problem. What does proportional mean? Right, directly proportional. Tell us the steps so that we can remember them”.

• The teacher addresses Rami again, “How many times I have to tell you, calm down, calm down!”
• A student raises his hand to ask a question, and the teacher comes close to him “Ask my son! Three hours, it takes you three hours to ask a question!” The student looks into his copybook, blushes, and says “I forgot the question”. The teacher walks away.

• The teacher taps on the table when another student goes to the board to solve a new exercise. The teacher says “Nada pay attention, later you will copy now pay attention to what we are doing”. The teacher explains and everyone is looking at the board. The teacher then sits at the back beside a student. The class is very quiet while their classmate is solving the exercise on the board.

• A student asks “Will you give us like these questions in the exam?” The teacher replies “These are the questions, what’s harder than this?” the teacher comes close to a student and says “Are they hard? No right? Did you understand?” the student nods her head. When the exercise is over the teacher asks the class “Any questions?”

• The teacher then goes to the board and explains a new exercise using two different methods. He activates prior knowledge that they already know from what they have done so far in class. He says when he finished “Did you understand this? Gradually you will get used to such problems.” The teacher also writes the rule on the board using words.

• The teacher then explains to the students how to read questions while solving a new exercise “Eyad here listen, if they tell us simplify, calculate, or find the value, it’s the same”.

• The teacher explains every single step that the student solves on the board and when the student finishes solving it, he makes sure the class is quiet and then revises the steps used with the students; he says “The first step is cross multiplication, the second step is simple equation etc.”
• The teacher then goes to a student and explains something for him and writes something on his copybook.

• At the end of the session, the class gets noisy but most of students are discussing the exercise they had solved. A student tells her friend “first I got stuck on this step but now I understood it”. Another student asks his friend “where did you get this answer?”