EIGHTH GRADE STUDENTS' PERCEPTIONS RELATED TO THEIR MATHEMATICS TEACHERS' INTERPERSONAL BEHAVIORS

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Approval of the Graduate School of Natural and Applied Sciences.

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I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

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This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis fort he degree of Master of Science.

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ABSTRACT

EIGHTH GRADE STUDENTS' PERCEPTIONS RELATED TO
THEIR MATHEMATICS TEACHERS' INTERPERSONAL BEHAVIORS

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The purpose of this study was to investigate eighth grade students' perceptions of their mathematics teachers' interpersonal behaviors. The study also investigated mathematics teachers' perceptions of their own interpersonal behaviors as well as relationships among students' perceptions of their teachers' interpersonal behaviors, attitudes towards mathematics, mathematics achievements, student gender, teacher gender, and socio-economical background. Questionnaire on Teacher Interaction (QTI) scale and a mathematics attitude scale were used for data collection. Data were collected from a sample of 1317 eighth grade students in public elementary schools in the following provinces: İstanbul, Ankara, İzmir, Adana, Bursa, and Hatay.

Statistical analyses revealed that the Turkish version of QTI translated and adapted by the researcher had an acceptable degree of validity and reliability. Results showed that Turkish students perceive their mathematics teachers as displaying high levels of leadership, helpful/friendly, understanding, and displaying strict behaviors rather than uncertain, admonishing and dissatisfied behaviors. The results also indicated that students' perceptions of their mathematics teachers' interpersonal behaviors were associated with their attitudes towards mathematics and their mathematics achievement. While the leadership, helpful/friendly, and understanding behaviors had positive correlations with attitude scores of students, the uncertain, dissatisfied, admonishing and strict behaviors had negative correlations. Similarly, students who perceived their teacher as displaying leadership, helping/friendly and understanding behavior had higher achievement levels than the ones who perceive their teacher as strict, uncertain, admonishing and dissatisfied. Students with higher cultural and economical background perceived their teachers more favorably.

The MANOVA results indicated that girls generally perceived their mathematics teacher more cooperative than boys did. Also students perceived their male teachers display more leadership, helping/friendly, and strict behaviors than their female teachers. Results also indicated that teachers generally perceived themselves in a more favorably manner than their students did.

Keywords: Learning environments, interpersonal teacher behavior, mathematics education, mathematics teacher

ÖZ

SEKİZİNCİ SINIF ÖĞRENCİLERİNİN MATEMATİK ÖĞRETMENLERİNİN KİŞİLER-ARASI DAVRANIŞ ÖZELLİKLERİNİ ALGILAMALARI

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Bu çalışmada 8. sınıf öğrencilerinin matematik öğretmenlerinin kişiler arası davranış özelliklerini algılayışları araştırılmaktadır. Ayrıca matematik öğretmenlerinin kendilerinin kişiler-arası davranışlarını algılayışlarının yanısıra, öğrencilerin algılamaları ile onların matematik dersine yönelik tutumları, matematik başarıları, cinsiyetleri, matematik öğretmenlerinin cinsiyeti, ve sosyo-ekonomik düzeyleri arasındaki ilişkileri belirlemek de bu çalışmanın amaçları arasındadır. Bu çalışmada veri toplama araçları olarak, öğretmen etkileşim ölçeği (QTI) ve matematik dersi tutum ölçeği kullanılmıştır. Veriler, İstanbul, Ankara, İzmir, Adana, Bursa ve Hatay illerinden seçilen ilköğretim devlet okullarından toplam 1317 8. sınıf öğrencisinden toplanmıştır.

İstatistiksel analizlerin sonuçları, araştırmacı tarafından Türkçe'ye çevrilen ve adapte edilen QTI ölçeğinin güvenilir ve geçerli olduğunu göstermiştir. Sonuçlara göre öğrenciler, öğretmenlerinin belirsiz, memnuniyetsiz ve nasihat verici davranışlardan çok lider, yardımcı/arkadaş, anlayışlı ve katı/disiplinli davranışlara sahip olduklarını belirtmişlerdir. Sonuçlar ayrıca öğrencilerin matematik dersine olan tutumları ile öğretmenlerinin kişiler-arası davranışlarını algılamaları arasında anlamlı bir ilişki olduğunu göstermiştir. Lider, yardımcı/arkadaş ve anlayışlı öğretmen davranışları ile öğrenci tutumları arasında pozitif korelasyon, buna karşılık belirsiz, memnuniyetsiz, nasihat verici ve katı/disiplinli öğretmen davranışları ile tutum arasında negatif korelasyon bulunmuştur. Aynı şekilde öğretmenini lider, yardımcı/arkadaş ve anlayışlı algılayan öğrencilerin genel olarak öğretmenini belirsiz, memnuniyetsiz, nasihat verici ve katı/disiplinli algılayan öğrencilerden daha başarılı olduğu analizler sonucu bulunmuştur. Ayrıca, daha iyi sosyo-ekonomik düzeye sahip öğrencilerin öğretmenlerini algılayışlarının daha olumlu olduğu belirlenmiştir.

MANOVA sonuçları, kız öğrencilerin öğretmenlerini erkek öğrencilere göre daha işbirlikçi ve olumlu algıladıklarını göstermektedir. Ayrıca öğrenciler erkek öğretmenlerinin bayan öğretmenlerinden daha çok liderlik, yardımcı/arkadaş aynı zamanda katı/disiplinli davranış özelliklerini gösterdiklerini belirtmişlerdir. Araştırma sonuçları ayrıca, öğretmenlerin kendilerini öğrencilerinin algılamalarından daha olumlu algıladıklarını da göstermektedir.

Anahtar kelimeler; Öğrenme ortamları, öğretmenlerin kişiler-arası özellikleri, matematik eğitimi, matematik öğretmeni.

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DV	: Dependent Variables
IV	: Independent Variables
ANOVA	: Analysis of Variance
MANOVA:	: Multivariate Analysis of Variance
SD	: Standart Deviation
MITB	: Model for Interpersonal Teacher Behavior
QTI	: Questionnaire on Teacher Interaction
DC	: Leadership scale of QTI
CD	: Helping/friendly scale of QTI
CS	: Understanding scale of QTI
SC	: Responsibility/freedom scale of QTI
SO	: Uncertain scale of QTI
OS	: Dissatisfied scale of QTI
OD	: Admonishing scale of QTI
DO	: Strictness scale of QTI
N	: Sample Size
α	: Significance Level

CHAPTER 1

INTRODUCTION

People are always in interaction with their environments. Everything around a person has an influence on his/her personal development. Especially in the learning process, learners tend to be influenced from everything around them, including the physical and the social environment. People show the best performance when they have an environment without problems.

Cheng (1994) mentioned that school is a social system in which educational outcomes are the results of inputs from external environment, which are transformed by the school's internal environment. The internal environment is the context of learning and consists of the physical environment and the psychological environment. The physical environment of the school and the classroom – facilities, spaces, lightening, ventilation, desks and chairs, and air pollution – affect the safety and comfort of students and thereby affect learning and personal development. The psychological environment refers to the social quality of the school and classroom, especially as it relates perceptions and feelings about social relationships among students and teachers. The terms classroom psychological environment, classroom atmosphere, classroom social climate, classroom social interactions, and classroom social relationship are often used interchangeably when scholars discuss the classroom-learning environment. Related to this idea, it can be argued that teacher behaviors play an important role as a part of learning environment. The critical

component of the classroom is heavily influenced by the interpersonal skills of the teacher (Creton, Wubbels & Hooymayers, 1989).

Learning environment can be defined as a set of dispositions that incline individuals to act and interact in particular ways (Bourdieu, 1992; Lemke, 1985). Researches have shown that the quality of the classroom environment in schools is a significant factor of student learning (Fraser, 1994, 1998a). The extent to which teaching and learning are productive depends partly on the learner's environment. Many research studies found out that students learn better when they perceive the classroom environment positively (Den Brok, Fisher, & Rickards, 2004; Fisher, Henderson, & Fraser, 1996; Wubbles, 1991).

The influence of the learning environment on the process of education has received a great deal of attention from educational researchers during the last three decades (Fraser, 1994, 1998a). According to Goh and Fraser (1995) the 'learning environment' concept got its importance in educational researches firstly in Murray's Need-Press Model (1938) and Kurt Lewin's Socio-psychological Climate (1936). Goh and Fraser stated that in 1960 Getzel and Tholen developed a framework for the analyses of the classroom as a unique social system. Later, Doyle (1979) proposed viewing the classroom from an ecological viewpoint, and hence placing strong emphasis on the inter-relationships and communications among all members in the classroom community.

Wubbels, Levy and Brekelmans (1997) argued that the process-product research of the 1960s and 1970s identified teaching strategies that contributed to student achievement. These studies, which analyzed teaching primarily from a methods perspective, empirically explained that how some teachers excel in asking

questions, monitoring student progress, organizing and managing the classroom and building appropriate lessons. Recent studies show that student attitudes and achievement are influenced jointly by a number of factors rather than by one dominant factor (Walberg, 1986; Walberg, Fraser, & Welch, 1986). Learning environment factors were found to be particularly important influences on student outcomes even when a number of other factors were controlled (Fraser, 1986; Henderson, 1995; Moos, 1980). Past studies on the concept of learning environment reported that students' perceptions of their teachers' interpersonal behavior is an important factor in their cognitive and attitudinal outcomes (Brekelmans, Wubbels, & Den Brok, 2002; Fraser & Fisher, 1982; Fraser & Butts, 1982; Goh & Fraser, 1995; Henderson, 1995; Wubbels, Brekelmans, & Hooymayers, 1991).

Many instruments have been developed to search for students' and teachers' perceptions of learning environment. These instruments are used to assess the qualities of the classroom environment from the perspective of the students and teachers. One of the most common measuring instruments on student- teacher interaction was developed in the Netherlands through several studies in the early eighties; is called the Questionnaire for Teacher interaction (QTI; Wubbels, 1985). In the present study, QTI was used for measuring the mathematics teachers' interpersonal behaviors from the perspectives of both the students and teachers.

As the learning environment researches got a history of over three decades, the instruments on learning environment are translated and adapted to many different languages and applied in many countries by educational researchers. In Turkey there is a great need for conducting researches in the domain of learning environment, especially teachers' interpersonal behaviors in the classroom. Many problems about

instructional quality in the Turkish schools are related to teacher behavior, especially in mathematics lessons. Rakıcı (2004) developed the Turkish version of QTI (T-QTI) consisting of 47 items measuring 8th grade students perceptions of their science teachers' interpersonal behaviors. This was the first study in Turkey on the concept of interpersonal teacher behavior.

This study is the first in Turkey in terms of measuring students' and their mathematics teachers' perceptions of interpersonal teacher behaviors. The results will give an idea about whether the Turkish teachers display cooperative behaviors or opposition behaviors in the class. The results will also indicate the relationships between students' perceptions and their affective and cognitive outcomes.

1.1 The main problem and sub-problems

The purpose of this study was to investigate 1317 8th grade students' perceptions related to their mathematics teachers' interpersonal behaviors. The study also aimed to investigate mathematics teachers' perceptions of their own interpersonal behaviors and relationships among students' perceptions of their teachers' interpersonal behaviors, students' attitudes towards mathematics, mathematics achievements, student gender, teacher gender, and socio-economical background.

1.1.1 Main problem

The main problems of this study were:

1) What are the 8th grade students' perceptions related to their mathematics teachers' interpersonal behaviors?

2) What are the relationships between students' perceptions related to their mathematics teachers' interpersonal behaviors and students' attitudes towards mathematics, mathematics achievement, gender, socio-economic status and teacher's gender?

3) What are the differences between students' perceptions related to their mathematics teachers' interpersonal behavior, teachers' perceptions related to their own interpersonal behaviors and their ideal teachers' interpersonal behaviors?

1.1.2 Sub-problems

The sub-problems of this study were;

1) Is there a statistically significant relationship between 8th grade students' attitudes towards mathematics and their scores on the 8 sub-dimensions of Model for Interpersonal Teacher Behavior (MITB)?

2) Is there a statistically significant relationship between 8th grade students' mathematics achievements and their scores on the 8 sub-dimensions of MITB?

3) Is there a statistically significant difference between 8th grade female and male students with respect to their scores on the 8 sub-dimensions of MITB?

4) Is there a statistically significant difference between the 8th grade students taught by male teachers and those taught by female teachers with respect to their scores on the 8 sub-dimensions of MITB?

5) Is there a statistically significant relationship between 8th grade students' socio-economic statuses and their scores on the 8 sub-dimensions of MITB?

6) Is there a statistically significant difference between 8th grade students' perceptions related to their mathematics teachers' interpersonal behaviors and teachers' perceptions related to their own interpersonal behaviors?

7) Is there a statistically significant difference between mathematics teachers' perceptions related to their own interpersonal behaviors and their ideal teachers' interpersonal behaviors?

1.2 The Null Hypotheses

The problems stated above will be tested with the following hypotheses:

1) There is no statistically significant relationship between 8th grade students' attitudes towards mathematics and their scores on the 8 sub-dimensions of Model for Interpersonal Teacher Behavior (MITB).

2) There is no statistically significant relationship between 8th grade students' mathematics achievements and their scores on the 8 sub-dimensions of MITB.

3) There is no statistically significant difference between 8th grade female and male students with respect to their scores on the 8 sub-dimensions of MITB.

4) There is no statistically significant difference between the 8th grade students taught by male teachers and those taught by female teachers with respect to their scores on the 8 sub-dimensions of MITB.

5) There is no statistically significant relationship between 8th grade students' socio-economic statuses and their scores on the 8 sub-dimensions of MITB.

6) There is no statistically significant difference between 8th grade students' perceptions related to their mathematics teachers' interpersonal behaviors and teachers' perceptions related to their own interpersonal behaviors.

7) There is no statistically significant difference between mathematics teachers' perceptions related to their own interpersonal behaviors and their ideal teachers' interpersonal behaviors.

1.3 Definitions of important terms

Definitions of some of the important terms in the study are;

Teacher interpersonal behaviors (Teacher communication style): Behavior is the way of acting in a particular way. Teacher behavior include all the behaviors that teacher acts in the classroom and school. At least two participants needed to communicate. The two main participants of communication in the class are the teacher and students. Both of these two participants are affected by the communications in the class. Teacher interpersonal behaviors include the ways of teacher's communication and interaction with his/her students.

Student perception: Perception is the ability to become aware of something. In the present study student perception means students' thoughts and observations about their mathematics teachers' interpersonal behavior.

Teacher perception: Mathematics teachers' thoughts and observations about their own interpersonal behavior.

Ideal teacher: Ideal means perfect. An ideal teacher shows high standard of behavior. In the present study, teachers participated to the study defined their ideal teacher's behaviors.

Attitude towards mathematics: Attitude is the way of thinking or behaving. In this study this term is used to describe students' thoughts and feelings toward

mathematics. A mathematics attitude scale is used to measure students' attitude towards mathematics.

Mathematics achievement: Achievement is gaining or reaching something by effort. In the present study mathematics achievements of the students are measured with their mathematics grades in last 3 semesters.

1.4 Significance of the Study

This study has both theoretical and practical significances. It is the common idea that, the most important role in learning environment is played by the teacher. Teacher is the heart of the teaching activity. As mentioned in earlier, the main influence on students' cognitive and affective outcomes is teacher behavior.

In many countries, Questionnaire on Teacher Interaction (QTI) and other learning environment scales are used to measure students' perceptions of teacher interpersonal behavior. QTI is translated to over 15 different languages (Wubbels, Brekelmans, Van Tartwijk, & Admiraal, 1997). But up to 2004 no version of QTI is developed or applied in Turkey. There are only a few studies on learning environment. Rakıcı (2004) translated and applied a version of QTI, consisting of 47 items. She applied T-QTI to 8th grade students to measure their perceptions of science teachers' interpersonal behavior. In the present study QTI is translated and adapted to Turkish by the researcher and applied to 8th grade students in order to measure students' perceptions of their mathematics teacher's interpersonal behavior. By this mean, this study has significance by being the first study in Turkey in its area.

2004 Program for International Student Assessment (PISA) results showed that the achievement of Turkish students on both mathematics and science are not satisfying. In both fields Turkey got a score below the average of all countries. More studies should be conducted that aims to put away the problems that effect students' performance and to increase both attitudes and achievements especially towards mathematics and science. In the present study the results will give an idea about the relationships between the Turkish students' attitudes on mathematics, achievements towards mathematics and their mathematics teacher's interpersonal behavior. In order to enhance students' mathematics performance, teachers may display the behaviors that affect their students' attitude and achievement positively. Studying such behaviors will provide valuable information that is beneficial for teachers.

Researchers can use the results of this study in order to develop new studies on teacher interpersonal behavior. The results of the present study indicated that Turkish version of QTI is a reliable and valid instrument. Also other results of the study support the previous studies conducted on QTI. QTI can be applied to other grades and on other fields in Turkey. This study gives new opportunities to researchers who want to study learning environments and interpersonal teacher behaviors.

This study will fill a gap in educational research in Turkey.

1.5 Ethical Issues

During the study, all ethical rules were carefully considered. During the data collection, students and teachers didn't have to write their names. As the study was

on teacher behaviors, in order not to hurt teachers, researcher explained the purposes and significance of the study briefly.

During and after the data collection, no one saw the collected data except for the researcher. School names were not mentioned in the study. Only researcher got the information about schools, teachers and students. From all schools, except for İzmir and Bursa, researcher collected the data. In İzmir and Bursa another educational researcher collected the data.

CHAPTER 2

REVIEW OF RELATED LITERATURE

In this chapter, previous studies that form theoretical and empirical framework for this study are reviewed. Review of related literature chapter consisting of 5 main sections;

1. Theoretical framework for learning environments
2. Theoretical Framework for interpersonal teacher behaviors
3. Instruments to measure learning environments and interpersonal behaviors
4. Interpersonal profiles
5. Researches on interpersonal teacher behaviors

2.1 Theoretical framework for learning environments

An examination of past reviews of research shows that international research efforts involving the conceptualization, assessment and investigation of various aspects of the classroom learning environments have been growing over the last three decades (Fraser, 1991; Wubbels, Creton & Hooymayers, 1992). Major researchers in this field report that considerable progress has been made over the last four decades in the conceptualization, assessment and investigation of learning environment (Fraser, 1986, 1994; Fraser & Walberg, 1991; Wubbels & Levy, 1993). In earlier studies, the most common means of measuring the learning environment has been through the use of

observations: that has led to insights into the learning environment through the eyes of the participants or the eyes of an external observer, rather than through the eyes of students (Rakıcı, 2004).

Classroom research methods about three decades ago were centered on observation techniques where trained observers would categorize classroom activities and interactions between members of the class (Rickards, 1998; Koul, 2003). In later studies both qualitative and quantitative research methods were used in learning environment research (Alldridge, Fraser & Huang, 1999; Tobin, Kahle & Fraser, 1990; Tobin & Fraser, 1998).

In 1936, Lewin introduced the formula $B=f(P,E)$ to describe the human behavior (B). According to Lewin, both the environment (E) and its interaction with personal characteristics of the individual (P) are the potent determinants of human behavior. In other words, the combination of two independent influences, the person (P) and the environment (E) made up human behavior. On Levin's approach, Murray (1938) developed a "need-press model" and introduced the terms "alpha press" that describes the environment from the point of view of an external observer and "beta press" that describes environment from the point of view of someone involved in the experience. In the need-press model, personal needs are motivated by personality characteristics representing tendencies to move in the direction of certain goals: while environment press provides an external situational counterpart that supports or frustrates the expression of internalized personality needs. According to Fraser, Fisher and Mcrobbie (1996), environmental measures were rarely considered, but various numbers of measures of personality were developed from Murray's Need-Press Theory in early studies. They argued that when the study of human environments was being established,

researchers recognized that different people bring different perspectives to research, which in turn may lead to different interpretations of results.

Various researchers have made the distinction between the classroom environment and school environment (Anderson, 1982; Fraser & Rentoul, 1982). The classroom environment involves the interaction between the students and teacher where the school environment includes all the relationships between members of the school. According to Walberg (1986), the common property for both learning environment units is that; in recent studies, classroom environment and school environment are found to be strong predictors of both achievement and attitudes even when a comprehensive set of other factors is held constant (Walberg, 1986). Walberg's multi-factor psychological model of educational productivity suggests that the psychological learning environment is one of the nine factors that affects student learning. The model suggests that learning is a function of student age, ability and motivation; of the quality and quantity of instruction; and of the psychological environments of the home, the classroom, the peer group and the mass media. According to Fraser (1990) Walberg and Moos, who studied on the effects of the psychological environments and their influences on student outcomes late 1960s and early 1970s, formed the starting points for contemporary learning environment research. Fraser states that Moos and Walberg, independent of one another, pioneered another approach to the study of learning environment in the late 1960 and early 1970s, that of using the perceptions of students and teachers within the environments. Their work was using the concept of Murray's (1938) beta press and involved the subjective perceptions of teachers and students within the classroom environment rather than the perceptions of external, objective researchers.

2.2 Theoretical Framework for interpersonal teacher behaviors

It is the reciprocal nature of the teacher-student communication that makes it a powerful force in influencing the learning environment and subsequently student performance. In the last 20 years, this long-standing recognition has inspired a tradition of studying classroom learning environment through the perceptions of both students and teachers (Fraser, 1994; Fraser & Walberg, 1991).

According to Koul (2003) one of the earliest attempts to categorize and observe interaction in the classroom with the use of trained observers who recorded verbal elements of the interaction in the classroom was carried out by Withall (1949). Withall classified the seven different categories in three main categories. The first category was "learner centered", which involves learner-supportive statements, acceptance and clarifying statements, and problem-structure statements. The second category was "teacher centered" that involves directive and authoritative statements, reproving or deprecating remarks and teacher self-supporting remarks. The last category was "neutral" that involves neutral statements.

The theory of Watzlawick, Beavin and Jackson (1967) on communication processes is adapted for use in classroom communication research by Wubbels, Creton and Holvast (1988). Within the systems perspective on communication, it is assumed that behaviors of participants influence each other mutually. The behavior of the teacher both influences and influenced by the behavior of the students (Wubbels, Brekelmans & Hooymayers, 1991). Communication in this theory is seen as circular, in that there is no beginning or end. It is unavoidable and it is ongoing, with communication both consisting of, and determining, behavior. According to Rawnsley (1997) the importance ascribed in the systems theory of communication to be command aspect of

communication and the ways in which it is interpreted underscore the use of students' perceptions as the means of gathering data in classrooms.

Teachers develop different types of relationships with their students because of their different communication types. Some teachers behave friendlier, some other are stricter. In order to measure these behaviors, Wubbels and his colleagues used a framework based on Leary's (1957) model for interpersonal behavior. As cited in the study of Wubbels, Levy and Brekelmans (1997), a clinical psychologist, Timothy Leary (1957) conceptualized all interpersonal behavior on two primary dimensions. One of the dimensions is called Proximity dimension that measures the degree of cooperative or oppositional behavior, and the other dimension is called influence dimension that measures the dominance and submissiveness in the relationship. A person who is controlling the communication is in influence dimension. Proximity dimension represents the cooperation between the people communicating. Leary and researchers who followed this model (Wubbels, Creton, Levy & Hooymayers, 1993) argued that all interpersonal behavior can be conceptualized into positions somewhere on these two dimensions. They mentioned that these two dimensions are both necessary and sufficient to describe the interpersonal behaviors (Rawnsley, 1997). Figure 2.1 expresses diagrammatically this conceptualization of interpersonal behavior.

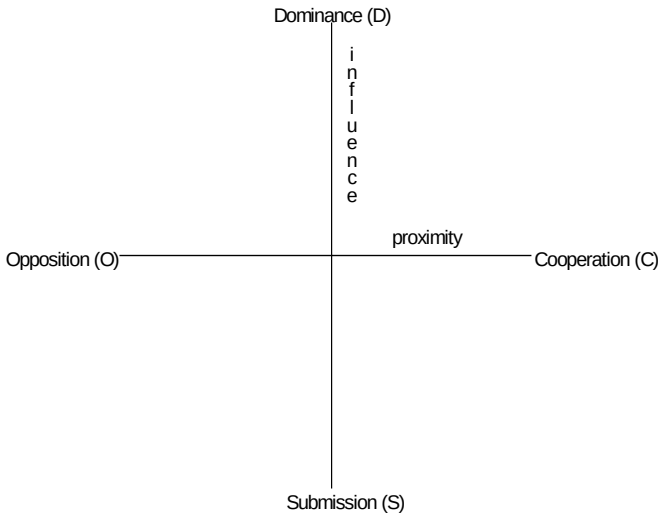


Figure 2.1 Leary's (1957) model for the interpersonal communication. (cited in Wubbels, Creton and Hooymayers (1985))

Latter authors gave different names to these communication dimensions, such as 'status' and 'solidarity' (Brown, 1965), 'warmth' and 'directivity' (Dunkin & Biddle, 1974), 'authority' and 'affiliation' (Slater, 1962). On the basis of the model of Leary (1957), Wubbels, Creton and Hooymayers (1985) developed a model to map interpersonal teacher behavior. This model is adapted to the classroom by dividing Leary's original two dimensions into the eight behavior types. The first letters of the two closer dimensions labels these eight sections. For example DC section and CD sectors both characterized by the dimensions Dominance and Cooperation. But the DC sector includes more dominant behaviors and less cooperative behaviors; however CD includes more cooperative behaviors and less dominant behaviors. The sections of the model describe eight different behavior aspects. Every instance of interpersonal teacher behavior can be placed within the system of axes. The closer the instances of behavior are in the chart, the more closely they resemble each other. The eight sectors are labeled as; Leadership (DC), Helpful/Friendly (CD), Understanding (CS), Student

Responsibility and freedom (SC), Uncertain (SO), Dissatisfied (OS), Admonishing (OD), Strict (DO). Figure 3 shows these sectors and behaviors, in an octagonal representation that is often called “goniometric circle”.

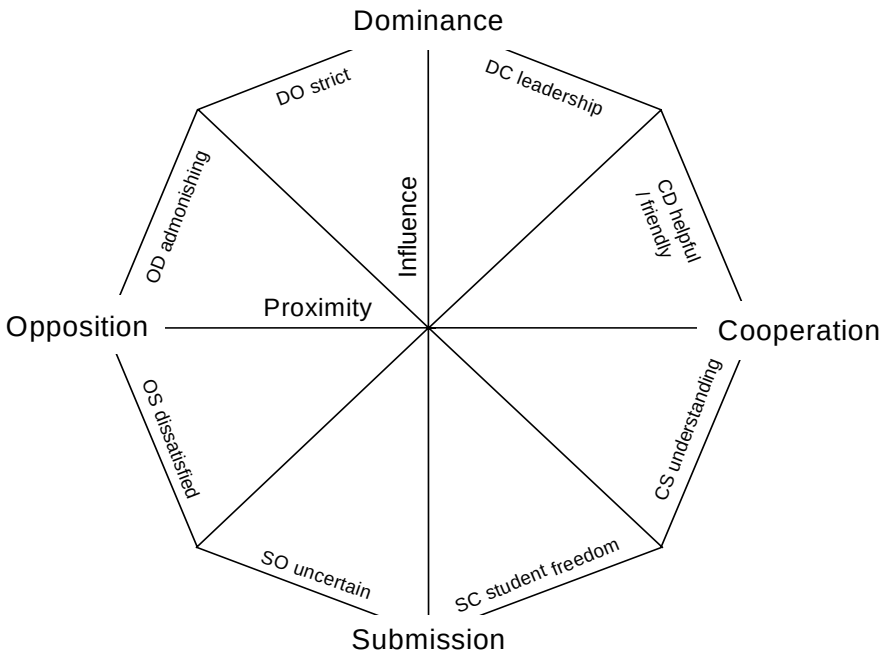


Figure 2.2 The eight dimensions of the model for interpersonal teacher behavior (Wubbels, Levy, & Brekelmans, 1997).

Table 2.1 shows the typical behaviors for each sector of Model for interpersonal teacher behavior (MITB) as stated by Wubbels et al. (1985). Adjacent sectors in the model reflect similar interpersonal behaviors whereas opposite sectors reflect opposite behaviors. Because of this, it is called a circumplex model.

Table 2.1 Typical behaviors for MITB. (Wubbels, et al, 1985, p.66)

Scale (sector)	Typical behavior
DC – leadership	Notice what is happening, leads, organizes, give orders, set tasks, determine procedure, structure the classroom situation, explain, hold on attention
CD – helpful/ friendly	Assist, show interest, join, and inspire confidence and trust.
CS – understanding	Listen, understanding, be open to, be patient.
SC–student responsibility/freedom	Give opportunity for independent work. Give freedom and responsibility.
SO – uncertain	Keep a low profile; admit one is in the wrong.
OS – dissatisfied	Wait for silence, keep quiet, and show dissatisfaction.
OD – admonishing	Get angry, forbid, correct, punish.
DO – strict	Keep reins tight, check, get class silent, exact norms and set rules.

Wubbels et al. (1985) suggest that in the MITB, sectors don't have strict boundaries between them, however sectors opposite each other represents opposite behaviors. For example SO (uncertain) sector describes opposite behaviors than DC (Leadership) sector describes.

As stated before, the MITB describes interpersonal teacher behavior in terms of two dimensions (influence and proximity) that underlie eight behavioral sectors, ordered in a two-dimensional plane. The MITB is a special model because of its statistical

properties and is theoretically linked to a particular branch of models called *circumplex models*. Circumplex models are based on a specific set of assumptions (Brok, Fisher, Brekelmans, Rickards, Wubbels, Levy, Waldrib, 2003). These are:

- Assumption 1: the eight behavioral sectors (or scales) of the model are represented by two dimensions (or factors).
- Assumption 2: the two interpersonal dimensions that lay behind the sectors are uncorrelated.
- Assumption 3: with the two interpersonal dimensions, the sectors (or scales) of the model can be ordered in a circular structure.
- Assumption 4: the sectors (or scales) of the model are equally distributed over this circular structure.
- Assumption 5: the sectors (or scales) occupy specific positions on the circle (as given in Figure 3).

The model for interpersonal behavior allows for the analysis of what the teacher does when he or she 'interacts with students' and the analysis of the effects of the teacher's actions on the students and on the patterns of the teacher's interpersonal behavior (Wubbels, Creton & Hooymayers, 1985). Wubbels et al. (1985) argued that many interactions needed to take place over a period of time so that interaction patterns have an opportunity to develop and evolve. Through this, a true picture of a teacher's interpersonal behavior can be observed.

2.3 Instruments measuring learning environment and interpersonal teacher behavior

As discussed earlier, Moos' work (1974) has influenced the development and application of many instruments used to assess the qualities of the learning environment

from the perspective of the student (Koul, 2003). According to Fraser and Walberg (1981) the use of student perceptions to measure classroom environment has a number of advantages over observational techniques. These are:

1) Paper and pencil perceptual measures are more economical than classroom observational techniques that involve the expense of trained outside observers.

2) Perceptual measures are based on students' experiences over many lessons whereas observational data are usually restricted to a small time period.

3) Perceptual measures involve the pooled judgments of all students in a class, whereas observation techniques typically involve only a single observer.

4) Students' perceptions can be more important than observed behaviors, because they are the determinants of student behavior more than the real situation.

5) Perceptual measures of classroom environment typically have been found to account for considerably more variance in student learning outcomes than directly observed variables.

Many instruments are developed by educational researchers such as; My Class Inventory (MCI), Learning Environment Inventory (LEI), Collage and University Classroom Environment Inventory (CUCEI), Classroom Environment Scale (CES), Science Laboratory Environment Inventory (SLEI), Constructivist Learning Environment Survey (CLES), What is Happening In this Class? (WIHIC), Computer Facilitated Learning (CFL). Table 2.1 summarizes the properties of nine learning environment instruments

Table 2.1 Overview of scales contained in nine learning environment instruments (Rakıcı, 2004)

Instrument	Level	Items/ scale	Relationship dimensions	Personal development dimensions	System maintenance and change dimensions
Learning Environment Inventory (LEI)	Secondary	7	Cohesiveness Friction Favoritism Satisfaction Apathy	Speed Difficulty Competitiveness	Diversity Formality Material Environment Goal Direction Disorganization Democracy
Individualized Classroom Environment Questionnaire (ICEQ)	Secondary	10	Personalization Participation	Independence Investigation	Differentiation
Classroom Environment Scale (CES)	Secondary	10	Involvement Affiliation Teacher Support	Task Orientation Competition	Order and Organization Rule Clarity Teacher Control Innovation
College and University Classroom Environment Inventory (CUCEI)	Higher Education	7	Personalization Involvement Student Cohesiveness Satisfaction	Task Orientation	Innovation Individualization
My Class Inventory (MCI)	Elementary	6--9	Cohesiveness Friction Satisfaction	Difficulty Competitiveness	
Science Laboratory Environment Inventory (SLEI)	Upper Secondary/ Higher Education	7	Student Cohesiveness	Open-Endedness Integration	Rule Clarity Material environment
Questionnaire on Teacher Interaction (QTI)	Secondary/ Primary	8--10	Helping/Friendly Understanding Dissatisfied Admonishing		Leadership Student Responsibility Uncertain Strict
Constructivist Learning Environment Survey (CLES)	Secondary	7	Personal Relevance Uncertainty	Critical Voice Shared Control	Student Negotiation
What Is Happening In This Classroom (WIHIC)	Secondary	8	Student Cohesiveness Teacher Support Involvement	Investigation Task Orientation Cooperation	Equity

According to Evans (1998), most of these instruments can be used in four distinct forms: Measurement of student perceptions of actual classroom environment (Student Actual form), student perceptions of preferred classroom environment (Student preferred form), teacher perceptions of actual classroom environment (Teacher Actual form), teacher perceptions of preferred classroom environment (Teacher preferred form) (Fraser, Seddon & Eagleston, 1982).

One of the most widely used instruments for measuring teacher behavior in many countries is Questionnaire on Teacher Interaction (QTI; Wubbels, & Brekelmans, 1998). QTI is the instrument that can be used to determine both students' and teachers' perceptions of interpersonal teacher behavior.

According to Goh and Fraser (1995), in the early eighties, QTI is developed in Netherlands based on Model for Interpersonal Teacher Behavior (MITB) (Wubbels et al, 1985). It is consisting of eight scales, each consisting of about 10 items. Each item corresponds to one of the eight sectors of the Model for Interpersonal Teacher Behavior. The 77 items are answered on a likert-type 5 point scale ranging from 'never/not at all to always/very).

Based on the original Dutch version, an American version consisting of 64 items is developed (Wubbels & Levy, 1989). In 1993, Fisher, Fraser and Wubbels developed an Australian version of QTI consisting of 48 items. Since its development, QTI has been the focus of well over 120 (learning environment) studies in many countries (den Brok, Brekelmans, Levy & Wubbels, 2002) and has been translated into more than 15 languages (Wubbels, Brekelmans, van Tartwijk & Admiraal, 1997) such as Hebrew, Russian, Slovenian, Swedish and Finish. The original QTI, designed for secondary education, also formed the basis for a number of other versions for primary education, higher education, principals and supervisors (den Brok, 2001).

QTI can be applied to both students and teachers. . The two versions, the Student Questionnaire and Teacher Questionnaire are basically similar. For example item 1 in the Student questionnaire is “This teacher is strict” whereas in the Teacher questionnaire it is “I am strict/My ideal teacher is strict”. Table 2.2 gives the question numbers and sample items for each scale of the American version of QTI.

Table 2.3 Number of items and typical item for each of the eight scales of the QTI.

	Scale name	Question numbers	Sample item
DC	Leadership	3,31,36,40,45,52,62	S/He is a good leader
CD	Helpful/Friendly	5,15,29,35,37,47,50,60	S/He is someone we can depend on
CS	Understanding	4,6,11,13,17,18,32,56	If we have something to say s/he will listen
SC	Giving students responsibility/freedom	8,21,25,27,33,48,49,64	S/he gives us a lot of free time in class
SO	Uncertain	23,34,39,42,44,46,55	S/He seems uncertain
OS	Dissatisfied	7,10,12,19,26,28,30,54,58	S/He is suspicious
OD	Admonishing	16,24,38,41,43,51,59,63	S/He gets angry unexpectedly
DO	Strict	1,2,9,14,20,22,53,57,61	S/He is strict

Each item in the QTI is scored on a five-point Likert scale, ranging from 0 (never) to 4 (Always). Each completed questionnaire allows a score to be calculated for each sector of the Model for interpersonal Behavior. For example for the strict sector, a score is gathered by adding up the scores of the 9 items in this scale. For all of the 8 scales, this process is applied, so that the scores for all scales can be compared in order

to compare the sectors. By this way a set of eight scores, called a profile, can be obtained from a completed questionnaire. When the number of questions in the related scale divides the score of that scale, a mean score for the scales are obtained ranging from 0 to 4. For example when we add a student's answers for the questions 3, 31, 36, 40, 45, 52 and 62; we get a total score of 22 for the scale Leadership. This scale has 7 items so that we divide 22 by 7 and we get a mean score for the sector Leadership as 3,1. For all sectors the mean scores can be calculated. These mean scores can be plotted on a sector profile as showed in figure 2.3. In this sector profile, every sector is divided into 4 parts. According to the mean score of the scale, the amount of shaded part is defined. Each sector is shaded in such a way that the degree of shading is a measure of the height of the scale scores (Wubbels, Brekelmans & Hooymayers, 1991). In other words, the ratio of the length of the perpendicular bisector of the shaded part and the length of the perpendicular bisector of the total sector equals the ratio of the observed score and the maximum score for that sector. As mentioned, the mean scores range from 0 to 4 where 'four' indicates that the behavior in that scale is always demonstrated and 'zero' indicates that the behavior in that scale never displayed.

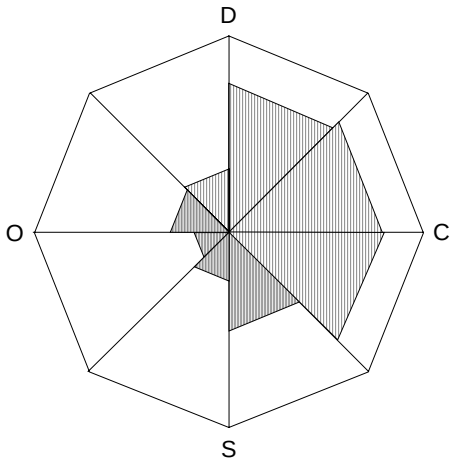


Figure 2.3 An example for sector profile

In a sector profile like in the figure 2.3, it can be concluded that this teacher displays more leadership, helping/friendly and understanding behaviors rather than uncertain, dissatisfied and admonishing behaviors. She/he does not give much freedom and responsibilities to students in the classroom and display much strict behaviors.

For both student and teacher perceptions, sector profiles like in figure 2.3 can be plotted. So that a general idea about the teacher's interpersonal behavior can be gathered. Also a comparison between students' perceptions and teacher's perceptions can be made.

2.4 Interpersonal profiles

Two different dimensions can describe the interpersonal style of teachers; one is the perception of students of their teachers and the other is perception of teachers of themselves. As mentioned above, a set of eight scores can be obtained from every completed QTI. Then, each sector is shaded according to the height of the scale mean scores. In a research study in which nearly all the teachers of one Dutch urban secondary school participated, Brekelmans (1989) developed a typology of learning environments based on students' perceptions of teachers' interpersonal behavior. Brekelmans' (1989) study revealed a typology of eight types of teacher behavior. In both Dutch and American classes, these eight different types of relatively stable patterns could be distinguished (Wubbels & Levy, 1993). These eight interpersonal profiles are named as; Directive, Authoritative, Tolerant/Authoritative, Tolerant, Uncertain/Tolerant, Uncertain/aggressive, Drudging, and Repressive. These patterns can be characterized in terms of two dimensions in the Model for Interpersonal Teacher Behavior. Figure 2.4.1 summarizes each of these eight profiles.

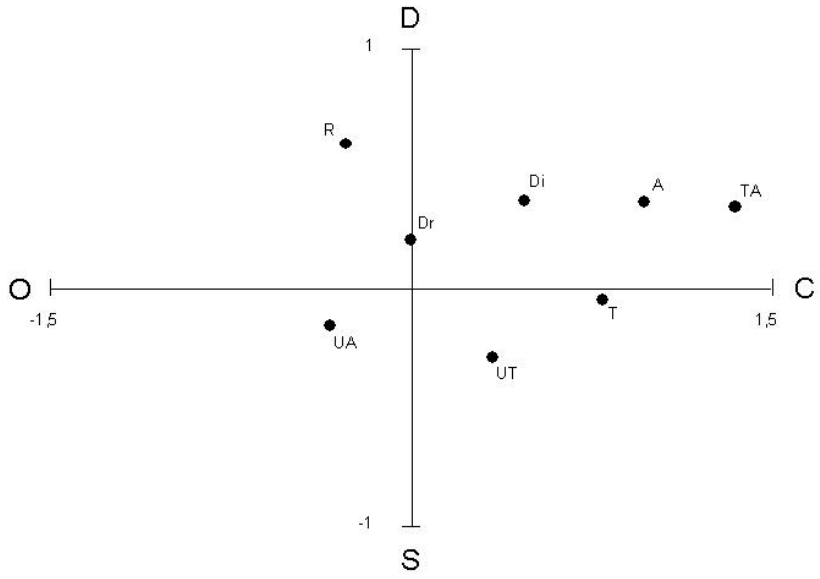


Figure 2.4.1 Main points of the eight types of patterns of interpersonal relationships. (Rickards, Den Brok, & Fisher, 2003).

(A=Authoritative, Di=Directive, Dr=Drudging, T=Tolerant, R=Repressive, TA= Tolerant/Authoritative, UA=Uncertain/Aggressive, UT=Uncertain/Tolerant)

The Authoritative, the Tolerant/Authoritative and the Tolerant type are patterns in which students perceive their teachers relatively high on the Proximity Dimension, with the Tolerant type lowest on the Influence Dimension. Less cooperative than the three previous types are the Directive type, the Uncertain/Tolerant and the Drudging type, with the Uncertain/Tolerant type lowest on the Dominance Dimension. The least cooperative pattern of interpersonal relationships has Repressive and Uncertain/Aggressive type classes. In Repressive type classes, teachers are the most dominant of all eight types (Rickards, et al, 2003).

These eight interpersonal types are summarized with their profiles below (Brekelmans, Levy, & Rodriguez, 1993).

1) Directive

The learning environment in a class with a teacher with a directive profile is well structured and task-oriented. The teacher is organized efficiently and normally completes all lessons on time. S/he directs the students and reminds them that they come to school to work. S/he dominates class discussion, but generally holds students' interest. The teacher behaves friendly and understanding but close relationships do not seem very important. S/he has high standards for student achievements, is rather demanding and can hold students' attention. S/He corrects students' behavior every now. The figure 2.4.2 summarizes a directive classroom environment and teacher profile.

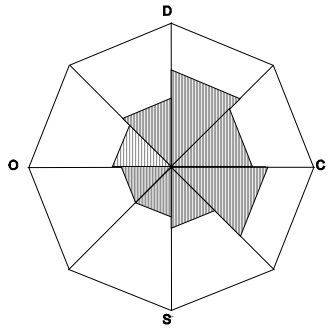


Figure 2.4.2 Sector profile for Directive teacher profile

2) Authoritative

The lessons of an authoritative teacher are well structured and the environment is pleasant and task-oriented. Rules and procedures are clear and students don't need to be reminded. They are attentive, and their behaviors are less corrected then did by a directive teacher. The Authoritative teacher is enthusiastic and his or her students listen and behave attentively. S/he takes a personal interest in them. An authoritative teacher likes lecturing teaching method most but s/he frequently uses other methods too. Figure 2.4.3 summarizes an authoritative teacher's behavior.

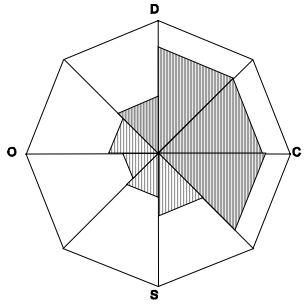


Figure 2.4.3 Sector profile for Authoritative teacher profile

3) Tolerant and Authoritative

Tolerant and Authoritative teachers maintain a structure that supports student responsibility and freedom. The environment is more supportive than type 2 teachers'. Teachers in this profile have close relationships with students. Students are highly involved in the lessons because they enjoy being in the class. The teacher uses different teaching methods in order to involve students into the lesson. S/he doesn't need to correct students' behavior or enhance rules. Students follow unwritten rules automatically. Students got the correct behaviors and need to reach achievement themselves because they like the teacher and enjoy the lessons. Figure 2.4.4 summarizes a tolerant and authoritative teacher behavior.

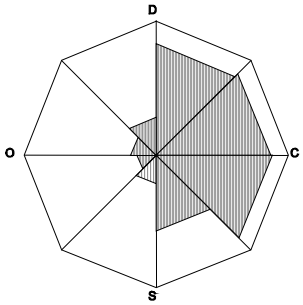


Figure 2.4.4 Sector profile for Tolerant and Authoritative teacher profile

4) Tolerant

These teachers have a pleasant, supportive atmosphere during their lessons. They give more freedom to the students then other types of teachers. They have more possibilities to influence lesson procedures and content. There seem to be separate Dutch and American views of the Tolerant teacher. To the Dutch, the atmosphere is pleasant and supportive and students enjoy attending class. They often work at their own pace and the class atmosphere sometimes may be a little confused as a result. In the U.S., however, the Tolerant teacher is seen disorganized. His/her lessons are not prepared well and they don't challenge students. The teacher often begins the lesson with an explanation and then sends the students off to individually complete an assignment.

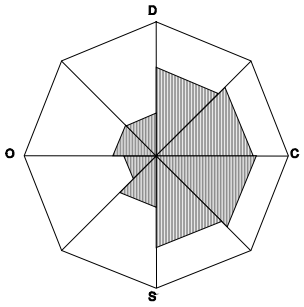


Figure 2.4.5 Sector profile for Tolerant teacher profile

5) Uncertain/Tolerant

Uncertain/Tolerant teachers' behaviors involve much cooperation but less leadership. Their lessons are poorly structured, are not introduced completely. They generally tolerate disorder, and the task orientation is very low. The environment is unstructured. Teacher is quite concerned about the class, and explains things again and again to students who haven't been listening. Only some of the students are attentive while the others do something else. They are not provocative so that teacher ignores most of the disorders. . The Uncertain/Tolerant teacher's rules of behavior are arbitrary,

and students don't know what to expect when infractions occur. The teacher has little effect on the class. He or she is usually very busy explaining the subject matter and talks loudly and quickly. It seems as if there is a tacit agreement that the teacher and students can go to their own way. Figure 2.4.6 summarizes the profile.

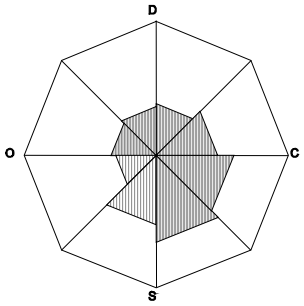


Figure 2.4.6 Sector profile for Uncertain/Tolerant teacher profile

6) Uncertain/Aggressive

In an uncertain/aggressive teacher’s class there is an aggressive kind of disorder. Teacher and students regard each other as opponents and spend almost all their time in symmetrically escalating conflicts. When teacher tries to explain something, students take every opportunity to disturb the lesson. They continually provoke the teacher by jumping up, laughing and shouting out. Teacher cannot direct the class at these times and generally his or her behaviors are violent, arbitrary and panicky. Because of the teacher’s unbalanced reactions the students feel that the teacher is the one who is to blame disorder. Therefore, after teacher’s reactions to their disturbances, they spend much effort to disturbing. In this class, rules of behavior aren't explained properly. The teacher spends most of his/her time trying to manage the class.

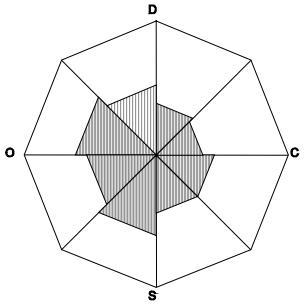


Figure 2.4.7 Sector profile for teacher Uncertain/Aggressive profile

7) Repressive

Students in the lessons of these teachers are uninvolved and extremely docile. They follow the instructions of the teacher and are afraid of the teacher's angry outbursts. In the class, rules are clean, explained and there is tight control. Teacher can react very angrily to the small mistakes of the students. His/her grades are very low and examinations are hard, so that students fear his/her examinations. The Repressive teacher's lessons are structured but not well organized. While directions and background information are provided, few questions are allowed or encouraged. The teacher does not help the students if they don’t understand the lesson. S/he thinks they have to work individual. The atmosphere is unpleasant, and the students are fearful and apprehensive. The Repressive teacher's expectations are competition-oriented and inflated. The teacher seems to repress student initiative, preferring to lecture while the students sit still.

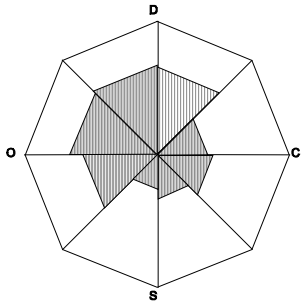


Figure 2.4.8 Sector profile for Repressive teacher profile

8) Drudging

The atmosphere in a Drudging teacher's class varies. Sometimes it resembles the aggressive disorder of type6, and sometimes it is like the tolerant disorder of type 5. One thing is constant, however: the teacher continually struggles to manage the class. S/he usually succeeds (unlike Types 5 and 6), but after spending a great deal of energy. Students pay attention as long as the teacher actively holds on their attention. When they be an orderly classroom, the atmosphere of the class is subject matter oriented and neither friendly nor unfriendly. Teacher use much energy to control the class and he or she doesn't use different methods in lessons, generally teach lessons in a routine way. S/he sometimes supports students but also there can be produced a competition in the lessons. Figure 2.4.9 summarizes this type of behavior.

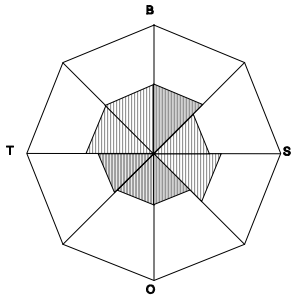


Figure 2.4.9 Sector profile for Drudging teacher profile

Each type of the eight interpersonal profiles are linked to student outcomes (Brekelmans, Wubbels & Levy, 1993). According to Rickards, den Brok, and Fisher (2003), it is found that, repressive teachers', tolerant and directive teachers' classes have highest achievement. Uncertain-tolerant and uncertain-aggressive teachers' classes released lowest achievement. Highest motivation has been found in classes of authoritative, tolerant-authoritative and directive teachers, lowest motivation in classes

of drudging and uncertain-aggressive teachers. The pattern found for the tolerant-authoritative teachers approximates the image of the ‘best’ or ‘ideal’ teacher closest.

2.5 Researches on interpersonal teacher behavior

2.5.1 Literature about the reliability and validity of the QTI

Many studies have been carried out to measure the reliability and validity of the QTI. The results of these studies showed that QTI is a reliable and valid instrument for measuring interpersonal teacher behavior.

Brekelmans (1989) found a mean alpha reliability of 0.90 for 206 classes in her studies in Netherlands. In USA 64-item version of QTI was applied. In this study the using the Cronbach Alpha Coefficient, internal consistency reliabilities found between 0.76 and 0.84 (Wubbels & Levy, 1991). In another study of Wubbels (1993), QTI is applied to a sample of 792 grade 11 students and 46 teachers. The Cronbach Alpha Coefficients of the scales of QTI are found between 0.80 and 0.95 for the students and between 0.60 and 0.82 for teachers. Studies in Israel (Kremer, Hayon, & Wubbels, 1992) and Brunei (Riah, Fraser, & Rickards, 1997) have also confirmed the reliability and validity of QTI. In 1996 Goh and Fraser carried out another study in Singapore and found Cronbach Alpha Coefficients ranged from 0.73 to 0.96. In Tasmania Fisher, Kent, and Fraser (1998) conducted a study involving 1883 students and 108 teachers. The for the scales of QTI is found between 0.66 and 0.83 using individual students as the unit of analysis, and between 0.83 and 0.93 when using the class as the unit of analysis. In Turkey, Rakıcı (2004) found the Cronbach Alpha Coefficient ranging from 0.59 to 0.82 using individual students as the unit of analysis, and ranging from 0.71 to 0.95 when using the class as the unit of analysis.

The study of Den Brok (2003) investigated the reliability and the validity of the Questionnaire on Teacher Interaction (QTI) in 6 countries: United States, Australia, the Netherlands, Slovakia, Singapore and Brunei. QTI data were obtained from researchers that conducted their studies in each of the six countries, and were then re-analyzed to meet the purposes of the present study. To enhance comparison between countries, researchers were asked to provide only data on secondary Science (Physics and Chemistry) teachers. In all countries, convenience sampling was used, except for the Netherlands, where teachers were randomly sampled. Reliability of the scale scores at the class level was above .80 in most countries. In most countries, reliability was lowest for the student responsibility/freedom scale (SC) and strict scale (DO). On average, reliability was highest for Australia and Singapore. Outcomes indicated that the scale inter-correlations corresponded with a circular ordering best for Australia and the Netherlands and least for Slovakia and Singapore (Den Brok, 2003).

In order to be a valid instrument, the QTI should be able to distinguish between classes on the basis of an analysis of intra-class correlations and structural analysis involving correlation between scales (Wubbels, Brekelmans, & Hooymayers, 1991). Wubbels et al. state that 48% to 62% of the total variance in the subscale scores is accounted for by the effects of the teacher. Thus they concluded that the QTI is a useful instrument for demonstrating the differences in the behavior of teachers.

According to Flinn (2004), Wubbels, Creton, Brekelmans, and Hooymayers (1987) concluded that the intra-class correlations for the QTI were above 0.80 for all scales. This result leads to conclusion that the differences in student perceptions were due more to class differences than individual student differences (Brekelmans, 1989).

Several studies used ANOVA and *eta²* results to examine the ability of the QTI to differentiate between the perceptions of different classes. In their study, Fisher,

Rickards, Chiew, and Wong (1997) found *eta²*statistic ranging from 0.13 to 0.52 for different classes in Singapore and from 0.15 to 0.40 in Australia. In Turkey Rakıcı's (2004) study has the similar result. She found *eta²*statistic ranging from 0.11 to 0.34 for different 8^{th} grade classes.

2.5.2 Studies involving the Questionnaire Teacher Interaction (QTI)

Since its development, QTI has been the focus of well over 120 (learning environment) studies in many countries (den Brok, Brekelmans, Levy & Wubbels, 2002) and has been translated into more than 15 languages (Wubbels, Brekelmans, van Tartwijk & Admiraal, 1997).

Goh and Fraser (1998) studied on the nature and impact of two aspects of classroom learning environment (interpersonal teacher behavior and classroom climate) and their associations with affective and cognitive outcomes among primary mathematics students in Singapore. A secondary purpose of the study was to explore the effects of gender differences in students' achievement, attitudes and perceptions of classroom environment. The two questionnaires: the Questionnaire on Teacher Interaction (QTI) and the My Class Inventory (MCI) were applied to a random sample of 1512 boys and girls from government primary schools. Simple, multiple and canonical correlation analyses and multilevel (hierarchical linear model) analyses were conducted using both individual students as the unit of analysis and the class as the unit of analysis. For the analysis of gender differences, multivariate analyses of variance for repeated measures were performed for the two outcome measures and the classroom environment scales. Results indicated that there are differences between girls and boys in mathematics achievement, in favor of boys. Girls generally viewed their classroom environments more favorably than boys did.

Rawnsley and Fisher (1998) applied the QTI to a sample of 490 9th grade students. Results of this study showed that students develop more positive attitudes towards mathematics classes, where the teacher was perceived to be highly supportive, equitable, place a strong emphasis on understanding the work, were involved in investigations, showed leadership, helping-friendly behavior and minimal admonishment of students. Students showed the greatest cognitive gains in classes where students perceived that the teacher emphasized understanding the work. The least cognitive gains occurred in classes where students perceived that the teacher was dissatisfied, gave them too much freedom and responsibility, and where they were involved in investigations.

Another study conducted by Scott, Den Brok and Fisher (2004), explored the relationships between students' perceptions of their teachers interpersonal behavior and their subject-related attitude in primary science classes in Brunei. The Questionnaire on Teacher Interaction (QTI) is used in order to distinguish teacher-student interpersonal behaviors. 1,305 students from 64 classes were involved in this study. Results indicated strong and positive effects of Influence and Proximity on students' enjoyment of their science class and supported findings of earlier work with the QTI.

In another study, Goh and Fraser (1996) adapted the QTI for use in elementary schools in Singapore. Their aim was to investigate effect of gender differences in students' perceptions of their teacher interpersonal behaviors. The results of this study indicated that girls perceived their teachers' interpersonal behaviors in a more positive way than boys did. Girls thought that teachers display more understanding and helping/friendly behaviors and less uncertain, dissatisfied, and admonishing behaviors. Fisher, Fraser, and Rickards (1996, 1997) made a similar study with a sample of 3994 students from 182 secondary science and mathematics classes in 35 schools to determine association between science and mathematics students' perceptions of their classroom

learning environments, the cultural backgrounds and gender of students. Their results were similar to the results of other studies. They concluded that females perceive their teachers in a more positive way than do males. Studies on gender differences and interpersonal teacher behavior was realized with different subjects, samples or in different countries. Similar results also obtained from Rawnsley and Fisher's (1997) study in Australia, Riah, Fraser, and Rickards' (1997) study in Brunei, Fisher and Rickards' (1998) study in Tasmania, Australia.

In order to examine variables associated with differences in students' perceptions of interpersonal teacher behavior, Levy, Den Brok, Wubbels, and Brekelmans (2003) conducted a study on 3023 students and 74 teachers in 168 classes. Investigating variance at the student, class, teacher and school levels revealed that several variables are significantly related to students' perceptions. These variables are: student and teacher gender, student and teacher ethnic background, student age and grade, class size, grade level, subject taught and teacher experience. There were interaction effects between some variables, such as student ethnicity and student gender, as well as student and teacher gender. While significant, the amount of variance explained by these was low.

Henderson, Fisher and Fraser's (1995) study's aim was to investigate relationships between students' perceptions of their biology teachers' interpersonal behavior and their laboratory learning environments and their affective and cognitive outcomes. The Questionnaire on Teacher Interaction (QTI) and the Science Laboratory Environment Inventory (SLEI) were applied together to a sample of 489 students from 28 senior biology classes in eight schools in Tasmania, Australia. The results of the study indicated that favorable student attitudes were associated with the student's perceptions of the teacher's strong leadership, a greater degree of integration of practical

and theory work, and more rule clarity. Furthermore, it was found that the teacher's strong leadership, provision of a degree of student responsibility and freedom, and integration of practical and theory components of the course were likely to promote achievement, whereas a greater degree of strict behavior by the teacher, emphasis on rule clarity and an open-ended approach to the course are negatively associated with student achievement. In addition, results indicated that associations between attitudinal outcomes and learning environment dimensions assessed by the SLEI and QTI were stronger than with either achievement or practical outcomes.

Wubbles (1991) investigated the relationships between the students' perceptions on the QTI scales and student learning outcomes in The Netherlands. It is found that regarding students' cognitive outcomes, the more that teacher demonstrated strict, leadership and helping/friendly behavior, the higher were cognitive outcomes scores. Conversely, student responsibility and freedom, uncertain and dissatisfied behaviors were related negatively to achievement. According to this study, student responsibility and freedom, understanding, helping/friendly, and leadership behaviors were related positively to student attitudes. Uncertain, dissatisfied, admonishing, and strict behaviors were related negatively to attitudes (effective outcomes).

Den Brok, Fisher, and Rickards (2004) investigated whether student, teacher and class characteristics affect students' perceptions of their teacher interpersonal behavior. The Questionnaire on Teacher Interaction (QTI) is applied in the U.S. and in Netherlands. The results indicated that, several factors affect student's perceptions including student and teacher gender, student and teacher ethnic background, student age, teacher experience, class size, student achievement and subject. The results also indicated that each of these variables has a distinctive effect, but also that they interact with each other in determining students' perceptions. The results showed that the more

positive the attitude of the student, the higher his or her perception of the teacher in terms of both influence and proximity. Boys perceived their teachers as less dominant and cooperative than girls.

Levy, Wubbels, Brekelmans, and Morganfield (1997) carried out a study in order to determine the language and cultural factors in students' perceptions of teacher communication style. The sample of the study was totally 550 high school students in 38 classes involving 117 Latinos, 111 Asians and 322 students from the United States. The results from this study suggested that the students' cultural background is indeed significantly related to the perceptions that they had of their teachers' interaction behavior. The study also concluded that teachers do not seem to be aware of cultural differences in their interactions with students in their classes in the same way as their students perceive.

Den Brok, Veldman, Wubbels, and Tartwijk (2004) investigated students' and teachers' perceptions of teacher interpersonal behavior in Dutch multicultural classes and the relationships between students' ethnic and socio-cultural background and their perception of the learning environment, and teachers' interpersonal behavior. QTI was applied to a sample of 365 students from 18 classes of 15 Dutch secondary education teachers. Results showed that culturally related differences in students' perceptions and teachers using a variety of strategies and knowledge in teaching multicultural classes. Results on teacher knowledge about teaching strategies for multicultural classrooms confirmed indications in the literature on general effective teaching competencies as well as previously found effective teaching methods in multicultural classes.

Evans and Fisher (2000) conducted another study on the differences between the students' perceptions and their cultural backgrounds. The QTI is applied to a sample of 2986 science students in 153 classes in 48 Australian secondary schools in two

Australian states, Victoria and Western Australia. The results indicated significant differences between students from different cultural backgrounds and their perceptions of student-teacher interactions.

In order to compare the students' perceptions of their teachers' interpersonal behavior and teachers' perceptions of their own interpersonal behavior, QTI is applied both to students and teachers in recent studies. Rickards and Fisher (2000, a) conducted a study to compare science students' perceptions of their teacher-student interactions with those of their teachers. QTI is applied to a sample of 3515 students from 164 secondary school science classes in 35 schools. The results indicated that there were significant differences in the responses to six of the eight scales of the QTI, with teachers considering they exhibited greater leadership, helping/friendly and understanding behaviors than did their students. The differences generally indicated that teachers believed they were more cooperative and less oppositional in the classrooms than their students perceived. In other words, teachers perceived their classes more positively than their students did.

Rickards and Fisher (1997) conducted another study. A sample of 3589 students in 173 science classes in 35 different schools completed the student version of the QTI while their 164 teachers completed the teacher self and teacher ideal versions. The result of this study showed that there were differences in teacher and student perceptions of teacher-student interpersonal behavior and that teachers perceived their classes more positively than their students did. Results also indicated that teachers' ideal teacher are more positive than themselves.

In Tasmania and Western Australia, Newby, Fisher, and Rickards (2001) carried out a study with a sample of 1659 students and 164 teachers. The aim of the study was to compare students' perceptions of teacher-student interactions with those of their

teachers. In the analysis, the students' perception of the teacher interaction was measured by using the class mean score as the unit of analysis. In order to investigate possible relationships between teachers' perception of their ideal and actual interaction, and relationships between teachers' perception of the actual interaction and the class' perception of that interaction, two structural equation models were used. The results would seem to confirm the underlying basis of the QTI in that the teachers' actual perceptions of their interactions with students affects the students' perceptions, which in turn affect the teachers' perceptions.

Wubbels (1993) applied the QTI to a sample of 792 students and 46 teachers in Western Australia and Tasmania. The results of this study were similar to previous Dutch and American research in that teachers generally, did not reach their ideal and differed from the best teachers as perceived by students. It is noteworthy that the best teachers, according to students, are stronger leaders, more friendly and understanding, and less uncertain, dissatisfied and admonishing than teachers on average. When teachers described their perceptions of their own behaviors, they tended to see it a little more favorably than did their students. On average, the teachers' perceptions were between the students' perceptions of actual behavior and the teachers' ideal behavior.

Another research on QTI that conducted by Waldrib and Fisher's (2003), aimed to determine the usefulness of the QTI to identify and describe exemplary science teachers. QTI is applied to a sample of 493 science students and their 25 teachers in 25 Australian secondary school classrooms. A number of students from classes that had indicated very positive student-teacher interactions were interviewed to examine why these students had such positive perceptions. The interviews showed that the better teachers were identified as those whose students' perceptions were more than one standard deviation above the mean on the scales of leadership, helping/friendly, and

understanding and more than one standard deviation below the mean on the uncertainty, dissatisfied and admonishing scales. It is apparent from these interviews that these better teachers tried to interest students in the learning process, involve students in developing understanding, were friendly, gave students responsibility and had a level of strictness that students were comfortable and such that they felt was conducive to learning.

2.5 Summary of the literature review

This chapter has reviewed the theoretical background of the concepts learning environment and teacher interpersonal behavior and research studies involving the measuring instrument Questionnaire Teacher Interaction (QTI). The findings can be summarized as follows:

- An examination of past reviews of research (Fraser, 1991; Fraser & Walberg, 1981a; Wubbels, Creton & Hooymayers, 1992) shows that international research efforts over the last three decades involving the conceptualization, assessment and investigation of perceptions of various aspects of the classroom learning environment have firmly established classroom environment research as a thriving field of study.
- Wubbels, Creton, and Hooymayers (1985) developed the Model for interpersonal teacher behavior (MITB) based on Leary's communication model.
- In order to measure interpersonal teacher behaviors, an instrument called Questionnaire on teacher interaction (QTI) is developed originally in Dutch by Wubbels, Creton, and Hooymayers (1985).
- Based on the QTI eight types of teacher behaviors are defined and called interpersonal profiles (Brekelmans, 1989).

- Recent studies on QTI show that QTI is a valid and reliable instrument (Brekelmans, 1989; Wubbels, 1993; Kremer, Hayon, & Wubbels, 1992; Riah, Fraser, & Rickards, 1997; Goh & Fraser, 1996; Rakıcı, 2004; Den Brok, 2003; Wubbels, Creton, Brekelmans, & Hooymayers, 1987; Rickards, Chiew, & Wong, 1997).

- There is a relationship between students' perceptions of teacher interpersonal behaviors and student's affective outcomes (Fisher, Henderson, & Fraser, 1996; Den Brok, Fisher, & Rickards, 2004; Wubbles, 1991)

- There is a relationship between students' perceptions of teacher interpersonal behaviors and student's cognitive outcomes (Fisher, Henderson, & Fraser, 1996; Rawnsley and Fisher, 1998; Scott, Den Brok & Fisher, 2004).

- Studies showed that students perceptions of interpersonal teacher behavior are affected by student and teacher gender, student and teacher ethnic background, student age, teacher experience, class size, student achievement and subject (Goh & Fraser, 1996, Fisher, Fraser & Rickards, 1997, Fisher & Rickards, 1997 Fisher & Rickards, 1998, Levy, Wubbels, Brekelmans & Morganfield, 1997, Evans & Fisher, 2000, Den Brok, Fisher, & Rickards, 2004, Den Brok & Fisher, 2004).

- Teacher perceptions of their own interpersonal behaviors are more positive than students (Levy, Den Brok, Wubbels, & Brekelmans, 2003; Wubbels, 1993).

- In the present study the information about Turkish mathematics teachers' interpersonal behaviors is gathered. Also the variables that effect students' perceptions are determined. The study makes contributions to the related literature by giving information about the situation in Turkish mathematics classes.

CHAPTER 3

METHODOLOGY

In the first chapter, problems and hypotheses of the study were presented and significance of the study was justified. In the second chapter, related literature was reviewed. In this chapter method of the study including, population and sampling, description of the variables, instruments of the study, procedure and methods used to analyze data and assumptions and limitations will be explained briefly.

3.1 Population and Sample

All eighth grade students in state schools in 6 cities (İstanbul, Ankara, İzmir, Adana, Bursa, & Hatay) in Turkey were identified as the target population of this study. However, it was necessary to define an accessible population since it is not easy to come into contact with this target population. The accessible population was determined as all eighth grade students in Etimesgut district of Ankara, Maltepe district of İstanbul, Narlıdere district of İzmir, Seyhan district of Adana, Nilüfer district of Bursa, and İskenderun district of Hatay. This is the population, which the results of the study will be generalized. The cluster random sampling was used to select the schools in the selected provinces. The study involves totally 1317 eight grade students in 37 classes and 22 teachers in 17 schools.

Table 3.1 presents total number of elementary schools in the selected districts and number of schools involved in the study.

Table 3.1 Total numbers of elementary schools in the selected districts and number of schools involved in the study.

City/district	Number of scools	Number of selected schools	Number of classes
İstanbul/Maltepe	42	5	13
Ankara/Etimesgut	27	4	7
İzmir/Narlıdere	8	1	3
Adana/Seyhan	107	2	3
Bursa/Nilüfer	26	2	4
Hatay/İskenderun	24	3	7
Total	234	17	37

Except Adana, in all of the cities, the schools selected are approximately the 10% of the total number of the schools, in accessible population.

3.2 Variables

There are 8 variables involved in this study, which were categorized as dependent and independent. 3 of these variables are categorized as dependent and 5 variables are categorized as independent.

3.2.1 Dependent Variables

The dependent variables (DV) are students' perception of interpersonal teacher behavior, teachers' perceptions of their interpersonal behavior and teacher perceptions of ideal teacher behavior. These variables are continuous.

3.2.2 Independent Variable

The independent variables (IV) are students' attitudes towards mathematics, students' mathematics achievement, students' gender, teachers' gender, and student's socio-economical status. Attitude, achievement and socio-economical status variables are continuous whereas gender and teacher's gender variables are categorical.

3.3 Data Collection Instruments

In this study, two instruments were used in order to obtain data from students. These are the Turkish version of the Questionnaire on Teacher Interaction (QTI), and Mathematics Attitude scale. The student version of the QTI was used to describe the students' perceptions related to their mathematics teacher's interpersonal behaviors and the teacher version of the QTI was used to describe teachers' perceptions of their own interpersonal behaviors and their ideal teacher's interpersonal behaviors. Mathematics attitude test was used to assess the students' attitudes toward mathematics. In order to assess students' achievement on mathematics, students' report marks in last 4 semesters and their exam results in the previous term were asked.

3.3.1 The Questionnaire on Teacher Interaction (QTI)

As discussed in Chapter 2, the Questionnaire on Teacher Interaction (QTI) developed in the Netherlands in 1984 to collect data about teachers' communication styles (Wubbels & Levy, 1991, Wubbels, 1985). QTI consist of 8 subscales that are based on the Model for Interpersonal Teacher behavior (MITB). The QTI can be used to map both students' and teachers' perceptions of interpersonal teacher behavior according to the MITB. The QTI originally consisted of 77 items, answered on a Likert-type 5-point scale (1= never to 5= always). The items of the QTI refer to the eight scales

of behavior; leadership, helping/friendly, understanding, responsibility/freedom, uncertain, dissatisfied, admonishing and strict. Table 3.2 clarifies further the nature of the QTI by providing a description and a sample item for each of the eight scales.

Since its development, the QTI has been the focus of well over 120 (learning environment) studies in many countries (Den Brok, Brekelmans, Levy, & Wubbels, 2002) and has been translated into more than 15 languages (Wubbels, Brekelmans, Van Tartwijk, & Admiraal, 1997). The original QTI, designed for secondary education, also formed the basis for a number of other versions for primary education, higher education, principals and supervisors (Den Brok, 2001). A more economical 48-items selection has been developed in Australia (Fisher, Henderson & Fraser, 1995; Wubbels, 1993). In the present study, the USA version of the QTI (Wubbels & Levy, 1989) involving 64 items was used.

Table 3.2 Description of scales and sample items for each scale of the QTI. (Rickards, Newby, & Fisher, 2001).

Scale name	**Description of scale (The extent to which the teacher...)**	**Sample item**
Leadership- DC	...Leads, organizes, gives orders, determines procedure and structures the classroom situation.	This teacher talks enthusiastically about his/ her subject.
Helping/friendly -CD	…Shows interest, behaves in a Friendly or considerate manner And inspires confidence and trust.	This teacher helps us with our work.
Understanding- CS	...Listens with interest, empathizes, shows confidence and understanding and is open with students.	This teacher trusts us.
Student responsibility/ freedom-SC	...Gives opportunity for Independent work, gives freedom And responsibility to students.	We can decide some things in this teacher's class.
Uncertain-SO	...Behaves in an uncertain manner And keeps a low profile.	This teacher seems uncertain.
Dissatisfied-OS	...Expresses dissatisfaction, looks unhappy, criticizes and waits for silence.	This teacher thinks that we cheat.
Admonishing-OD	...Gets angry, express irritation and anger, forbids and punishes.	This teacher gets angry unexpectedly.
Strict-DO	...Checks, maintains silence and strictly enforces the rules.	This teacher is strict.

In the present study, firstly the QTI was translated to Turkish by the researcher. A qualified, bilingual Turkish graduate student realized independent back translation of the Turkish version into English. Then the Turkish researchers checked the back translations and, for some items, necessary modifications in the Turkish translation were carried out. Some items were consulted to English teachers. An expert from the

Mathematics Education Department, one mathematics teacher, and an English teacher working in a public school checked content and format of the instrument. The suggestions of these people were taken into consideration; the necessary changes were done accordingly.

Pilot study was conducted in the 2003 spring semester with 107 eighth grade students from 4 classes in two secondary schools in İskenderun province. The results of the pilot study indicated that all scales of the QTI have a Cronbach Alpha Reliability ranging from 0.61 to 0.92. ANOVA results indicated that there are significant differences between classes in means of student perceptions. In two items, necessary changes were made in order to increase reliability.

For the QTI, somewhat different statistical procedures from those used for other instruments were performed. Both factor analysis and discriminant validity analysis are irrelevant for the QTI, because of its conceptual idiosyncratic structure, which is based on Leary's circumplex model of interpersonal behavior. Instead, the pattern of inter-scale correlation was calculated as another measure of the circumplex model of the QTI, as recommended by Wubbels and Levy (1993). As discussed earlier, the data gathered with QTI is analyzed in two units of analysis; one is student score, and the other one is class score. In line with previous researches, in the present study, to measure the validity and the reliability of the QTI, both individual mean scores and class mean scores were computed in order to furnish evidence for each QTI scale regarding scale intercorrelations, internal consistency, and ability to differentiate between classrooms.

According to circumplex model of QTI, adjacent behavior scales should correlate highest and positively with each other, and the magnitude of the correlation should diminish as the scales become increasingly different as they move further apart from each other until they are diametrically opposite each other. Diametrically opposite

scales, such as Helping/Friendly (CD) and Dissatisfied (OS), should have the highest negative correlation (Wubbels, 1993). The results of the present study satisfy this assumption with some discrepancies. According to the results, the strict scale had positive correlations with all other scales when the classes are used as unit of analyses. The cultural characteristics may be the reason of this result. Table 3.3 shows the intercorrelations for the QTI scales.

Table 3.3 Scale inter-correlations for each QTI scale using individual students and classes as unit of analysis.

	DC	CD	CS	SC	SO	OS	OD	DO
DC	1	.907	.899	.684	-.254	-.225	-.387	.258
CD	.776	1	.919	.777	-.242	-.260	-.436	.171
CS	.759	.821	1	.771	-.389	-.339	-.556	.037
SC	.501	.621	.605	1	.054	.046	-.071	.322
SO	-.398	-.355	-.414	-.084	1	.688	.800	.440
OS	-.486	-.533	-.607	-.351	.615	1	.766	.409
OD	-.477	-.538	-.604	-.349	.676	.772	1	.502
DO	.006	-.123	-.173	-.150	.251	.416	.453	1

Note: Data below the diagonal are for individual students, while data above the diagonal are for class means.

Figure 3.3 illustrates the circumplex model of interpersonal teacher behavior using the Helping/Friendly (CD) scale's correlations to other scales by using individual students' scores. Adjacent scales of Leadership (DC) and Understanding (CS) correlate highest and positively. This correlation becomes smaller for scales located further from each other, and the directly opposite scale of Dissatisfied (OS) has the highest negative correlation with a small difference with Admonishing (OD) scale.

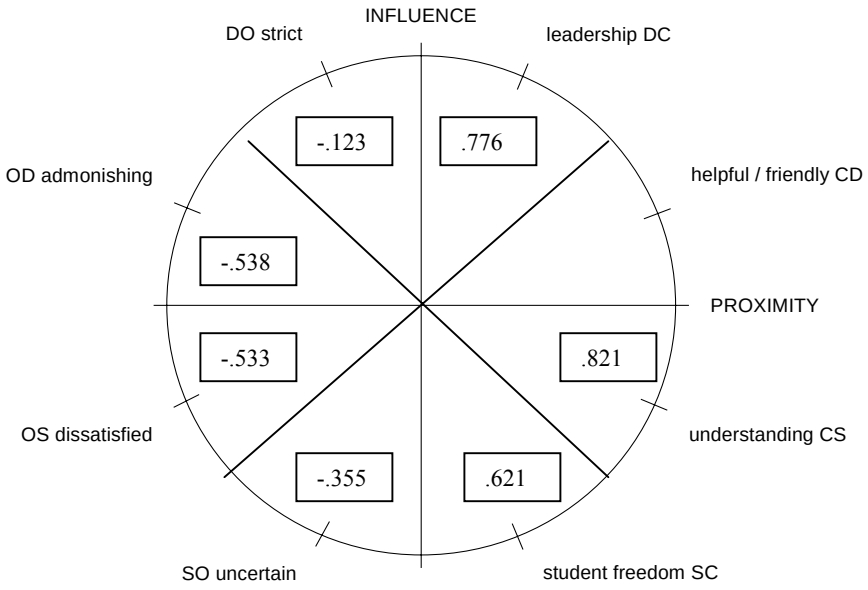


Figure 3.1 Profile of inter-scale correlation for helping/friendly scale using students as unit of analysis

The Cronbach alpha coefficient was computed for each QTI scale as a measure of internal consistency reliability. Table 3.4 reports internal consistency reliabilities at two levels of analysis, namely, the individual student score (N=1.317) and the class mean score (n=37). The results suggest that the QTI has quite good reliability, with five out of eight scales (namely leadership, helping/friendly, understanding, dissatisfied and

admonishing) having values above 0.90 for class means, and the same five scales having values between 0.75 and 0.84 for individual students.

As expected, reliability estimates were higher when the class mean was used as the unit of analysis. This meant that scales were unidimensional at the class level. These values for a Turkish sample are comparable to those reported by Wubbels (1993), and Wubbels and Levy (1991) for secondary students in the Netherlands, the USA and Australia. In all four countries, the highest reliability occurred for helping/friendly teacher behavior and the lowest for student responsibility/freedom.

In order to measure the ability of QTI to differentiate between classes one-way ANOVA statistics was used. A series of analyses of variance, with class membership as the main effect revealed significant differences ($p<0.01$) for every QTI scale between the perceptions of students in different classes. The eta-squared statistics (which is the ratio of 'between' to 'total' sums of squares and represents the proportion of variance in scale scores accounted for class by membership), ranges from 0.10 to 0.25 for all scales of the QTI Table 3.4 also shows the ANOVA results. These results indicate that the instrument is able to distinguish between classes. In other words, QTI was able to differentiate significantly ($p<0.01$) between students' perceptions in different classes.

Table 3.4 Internal consistency reliability (Cronbach Alpha Coefficient) and ability to differentiate between classrooms (ANOVA results) for the QTI.

QTI Scales	Unit of Analysis	Alpha Reliability	ANOVA Results (eta squared)
DC leadership	Individual	0.79	0.25
	Class Mean	0.95	
CD helping/friendly	Individual	0.84	0.22
	Class Mean	0.96	
CS understanding	Individual	0.83	0.23
	Class Mean	0.96	
SCstudent responsibility/freedom	Individual	0.61	0.11
	Class Mean	0.77	
SO uncertain	Individual	0.71	0.12
	Class Mean	0.89	
OS dissatisfied	Individual	0.75	0.10
	Class Mean	0.90	
OD admonishing	Individual	0.82	0.16
	Class Mean	0.95	
DO strict	Individual	0.56	0.13
	Class Mean	0.77	

3.3.2 Mathematics Attitude Scale

The attitudes of students towards mathematics were determined with a mathematics attitude scale developed by Askar (1986). It consists of 20 items; 10 positive and 10 negative statements. This attitude scale uses a five-point likert type that every item has five possible responses: strongly agree, agree, undecided, disagree and strongly disagree. The published relibality of the scale was reported to be .96 by Cronbach alpha coefficient. In the present study, firstly negative items are reversed and then a total attitude score is calculated by summing up 20 scores for all students. In the

present study the Cronbach alpha coefficient for the mathematics attitude scale was found .95.

3.4 Procedure

At the beginning of the study, for the literature review, related documents are obtained through the university libraries and Internet by using the keywords "QTI, learning environment, teacher interaction, mathematics attitude and achievement, interpersonal teacher behavior." After completing the literature review, the participant schools and subjects of the study were determined. Because of the budget and time problem, pilot study is made in İskenderun. Results of the pilot study were as expected, but some of the items needed to be changed. All the reliability scores were reasonable. After the pilot study, the data collection procedure began and measuring instruments were applied to the selected 1317, 8th grade students from 37 classes and 22 teachers in 17 schools during the first term of the 2003-2004 academic year. Except İzmir and Bursa, the researcher collected all the data. In other provinces another researcher collected the data. One class hour was given to the participants to complete all the instruments. Directions were made clearly and the researcher did necessary explanations. Researcher also told that any data collected from them would be held in confidence. They were warned to complete all measuring tools without leaving any empty items as well.

No specific problems were encountering during the administration of the measuring instruments. Teachers' and students' participation in the study were voluntarily. Some of the teachers did not want to participate to the study because of time restriction.

3.5 Analysis of Data

The data obtained in the study were analyzed by using both descriptive statistics and inferential statistics. The Statistical Package for the Social Sciences (SPSS) is used to analyze the data.

3.5.1 Descriptive Statistics

For an overview of the data, mean, standard deviation, skewness and kurtosis of the variables were calculated. Descriptive statistics helped checking the item quality. In order to compare students' perceptions of their teachers' interpersonal behaviors, teachers' perceptions of themselves and teachers' perceptions of their ideal teacher, mean scores were compared.

3.5.2 Inferential Statistics

One-way analysis of variance (ANOVA) was used in order to determine if the Turkish version of the QTI was able to differentiate between the perceptions of students in different classrooms.

Simple correlation and multiple regression analyses were conducted to examine whether associations exists between the students' perceptions of interpersonal teacher behavior with the students' affective and cognitive outcomes. Simple correlation analysis was used to provide information about the bivariate relationship between the students' cognitive and affective outcomes and each interpersonal teacher behavior types. Multiple regression analysis was used to describe the joint relationship between the students' cognitive and affective outcomes and the whole set of eight teacher interpersonal scales. In order to determine the scale, which contributed uniquely and

significantly to the explanation of the variance in the dependent variable, standardized regression coefficient (β) is used.

In order to investigate the differences between boys' and girls' perceptions of teacher interpersonal behavior and to investigate the differences between students' taught by male teachers and those taught by female teachers, one-way between-groups multivariate analysis of variance (MANOVA) was used. In order to determine the perceptions of students from different socio-economic status, again MANOVA was used.

3.6 Assumptions and Limitations

The assumptions and the limitations of this study are below.

3.6.1 Assumptions

- The students of the both pilot study and main study were assumed to have approximately the same characteristics and conditions.
- The administration of the instruments was under standard conditions for all cities and schools.
- All of the students in the study completed the items of the QTI and attitude tests by themselves.
- No external factors affected students' answers.

3.6.2 Limitations

- QTI scale has 64 items and attitude scale has 20 items, so that it may be too long for the students and teachers.

- Some of the classes were too crowded so some of the students could not be concentrated on the scale.
- The study involved participants from only one district for each city.
- In some of the schools there was only one class of one teacher.
- Only eighth grade students involved in the study.
- The provinces were selected in a convenience manner.

CHAPTER 4

RESULTS

In this chapter the results of the study are explained. In the first section, the information about the missing data is given. The second and third parts of the chapter deal with descriptive and inferential statistics used in the study. The null hypotheses are teseted in these sections. In the last section, the results are summarized.

4.1 Missing Data

Before starting the statistical analysis, missing data analyses were carried out. The questionnaires were applied to 1.344 students. 21 students did not answer last 10 or 15 items of the QTI. 6 students did not answer any of the questions. Totally 1.317 students included into the analyses.

4.2 Descriptive Statistics

First step in descriptive statistics was to get a frequency table with means, standard deviations and other statistics to get a general view of the variables. As explained before, the study is including 17 schools, 37 classes, 22 teachers and 1317 students. Girls are the % 50.6 of the whole sample, and boys are the % 49.4. Female teachers are the %63 of the whole sample whereas male teachers are the %37. Students' achievements on mathematics were measured by using their last three semester report grades. Avarage mean of the three semester grades show that % 6.3

of the students got the grade 1, 24.0% got 2, 26.2% got 3, 17.1% got 4 and 21.2% got 5, where minimum grade is 1 and maximum grade is 5 in Turkish Education System. In order to get information about students' socio-economic status, data about students' parents' education level, and their income in a month were asked. A total score was calculated by summing up these three scores. The results are summarized in table 4.2.1, table 4.2.2.

Table 4.2.1 Distribution of education levels of parents of students participated in the study

	Mother		Father	
	Frequency	Percent	Frequency	Percent
No education	155	11.8	18	1.4
Primary (5 years)	535	40.6	429	32.6
Primary (8 years)	217	16.5	283	21.5
Secondary	263	20.0	334	25.4
University	123	9.3	210	15.9
Graduate	19	1.4	30	2.3
Total	1317	100.0	1317	100.0

Table 4.2.2 Distribution of average monthly income of the families of the students involved in the study

	Frequency	Percent
No income	6	.5
0-350 YTL	124	9.4
350-750 YTL	447	33.9
750-1000 YTL	198	15.0
1000-1500 YTL	151	11.5
More than 1500YTL	294	22.3
Total	1317	100.0

In mathematics attitude scale, the mean score for the positive attitude items found to be 2.42 whereas mean score for the negative attitude items is 1.41. This means that students generally had positive attitude towards mathematics. Figure 4.2.1 shows the item mean scores for the positive items and negative items for the attitude scale. In the figure, the first 10 items (a1, a4, a5, a8, a11, a13, a14, a17, a18, a20) measure positive attitude and next 10 items (a2, a3, a6, a7, a9, a10, a12, a15, a16, a19) measure negative attitude towards mathematics As seen in the figure, while responses to all of the positively stated items were above the average, responses to negatively stated items were generally below the average.

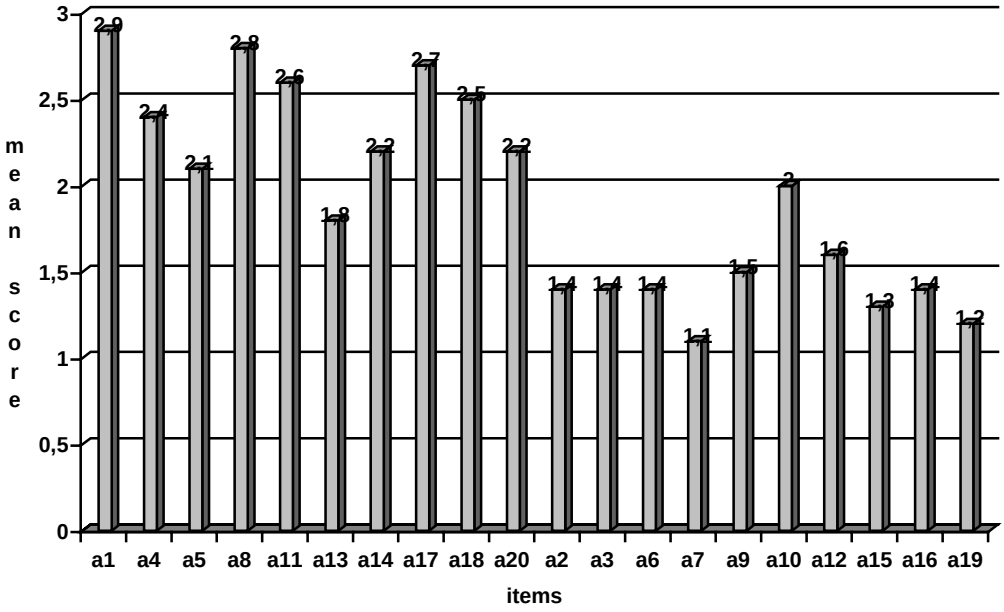


Figure 4.2.1 Item mean scores for the mathematics attitude scale.

In order to check the item qualities for both mathematics attitude scale and QTI, descriptive statistic results were examined. To explore the nature of the mathematics teachers' interpersonal behavior, the average item mean (the scale mean divided by the number of items in that scale) and average item standard deviation of each scale of the QTI were calculated (Table 4.2.4). Students generally perceived that their teachers display cooperative behaviors (leadership, helping/friendly, and understanding), rather than opposition behaviors (uncertain, dissatisfied, admonishing). The mean score for the Leadership scale is found 2.76 where the maximum value was equal to 4. In addition the mean values for helping/friendly and Understanding scales were 2.43 and 2.61 respectively. These scores correspond to 'often'. Surprisingly, the Strict scale also got a high level, which is 2.26. This means that Turkish students perceieve their mathematics teachers display cooperative behaviors together with strict behaviors. On the other hand, the uncertain, dissatisfied

and admonishing scales got mean scores lower than 2, which mean that teachers display these behaviors 'sometimes'. The Student Responsibility/Freedom scale got a level below the average. That result reflects the tendency of Turkish elementary mathematics teachers not to allow their students much freedom or responsibility in their lessons. It also reminds us of the fact that Turkish elementary school teachers normally use lecturing rather than any other teaching strategies. The lowest level belongs to Uncertain scale. That means mathematics teachers seldom display uncertain behaviors in the classroom

Table 4.2.3 Average item means, skewness and kurtosis values for the QTI scales for two unit of analysis

QTI Scales	Unit of Analysis	No of items	Average item mean	Skewness	Kurtosis
DC leadership	Individual	7	2.76	-.702	-.089
	Class Mean		2.76		
CD helping/ friendly	Individual	8	2.43	-.448	-.658
	Class Mean		2.43		
CS understanding	Individual	8	2.60	-.584	-.381
	Class Mean		2.61		
SC student responsibility/freedom	Individual	8	1.97	-.209	-.331
	Class Mean		1.98		
SO uncertain	Individual	7	1.07	.759	.012
	Class Mean		1.07		
OS dissatisfied	Individual	9	1.24	.754	.246
	Class Mean		1.24		
OD admonishing	Individual	8	1.39	-.617	-.257
	Class Mean		1.38		
DO strict	Individual	9	2.28	.227	-.235
	Class Mean		2.26		

Note: Avarage item means are computed by dividing the scale scores to the number of items in that scale. Therefore, possible item means range from 0 to 4.

Figure 4.2.2 presents the average item mean for the QTI scales for the two units of analysis; for individual and for class analysis. The results showed that Turkish secondary school mathematics teachers run their classes with fairly strong leadership, helping/friendly, and understanding behavior but they also display strict behavior. They do not display uncertain and admonishing behaviors.

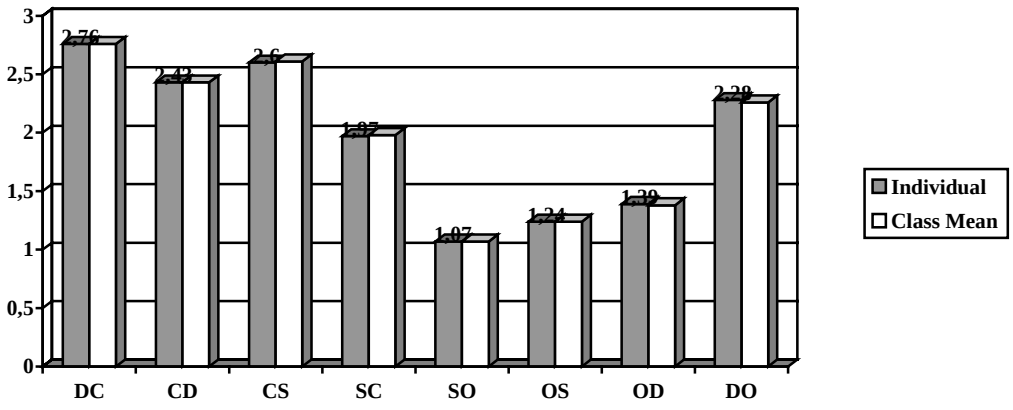


Figure 4.2.2 Average item means for the QTI scales for the two units of analysis.

When a sector profile is plotted by using the mean scores for eight scales, it can be concluded that the most appropriate interpersonal profile for Turkish mathematics teachers is the Directive profile. According to the students, their mathematics teachers display high levels of leadership, helpful/friendly and understanding behaviors. They also display strict behaviors and also give responsibility and freedom to their students. Figure 4.2.3 presents the sector profile for the mean scores of eight scales.

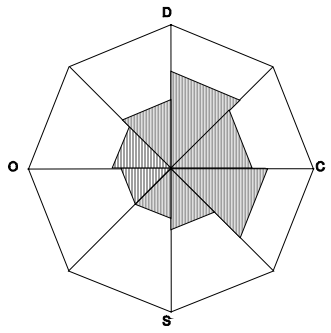
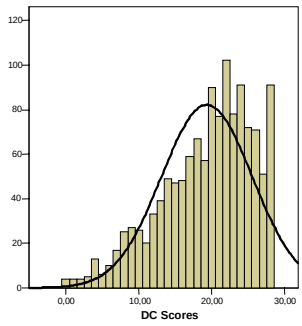
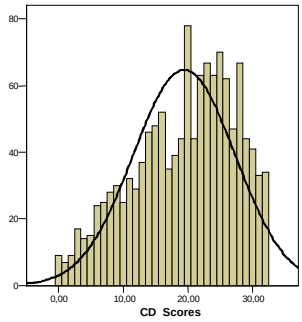
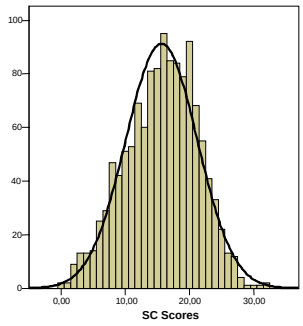


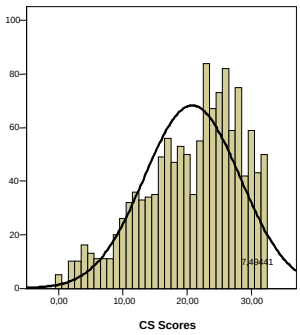
Figure 4.2.3 The general interpersonal profile of the Turkish mathematics teachers.

Figure 4.2.4 presents the histograms with normal curve related to the eight scales of QTI. Although some of the histograms were right-skewed, they can be accepted as evidences for the normal distribution of the dependent variables. When we look at the skewness and kurtosis values, all of the eight scales lie between the -1 and +1 values.









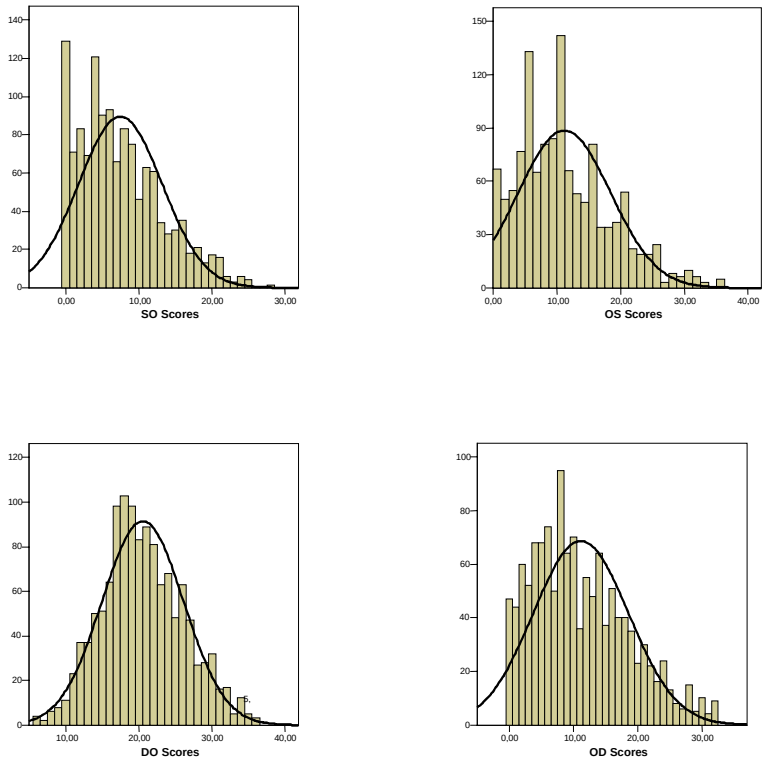


Figure 4.2.4 Histograms with normal curves for the QTI scales

4.3 Inferential Statistics

This section deals with the verification of one-way between-groups multivariate analysis of variance (MANOVA) assumptions, analysis of variances (ANOVA), bivariate correlations and multiple regression analyses of the hypotheses.

4.3.1 Assumptions of Multivariate Analysis of Variance

MANOVA has a number of assumptions. These are:

1. Sample size
2. Normality
3. Outliers

4. Linearity

5. Multicollinearity and singularity

6. Homogenity of variance-covariance matrices

Since two separate MANOVAs were conducted with one group of dependent variable (including eight interpersonal teacher behavior scales) across two groups of independent variables (students' gender, teachers' gender), the assumptions were tested for two different groups of data.

Sample size is enough to conduct MANOVA. Univariate normality was checked for each of the dependent variables by using tests of Normality statistics for the classes seperately. Multivariate normality was checked using Mahalanobis distances statistics. By using Mahalanobis distances, the outliers in data were checked. The results did not violate the normality assumption. The Linearity assumption was checked by generating scatterplots between each pair of the variables. Results did not violate the linearity assumption. Multicollinearity and singularity assumption was checked by running correlation and checking the strength of the correlations among the dependent variables. Significant correlations were found between all of the variables. For the Equity of variance-covariance matrices assumption, Box's M Test of Equality of Covariance Matrices and Levene's Test of Equality was used.

Table 4.3.1 Box's test of equality of covariance matrices for hypothesis 3 and 4

	Student gender	Teacher gender
Box's M	93.040	94.572
F	2.567	2.608
df1	36	36
df2	5272933	3177910
Sig.	.000	.000

As seen in the table, the observed covariance matrices of the dependent variables are not equal across groups for either data. According to Pallant (2001, p.229) Box's M can tend to be too strict when used on a large sample.

For the equality of variances assumption, Levene's Test of Equality was used. As indicated in Table 4.3.2 variances on the five scales of the QTI (DO, SO, SC, DC, CS) across students' gender were equal. Variances on the five scales of the QTI (SO, DC, CD, OS, CS) across teachers' gender were equal. Most of the variables do not violate the assumption of equality of variances.

Table 4.3.2 Levene's Test of Equality of Error Variances

	F	df1	df2	Sig.
Students' perceptions on interpersonal teacher behavior across students' gender				
DO	,208	1	1317	,649
SO	,052	1	1317	,819
SC	,462	1	1317	,497
DC	3,562	1	1317	,059
CD	8,120	1	1317	,004
OS	5,616	1	1317	,018
CS	,117	1	1317	,733
OD	5,544	1	1317	,019
Students' perceptions on interpersonal teacher behavior across teachers' gender				
DO	21,507	1	1317	,000
SO	21,507	1	1317	,246
SC	12,176	1	1317	,001
DC	1,995	1	1317	,158
CD	3,570	1	1317	,059
OS	,001	1	1317	,978
CS	,009	1	1317	,924
OD	5,648	1	1317	,018

4.3.2 Null Hypothesis 1

There is no statistically significant relationship between 8th grade students' attitudes towards mathematics and their scores on the 8 sub-dimensions of Model for Interpersonal Teacher Behavior (MITB).

Simple correlation and multiple regressions analyses were conducted to examine whether associations exist between students' perceptions of teacher interpersonal behavior and the students' attitudes towards their mathematics classes (Table 4.3.3). As indicated in the Table 4.3.3, there was a positive moderate correlation between the students' attitudes towards mathematics and DC, CD, CS, and SC scales. On the other hand, there was a negative correlation between the students' attitudes and SO, OS, OD, and DO scales. All correlations were significant at the 0.01 level. The multiple correlation, R, was 0.556 and is statistically significant ($p<0.01$). This strongly supports that the nature of the interpersonal teacher behaviors is strongly influencing students' attitudes towards mathematics. In order to interprete this relationship, the standardised regression coefficient (β) was also examined. The beta coefficients for the scales Leadership, Helping/Friendly, Strict and Dissatisfied are larger than the others. This means that the scales leadership, helping/friendly, dissatisfied and strict behavior are independent predictors of individual students' attitude towards mathematics lessons. Among these scales, Strict (DO) scale has the largest value of 0.196. This means that this variable makes the strongest contribution to explaining the dependent variable, when the variance explained by all other variables in the model is controlled for. According to the results, it can be concluded that favorable student attitudes were found to be associated with students' perceptions of the teacher interpersonal behavior. In other words, when students perceive their teacher display more cooperative behaviors, they tend to have positive attitudes towards mathematics. When they perceive their teacher display more oppositive behaviors, they show more negative attitudes towards mathematics. The R^2 value tells how much of the variance in the dependent variable (students'

perceptions of their mathematics teacher's interpersonal behavior) is explained by the model (student attitudes towards mathematics). The R^2 value was found to be 0.31. This means the proportion of variance in attitude towards mathematics lessons that can be attributed to students' perception of interpersonal behavior was 31% ($F= 69.632$, $p<0.005$).

Table 4.3.3 Associations between the QTI scales and students' affective outcomes in terms of simple correlation (r) and standardised regression coefficient (β).

QTI SCALES	B	β	t	P	r
CONSTANT	52.841		18.343	.000	
DC	.383	.119	2.880	.004	0.389**
CD	.478	.189	4.002	.000	0.444**
CS	-.061	-.023	-.476	.634	0.430**
SC	.171	.048	1.499	.134	0.318**
SO	-.144	-.041	-1.198	.231	-0.334**
OS	-.319	-.116	-2.880	.004	-0.457**
OD	-.252	-.094	-2.134	.033	-0.461**
DO	-.699	-.196	-6.917	.000	-0.323**
Multiple Correlation, R		.556			
Variance, R^2		.309			

** Correlation is significant at the 0.01 level (2-tailed). **p < 0.01

4.3.3 Null Hypothesis 2

There is no statistically significant relationship between 8th grade students' mathematics achievements and their scores on the 8 sub-dimensions of MITB.

Simple correlation and multiple regression analyses were conducted to test this hypothesis. Results indicated that there was a small correlation between mathematics achievement and the scales of the QTI. DC, CD, SC, and CS scales had positive correlation, while SO, OS, OD, and DO scales had negative correlation with achievement (Table 4.3.4). All the correlation values were significant at the $p<0.01$, except SC, which is significant at the $p<0.05$. In order to determine which scale makes the strongest unique contribution to explaining the dependent variable, Beta value was computed. As seen in the table 4.3.4, by ignoring the sign in front of the value, the scales DC, CS, SO and DO have large beta values than the others. Among these scales, DC (Leadership) scale has the largest Beta value of 0,214. This means that the Leadership variable makes the strongest contribution to explaining the dependent variable, when the variance explained by all other variables in the model is controlled for.

The multiple correlation, R, was 0.30 and is statistically significant ($p<0.01$). This supports that the nature of the interpersonal teacher behaviors is influencing students' mathematics achievement. In order to interpret this relationship, the standardised regression coefficient (β) was also examined. It was found that out of eight scales, four scales retained their significance ($p<0.01$). This means that the scales Leadership, Understanding, Uncertain and Strict behaviors are independent predictors of individual students' mathematics achievement. The R^2 value, which indicates the proportion of variance in mathematics achievement that can be

attributed to students' perception of interpersonal behavior, was 10% (F=14.220, p<0.005).

Table 4.3.4 Associations between the QTI scales and students' cognitive outcomes in terms of simple correlation (r) and standardized regression coefficient (β).

QTI SCALES	B	β	t	P	r
CONSTANT	11.381		20.541	.000	
DC	.114	.214	4.449	.000	.166**
CD	.002	.004	.076	.940	.127**
CS	-.061	-.138	-2.473	.014	.113**
SC	.010	.016	.437	.662	.071*
SO	-.091	-.158	-3.948	.000	-.215**
OS	.038	.082	1.761	.078	-.154**
OD	-.021	-.048	-.931	.352	-.198**
DO	-.106	-.178	-5.424	.000	-.183**
Multiple Correlation, R	.29				
Variance, R^2	.09				

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

4.3.4 Null Hypothesis 3

There is no statistically significant difference between 8th grade female and male students with respect to their scores on the 8 sub-dimensions of MITB.

The differences between boys' and girls' perceptions of their mathematics teacher's interpersonal behaviors were tested by using MANOVA. MANOVA results indicated that there was a significant differences between boys and girls on the dependent variables (Eight scales of the QTI): F = 3.902, p=.000; Wilk's Lambda =.963; partial eta squared = .037. When the results of the dependent variables were considered seperately, all scales of the QTI (except SC (Student responsibility/freedom)) reach statistical significance.

Table 4.3.5 MANOVA results for null hypothesis 3.

QTI Scales	GENDER	Mean	Std. Error	F	Sig.	Eta squared
DC	Girls	19.662	.247	3.832	.050	.003
	Boys	18.974	.251			
CD	Girls	19.890	.312	4.791	.029	.004
	Boys	18.917	.317			
CS	Girls	21.416	.295	7.211	.007	.006
	Boys	20.286	.300			
SC	Girls	15.953	.221	2.136	.144	.002
	Boys	15.492	.225			
SO	Girls	6.474	.223	37.139	.000	.029
	Boys	8.409	.226			
OS	Girls	10.022	.280	28.617	.000	.022
	Boys	12.159	.285			
OD	Girls	10.256	.291	15.420	.000	.012
	Boys	11.883	.295			
DO	Girls	20,166	,220	4,712	,030	,004
	Boys	20,848	,224			

As seen in the table 4.3.5, results indicated that girls viewed that their teacher display more leadership, helping/friendly and understanding behaviors then do boys. Boys viewed that their techers display more uncertain, admonishing, dissatisfied and strict behavior than do girls. Altough there is not a significant difference between girls and boys with respect to student responsibility/freedom behaviors, when the means are compared it is seen to be a little difference in favor of girls.

4.3.5 Null Hypothesis 4

There is no statistically significant difference between the 8th grade students taught by male teachers and those taught by female teachers with respect to their scores on the 8 sub-dimensions of MITB.

In order to investigate differences between the 8th grade students' taught by male teachers and those taught by female teachers with respect to students' perceptions of their mathematics teachers' interpersonal behavior, a one-way between groups multivariate analysis of varaince was performed. MANOVA results indicated that there was a significant difference between males and females on the combined dependent variables (the eight scales of QTI) [F= 21.795, p=0.000; Wilk's Lambda =.877 ; partial eta squared =.123]. When the results of the dependent variables were considered seperately, five scales of the QTI (DC, SC, OS, OD, DO) reach statistical significance.

Table 4.3.6 MANOVA results for null hypothesis 4.

QTI Scales	TEACHER GENDER	Mean	Std. Error	F	Sig.	Eta squared
DC	Female	18.954	.220	7.980	.005	.006
	Male	19.983	.290			
CD	Female	19.269	.279	.706	.401	.001
	Male	19.657	.367			
CS	Female	20.897	.265	.054	.817	.000
	Male	20.796	.348			
SC	Female	16.073	.198	11.560	.001	.009
	Male	14.961	.260			
SO	Female	7.487	.202	.293	.588	.000
	Male	7.307	.266			
OS	Female	10.686	.253	6.245	.013	.005
	Male	11.730	.333			
OD	Female	10.734	.262	3.959	.047	.003
	Male	11.593	.344			
DO	Female	19.177	.187	136.685	.000	.098
	Male	22.798	.247			

An inspection of the mean scores indicates that students perceived their male teacher slightly higher levels of Leadership, Dissatisfied, Admonishing and Strict behavior than female teachers. Students rated their female teachers give more responsibility and freedom in the class that male teachers do.

4.3.6 **Null hypothesis 5**

There is no statistically significant relationship between 8th grade students' socio-economic statuses and their scores on the 8 sub-dimensions of MITB.

Simple correlation analyses were conducted to test this hypothesis. Results indicated that there was a small correlation between students' perceptions of their mathematics teacher's interpersonal behaviors and their socio-economic status. DC, CS, DO and scales had positive correlations, while SC, SO, OS and OD scales had negative correlation with achievement. The correlation coefficient between socio-economic status and the scales DC, SO, OS, and OD were significant at the $p<0.01$ and SC, CS and DO were significant at the $p<0.05$. CD (Helping/friendly) scale does not have significant relationship with students' socio-economic situations.

Table 4.3.7 Associations between the QTI scales and students' socio-economic status in terms of simple correlation (r).

QTI SCALES	r
DC	.091**
CD	.026
CS	.057*
SC	-.067*
SO	-.177**
OS	-.088**
OD	-.094**
DO	.059*

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Te results can be interpreted, as students having a better socio-economic status perceive their mathematics teachers as demonstrating more leadership,

understanding, and strict behaviors. When socio-economic status becomes lower, students' perceptions tend to include more influencing behaviors like uncertain, dissatisfied and admonishing.

4.3.7 Null hypothesis 6

There is no statistically significant difference between 8th grade students' perceptions related to their mathematics teachers' interpersonal behaviors and teachers' perceptions related to their own interpersonal behaviors.

In order to compare students' perceptions of their mathematics teachers' interpersonal behavior and teachers' perceptions of their own interpersonal behavior, paired samples t-test statistics was used and mean scores for both variables were compared. Table 4.3.8 presents the results of t-test and figure 4.3.1 illustrates a comparison of the mean scores for students' perceptions and teachers' perceptions.

Table 4.3.8 Mean scores for student perceptions and teacher perceptions

QTI Scales	Class mean scores	Teacher mean scores	Mean Difference	Sig(2-tailed)	t
DC leadership	19.3	21.9	-2.6	.000	-8.3
CD helping/ friendly	19.4	21.9	-2.5	.000	-5.2
CS understanding	20.8	22.9	-2.1	.000	-4.7
SC student responsibility/freedom	15.6	20.6	-5.0	.000	-7.6
SO uncertain	7.4	6.0	1.4	.000	4.9
OS dissatisfied	11.1	5.5	5.6	.000	15.2
OD admonishing	11.1	7.4	3.7	.000	10.3
DO strict	20.5	17.2	3.3	.000	10.1

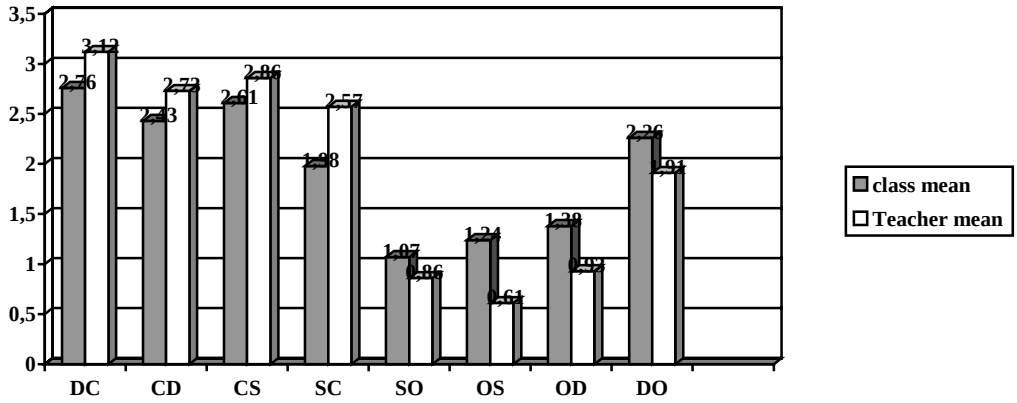


Figure 4.3.1 Comparisons of students' mean scores and teachers' mean scores.

Results indicate that there is a significant difference between students' perceptions of their mathematics teachers' interpersonal behavior and teachers' perceptions of themselves As seen in the table and in the figure, teachers perceive their own interpersonal behavior more favorably than students do. The biggest difference occurs in the dissatisfied and student resposibility/freedom scales. Teachers think that they display cooperative behaviors rather than oppositive bahaviors in the classroom.

4.3.7 Null hypothesis 7

There is no statistically significant difference between mathematics teachers' perceptions related to their own interpersonal behaviors and their ideal teachers' interpersonal behaviors.

In order to compare, mathematics teachers' perceptions on their own interpersonal behavior and their ideal teachers' interpersonal behavior, mean scores

for both variables are compared by using paired samples t-test.. Table 4.3.9 and figure 4.3.2 show the results and compare the mean scores for both variables.

Table 4.3.9 Mean scores for teachers' perceptions and their perception of ideal teacher behaviors

QTI Scales	Teacher mean scores	Ideal teacher mean scores	Mean Difference	Sig(2-tailed)	t
DC leadership	21.9	27.4	-5.4	.000	-13.1
CD helping/ friendly	21.9	27.1	-5.2	.000	-8.7
CS understanding	22.9	26.9	-4.0	.000	-6.9
SC student responsibility/freedom	20.6	26.6	-6.0	.000	-7.7
SO uncertain	6.0	1.3	4.7	.000	12.9
OS dissatisfied	5.5	0.9	4.6	.000	12.8
OD admonishing	7.4	3.8	3.6	.000	8.8
DO strict	17.2	13.3	3.9	.000	5.3

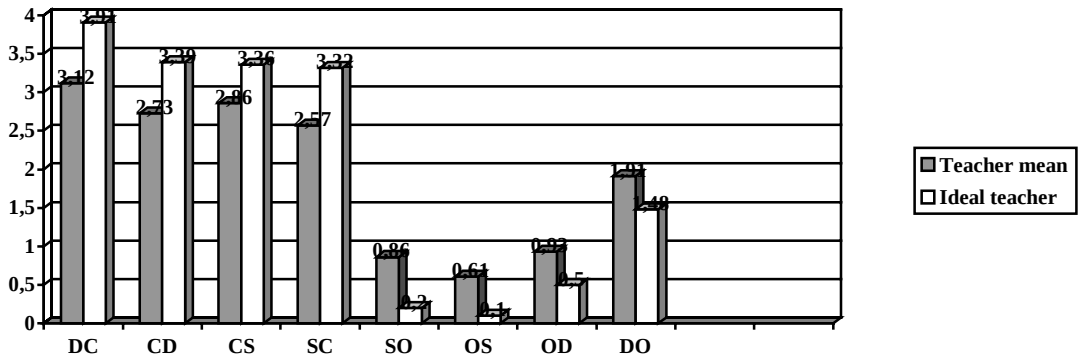


Figure 4.3.2 Comparisons of teachers' mean scores and their ideal teachers' mean scores.

As seen in the table and in the figure, there is a significant difference between the means. According to the results, it can be concluded that teachers' ideal teacher display more cooperative behaviors than they do. The biggest difference occurs in the student resposibility/freedom scale. That means mathematics teachers think that more responsibility and freedom should be given in mathematics classes.

4.4 Summary of the Results

The results of the study can be summarized as follows;

1. Students perceived that their teachers displayed Leadership, Helping/friendly, understanding and strict behaviors rather than uncertain, dissatisfied and admonishing behaviors in terms of interaction with them.

2. Turkish mathematics teachers have directive interpersonal profile.

3. Students' attitudes towards mathematics were found to be associated with students' perceptions of the teacher interpersonal behavior. When students perceive their mathematics teachers as displaying more cooperative behaviors (Leadership, Helping/Friendly, Understanding and Student responsibility/freedom) students show a more positive attitude towards mathematics whereas when they perceive that their teacher display more oppositive behaviors (Uncertain, Dissatisfied, Admonishing and Strict), students tend to have a negative attitude towards mathematics. Among these behaviors, Strict variable makes the strongest contribution to explaining the attitude towards mathematics.

4. There is a significant positive correlation between the students' mathematics achievement and teachers' cooperative behaviors and a negative correlation between students' mathematics achievement and teachers' oppositive

behaviors. The Leadership scale makes the strongest contribution to explaining the mathematics achievement.

5. There is a significant difference between girls' and boys' perception of interpersonal teacher behaviors. Girls' perception of their teachers' interpersonal behaviors were more cooperative than boys' perception and boys perceive that their teachers display more oppositive behaviors than girls percieved.

6. Students of male teachers perceived their teachers displaying slightly higher levels of Leadership, Dissatisfied, Admonishing and Strict behaviors than the students of female teachers. Students of female teachers rated their teachers as giving more responsibility and freedom in the class than the students of male teachers.

7. Students having a higher socio-economic status perceive their mathematics teacher's to have more leadership, understanding and strict behaviors. When socio-economic status becomes lower, students' perceptions include more influincing behaviors like uncertain, dissatisfied and admonishing.

8. Mathematics teachers perceive their own interpersonal behavior more favorably than students do.

9. Teachers think that an ideal teacher should display more cooperative behaviors than they do.

CHAPTER 5

CONCLUSIONS, DISCUSSIONS AND IMPLICATIONS

The main aim of this study was to describe and analyze existing teacher-student interactions in mathematics classrooms in Turkey. The research explored relationships between a range of variables and factors that may effect the interaction between teachers and students. This chapter includes the summary of the research study; conclusion based on the results, discussion of the results, internal and external validity of the study, and implications of the study. The last section presents recommendations for further studies.

5.1 Summary of the Research Study

The purpose of this study was to investigate 8^{th} grade students perceptions of their mathematics teachers' interpersonal behaviors. The study also investigates mathematics teachers' perceptions of their own interpersonal behavior as well as relationships between teachers' interpersonal behaviors and students' attitude towards mathematics, achievement on mathematics, gender, teachers' gender, and socio-economic background. Questionnaire on Teacher Interaction (QTI) scale and a mathematics attitude scale were used for data collection.

In order to investigate the specified purposes of the study, 1317 eight grade students were administered the Turkish version of Questionnaire on Interpersonal teacher behavior (QTI) and Mathematic Attitude scale during the first semester of the

2004-2005. After the data gathered, first step was testing the reliability and validity of the measuring instruments. After this step, statistical analysis held in order to test the hypotheses.

5.2 Conclusions and Discussions

The results of the current study revealed that generally, Turkish elementary school mathematics teachers run their classes with fairly strong leadership, helping/friendly, and understanding behaviors accompanied by some strict behaviors. However, but that they do not display much uncertain, dissatisfied and admonishing behaviors. They sometimes give responsibilities and freedom to students in the class. Results also indicated that there is a relationship between the students' perception of their mathematics teacher interpersonal behavior and their cognitive and affective outcomes. When gender differences were tested in students' perceptions on the teacher interpersonal behavior, it is found that, as expected, girls perceived their mathematics teachers as displaying more leadership, helping/friendly, and understanding behaviors than boys do. Students of male teachers perceived their teachers displaying slightly higher levels of Leadership, Dissatisfied, Admonishing and Strict behavior than that of female teachers. Students of female teachers rated their teachers giving more responsibility and freedom in the class than that of male teachers. Results also indicated that there is a significant relationship between students' perceptions and their socio-economic status. Students having higher socio-economic status perceive their mathematics teacher's behavior including more leadership, understanding and strict behaviors. When socio-economic statuses of students are lower, their perceptions include more influencing behaviors like

uncertain, dissatisfied and admonishing. When the perceptions of students, teachers' perceptions of themselves, and teachers' ideal teacher behaviors are compared, as expected, significant differences were found. Mathematics teachers perceive their own interpersonal behavior more favorably than their students do. Teachers' ideal teacher display more cooperative behaviors than they do.

When the interpersonal teacher behavior examined, it was seen that, Turkish secondary school mathematics teachers run their classes with fairly strong leadership, accompanied by a somewhat helping, friendly and understanding behaviors, and with fairly strict behavior, but that they do not display uncertain and admonishing behaviors. Mathematics teachers give responsibilities and freedom to the students sometimes. Results remind us the fact that Turkish elementary school mathematics teachers normally depend on lecturing rather than any other teaching strategies. Goh and Fraser (1995) found the similar results in their study. Their study was conducted by applying QTI to a sample of 1512 elementary students in Singapore in order to measure learning environment in mathematics classrooms. In Singapore students perceived that their mathematics teachers display leadership, helping/friendly, understanding and strict behaviors rather than uncertain, dissatisfied and admonishing behaviors.

As indicated in the Chapter IV, the scales of QTI; namely leadership (DC) helping/friendly (CD), understanding (CS), and student responsibility/freedom (SC) were related positively to students' attitudes towards the mathematics classes. Conversely each of the remaining four scales of uncertain (SO), dissatisfied (OS), admonishing (OD) and strict (DO) behaviors were related negatively to students' attitudes towards mathematics. The results showed that the more positive the attitude

of the students, the higher level his or her perception of the teacher in terms of both influence and proximity. This is consistent with the findings reported with students in The Netherlands and the USA (Wubbels, Brekelmans & Hooymayers, 1991, Brekelmans, Levy & Rodriguez, 1993, Den Brok, 2001, Brekelmans, Wubbels & Den Brok, 2002, Scott, Den Brok & Fisher, 2004, Den Brok, Fisher, & Rickards, 2004). These previous studies indicated that when students perceive strong behavior typified by the behavior on the right of the vertical axis in the circumplex model, i.e. in the cooperative part of the Proximity axis, there is a high correlation with development of positive attitudes. Strong behavior on the left of the vertical axis was shown to have a negative correlation with the development of positive attitudes.Variations in the students' attitudes toward the subject and the lessons have been characterized on the basis of the proximity dimension: the more cooperative the behavior displayed, the higher the affective outcome scores (Wubbels, Brekelmans, & Hooymayers, 1991). That is, student responsibility and freedom, understanding, helping/friendly and leadership behaviors were related positively to student attitudes. Uncertain, dissatisfied, admonishing and strict behaviors were related negatively to student attitudes. A similar pattern exists with cognitive achievement with an addition that strict or controlling behaviors are positively associated with cognitive outcomes. (Wubbels, Brekelmans, & Hooymayers, 1991).

Students within a class see their classroom environment-either learning environment or interpersonal teacher behavior-relatively similarly, and that average class perceptions vary from class to class. A series of analyses of variance, with class membership as the main effect, revealed significant differences ($p < 0.01$) for every QTI scale between the perceptions of students in different classes. Levy, Den Brok,

Wubbels, and Brekelmans (2003) presented the causes of the differences in within-class perception. The first cause is; systematic differences could occur with respect to specific characteristics of students, teachers or classes. For example, girls could view teachers differently than boys, or teachers could pay more attention to one group than the other. Differences in students' opinions have been associated with variables such as student and teacher gender, student and teacher ethnic background, grade level, teacher experience, subject (Wubbels & Levy, 1993). Second, they could be the result of differences in teacher treatment. While this would be unsurprising at the individual level, it is clear that some teachers do treat students differently depending on their students and their own gender and/or ethnic background. Kuklinsk and Weinstein (2000) reported that children were able to perceive that there were different learning environments within the same classroom for high-achieving students compared with low-achieving students. Third, within-class perceptual differences could be the result of varying needs and expectations that students have with respect to the teacher. Some students, for example, could have lower self-esteem than others and therefore need a teacher who is overly supportive. These students could project this need onto their teachers, resulting in different interpretations than other students of the same behavior. Finally, within-class differences could be caused by dissimilar values and norms used by students to assess their teachers. Some students could regard a teacher who repeatedly checks for understanding as helpful, for example, while others might see this as intrusive.

The result of this research about relationships between attitude and QTI scales supports the previous studies. As Wubbels, Brekelmans, and Hooymayers (1991) reported that the more cooperative the behavior displayed by teacher, the higher the

students' affective outcome scores, that is, leadership (DC), helping/friendly (CD), understanding (CS) and student responsibility and freedom (SC) behaviors were related positively to student attitudes. Uncertain, dissatisfied, admonishing and strict behaviors were related negatively to student attitudes.

In numerous studies of relationships between teacher behavior and student outcomes (Wubbels and Brekelmans, 1998), medium to strong associations have been found, but relationships are stronger for affective than cognitive outcomes. Whereas leadership, helpful/friendly and understanding behaviors are positively related to student outcomes, uncertain, dissatisfied and admonishing behaviors are negatively related to outcomes.

In the presents study the relationship between students' mathematics achievement and teacher behavior were tested using simple correlation analysis and multiple regression analysis. Simple correlation analysis showed that there is small correlation with students' mathematics achievement and all the QTI scales. Leadership, helping/friendly, understanding, and student responsibility scales had positive correlation, while uncertain, dissatisfied, admonishing, and strict scales had negative correlation with students' mathematics achievement. The highest positive correlation found with leadership scale and the highest negative correlation was found with admonishing scale. The highest standardized regression coefficient (β) was for leadership scale. This result supports some of the findings of Henderson, Fisher and Fraser (2000) stated that the teacher's strong leadership, provision of a degree of student responsibility and freedom were likely to promote achievement, whereas a greater degree of strict behavior by the teacher, were negatively associated with student achievement. Wubbles et al. (1991) investigated the relationships

between perceptions on the QTI scales and student learning outcomes in The Netherlands. They found that regarding students' cognitive outcomes, the more that teacher demonstrated strict, leadership and helping/friendly behaviors, the higher the cognitive outcomes scores were. Conversely, student responsibility and freedom, uncertain and dissatisfied behaviors were related negatively to achievement.

Rawnsley and Fisher (1998) indicated that students showed the greatest cognitive gains in classes where students perceived that the teacher emphasized understanding the work. The least cognitive gains occurred in classes where students perceived that the teacher was dissatisfied, gave them too much freedom and responsibility, and where they were involved in investigations.

Perceptional differences of interpersonal teacher behavior between genders were also tested and significant differences were detected between genders. When the results of the dependent variables were considered separately, all scales of the QTI (except SC (Student responsibility/freedom)) reached statistical significance. Results indicated that girls viewed that their teachers display more leadership; helping/friendly and understanding behaviors then do boys. Boys viewed that their teachers display more uncertain, admonishing, dissatisfied and strict behavior than do girls. Although there’s not a significant difference between girls and boys with respect to student responsibility/freedom behaviors, when the means are compared, there is a slight difference in favor of girls. The result supports the recent studies on gender differences. Goh and Fraser (1996) indicated that in relation to boys, girls consistently rated their teacher interpersonal behavior in a more positive way. In other words, girls rated their teachers’ understanding and helping/friendly behaviors more highly and their uncertain, dissatisfied, and admonishing behaviors less highly

in elementary schools. Fisher, Fraser, and Rickards (1996, 1997) argued that girls perceive their teachers in a more positive way than boys do. The results of the previous studies were similar with the present study on gender differences.

Analysis of association between teacher gender and teacher interpersonal behavior indicated that there are differences between the students' perception on female and male teacher interpersonal behavior that; students perceived their male teacher to demonstrate slightly higher levels of Leadership, Dissatisfied, Admonishing and Strict behaviors than female teachers do. Students rated their female teachers to give more responsibility and freedom in the class that male teachers do.

Another result of the present study indicated that, there was a small correlation between students' perceptions of their mathematics teacher's interpersonal behavior and their socio-economic status According to statistical results; students having a higher socio-economic status perceive their mathematics teachers to have more leadership, understanding and strict behaviors. When socio-economic statuses become lower, students' perceptions include more influencing behaviors like uncertain, dissatisfied and admonishing.

There have been a limited number of studies about effects of teacher gender and students' socio-economic status on students' perceptions of interpersonal teacher behaviors. Using the QTI in the U.S. and The Netherlands, Den Brok, Fisher, and Rickards (2004) indicated that in those countries, several factors affect student's perceptions. These include student and teacher gender, student and teacher ethnic background, student age, teacher experience, class size, student achievement and subject. Levy, Wubbels, Brekelmans, and Morganfield (1997) carried out a study in

order to determine the language and cultural factors in students' perceptions of teacher communication style. The results from this study suggested that the students' cultural background is indeed significantly related to the perceptions that they had of their teachers' interaction behavior.

When the students' perceptions of their mathematics teachers' behaviors, teachers' perceptions of their own interpersonal behaviors and ideal teachers' interpersonal behaviors are compared, it is seen that teachers perceive themselves more favorably than students do and teachers' ideal teacher display more cooperative behaviors, less oppositive behaviors than they do. The results support the recent studies. Similar results were found in study of Rickards and Fisher (2000, a). Their results indicated that teachers believed that they were more cooperative and less oppositional in the classrooms than their students perceived. In other words, teachers perceived their classes more positively than their students did. In another study of Rickards and Fisher (1997), they are found that there were differences in teacher and student perceptions of teacher-student interpersonal behavior and that teachers perceived their classes more positively than their students did. Results also indicated that teachers' ideal teacher are more positive than themselves.

All of the results of the present study support the results of recent studies on interpersonal teacher behavior. Overall, this study made several distinctive contributions to the field of learning environment research in Turkey. This study provided some information about adaptation and the validation of the widely applicable Questionnaire on Teacher Interaction (QTI) for use in Turkey. Therefore, this instrument can be used for further research.

5.3 Internal Validity of the Study

Internal validity of the study refers to the degree to which the observed differences on the dependent variables are directly related to the independent variables, not to extraneous variables that may affect the results of the research (Fraenkel and Wallen, 1996). Possible threats to internal validity and methods to cope with them were discussed in this section.

The schools are selected in a convenience manner rather than randomly selected. Location and instrumentation could not be threats to the study since the instruments were administered to all groups in similar conditions. Data collector characteristics and data collector bias threats were assumed to be controlled by training and informing the teachers to ensure Standard procedures under which data were collected. Finally confidentially was not a possible threat for this study since names of the students were not collected and used anywhere.

5.4 External Validity of the Study

Since all the administration procedure took place in ordinary classrooms during regular class hours, there were possibly no remarkable differences among environmental conditions. Therefore, it was believed that external effects were sufficiently controlled by the setting used in the study.

5.5 Implications of the Study

Based on the findings of this study and previous research following suggestions can be offered:

- The validation of the QTI allows it to be used to monitor teacher interpersonal behavior. Thus, teachers could use it as an evaluation tool to examine mathematics classroom environments. They can use the results from the student version of QTI and the teacher version of the QTI to compare differences between what students perceive and what teachers perceive their interpersonal behavior to be.
- Teachers can also use the QTI to monitor their classroom environment over a period of time. So that she or he can know about the differences in the class perceptions.
- If teachers wish to improve students' affective outcomes, they should include lessons that allow for more student responsibility and freedom, understanding, helping/friendly and leadership behaviors and less uncertain, dissatisfied, admonishing and strict behaviors
- If teachers wish to improve students' cognitive outcomes should include lessons that allow for more student responsibility and freedom, understanding, helping/friendly and leadership behaviors and less uncertain, dissatisfied, admonishing and strict behaviors.
- As recent studies, the present study also indicated the differences between the perceptions of girls and boys. Teachers should take care of these differences in the classroom.

5.6 Recommendations for Further Researches

Current study has suggested a variety of useful topics for further studies. These are briefly as follows:

- This study provides the first major data on the use of QTI in mathematics classrooms in Turkey. QTI can be used in many other fields. There is a lack of learning environment studies in Turkey. Later studies can use QTI in other fields in Turkey.
- This study is only applied in government schools. In later studies QTI can be applied to a large sample involving other school types.
- This study is applied only to 8^{th} grade students. According to Hattie, Byrne, and Fraser (1987) different grade levels prefer different environments. So another area of study would be the examination of interpersonal behavior in other grade levels.
- Qualitative researches can be conducted in order to examine the teacher behaviors in more detail.
- There are many variables effecting the student-teacher interaction. In the present study limited variables are examined. Others, like teacher experience, socio-cultural background and job satisfaction can be examined in later studies.

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APPENDIX A

MATEMATİK ÖĞRETMENİ ETKİLEŞİM ÖLÇEĞİ

Sevgili öğretmenimiz, bu ölçek 64 madde içermektedir. Her bir maddeyi okuyarak size en uygun gelen cevabı işaretleyiniz. Cevap bölümündeki ilk kısım sizin kendiniz hakkındaki görüşlerinizi anlatmaktadır. İkinci bölümde ise size göre ideal öğretmenin nasıl olması gerektiğini ifade etmektedir. Bu ölçek incelenirken kesinlikle etik değerlere uyulacak ve sonuçlar sadece istatistiksel olarak incelenecektir, isim kullanılmayacaktır. Dilerseniz adınızın yerine bir rumuz kullanabilirsiniz. Size çalışma sonuçlarını iletmemizi istiyorsanız , bir irtibat telefonu veya posta adresi ekleyebilirsiniz. İlginiz ve eğitim bilimine katkınız için teşekkür ederiz.

1. Okulunuzun adı:

2. İsim veya rumuz:

3. Cinsiyet:

4. Doğum tarihi:

5. Doğum yeri:

6. Kaç yıldır öğretmensiniz?:

7. Haftada kaç saat derse giriyorsunuz?:

8. Girdiğiniz sınıfların herbirinde ortalama kaç öğrenci var?:

9. Maaşınızı yeterli buluyor musunuz?:

10. Mesleğinizi severek mi yapıyorsunuz?:

11. İletişim için:

MATEMATİK ÖĞRETMENİ ETKİLEŞİM ÖLÇEĞİ

	SİZ					İDEAL ÖĞRETMEN				
Bu sınıfta;	Hiçbir zaman	Nadiren	Ara sıra	Sıklıkla	Her zaman	Hiçbir zaman	Nadiren	Ara sıra	Sıklıkla	Her zaman
1. Kuralları uygulama konusunda katıyımdır.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
2. Dersimde çok sessiz olmalarını isterim.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
3. Dersi gayretli ve istekli anlatırım.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
4. Öğrencilerime güvenirim.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
5. Dersi anlamadıkları zaman kaygılanırım.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
6. Benimkinden farklı düşüncelerini rahatlıkla söyleyebilirler.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
7. Onları cezalandırmakla korkuturum.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
8. Ders ile ilgili kararlara onların da katılmalarını sağlarım.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
9. Ders konusunda çok fazla gayret göstermelerini isterim.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
10. Kopya çektiklerini, hileci olduklarını düşünürüm.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
11. Dersi anlamadıklarında tekrar anlatmaya hazırım ve bunu istekle yaparım.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
12. Hiç birşey bilmediklerini düşünürüm.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
13. Sınıfça yapmak istedikleri	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O

Bu sınıfta;	Hiçbir zaman	Nadiren	Ara sıra	Sıklıkla	Her zaman	Hiçbir zaman	Nadiren	Ara sıra	Sıklıkla	Her zaman
aktivitelere istekle katılırım.										
14. Sınavlarım zordur.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
15. Çalışmalarında istedikleri zaman onlara yardımcı olurum.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
16. Ne zaman sinirleneceğim belli olmaz ansızın sinirlenirim.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
17. Onları dinlerim.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
18. Onlarla yakınlık kurarak, duygularını anlamaya çalışırım.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
19. Mantıksız, beceriksiz görünmeleri için çalışırım.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
20. Standartlarım yüksektir, beklentilerim çoktur.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
21. Davranışlarıyla, düşünceleriyle beni etkileyebilirler.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
22. Derste konuşmadan önce iznimi almak zorundadırlar.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
23. Kararsız, değişken bir görünümüm vardır.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
24. Onları küçümserim.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
25. Ödevlerinde, bireysel çalışmalarında onların hoşlanacağı bir konuyu seçme hakkı tanırım.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
26. Mutsuz, hoşnutsuz bir görünümüm vardır.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
27. Dersi kaynatmalarına, boş vakit geçirmelerine izin	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O

Bu sınıfta;	Hiçbir zaman	Nadiren	Ara sıra	Sıklıkla	Her zaman	Hiçbir zaman	Nadiren	Ara sıra	Sıklıkla	Her zaman
veririm.										
28. Onları kolayca disipline sokar, sustururum.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
29. Onları bireysel olarak tanır ve tek tek ilgilenirim.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
30. Onların hiçbir işi iyi yapamadıklarını düşünürüm.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
31. Konuşmalarım açıklayıcıdır, onlardan ne istediğimi açıkça anlayabilirler.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
32. Anlatmak istediğimi anlayamadıklarında bunu onlar söylemeden hemen fark ederim.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
33. Yaptıkları hataların hesabını sormaz, bir çok şeye göz yumarım.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
34. Tutarsızımdır, her an değişik davranabilirim.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
35. Onlara arkadaşça davranırım.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
36. Benden her konuda birçok şey öğreniyorlar.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
37. Güvenebilecekleri bir kişiyim.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
38. Her şeye çok çabuk sinirlenirim.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
39. Ne yapacağımı bilmiyormuş gibi bir görünümüm vardır.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
40. Derste dikkatlerini ayakta tutar, ilgilerini çekerim.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
41. Bir hatada düzeltme şansı	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O

Bu sınıfta;	Hiçbir zaman	Nadiren	Ara sıra	Sıklıkla	Her zaman	Hiçbir zaman	Nadiren	Ara sıra	Sıklıkla	Her zaman
vermeden hemen uyarır,tepki gösteririm.										
42. Beni istedikleri şekilde kolaylıkla yönlendirebilirler.										
43. Sabırsızımdır.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
44. Dersi kaynatmaya başladıklarında nasıl davranacağımı, ne yapacağımı bilemem.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
45. Sınıfta olup biten her şeyden haberdarımdır.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
46. Benim çeşitli yönlerimle dalga geçebilir, örneğin bir ad takabilirler.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
47. Espri anlayışım vardır, espri yaparım.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
48. Dersle ilgili çalışmalarında bir değil bir çok seçenek sunarım.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
49. Derste çoğunlukla boş vakit geçirmelerine izin veririm.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
50. Benimle ilgili espri yapmalarına kızmaz, anlayışla karşılarım.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
51. Öfkeli, olumsuz biriyimdir.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
52. İyi bir lider,iyi bir öncüyümdür.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
53. Ödevi yapmadılarsa dersime girmekten korkarlar.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
54. Sınıfta memnuniyetsiz, hoşnutsuz görünürüm.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
55. Utangaç, çekingen bir	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O

Bu sınıfta;	Hiçbir zaman	Nadiren	Ara sıra	Sıklıkla	Her zaman	Hiçbir zaman	Nadiren	Ara sıra	Sıklıkla	Her zaman
görünümüm vardır.										
56. Sabırlıyımdır.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
57. Notum kıttır.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
58. Şüpheciyimdir.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
59. Çok kolay tartışmaya girerim, tartışmacı bir yapım vardır.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
60. Derslerim çok güzel, verimli geçer.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
61. Benden çok korkarlar.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
62. Kendime güvenim vardır, kendimden emin davranırım.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
63. Alaycı, küçümseyicimdir.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O
64. Yumuşak, ılımlı yapım vardır.	1O	2O	3O	4O	5O	1O	2O	3O	4O	5O

Teşekkür Ederim

APPENDIX B

ÖĞRETMEN İÇİN ETKİLEŞİM ÖLÇEĞİ

Bu ölçek sizden matematik öğretmeninizin davranışlarını tanımlamanızı istemektedir. İsimlerinizi yazmayınız. Vereceğiniz yanıtlar sadece araştırmacı tarafından incelenecek ve asla notlarınızı etkilemeyecektir.

Bu ölçek 64 sorudan oluşmaktadır. Belirtilen ifadelere ne derece katıldığınızı veya katılmadığınızı ilgili kutucuğu tamamen doldurarak belirtiniz. Her ifade için bir kutucuk seçiniz. Lütfen bütün sorulara cevap veriniz.

İlginiz için teşekkürler.

1. Sınıf : _____
2. Cinsiyet: ❑ Kız ❑ Erkek
3. Matematik dersindeki genel not ortalamanız: _____
4. 6. sınıf matematik notunuz: _____

   7. sınıf matematik notunuz: _____
5. Annenizin eğitim durumu:

Hiç okula gitmemiş ❑	Lise ❑
İlkokul ❑	Üniversite ❑
Ortaokul ❑	Yüksek lisans ❑

6. Annenizin mesleği : _____
7. Babanızın eğitim durumu :

Hiç okula gitmemiş ❑	Lise ❑
İlkokul ❑	Üniversite ❑
Ortaokul ❑	Yüksek lisans ❑

8. Babanızın mesleği: _____
9. Ailenizin aylık ortalama geliri : _____
10. Matematik öğretmeninizin cinsiyeti : ❑ Bayan ❑ Erkek

Matematik Öğretmenim ;	Hiçbir zaman	Nadiren	Ara sıra	Sıklıkla	Her zaman
1. Kuralları uygulama konusunda katıdır.	1O	2O	3O	4O	5O
2. Dersinde çok sessiz olmamızı ister.	1O	2O	3O	4O	5O
3. Dersi gayretli ve istekli anlatır.	1O	2O	3O	4O	5O
4. Bize güvenir.	1O	2O	3O	4O	5O
5. Dersi anlamadığımız zaman kaygılanır.	1O	2O	3O	4O	5O
6. Onunkinden farklı düşüncelerimizi rahatlıkla ona söyleyebiliriz.	1O	2O	3O	4O	5O
7. Bizi cezalandırmakla korkutur.	1O	2O	3O	4O	5O
8. Ders ile ilgili kararlara bizim de katılmamızı sağlar.	1O	2O	3O	4O	5O
9. Ders konusunda çok fazla gayret göstermemizi ister.	1O	2O	3O	4O	5O
10. Bizim kopya çektiğimizi, hileci olduğumuzu düşünür.	1O	2O	3O	4O	5O
11. Dersi anlamadığımızda tekrar anlatmaya hazırdır ve bunu istekle yapar.	1O	2O	3O	4O	5O
12. Bizim hiç bir şey bilmediğimizi düşünür.	1O	2O	3O	4O	5O
13. Sınıfça yapmak istediğimiz aktivitelere istekle katılır.	1O	2O	3O	4O	5O
14. Sınavları zordur.	1O	2O	3O	4O	5O
15. Çalışmalarımızda istediğimiz zaman bize yardımcı olur.	1O	2O	3O	4O	5O
16. Ne zaman sinirleneceği belli olmaz, ansızın sinirlenir.	1O	2O	3O	4O	5O
17. Bizi dinler.	1O	2O	3O	4O	5O
18. Bizimle yakınlık kurarak, bizim duygularımızı anlamaya çalışır.	1O	2O	3O	4O	5O
19. Bizim mantıksız, beceriksiz görünmemiz için çalışır.	1O	2O	3O	4O	5O
20. Standartları yüksektir, beklentileri çoktur.	1O	2O	3O	4O	5O
21. Davranışlarımızla, düşüncelerimizle onu etkileyebiliriz.	1O	2O	3O	4O	5O
22. Derste konuşmadan önce iznini almak zorundayız..	1O	2O	3O	4O	5O
23. Kararsız, değişken bir görünümü vardır.	1O	2O	3O	4O	5O
24. Bizi küçümser.	1O	2O	3O	4O	5O

Matematik Öğretmenim ;	Hiçbir zaman	Nadiren	Ara sıra	Sıklıkla	Her zaman
25. Ödevlerimizde, bireysel çalışmalarımızda bizim hoşlanacağımız bir konuyu seçme hakkı tanır.	1O	2O	3O	4O	5O
26. Mutsuz, hoşnutsuz bir görünümü vardır.	1O	2O	3O	4O	5O
27. Dersi kaynatmamıza, boş vakit geçirmemize izin verir.	1O	2O	3O	4O	5O
28. Bizi kolayca disipline sokar, susturur.	1O	2O	3O	4O	5O
29. Bizleri bireysel olarak tanır ve tek tek ilgilenir.	1O	2O	3O	4O	5O
30. Bizim hiçbir işi iyi yapamadığımızı düşünür.	1O	2O	3O	4O	5O
31. Konuşmaları açıklayıcıdır, bizden ne istediğini açıkça anlayabiliriz.	1O	2O	3O	4O	5O
32. Anlatmak istediğini anlayamadığımızda bunu biz söylemeden hemen fark eder.	1O	2O	3O	4O	5O
33. Dersinden bilgi almış, konuyu öğrenmiş olarak ayrılırız.	1O	2O	3O	4O	5O
34. Yaptığımız hataların hesabını sormaz, bir çok şeye göz yumar.	1O	2O	3O	4O	5O
35. Bize arkadaşça davranır.	1O	2O	3O	4O	5O
36. Ondan her konuda birçok şey öğreniyoruz.	1O	2O	3O	4O	5O
37. Güvenebileceğimiz bir kişidir.	1O	2O	3O	4O	5O
38. Her şeye çok çabuk sinirlenir.	1O	2O	3O	4O	5O
39. Ne yapacağını bilmiyormuş gibi davranır.	1O	2O	3O	4O	5O
40. Derste dikkatimizi ayakta tutar, ilgimizi çeker.	1O	2O	3O	4O	5O
41. Bir hata yaptığımızda düzeltme şansı vermeden hemen uyarır, tepki gösterir.	1O	2O	3O	4O	5O
42. Onu istediğimiz şekilde kolaylıkla yönlendirebiliriz.	1O	2O	3O	4O	5O
43. Sabırsızdır.	1O	2O	3O	4O	5O
44. Biz dersi kaynatmaya başlayınca nasıl davranacağını, ne yapacağını bilemez.	1O	2O	3O	4O	5O
45. Sınıfta olup biten her şeyden haberdardır.	1O	2O	3O	4O	5O
46. Onun çeşitli yönleriyle dalga geçebilir, örneğin bir ad takabiliriz.	1O	2O	3O	4O	5O
47. Espri anlayışı vardır, espri yapar.	1O	2O	3O	4O	5O
48. Dersle ilgili çalışmalarımızda bir değil bir çok seçenek sunar.	1O	2O	3O	4O	5O
49. Derste çok fazla boş vakit geçirtir.	1O	2O	3O	4O	5O

Matematik Öğretmenim ;	Hiçbir zaman	Nadiren	Ara sıra	Sıklıkla	Her zaman
50. Onunla ilgili espri yapmamıza kızmaz, anlayışla karşılar.	1O	2O	3O	4O	5O
51. Öfkeli, olumsuz biridir.	1O	2O	3O	4O	5O
52. İyi bir lider,iyi bir öncüdür.	1O	2O	3O	4O	5O
53. Ödevi yapmadıysak dersine girmekten korkarız.	1O	2O	3O	4O	5O
54. Memnuniyetsiz, hoşnutsuz görünür.	1O	2O	3O	4O	5O
55. Utangaç, çekingen bir görünümü vardır.	1O	2O	3O	4O	5O
56. Sabırlıdır.	1O	2O	3O	4O	5O
57. Notu kıttır.	1O	2O	3O	4O	5O
58. Şüphecidir.	1O	2O	3O	4O	5O
59. Çok kolay tartışmaya girer, tartışmacı bir yapısı vardır.	1O	2O	3O	4O	5O
60. Derslerimiz çok güzel, verimli geçer.	1O	2O	3O	4O	5O
61. Ondan çok korkarız.	1O	2O	3O	4O	5O
62. Kendine güveni vardır, kendinden emin davranır.	1O	2O	3O	4O	5O
63. Alaycı, küçümseyicidir.	1O	2O	3O	4O	5O
64. Yumuşak, ılımlı yapısı vardır.	1O	2O	3O	4O	5O

Teşekkür Ederim

APPENDIX C

MATEMATİK DERSİ TUTUM ÖLÇEĞİ

Sevgili öğrenci, bu ölçek sizin matematik dersine yönelik düşüncelerinizi öğrenmek için hazırlanmıştır. Ölçekte belirtilen ifadelerden hiçbirinin kesin cevabı yoktur. Her ifadeyle ilgili görüş, kişiden kişiye değişebilir. Bunun için vereceğiniz yanıtlar kendi görüşünüzü yansıtmalıdır. Her ifadeyle ilgili düşüncenizi yazmadan önce, o ifadeyi dikkatlice okuyunuz, sonra ifadede belirtilen düşüncenin, sizin düşünce ve duygunuza ne derecede uygun olduğuna aşağıda belirtilen derecelendirmeyi düşünerek karar veriniz.

Hiç katılmıyorsanız; Hiç uygun değildir

Katılmıyorsanız; Uygun değildir

Kararsız iseniz; Kararsızım

Kısmen katılıyorsanız; Uygundur

Tamamen katılıyorsanız; Tamamen uygundur seçeneğini işaretleyiniz.

	Tamamen uygundur	Uygundur	Kararsızım	Uygun değildir	Hiç uygun değildir
1.Matematik sevdiğim bir derstir.					
2. Matematik dersine girerken büyük bir sıkıntı duyarım					
3. Matematik dersi olmasa öğrencilik hayatı daha zevkli olurdu.					
4. Arkadaşlarımla matematik tartışmaktan zevk alırım.					
5. Matematiğe ayrılan ders saatlerinin daha fazla olmasını isterim.					
6. Matematik dersi çalışırken canım sıkılır.					
7. Matematik dersi benim için angaryadır.					

	Tamamen uygundur	Uygundur	Kararsızım	Uygun değildir	Hiç uygun değildir
8. Matematikten hoşlanırım.					
9. Matematik dersinde zaman geçmek bilmez.					
10. Matematik dersi sınavından çekinirim.					
11. Matematik benim için ilgi çekicidir.					
12. Matematik bütün dersler içinde en korktuğum derstir.					
13. Yıllarca matematik okusam bıkmam.					
14. Diğer derslere göre matematiği daha çok severek çalışırım.					
15. Matematik beni huzursuz eder.					
16. Matematik beni ürkütür.					
17. Matematik dersi eğlenceli bir derstir.					
18. Matematik dersinde neşe duyarım.					
19. Derslerin içinde en sevimsizi matematiktir.					
20. Çalışma zamanımın çoğunu matematiğe ayırmak isterim.					