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TEACHER MOTIVATING STYLE, STUDENTS' QUALITY OF MOTIVATION AND STUDENTS' STRIVING IN MATH

A MASTER'S THESIS

BY

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THE PROGRAM OF CURRICULUM AND INSTRUCTION
İHSAN DOĞRAMACI BILKENT UNIVERSITY
ANKARA

JUNE 2016

2016

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The Graduate School of Education

of

İhsan Doğramacı Bilkent University

by

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In Partial Fulfillment of the Requirements for the Degree of

Master of Arts

The Program of Curriculum and Instruction

İhsan Doğramacı Bilkent University

Ankara

June 2016

İHSAN DOĞRAMACI BİLKENT UNIVERSITY

GRADUATE SCHOOL OF EDUCATION

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Leyla Goldfinger

June 2016

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Curriculum and Instruction.

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ABSTRACT

TEACHER MOTIVATING STYLE, STUDENTS' QUALITY OF MOTIVATION AND STUDENTS' STRIVING IN MATH

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June 2016

Using a cross-sectional design, this study investigated through a survey the relationship of Turkish high school math teachers' perceived motivating style with students' type of achievement goals and the reasons for endorsing them. The study also investigated the relation of students' type of achievement goals and their underlying reasons with their grade, learning strategies, experience of challenge, and self-handicapping in math. The study included 180 students (M_{age} = 16.01, *SD* = 1.44, 56.7% females) from grades "preparatory level" to 12th, from an international foundation school in eastern part of Turkey. The questionnaires measured Math teachers' perceived autonomy support, structure, and involvement as well as perceived classroom goal structures. Students' achievement goal type (mastery-approach, performance-approach or outcome goal) and the underlying reasons for pursuing the goal (autonomous or volitional versus controlling or pressuring reasons) were also measured. Lastly, academic self-handicapping, use of effective learning

strategies, experience of challenge in Math were measure with the questionnaires and data about students' average grades in Math was collected.

Results showed that mastery-approach goal was chosen most frequently as the most dominant goal of the participants in math. Students who were focused on their performance, however, chose to get high grades (i.e., endorsed an outcome goal) instead of outperforming other students (i.e., endorsing a performance-approach goal). Performance-approach goal was not a dominant goal for the majority of the participated Turkish students. A hierarchical regression analysis revealed that autonomous reasons underlying either a mastery-approach goal or an outcome goal related positively to use of effective learning strategies and experience of challenge in math. In contrast, controlling reasons underlying mastery-approach or outcome goal were negatively related to experience of challenge in math. The autonomous reasons underlying mastery-approach goals were also positively related with perceived teacher's involvement whereas the controlling reasons underlying mastery-approach goals were positively related with perceived performance-approach goal structures.

The results were discussed in terms of their implication to educational practices.

Key words: autonomous and controlled motivation, achievement goals, achievement goal structures, experience of challenge, learning strategies, outcome goal

ÖZET

ÖĞRETMENİN MOTİVE ETME ŞEKLİ, ÖĞRENCİNİN SAHİP OLDUĞU MOTİVASYON VE MATEMATİK DERSİNDE ÖĞRENCİ BAŞARISI

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Haziran 2016

Kesitsel araştırma yönteminin kullanıldığı bu çalışmada, Türk lise Matematik öğretmenlerinin öğrenci algısıyla öğrencileri motive etme şekillerinin öğrencilerin belirlediği başarı hedefleriyle ve bu hedeflerin altında yatan sebeplerle ilişkisi anket aracılığıyla incelenmiştir. Bu çalışmada ayrıca, öğrencilerin öğrencilerin Matematik dersi için belirlediği başarı hedefleriyle ve bu hedeflerin altında yatan sebeplerin öğrencilerin aldığı notlar, kullandıkları öğrenme stratejileri, zorlayıcı etkinliklere istekli olmaları ve başarısızlığa bahane arama durumu ile ilişkisi de incelenmiştir. Çalışmaya Türkiye'nin doğusunda yer alan bir uluslararası vakıf okulunun hazırlık sınıfından 12. sınıfa kadar olan 180 öğrencisi ($M_{\text{yaş}}$ = 16.01, SD = 1.44, 56.7% kız) katılmış ve anket sorularına yanıt vermiştir. Anketler Matematik öğretmeninin öğrenci tarafından algılanan otonomi desteğini, sınıf yapısını, öğretmen ilgisini ve sınıf amaç yapısını ölçmüştür. Öğrencilerin başarı hedefi türleri (uzmanlık hedefi, performans hedefi ve sonuç hedefi) ve bu hedefin belirlenmesinin altında yatan

nedenler (otonom ve kontrol motivasyon) de incelenmiştir. Son olarak, Matematik dersinde başarısızlığa bahane arama durumu, etkili öğrenme stratejilerinin kullanımı ve zorlayıcı etkinliklere istekli olma durumu da ölçülmüş ve öğrencilerin not ortalamaları bilgisi toplanmıştır.

Araştırma sonuçlarına göre, katılımcılar tarafından en çok seçilen en baskın hedef türü uzmanlık hedefi olmuştur. Bununla beraber, derste gösterdikleri performansa odaklanan öğrenciler diğer öğrencilere göre daha başarılı olmak yerine (performans hedefi) yüksek notlar almayı hedeflediklerini (sonuç hedefi) belirtmişlerdir. Katılımcı Türk öğrencilerinin çoğu performans hedefini baskın hedef türü olarak seçmemişlerdir. Analiz sonuçlarına göre, uzmanlık ve sonuç hedeflerinin altında yatan otonom nedenler, Matematik dersinde etkili öğrenme stratejileri kullanımı ve zorlayıcı etkinliklere istekli olma durumu ile pozitif yönde ilişkili bulunmuştur. Aksine, uzmanlık ve sonuç hedeflerinin altında yatan kontrol edici nedenler, Matematik dersinde zorlayıcı etkinliklere istekli olma durumu ile negatif yönde ilişkili bulunmuştur. Uzmanlık hedeflerinin altında yatan otonom nedenler aynı zamanda öğretmenin öğrenci tarafından algılanan katılımı ile pozitif yönde ilişkili bulunmuş bunun yanında uzmanlık hedeflerinin altında yatan kontrol edici nedenler öğrenci tarafından algılanan performansa dayalı sınıf hedef yapısı ile pozitif yönde ilişkili bulunmuştur.

Bu çalışmanın sonuçları eğitimdeki uygulamaları yönünden tartışılmıştır.

Anahtar kelimeler: otonom ve kontrol motivasyon , başarı hedefleri, başarı hedefi sınıf amaç yapıları, zorlayıcı etkinliklere istekli olma durumu, öğrenme stratejileri, sonuç hedefi

ACKNOWLEDGEMENTS

I would first like to thank my thesis advisor Asst. Prof. Dr. Aikaterini Michou for introducing me to the topic and for her patience throughout the research. I am grateful to be able to work with such a motivating, positive, kind and very supportive advisor. She was always available to answer my questions even from a long distance and allowed the thesis to be my own work but steered me in the right direction when I needed. She gave me moral support next to academic support and helped me to finish my research on time. I appreciate the time she spent reading my paper and giving me useful suggestions.

Special thanks are given to Prof. Dr. Margaret Sands for giving me the chance to be part of this program and for the Bilkent University Graduate School of Education community members for their support and sharing of their knowledge.

I would also like to thank my committee members, Prof. Dr. Alipaşa Ayas and Asst. Prof. Dr. Athanasios Mouratidis for the assistance they provided during my defense with their encouraging comments and helpful suggestions.

I would like to acknowledge all the teachers who helped especially Halil İbrahim Mali and Mehmet Kılıç with their technology support and all the participants in the survey who shared their precious time during data collection.

I owe more than thanks to my family for their motivation and especially my husband Uriah Goldfinger for supporting me and encouraging me whenever I doubt myself,

for his patience and understanding throughout my years of study. This accomplishment would have not been possible without my family.

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CHAPTER 1: INTRODUCTION

Introduction

Teachers have different approaches to teach and motivate their students. While some teachers focus on their student's learning and improvement, other teachers focus on how much better a student performs relative to his or her classmates. The teachers may promote either learning or competition goals by supporting students' needs (e.g. by taking into consideration their preferences or giving them the chance to make choices) or by coercing students to accept their goals and values. This means that different goals (e.g. learning or competition) can be promoted with two different motivating styles; need supportive or controlling (Vansteenkiste, Lens, Elliot, Soenens, & Mouratidis, 2014).

The types of achievement goals promoted by the teacher are known as *goal structures* (Ames, 1992; Maehr & Midgley, 1996) and research has shown that they predict students' achievement goal endorsement (Kaplan, Middleton, Urdan, & Midgley, 2002).

Specifically, mastery goal structures (learning environments where teachers encourage students' strivings for mastery, understanding and self-improvement) have been related to the endorsement of mastery-approach goals (i.e., learning goal) whereas performance-approach goal structures (a classroom climate where competition among students is highlighted) have been related to the endorsement of

performance-approach (i.e., the goal to outperform others) or performance-avoidance (i.e., the goal to avoid being worse compared to others) goals (Elliot & McGregor, 2001).

Regarding the need-supportive teaching style, research has shown that teacher's attempt to include students in decision making, respect their needs and acknowledge their efforts is related to students volitional engagement in schooling (i.e., autonomous motivation) (Jang, Reeve & Deci, 2010).

In contrast when the teacher shows his/her power over students and demand obedience to his/her decisions, students are engaged in schooling out of obligations and pressure (i.e., controlled motivation) (Vansteenkiste, Soenens, Sierens & Luyckx and Lens, 2009).

The type of goals students adopt and their autonomous and controlled motivation may affect the learning outcomes. The effects can be positive such as higher academic grades, using effective learning strategies or negative such as self-handicapping and low academic grades according to the quality of students' motivation.

This research focuses on the relationship of Turkish teacher's motivating style as perceived by high school students (i.e. what goal does s/he promote and how) with

students' motivation in mathematics as well as with their grades, learning strategies, experience of challenge and self-handicapping in math.

Background

Self-determination theory (SDT)

Self Determination Theory (SDT) investigates the basic psychological needs that are the base for human's self-determined motivation. Specifically, SDT claims that there are three basic psychological needs; the need for competence (sense of effectiveness), the need for relatedness (desire to feel connected to others, to be loved and cared for), and the need for autonomy (a sense of self-organized behavior). The satisfaction of these three basic needs is essential for personal growth and well-being (Ryan & Deci, 2000).

According to SDT, people have by nature an intrinsic motivation to explore their surroundings. They also have an innate tendency to integrate their experience to a coherent sense of self. The quality of the social environment is the key for people to be engaged in exploration and active internalization or to remain passive and uninterested for exploration. Some environments support people's natural motivation and some environments thwart it. Satisfying the basic needs affect individual's quality of motivation (Reeve, 2010).

According to SDT, people can be motivated autonomously (willingly) where they value the activity or their motivation can be controlled (pressure from self and

outside) by the existence of an external reward or punishment. Therefor action comes from personal commitment or fear and reward. When motivation is autonomous (self-endorsed) people have more confidence, interest, and excitement comparing to people whose motivation is externally controlled. Having autonomous motivation is related to better performance and creativity (Deci & Ryan, 2000, Deci & Vansteenkiste 2004, Kusurkar, Ten Cate, Vos, Westers, & Croiset 2012, Vansteenkiste & Ryan 2013).

Need-supportive and controlling teaching

Teachers motivate students in different ways. Reeve (2010), argued that motivating style of teachers refers to teacher's behavior s/he shows during teaching to engage students in learning activities in order to get positive outcomes (Reeve, 2010).

Through instructional practices teachers can support students' basic psychological needs of competence, relatedness and autonomy. For autonomy support, students' interest is taken into consideration in class, students express their feelings and ideas freely, they are given choices, challenging activities are provided for them and the reasons for participating in the activities are meaningful for them (Jang, Reeve & Deci, 2010). For competence support, well structured environment is set with clear expectations and guidelines as well as informational feedback. For relatedness support, teachers interact with students in a warm manner and shows interest in them. Need supportive teachers identify, nurture and develop students' intrinsic motivation. They listen to the perspectives of the students, welcome their thoughts, feelings, support autonomous self-regulation, give rationale, use informational language, give

students time to work on their own way and be patient with them. Students are more involved in such environments (Reeve, Ryan, Deci & Jang, 2007).

Opposite of need-supportive teaching is controlling teaching. When a teacher adopts controlling instructional practices, the classroom environment is chaotic, teacher isuninvolved; s/he thwarts students' psychological needs. Students become less involved in such environments (Aelterman, Vansteenkiste, Berghe, Meyer & Haerens, 2014). Controlling teachers pressure students to think, feel and behave in a specific way. Controlling teachers want students to adopt their own perspective. The teachers attempt to change the way students think and behave. Teachers pressure students by giving deadlines, directives, do not provide rationale for the classroom activities and they are impatient with students. Students are less engaged and satisfied in such environments (Reeve, Ryan, Deci & Jang, 2007).

Achievement Goals

Students set different types of achievement goals in different activities depending on how they define their competence and whether they tend to approach success or avoid failure (Elliot & McGregor, 2001). Some students feel competent when they meet the requirements of the task (absolute standard). Some other students feel competent when they improve their skills (interpersonal standard) whereas some others when they perform better than others (normative standard) (Elliot & McGregor, 2001) or when they achieve a high grade (Grant & Dweck, 2003). The students, who use absolute or interpersonal standard to define their competence, adopt a mastery goal. That is, they strive to master a task or improve their

understanding and learning. The students, who use normative standard to define their competence, adopt a performance goal whereas the students who aim to achieve high grades endorse an outcome goal.

The above described goals can be further differentiated to approach and avoidance according to students' tendency to approach success or avoid failure (Elliot & McGregor, 2001).

Elliot and Church (1997), proposed to add the avoidance and approach motivation in the achievement goal differentiation. In this framework, initially performance goals were divided in two groups as performance-approach and performance-avoidance and later on mastery goals were also divided in two groups as mastery-approach and mastery-avoidance goals (Elliot & Church, 1997).

Figure 1 shows the achievement goals based on the definition and valence (i.e., positive in terms of approaching success and negative in terms of avoiding failure) of competence.

Definition

		Mastery	Performance
Valance	Approach	Mastery-approach goal	Performance-approach goal
	Avoidance	Mastery-avoidance goal	Performance-avoidance goal

Figure 1. The 2X2 achievement goal framework.

Outcome goals (e.g., getting an A) are neutral regarding the definition of competence as they do not imply that a failure to achieve a positive outcome (e.g., high grade) means low ability. Outcome goals have mostly to do with a causal attribution of success or failure (Grant & Dweck, 2003). They can be close to both performance and mastery goals. As an example, if a student is trying to get an A in class to outperform others (close to performance goal) or trying to get an A to prove learning of the task (mastery goal) will make a difference in terms of where outcome goals belong. Therefore they can be considered as a separate group of achievement goals (Hulleman, Schrager, Bodmann & Harackiewicz, 2010).

Achievement Goal Structures

The types of achievement goals promoted in instructional environments are known as *goal structures* (Ames, 1992; Maehr & Midgley, 1996). Goal structures are the type of goals emphasized in instructional environments such as schools and classrooms by

the learning practices, policies applied, and evaluation procedures used (Wolters, 2004). The type of task provided for students (challenging, creates curiosity, reasons for completing it are meaningful to students), the type of evaluation used (focus on individual's progress, mastery of learning goals), and the amount of autonomy support (choice) provided by the teacher are the factors in learning environments that affects students' goal adoption (Ames & Archer, 1988).

Achievement goal structures studies focused on two type of goal structures; mastery and performance goal structures. "Mastery structures describe an academic context that tends to foster students' adoption of mastery goals." (Wolters & Daugherty, 2007, p. 181) It represents environments where the importance of learning and personal improvement is emphasized; all students are valued and understanding of the learning material is important (Midgley et al., 1998). "Performance structure is a context in which the practices, policies, and procedures foster students' adoption of performance goals." (Wolters & Daugherty, 2007, p. 181) It represents environments where being successful means to be better than others in the classroom and where there are extrinsic rewards for achieving success (Midgley et al., 1998).

Classroom goal structures were found linked with students' motivation (Wolters, 2004) and their achievement in school (Midgley & Urdan, 2001).

Problem

Teachers motivate students in different ways. Motivating style of teachers is the behavior of the teachers during teaching to engage students in learning activities (Aelterman et al., 2014).

Self-determination Theory (Deci & Ryan, 2000) is a framework for teachers' motivating style. Based on Self-determination Theory, need-supportive teacher satisfies students' need for autonomy, relatedness and competence. They create structured, autonomy supportive academic environments and they are warm toward students (Aelterman et al., 2014).

Need supportive motivating style has been related with desired educational outcomes (Vansteenkiste et al., 2009) and students' autonomous motivation (i.e. involvement in schooling to meet personal values or out of interest) (Jang, Reeve & Deci, 2010).

Based on Achievement Goal Perspective (Elliot, 2005), goal structures are the type of achievement goals promoted by the teachers in learning environments and the goal structure perceived by students in educational environments is related to students' adoption of personal achievement goals (Wolters, 2004, Urdan, 2004). Mastery goals structures represent environments where teachers focus on students' learning and improvement (Midgley et al., 1998). Performance goal structures represent environments where teachers focus on students' success comparing to other students in class (Midgley et al., 1998). Students' perception of their learning environment as more mastery structured leads them to adopt mastery goals (Michou, Mouratidis, Lens & Vansteenkiste, 2012) and when they perceive the environment as more performance structured they tend to adopt performance goals (Wolters, 2004).

These two aspects of teachers motivating style –the achievement goals promoted and teacher's need-supportive interpersonal style- are related with the quality of students' motivation (i.e. the achievement goals they endorse and the reasons for doing so) and

the quality of their outcomes at school. However there are no studies to investigate concurrently students' perception about both their teachers' goal structures and their need-supportive style and their relation to students functioning at school (Vansteenkiste et al., 2014). The lack of evidence about the degree of contribution of each of these two aspects of teachers' motivating style to students' motivation and learning outcomes prevents scholars to suggest concrete instructional interventions and curriculum reforms to improve students' learning and well-being. Regarding Turkish education system which emphasizes strongly on students' performance, no research has investigated to what extent Turkish students adopt to a higher degree outcome goals than mastery or performance ones, what are the reasons (autonomous or controlling) that make them to endorse these goals, and what is the relation of such outcome achievement goals and underlying reasons with students' perception of classroom environment and their performance and learning outcomes. In a grade-focused educational environment such as the Turkish one, it is important to have evidence about the role of outcome goals in students' functioning in school.

Purpose

The aim of this study was to investigate the relation of Turkish high school math teachers' perceived motivating style with students' type of achievement goals and the reasons for endorsing them. Also the aim of the study was to investigate the relation of students' type of achievement goals and their underlying reasons with their grade, learning strategies, experience of challenge, and self-handicapping in math. For this reason, the objectives of the present study are twofold:

(a) to investigate the relation of Turkish high school math teachers' perceived motivation style with students' type of achievement goals and the autonomous and controlling reasons for endorsing them and (b) to investigate the relation of students' types of achievement goals and their underlying reasons to their grade, learning strategies, self-handicapping, and experience of challenge in math.

Research Questions

The following questions will guide this research:

1. Are different types of achievement goals and underlying reasons differentially related to students' learning strategies, grades, experience of challenge, and self-handicapping in math?

2. Are these differences in students' motivation related to their perceptions about their math teacher's motivating style?

3. Does students' motivation in math mediate the relation of perceived math teacher's motivating style and learning strategies, grades, experience of challenge, and self-handicapping?

Assumptions

Regarding the relation of students' achievement goals and their underlying reasons to grades, use of effective learning strategies and self-handicapping the hypothesis is that if student works to learn as much as possible (i.e. endorse a mastery goal) and they do so out of their personal values and interests (i.e. for autonomous reasons) then he/she will be more successful in Math with higher grades by using effective

learning strategies and will show less self-handicapping and higher experience of challenge.

Regarding the relation of students' performance or outcomes goals and their underlying reasons to grades, use of effective learning strategies and self-handicapping the hypothesis is that these goals will be positively related to students' grades, effective learning strategies and experience of challenge negatively with self-handicapping only in the case that the underlying reasons of goal pursuit will be autonomous.

Regarding to relation of students' motivation and teachers' perceived motivating style the hypothesis is that teacher's need supportive teaching style and the promotion of mastery-approach goals will motivate students to endorse mastery-approach goals with underlying autonomous reasons. It is also hypothesized that the promotion of any other goal (i.e. performance-approach or outcome) with a need supportive teaching style will be positively related with students' autonomous reasons for endorsing achievement goals as well as with positive outcomes in math.

Significance

This research will depict how math teachers' motivating style covariates with students quality of motivation and their outcomes in math. What is the most optimal motivating style for students optimal functioning in mathematics? This study will provide answers to this question with considerable implications for the related literature and Turkish education. The findings of this study will enhance the knowledge about the concurrent contribution of the two aspects of teachers' motivating style to students' motivation and outcomes and will provide suggestions

for future research. Furthermore, the findings of this study, on the one hand, will guide Turkish math teachers to improve their teaching style and consequently their students' outcomes; on the other hand, will guide policy makers to suggest the adequate curriculum reforms in Turkish education.

Definition of key terms

Achievement goals. Achievement goals are distinguished according to how competence is defined and competence valence. If a student defines competence with task-based or self-based criteria and aims to approach success, she endorses a *mastery-approach goal* (MAp); if a student defines competence with other-based criteria and aims to approach success; she adopts *performance-approach goals* (PAp) (Elliot & McGregor, 2001). If student's aim is to get high score/grades in a task; she adopts *outcome goals* (Grant & Dweck, 2003).

Autonomous versus controlling reasons: There are autonomous and controlling reasons which motivate people to endorse an achievement goal. *Autonomous reasons* mean that a student endorses an achievement goal willingly. The autonomous reasons for endorsing an achievement goal have different subcomponents such as finding the goal enjoyable or interesting and challenging (*intrinsic regulation*), personally meaningful (*identified regulation*), and finding the goal as a part of one's personal values (*integrated regulation*) (Deci & Ryan, 2000). In contrast, c*ontrolling reasons* mean that a student feels pressure from external environments or from himself to pursue a goal. Controlling reasons are composed of two subcomponents, *external* and *interjected regulation*. In external regulation, students endorse an achievement goal just because their parents (or significant others) may reward them

or punish them in case they do not do so. In interjected regulation students endorse an achievement goal to avoid feeling guilty; for this reason they exert a self-imposed pressure on themselves (Deci & Ryan, 2000).

Experience of Challenge in Math: Students' willingness to take on difficult Math tasks (Baker & Wigfield, 1999).

Goal Structures. The type of achievement goals that teachers promote in their classroom (Ames, 1992; Maehr & Midgley, 1996). *Mastery goal structures* represent learning environments where teachers encourage students' strivings for mastery, understanding and self-improvement. *Performance-approach goal structures* reflect a classroom climate where competition among students is highlighted (Midgley et al., 1998).

Learning Strategies: Students' self-generated actions and thoughts that is oriented toward reaching their goals (Hasanbegovic, Zellweger & Metzger, 2006).

Need-supportive teaching style. A *need-supportive teaching style* is characterized by an interpersonal style where the teacher satisfies students' needs for autonomy, competence and relatedness (Deci & Ryan, 2000).

Self-Handicapping: A strategy by which a student avoids effort in order not to harm his/her self-esteem in the case of failure (Elliot & Church, 2003).

CHAPTER 2: REVIEW OF RELATED LITERATURE

Introduction

As it was discussed in Chapter 1 teachers promote different achievement goals in their classroom. Some teachers focus on learning by fostering mastery goals, while some other teachers focus on competition by fostering performance goals. Furthermore, teachers can promote these achievement goals by either supporting students' needs or thwarting them. Teachers' instructional practices related to goal promotion and need support have been related to students' quality of motivation.

The aim of this study was to investigate the relation of Turkish high school math teachers' perceived motivating style with students' type of achievement goals and the reasons for endorsing them. Also the aim of the study was to investigate the relation of students' type of achievement goals and their underlying reasons with their grade, learning strategies, experience of challenge, and self-handicapping in math.

In this chapter research findings related to the aims of the study will be reviewed. Specifically, in the first two sections, it will be reviewed research on the relation of teachers' motivating style to students' quality of motivation, whereas in the following three sections, research on the relation of students' quality of motivation to educational outcomes will be presented.

Achievement goal structures and their relation to achievement goal

Goal structures are the type of achievement goals promoted by the teachers in learning environments. Mastery goals structures are the environments where students' learning is the focus, all students are valued and importance of trying harder is highlighted (Midgley et al., 1998). Performance goal structures are the environments where teachers communicate to students that doing better than others and showing high ability equals to success (Midgley et al., 1998).

Studies show evidence of relation between goal structure perceived by students in educational environments and their adoption of personal achievement goals (Linnenbrink, 2005, Michou et al., 2012, Wolters, 2004). According to a study done in Greece classroom goal structures for mastery (improving and understanding focused) perceived by elementary students were related to adoption of mastery approach goals and competition goal structure was related to performance approach goals (Michou et al., 2012).

When students perceive their learning environment as more mastery structured they tend to adopt mastery goals (Wolters & Daugherty, 2007, Murayama & Elliot, 2009) and when they see the environment as more performance structured they lean toward adopting performance goals (Murayama & Elliot, 2009, Urdan, 2004).

In different studies students' adoption of mastery-approach goals were found related to positive educational outcomes such as intrinsic motivation, achievement, and effective strategy use (Wolters, 2004). They were also found to be related to critical thinking, use of metacognitive strategies and effort regulation for elementary students (Michou et al., 2012) and related to less self-handicapping and more engagement (Wolters, 2004).

When classroom goal structure leads students to adoption of performance-avoidance goals students were reported high self-handicapping but this was not the case when performance-approach goals were adopted (Urdan, 2004). Moreover, self-handicapping was related to less academic success (Urdan, 2004). Adoptions of performance-approach goals have been also related to more help seeking by students (Linnenbrink, 2005) compared to the case that both mastery and performance-approach goals were adopted. Promotion of performance-approach goals in the classroom related negatively to intrinsic motivation, self-concept (Murayama & Elliot, 2009) and engagement in class (Wolters, 2004).

A study also showed that elementary classes were more mastery goal oriented and less performance-approach goal oriented comparing to middle and high school classes because teachers' instructional practices in elementary were focusing on learning the material and in middle and high school focus was on outperforming others (Wolters & Daugherty, 2007).

Need-supportive environment and its relation to student motivation

Teachers' motivating style refers to teacher behavior during teaching to engage students in learning activities (Aelterman et al., 2014). According to Self-determination theory (SDT; Deci & Ryan, 2000) teachers could develop a motivating style that supports students' basic psychological needs of autonomy, relatedness and competence. Need-supportive teachers have well-structured, consistent, predictable classrooms with clear rules and expectations (competence); they are warm toward students and they show personal interest in them (relatedness). They take students' interest into consideration. Students are free to express their feelings and ideas. They are given choices and challenging activities are provided for them. Teachers give rationale and explain the importance of the learning activities for the students (autonomy support).

A study showed that teachers find need-supportive environments more effective (Aelterman et al., 2014). Another study also showed that when structure is combined with autonomy support optimal learning environment can be achieved (Jang, Reeve & Deci, 2010). Autonomy support (Hein & Caune, 2014; Shen, McCaughtry, Martin & Fahlman, 2009) and relatedness, emotionally supportive teaching environment, (Skaalvik & Skaalvik, 2013) were found positively related to students' autonomous motivation (Bieg, Backes & Mittag, 2011; Black & Deci, 2000; Joesaar, Hein & Hagger, 2012; Standage, Duda & Pensgaard, 2005).Students who reported high level of autonomy support from their teachers had higher scores in intrinsic motivation (Beaten, Dochy & Struyven, 2013; Furtak & Kunter, 2012) and when perceived autonomy support, relatedness and competence were measured all three dimensions of need-supportive environment were found to be associated with more autonomous

motivation of students (Stroet, Opdenakker & Minnaert, 2013). This was supported with an experimental study done with 100 French students and results indicated that high autonomy-supportive environments lead to self-determined motivation (Amoura, Bergot, Gillet, Caruana & Finez, 2015).

Opposite to need-supportive environment is the need-thwarting environment. This environment can be chaotic or highly structured by the teacher without permitting students to make choices and take initiations; teacher is not involved in students' interest and does not support their basic psychological needs. In such controlling environment, students feel pressured. The pressure can be from outside (giving students deadlines, punishments, rewards, using a controlling language) or inside (making students feel guilty, ashamed and withdrawing love). Controlling environment thwarts students' need for autonomy, relatedness and competence and undermines their autonomous motivation (Deci & Ryan, 2000; Reeve, 2010).

The relation of autonomous and controlled motivation to educational outcomes

Even that curiosity is a core characteristic of human's nature (Deci & Ryan, 2000), people are not always curious to explore new experiences and promote their growth. Students stare at books, adults spend their time just watching television all day. Research has been done to understand what fosters or undermines optimal functioning, well-being and performance.

According to self-determination theory people are motivated by different factors. Students can be motivated to participate in a class activity because they are interested in the subject, or alternatively, because they want to prove themselves, or they want to meet the expectations of others. One of these motives can be more dominant than the others. Having high level of motivation does not necessarily relate to most desirable educational outcomes. Quality of the motivation is also important. Therefore motivation can be autonomous in nature or controlled (Deci & Ryan, 2000). Autonomous motivation has two subcomponents; intrinsic (participating in learning activities for enjoyment and self-interest) and identified motivation (finding learning activities personally important).

According to various studies autonomous motivation positively relates to many desirable learning outcomes such as effective strategy use (Kusurkar, Galindo-Garre & Ten Cate, 2013), higher academic achievement (Black & Deci, 2000; Kusurkar et al., 2013; Shen, McCaughtry, Martin & Fahlman, 2009), effort regulation (Hein & Caune, 2014; Standage, Duda & Pensgaard, 2005), determination (Black & Deci, 2000; Kusurkar et al., 2013; Moller, Deci & Ryan, 2006; Vansteenkiste et al., 2009), better performance (Deci & Ryan, 2000; Moller, Deci & Ryan, 2006), enjoyment of the class, lower anxiety (Black & Deci, 2000), higher self-esteem (Hein & Caune, 2014), and well-being (Deci & Ryan, 2000). Alternatively, Vansteenkiste et al. (2009) found in sample of Belgian students that those with high autonomous motivation and low controlled motivation exhibited better cognitive, meta-cognitive and effort regulation, and academic performance as well as less test anxiety, procrastination and cheating compared to students with high (or low) both autonomous and controlled motivation. These findings support the superiority of a good quality of motivation (i.e., high autonomous and low controlled motivation)

over the quantity of motivation (i.e., high both autonomous and controlled motivation) in terms of producing positive educational outcomes.

Controlled motivation has two subcomponents as well; external regulation (studying to get rewards or avoid punishment) and introjected regulation (pressuring self to avoid guilt). According to studies controlled motivation is related to undesirable educational outcomes such as less engagement in class, ineffective time management, cheating, poor regulation of study activities, lower grades (Vansteenkiste et al., 2009), less use of effective learning strategies, more drop outs (Kusurkar et al., 2013), less enjoyment in class (Black & Deci, 2000), high test anxiety (Black & Deci, 2000; Vansteenkiste et al., 2009).

The relation of achievement goals to educational outcomes

In the original conceptualization achievement goals were separated as mastery (learning) and performance (normative) goals based on the definition of competence. Mastery (learning) goals focus on developing competence by mastering the task. Performance goals focus on showing competence by outperforming others. Mastery and performance goals were also grouped to approach (focus on success) and avoidance (focus on avoiding failure) based on the valence of competence. This way, four types of achievement goals have been defined: mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goals (Elliot & McGregor, 2001). Dweck and Grant (2003) suggested that next to these widely investigated achievement goals, the outcome goals (getting an A in class) can form a separate category. The outcome goals can be related to both mastery (wanting to get

an A as a positive feedback of learning) and performance (wanting to get an A to perform better than others) goals.

In the present study the focus is on mastery-approach, performance-approach and outcome goals in attempt to investigate these less studied outcome goals and their relation to educational environment and outcomes while comparing their correlates with those of the adaptive mastery-approach goals and the less adaptive performance-approach goals. In this section of the chapter previous studies will be presented regarding the educational correlates of these three achievement goals (i.e., mastery-approach, performance-approach and outcome) investigated in the present study.

Effects of mastery-approach goals on educational outcomes are generally consistent among studies. Studies found mastery-approach goals related to intrinsic motivation (Elliot, Murayama & Pekrun, 2011; Grant & Dweck, 2003) as well as better learning strategies (Elliot & McGregor, 2001; Grant & Dweck, 2003; Michou et al., 2012). Study with 189 elementary students from Greece found a relationship between mastery-approach goals and critical thinking, metacognitive strategies, and effort regulation (Michou et al., 2012). In another study need for achievement, classroom engagement and self-determination were positive predictors of mastery-approach goals. Mastery-approach goals were also found related to deep processing study strategies (Elliot & McGregor, 2001) and better performance in achievement situations (Elliot & McGregor, 2001; Elliot, Murayama & Pekrun, 2011; Grant & Dweck, 2003; Michou et al., 2012).Grant and Dweck's (2003) study supported the

above reported findings providing also evidence for the positive effects of mastery goals on educational outcomes. Specifically, data collected from Columbia University Chemistry department at different times of a course showed that grades were improved from first exam to final exam when mastery goals were adopted. Mastery goals also predicted planning, and active coping (Grant & Dweck, 2003). Elliot, Murayama and Pekrun's (2011) study showed that mastery-approach goals were positive predictor of learning efficacy (understanding difficult topics) and absorption in class (Elliot, Murayama & Pekrun, 2011). Effects of mastery goals on outcomes were also examined in sports and had similar outcomes. A study from Belgium with 67 volleyball players resulted with more prosaically behavior toward teammates during games, more enjoyment, and more satisfaction of their performance when mastery-approach goals were pursued comparing to any other goals (Vansteenkiste, Mouratidis, Riet & Lens, 2014). On the other hand, adoption of performance-approach goals was related to both positive and negative educational outcomes in different studies.

Hulleman, Schranger, Bodmann and Harackiewicz (2010) reviewed in a meta-analysis, 243 studies to understand the different results for performance-approach goals and see if the researchers were using different labels for same constructs or labeling different constructs the same way. Results showed that they were using the same labeling for different constructs. Performance-approach goals predicted positive outcomes in some researches that normatively referenced performance-approach items (Achievement Goal Questionnaire) were used to assess this type of achievement goals while opposite results were found in researches that used more appearance-relevant items (PALS) (Hulleman, et al., 2010).

The different results for performance-approach goals seem to be the result of how performance goals were defined. Some research showed performance-approach goals linked to success (Barron & Harackiewicz, 2001; Elliot & Church, 1997) but whether or not it links to long term learning or better strategy use is not answered. Success can be in memorizing type of task and multiple-choice questions but not in higher level thinking task (Garcia & Pintrich, 1994). Performance-approach goals were also found positively related to effort (Elliot & McGregor, 1999) and strategy use (Wolters, Yu & Pintrich, 1996) in some studies.

People not always choose one goal or another. Goals can be combined as well (Midgley, Kaplan & Middleton, 2001). Combination of different achievement goals showed different results. In Elliot and Church's (1997) study when two goals were combined but performance-approach goal was stronger than mastery goal, students' grades were higher. Oppositely when goals were combined but mastery-approach goal was stronger than the performance-approach goal intrinsic motivation was higher (Elliot & Church, 1997).

Negative outcomes of performance-approach goals were less self-worth, less intrinsic motivation (Elliot & McGregor, 2001; Grant & Dweck, 2003), worry about success that creates psychical illness (Elliot & McGregor, 2001; Linnenbrink, 2005), surface processing study strategies, low self-determination, disorganization, low class engagement, and poor achievement (Elliot & McGregor, 2001). In Grant and Dweck's (2003) study with 92 participants from Columbia University, performance-

approach goals predicted helplessness. Performance-approach goals also predicted poor performance when setbacks were repeated. Urdan's (2004) study with high school students in North California revealed that self-handicapping (lack of behavior before or during an activity and using it as an excuse in the case of failure) was predicted by performance-approach goals as a negative outcome that decreased the academic success. Lower performance as a negative outcome was also found as a result of performance-approach goals in a study with 5th and 6th grade students in United States (Linnenbrink, 2005).

Outcome goals even that have been disregarded in research, just like the performance-approach goals were found to be related to both positive and negative educational outcomes. In Grant and Dweck's (2003) study, outcome goals were positively related with help-seeking as a positive coping strategy in adverse situations but they were also related with less intrinsic motivation. Outcome goals predicted surface processing of course material (Grant & Dweck, 2003).

These different results of the studies show that further investigation is needed for the correlates of performance-approach and outcome goals. Moreover, further research is needed about the ecological validity of performance-approach goals when outcome goals are also suggested to survey participants (Brophy, 2005). In most of the studies, mastery-approach goals were scored higher compared to performance-approach goals and the question is whether mastery-approach goals will be preferred when outcome goals are also assessed.

The relation of achievement goals and their underlying reasons to educational outcomes

The literature review above showed that superiority of autonomous motivation from the SDT perspective and the mastery-approach goals from the achievement goal perspective in the prediction of positive educational outcomes. In addition, the literature review showed the ambiguous role of performance-approach goals in the prediction of positive or negative educational outcomes. Recently, research on student motivation suggested that a broader understanding for achievement motivation will occur if the two motivational perspectives of SDT and achievement goal will combine. The argument of this line of research is that the same achievement goal can be adopted by different people for different underlying reasons. For example an athlete may try to shoot more baskets in a game to outperform others (performance-approach goal) because this is challenging for him/her (autonomous reason) while another athlete may endorse the very same achievement goal because s/he wants approval from the coach. Different underlying reasons (i.e., autonomous or controlling) for the same achievement goal may result in different outcomes as well.

In a sample Israeli students from grades 7 and 8, Benita, Roth and Deci, (2013) found that mastery-approach goals predicted student interest and engagement when high level of sense or choice were also reported. This finding implies that a sense of autonomy when combined with mastery-goals can lead to positive outcomes (Benita, Roth & Deci, 2013). This implication was tested by Michou, Vansteenkiste, Mouratidis and Lens (2014) who found that mastery-approach goals and autonomous underlying reasons were positively related to need for achievement and effective

learning strategies, while they were negatively related to cheating. Controlling reasons for mastery-approach goals were positively related to fear of failure and negatively related to effort regulation (Michou et al., 2014).

According to Hulleman et al.'s (2010) meta-analysis, performance-approach goals were constantly related to performance while mastery-approach goals were related to interest and satisfaction. Gaudreau (2012) tested in Canadian undergraduate students whether the above finding in Hulleman et al.'s (2010) meta-analysis is the result of the reason underlying the adoption of achievement goals. According to Gaudreau 's (2012) results when mastery-approach goals were adopted for autonomous reasons, students reported more interest and higher performance than when mastery-approach goals were adopted for less autonomous reasons. More interestingly, only when performance-approach goals were adopted for autonomous reasons a positive and strong relationship with academic performance was observed. When the performance-approach goals were adopted for less autonomous reasons anxiety and less satisfaction was observed (Gaudreau, 2012). Taking these findings together, it seems that the autonomous reasons underlying the endorsement of either mastery-approach or performance-approach goals were related to both interest and performance showing that the underlying reasons could make the difference over and above the achievement goals in the prediction of interest and performance.

This in consistent with Vansteenkiste et al. (2010) who found that autonomous reasons underlying performance-approach goals were positively related to cognitive (information processing) and meta-cognitive (time management and concentration)

processing, engagement and adaptive perfectionism and negatively to cheating over and above the performance-approach goal. Controlled regulation of the same goal was negatively related to concentration but positively related to anxiety and maladaptive perfectionism. An interesting result was that test anxiety and cheating behavior was related also to performance-approach goals showing that for some negative outcomes performance-approach goals can be also considered as predictors while the consideration of the underlying reasons revealed meaningful and illuminated for understanding achievement motivation.

Conclusion of the literature review related to the research questions

According to the literature review teacher's motivating style (satisfying the needs for autonomy, competence and relatedness) is related to students' autonomous motivation and the need-thwarting environment is related to controlled motivation. Autonomous motivation leads to more desirable outcomes (achievement, effort regulation, and effective learning strategy use) and controlled motivation leads to less desired outcomes (less use of effective learning strategies, cheating etc.).

Teachers' goal structures emphasized in class are related to students' adoption of personal achievement goals. Mastery goal structures related to adoption of mastery-approach goals and performance goal structures related to performance-approach goal adoption. There is no research on the relation of teachers' goal structures to students' outcome goals, a type of performance goals that focus on performance but not on competition. Students' personal goal adoption is also related to educational outcomes. Spesifically, mastery-approach goals are found related to more desirable outcomes but performance –approach goals are related to both positive and negative

outcomes in different studies. Outcome goals and their relation to educational outcomes have not been studied as much. Also both these aspects of teachers' instructional behavior (i.e., teacher motivating style and teachers' goal structures) have not been investigated together in relation to student quality of motivation.

CHAPTER 3: METHOD

Introduction

The aim of this study was to investigate the relation of Turkish high school math teachers' perceived motivating style with students' type of achievement goals and the reasons for endorsing them. Also the aim of the study was to investigate the relation of students' type of achievement goals and their underlying reasons with their grade, learning strategies, experience of challenge, and self-handicapping in math. For this reason, the researcher used a cross-sectional design with a survey method.

Research design

Correlational research with a cross-sectional design

Correlational research aims to find the degree of possible relationship between two or more quantitative variables with no manipulation of the variables by using correlation coefficient (r). Correlational research has to be followed by experimental study to determine the cause-effect relationship because correlational studies do not suggest the cause. Correlation found between variables can be either positive (high scores on one variable associated with high scores on another variable or low scores on one variable associated with low scores on another variable) or negative (high scores on one variable associated with low scores on another variable) (Wallen & Fraenkel, 2011).

A cross-sectional study is one type of study in which data is collected at one time from a sample that was predetermined (Wallen & Fraenkel, 2011).

Cross-sectional design was selected to measure differences between grade levels at one point of a time instead of collecting data every year from the same group of students. The research design was most suited in this research to be able to complete the research and have the results in a shorter time period.

Cross-sectional survey was conducted to assess students' motivation in their Mathematics class. Specifically, students reported their Mathematics teacher's perceived motivating style, achievement goals they adopt in their Mathematics class and the autonomous or controlling reasons for endorsing these goals as well as their learning strategies, self-handicapping strategies, experience of challenge, and grades in math.

Context

This study was conducted within a non-profit private international school in the eastern part of Turkey. The sample for the study came from high school students from preparatory English year 9^{th}, 10^{th}, 11^{th} and 12^{th} grade. In this program, students in preparatory level (focus is mainly on learning English) all take the same Mathematics class. The school follows the IGCSE (International General Certificate of Secondary Education) program for grades 9 and 10. Students choose from additional (more difficult content comparing to international level) and international Mathematics classes based on their skills in Mathematics. In grades 11 and 12, International Baccalaureate Program (IB) is followed. This program prepares students for success at university and students have to choose one subject out of five

groups that includes Mathematics. At least three subjects need to be higher level and the remaining subjects are standard level. Standard level Mathematics (SL) introduces the important concepts to students and does not go in depth as high level Mathematics does. Students who want to study high degree of mathematical content with broad range of topics in depth choose the high level (HL) course.

Majority of the students who are part of this study are on 100% scholarship. Students earn their scholarship after an entrance test to be accepted for the preparatory year and based on their middle school GPA. For this reason students' performance is high in the school.

There is variety of socio-economic levels since earning a scholarship is not related to students' socio-economic levels.

Participants

In this study, 180 students from a private non-profit school in the eastern part of Turkey were volunteer participants. Participants came from the preparatory level (*N* = 41), grade 9 and 10 (*N* = 90; 61 (44.2%) additional Matehematics students and 29 (16.1% international Mathematics students) as well as grade 11 and grade 12 (*N* = 49; 12 (8.7%) high level Mathematics students and 36 (26.1%) standard level Mathematics students). Of the participants, 102 (56.7%) were females and 78 (43.3%) were males. The mean age of the students was *M*age= 16.01 (*SD*= 1.44) years. Majority of the students, 149 (82.8%) were on 100% scholarship with 29 (16.1%) students who does not have full scholarship or has no scholarship. Two students (1.1%) did not report their scholarship status.

Instrumentation

The instruments used in this study were taken translated in Turkish from other studies carried out in Turkey that had validated them. Specific permission from the researchers who had validated them had been asked.The questionnaires were administrated in Turkish.

Specifically, in the present study the following variables were assessed.

Survey instruments

Scales used in this study were taken from other research that has developed reliable and valid instruments.

To assess following variables different scales were used in this study.

Perceived autonomy support from Math teacher

Perceived structure of Math teacher

Perceived involvement

Perceived goal structures

Achievement goals

Reasons underlying the pursuit of achievement goals

Learning strategies

Academic self-handicapping strategies

Experience of challenge in Math

Performance in Math

Perceived autonomy support from Math teacher

Autonomy support students perceived form their Mathematics teacher was assessed with six items from Percieved Autonomy Support Questionnaire (Williams & Deci, 1996; Turkish translation and validation retrived from 114K815 project funded by TUBITAK after the permission of the principal investigator) (see Appendix, pages 85, 86, 93, 94) Participants responded to 5-point Likert-type scale ranging from *Strongly disagree* (1) to *Strongly agree* (5) to what extend they perceive autonomy support from their Mathematics teacher (e.g., I feel that my teacher provides me choices and options). The internal consistency of the perceived autonomy support represented by Cronbach alpha was $a = .79$.

Perceived structure of Math teacher

The structure that students perceived from their Math teacher was assessed with the Perceived Structure Questionnaire (Skinner & Belmont, 1993; Turkish translation and validation retrived from 114K815 project funded by TUBITAK after the permission of the principal investigator). This questionnaire consists of four subscales related to teachers' predictability and contingency, expectations, provision of help and support as well as teachers' adjustment of teaching methods. The original scale included six items for contingency and five items each of the following: expectations, help/support and adjustment/monitoring. However in the present study the reverse items of each subscale were not used after the request of the Turkish Ministry of Education to not include negatively worded items (e.g., My teacher doesn't check to see if I understand before he/she goes on). Participants responded to 5-point Likert-type scale ranging from *Strongly disagree* (1) to *Strongly agree* (5)

their perception about their Mathematics teacher's contingency (3 items; e.g., When I do something right, my teacher always lets me know), expectations (3 items; e.g., My teacher makes it clear what he/she expects of me in school), help/support (3 items; e.g., My teacher shows me how to solve problems for myself), and adjustment/monitoring (3 items; e.g., My teacher makes sure I understand before he/she goes on) (see Appendix, pages 85, 86, 93, 94, 95). The internal consistency of the perceived structure represented by Cronbach alpha was a = .85.

Perceived involvement of Math teacher

The Perceived Involvement Questionnaire (Skinner & Belmont, 1993; Turkish translation and validation retrived from 114K815 project funded by TUBITAK after the permission of the principal investigator) was used to assess student perception about their Mathematics teacher's involvement. This questionnaire consists of four subscales related to teacher's affection (e.g., liking the student), attunement (e.g., understanding the student), dedication of resources and dependability (i.e., availability). The original scale of involvement included three items for affection and attunement and six items for dependability. However because of Turkish Ministry of Education request, the negatively worded items excluded from the present study (e.g., I can't depend on my teacher for important things). Participants responded to 5-point Likert-type scale ranging from *Strongly disagree* (1) to *Strongly agree* (5) about their perception for their Mathematics teacher's affection (2 items; e.g., My teacher likes me), attunement (2 items; e.g., My teacher knows a lot about me), dedication of resources (2 items; e.g., My teacher spends time with me), and dependability (3 items; e.g., My teacher is always there for me) (see Appendix, pages

86, 87, 93, 94, 95). The internal consistency of the perceived involvement represented by Cronbach alpha was *a* = .89.

Perceived goal structures

This questionnaire consist two subscales; mastery and performance goal structures with four items in mastery goal structure scale and three items in performance goal structure scale.

Achievement goal structures perceived by students in their Mathematics class were assessed with the Patterns of Adaptive Learning Strategies scale (PALS; Midgley et al., 2000; Turkish translation and validation retrived from 114K815 project funded by TUBITAK after the permission of the principal investigator) (see Appendix, pages 87, 95). Participants responded to 5-point Likert-type scale ranging from *Strongly disagree* (1) to *Strongly agree* (5) to what extend they perceive mastery goal structures (4 items; e.g., In this class, it's important to understand the work, not just memorize) and performance goal structures (3 items; e.g., in this class, students want to do better than other students) in their Mathematics class. The internal consistency of the mastery goal structures represented by Cronbach alpha was *a* = .28 respectively. Because of the very low Cronbach alpha not being improved for the mastery goal structures even after any items deleted, this subscale was not kept for further analysis. The internal consistency of the performance goal structures represented by Cronbach alpha was *a* = .53 respectively.

Achievement goals

To assess students' most important achievement goal in Math, one item from the Revised Achievement Goal Questionnaire (Elliot & Murayama, 2008; Turkish translation and validation retrived from 114K815 project funded by TUBITAK after the permission of the principal investigator) was selected for the mastery-approach goal (i.e., In Math class my most important goal is to completely master the material presented) and one item for the performance-approach goal (i.e., In Math class my most important goal is to perform better than the other students), while an item for outcome goal was constructed by the researcher of the present study (i.e., In Math class my most important goal is to have high grades) (see Appendix, pages 88, 96). The participants selected among these three goals their most important endorsed goal and they reported the autonomous or controlling reasons for pursuing this goal (see below).

Reasons underlying the pursuit of achievement goals

To determine whether students endorsed their most important achievement goal for autonomous or controlling reasons, three and four items respectively were selected from the Treatment Self-Regulation Questionnaire (TSRQ; Levesque et al., 2007; Turkish translation and validation retrived from 114K815 project funded by TUBITAK after the permission of the principal investigator) and revised sport motivation scale (SMS-II; Pelletier, Rocchi, Vallerand, Deci, & Ryan, 2013; Turkish translation and validation retrived from 114K815 project funded by TUBITAK after the permission of the principal investigator) were used (see for a similar approach Vasteenkiste, Mouratidis & Lens, 2010). After students selecting their most important achievement goal in Math, they reported in a 5-point Likert-type scale

ranging from *Strongly disagree* (1) to *Strongly agree* (5) their *controlling underlying reasons* (4 items; e.g., because people around me reward me when I endorse this goal) their *autonomous underlying reasons* (3 items; e.g., because I have chosen this goal as a way to develop myself). The internal consistency of the controlling and autonomous reasons represented by Cronbach alpha was $a = .57$ and $a = .49$ respectively. Because of the very low Cronbach alpha for the autonomous reasons, the sample was scrutinized for outliers. Specifically, 13 students, who scored 5 in two out of the three autonomous reasons items and 1 or 2 in the third one, were excluded from the analysis. After this modification, the internal consistency of the controlling and autonomous reasons represented by Cronbach alpha became $a = .58$ and $a = .61$ respectively.

Learning strategies

A part of the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia, & McKeachie, 1993; Karadeniz et al., 2008 for the validation in Turkish) was used to assess students' critical thinking (5 items; e.g., I treat the course material as a starting point and try to develop my own ideas about it), metacognitive self-regulation (5 items; e.g., When I become confused about something I'm reading for this class, I go back and try to figure it out) and effort regulation (4 items; e.g., I work hard to do well in this class even if I don't like what we are doing) (see Appendix , pages 89, 90, 97). Participants responded to 5-point Likert-type scale ranging from *Strongly disagree* (1) to *Strongly agree* (5) to what extend they use the above learning strategies in Math. The internal consistency of the learning strategies represented by Cronbach alpha was $a = .72$.

Academic self-handicapping strategies

Academic self-handicapping strategies adopted by students in Math class were assessed with six items from the Patterns of Adaptive Learning Strategies scale (PALS; Midgley et al., 2000; Turkish translation and validation retrived from 114K815 project funded by TUBITAK after the permission of the principal investigator) (see Appendix, pages 91, 92, 98, 99). Participants responded to 5-point Likert-type scale ranging from *Strongly disagree* (1) to *Strongly agree* (5) to what extend they adopt self-handicapping strategies in Math class. An adaption of original items was made by avoiding to ask students if they use the assessed strategies as an excuse for their poor outcomes (e.g., "Some students fool around the night before a test. Then if they don't do well, they can say that is the reason. How true is this of you?" was transformed to the following one "Some students fool around the night before a test. How true is this of you?"). The internal consistency of the academic self-handicapping represented by Cronbach alpha was a = .42 respectively. Because of the very low Cronbach alpha not being improved for the academic self-handicapping even after any items deleted, this subscale was not kept for further analysis.

Experience of Challenge in Math

The challenge students experience in Math was assessed with five items from the Motivation for Reading Questionnaire (Baker & Wigfield, 1999; Turkish translation and validation retrived from 114K815 project funded by TUBITAK after the permission of the principal investigator) which were adopted to Mathematics (see Appendix, pages 91, 92, 98, 99). Participants responded to 5-point Likert-type scale

ranging from *Strongly disagree* (1) to *Strongly agree* (5) to what extend they experience challenge in Mathematics (5 items; e.g., I like hard, challenging problems). The internal consistency of the experience of challenge represented by Cronbach alpha was $a = .75$.

Performance in Math

Students reported their average of first two exam grades in Math from the first academic semester.

Method of data collection

In the beginning of 2015-16 academic year necessary documents for permission from the Turkish Ministry of Education was prepared and submitted (see Appendix, page 104). After their feedback on not using negatively worded items on certain scales changes were made on the survey instruments by the researcher before it was applied in the school. Preparatory year, grade 9, 10, 11 and 12 students from a school in the eastern party of Turkey and their parents were informed about the purpose of the study. Parents signed consent for their child's participation (see Appendix, pages 100, 101, 102, 103). Students filled out the questionnaires voluntary and anonymously. The questionnaires were used to collect data about teachers' perceived motivating style (autonomy, competence and relatedness support as well as achievement goal promotion), students' learning strategies and achievement goal types with the underlying reasons. Self-handicapping and experience of challenge in Math were also measured. Data was collected in December towards the end of the first academic semester and students' average grade in Math was also reported.

Method of data analysis

The quantitative data was analyzed using SPSS 19 in order to investigate the hypothesized relationships between the assessed variables. The analysis started with the inspection of the descriptive statistics of the variables and the bivariate correlations among them, as well as a MANOVA checking for gender differences. The main analysis included a series of hierarchical regression analysis to investigate whether teachers' perceived motivating style predict students' achievement goals and their underlying reasons in Math and whether students' motivation (i.e., their endorsed achievement goal and the underlying reasons) predict students' grades, learning strategies, experience of challenge and self-handicapping in Math.

CHAPTER 4: RESULTS

Introduction

The purpose of the present study was to investigate the relation of Turkish high school Math teachers' perceived motivating style with students' type of achievement goals and the reasons for endorsing them. The study also aimed to investigate the relation of students' type of achievement goals and their underlying reasons with their grades, learning strategies, self-handicapping, and experience of challenge in Math. However, as it has been referred to in chapter 3, the self-handicapping instrument did not present acceptable internal consistency and this educational outcome excluded from the analysis. Descriptive statistics of the measured variables and the bivariate correlations among them were presented below in the preliminary analysis of the study. MANOVA was also conducted to report gender differences in the studied variables.

The main analysis examined first whether students with different achievement goal in math differed in the studied variables. A MANOVA was performed to check for differences in the measured variables according to students' most important achievement goal in math. The main analysis examined also whether math teachers' perceived motivating style predicted students' achievement goals and their underlying reasons in math and whether students' motivation (i.e., their endorsed achievement goal and underlying reasons) predicted their grades, learning strategies, and experience of challenge in math. To analyze the relation of teachers' perceived motivating style with students' achievement goals and their underlying reasons

hierarchical regression analysis was conducted. Hierarchical regression analysis was also conducted to investigate if students' motivation predicted their grades, learning strategies, and the experience of challenge in Math.

Preliminary analysis

Descriptive statistics of the variables are presented in Table 1. Results came from all participants after subtracting 13 outliers (see chapter 3, p.34). Also the math scores were not reported by 7 students among 167 who remained in the used sample.

Table 1
Descriptive statistics of studied variables

	N	*M*	*SD*
Teacher motivating style			
1.Autonomy support	167	4.03	.73
2.Provosion of structure	167	4.26	.54
3.Involvement	167	3.97	.70
4.Perf-app goal structures	167	3.59	.84
Reasons for AGs of the math class			
5.Controlling	167	3.51	.82
6. Autonomous	167	4.39	.62
Educational outcomes			
7.Learning strategies	167	3.75	.51
8.Experience of challenge	167	3.49	.91
9.Score	160	75.88	11.97

Note. *N* = Number of participants for corresponding variable; *M* = Mean; *SD* = Standard Deviation.

In Table 2 the bivariate correlations among the studied variables were presented. As it can be noticed in Table 2, regarding the teacher's motivating style, perceived

autonomy support, perceived structure and perceived involvement of the teacher were strongly and positively intercorrelated (r = .77 to .79, p < .01). Perceived autonomy support of the teacher was also positively associated with the autonomous (r = .16, p < .05) and controlling (r = .20, p < .05) underlying reasons of the students' endorsed achievement goal as well as with student's Math score (r = .22, p < .01) and the use of effective learning strategies in Math (r = .32, p < .01).

Perceived structure from the teacher was positively correlated with student's controlling reasons (r = .21, p < .01), Math score (r = .16, p < .05) and the use of effective learning strategies in math (r = .35, p < .01). Perceived involvement of the teacher was positively correlated with both autonomous (r = .16, p < .05) and controlling (r = .23, p < .01) reasons behind achievement goal and the use of effective learning strategies in math (r = .24, p < .01). Finally, performance-approach goal structures and controlling reasons underlying the achievement goals were positively correlated (r = .28, p < .01) whereas performance-approach goal structures and experience of challenge in math were negatively correlated (r = -.15, p < .05).

As it concerns students' motivation, controlling reasons underlying the most important achievement goal in math were negatively correlated with the experience of challenge in math (r = -.28, p < .01).

Autonomous reasons underlying the achievement goal in math were positively correlated with the educational outcomes. Specifically, autonomous reasons were positively correlated with the use of effective learning strategies in math ($r = .47$, $p < .01$), experience of challenge in math ($r = .26$, $p < .01$), and the math score ($r = .20$, $p < .05$). Regarding the correlations among the educational outcomes, experience of challenge in math and student math scores were positively correlated ($r = .27$, $p < .01$). The use of effective learning strategies and experience of challenge ($r = .31$, $p < .01$) as well as student scores ($r = .35$, $p < .01$) were also positively and strongly correlated.

Table 2

Bivariate correlations of studied variables

	1	2	3	4	5	6	7	8	9	10
Background variable										
1.Gender	-									
Teacher motivating style										
2.Autonomy support	-.20**	-								
3.Provision of structure	-.18*	.77**	-							
4.Involvement	-.19*	.79**	.77**	-						
5. Perf-app goal structures	.06	-.13	-.08	-.10	-					
Reasons for AGs of the Math class										
6. Controlling	-.08	.20*	.21**	.23**	.28**	-				
7.Autonomous	-.12	.16*	.13	.16*	-.03	.09	-			
Educational outcomes										
8. Learning strategies	-.07	.32**	.35**	.24**	.04	.15	.47**	-		
9. Experience of challenge	.00	-.01	-.04	-.09	-.15*	-.28**	.26**	.31**	-	
10.Score	-.23**	.22**	.16*	.14	-.05	-.02	.20*	.35**	.27**	-

Note. *p< .05. **p< .01. Perf-app= Performance-approach structures

Gender was dummy-coded (1 = females; 2 = males)

Gender was positively correlated with perceived autonomy support from the teacher (r = .20, p < .01) however negatively correlated with structure (r = -.18, p < .05), involvement (r = -.19, p < .05) and student math scores (r = -.23, p < .01).

A multivariate analysis of variance (MANOVA) showed significant gender differences in the sample (Wilk's Λ = .894, F [9, 150] = 1.976, p < .05, multivariate η^2 = .11). A follow-up analysis of variance (ANOVA) with Bonferroni correction showed that females scored higher than males in perceived autonomy support of the teacher F (1, 158) = 6,585, p < .05, η^2 = .04 (M_{female} = 4.16, SD = 0.65 vs. M_{male} = 3.87, SD = 0.77), perceived structure of the teacher F (1, 158) = 5,338, p < .05, η^2 = .03 (M_{female} = 4.34, SD = 0.54 vs. M_{male} = 4.14, SD = 0.54), perceived involvement of the teacher F (1, 158) = 7,004, p < .05, η^2 = .04 (M_{female} = 4.10, SD = 0.67 vs. M_{male} = 3.80, SD = 0.72), and score in math F (1, 158) = 8,757, p < .01, η^2 = .05 (M_{female} = 78.18, SD = 11.08 vs. M_{male} = 72.62, SD = 12.50). Therefore, gender was included as a covariate in the subsequent analysis of the study.

Main analysis

Difference between students who endorsed mastery-approach and outcome goals

A multivariate analysis of variance (MANOVA) showed significant differences for students who endorsed different achievement goals in the sample (Wilk's Λ = .804, F [8, 152] = 4.634, p < .05, multivariate η^2 = .20). Specifically, the comparison was made between students who selected the mastery-approach goal (N = 123) and those who selected the outcome goal (N = 49) as their most important achievement goal in

Math. Students who selected the performance-approach goal were not included in the analysis because of their limited number (N = 8).

A follow-up analysis of variance (ANOVA) with Bonferroni correction showed that the students who selected the outcome goal had higher score than the students who selected the mastery-approach goal in the perceived performance-approach goal structures F (1, 159) = 5,812, $p < .05$, $\eta^2 = .04$ ($M_{outcome}$ = 3.84, SD = 0.80 vs. $M_{mastery\text{-}approach}$ = 3.48, SD = 0.85) and controlling underlying reasons F (1, 159) = 7,301, $p < .05$, $\eta^2 = .04$ ($M_{outcome}$ = 3.77, SD = 0.81 vs. $M_{mastery\text{-}approach}$ = 3.39, SD = 0.81). However the students who selected the mastery-approach goal had higher score than those who selected the outcome goal in autonomous underlying reasons for endorsing the goal F (1, 159) = 13,720, $p < .05$, $\eta^2 = .08$ ($M_{mastery\text{-}approach}$ = 4.50, SD = 0.51 vs. $M_{outcome}$ = 4.11, SD = 0.79). As differences were found between students who selected a mastery-approach and an outcome goal as their most important achievement goal in Math, the analysis continued separately for these two groups of students.

Predictors of students' motivation and educational outcomes when mastery-approach goal was endorsed

Having checked the bivariate correlations (shown in Table 2) two hierarchical, three-step regression models were tested, one for autonomous reasons underlying the mastery-approach goals and another one for controlling reasons underlying the mastery-approach goals as dependent variable. In both models, the dependent variable was regressed on gender in step one, performance-approach goal structure in

step two and perceived teacher autonomy support, perceived teacher structure and perceived teacher involvement in step three.

The model for autonomous reasons was statistically significant only in step three (F [5,110] = 2.71), $p < .05$ adjusted $R^2 = .07$). The results are shown in Table 3.

Table 3
The hierarchical regression model for autonomous reasons

Predictors	Autonomous Reasons								
	Step 1			Step 2			Step 3		
	B	*SE*	β	*B*	*SE*	β	*B*	*SE*	β
1. Gender	- 0.14	(0.10)	-.14	-0.13	(0.10)	-.13	-0.08	(0.10)	-.07
2. Perf-app goal structures	-	-	-	-0.05	(0.06)	-.08	-0.05	(0.06)	-.08
3. Perceived autonomy Support	-	-	-	-	-	-	-0.05	(0.11)	-.07
4. Perceived structure	-	-	-	-	-	-	-0.02	(0.15)	-.03
5. Perceived involvement	-	-	-	-	-	-	0.27	(0.13)	.37 *
F change (1,113)	0.65								
F change (3,110)	3.50*								

Note. * $p < .05$. ** $p < .01$ Gender was dummy-coded (1 = females; 2 = males)

The only positive and significant predictor of autonomous reasons was teacher involvement which means that when students feel that the teacher likes them, cares about them, be there for them and they can count on him/her, they endorse the mastery-approach goal for autonomous reasons.

The model for controlling reasons was statistically significant in steps two (F [2,113] = 4.02), $p < .05$ adjusted $R^2 = .09$) and three (F [5,110] = 2.48), $p < .01$ adjusted $R^2 = .13$). The results are shown in Table 4.

Table 4
The hierarchical regression model for controlling reasons

Predictors	Controlling Reasons								
	Step 1			Step 2			Step 3		
	B	*SE*	β	*B*	*SE*	β	*B*	*SE*	β
1. Gender	- 0.27	(0.15)	-.16	-0.33	(0.09)	-.20*	-0.25	(0.15)	-.15
2. Perf-app goal structures	-	-	-	0.27	(0.09)	.29**	0.28	(0.09)	.29**
3. Perceived autonomy Support	-	-	-	-	-	-	0.12	(0.17)	.10
4. Perceived structure	-	-	-	-	-	-	0.02	(0.24)	.01
5. Perceived involvement	-	-	-	-	-	-	0.17	(0.20)	.14
F change (1,113)				10.08*					
F change (3,110)							2.55**		

Note. * $p < .05$. ** $p < .01$ Gender was dummy-coded (1 = females; 2 = males)

The positive predictor of controlling reasons was performance-approach goal structures which mean that when students felt that the teacher and classroom environment reinforced outperforming others (i.e., performance-approach goals), they endorsed the mastery-approach goal for controlling reasons.

Three hierarchical, two-step regression models were tested to investigate the relationship of students' motivation (i.e., autonomous vs. controlling) with their educational outcomes; one for the use of effective learning strategies use, one for experience of challenge in math when adopting a mastery-approach goal and another one for student's score when adopting a mastery-approach goal as dependent variables. In all models, the dependent variable was regressed on gender in step one, type of motivation (autonomous vs. controlled) in step two.

The model for use of effective learning strategies was statistically significant only in step two (F [3,109] = 6.23, $p < .01$ adjusted $R^2 = .12$). The results are shown in Table 5.

Table 5
The hierarchical regression model for use of effective learning strategies

Predictors	Learning Strategies					
	Step 1			Step 2		
	B	*SE*	β	*B*	*SE*	β
1. Gender	-0.02	(0.09)	-.02	0.05	(0.09)	.05
2. Autonomous reasons	-	-	-	0.31	(0.08)	.35**
3. Controlling reasons	-	-	-	0.06	(0.05)	.11
F change (2, 109)						9.33**

Note. * $p < .05$. ** $p < .01$ Gender was dummy-coded (1 = females; 2 = males)

The only positive predictor of use of effective learning strategies was autonomous motivation which means that when students are motivated in math class because they value the course material and they see it as a way of developing themselves they are able to use effective learning strategies.

The model for experience of challenge in math was statistically significant only in step two (F [3,109] = 8.38, $p < .01$ adjusted $R^2 = .17$). The results are shown in Table 6.

Table 6
The hierarchical regression model for experience of challenge

Predictors	Experience of Challenge					
	Step 1			Step 2		
	B	*SE*	β	*B*	*SE*	β
1. Gender	0.14	(0.18)	.07	0.13	(0.17)	.07
2. Autonomous reasons	-	-	-	0.62	(0.16)	.35**
3. Controlling reasons	-	-	-	0.36	(0.10)	-.32**
F change (2, 109)						12.22**

Note. * $p < .05$. ** $p < .01$ Gender was dummy-coded (1 = females; 2 = males)

The positive predictor of experience of challenge in math was autonomous reasons and negative predictor was controlling reasons which mean that when students endorsed the mastery-approach goal because they saw it as a way of developing themselves they experience challenge in math. In contrast, when the students endorsed the mastery-approach goal out of pressure from outside or themselves, they did not want to try harder and challenge themselves in math.

The model for student's score in math was statistically significant in step one (F [1,111] = 6.18, $p < .05$ adjusted $R^2 = .04$) and step two (F [3,109] = 2.64, $p < .05$ adjusted $R^2 = .04$). The results are shown in Table 7.

Table 7
The hierarchical regression model for student score

Predictors	Student Score					
	Step 1			Step 2		
	B	*SE*	β	*B*	*SE*	β
1. Gender	-5.36	(2.16)	-.23*	-5.27	(2.21)	-.23*
2. Autonomous motivation	-	-	-	2.46	(2.09)	.11
3. Controlled motivation	-	-	-	-1.03	(1.33)	-.07
F change (1, 111)						6.18*

Note. * $p < .05$. ** $p < .01$ Gender was dummy-coded (1 = females; 2 = males)

The only positive predictor of student's score in math was gender which means that the girls who adopted mastery-approach goal as their most important, they had higher score in class compared to boys.

Three hierarchical, four-step regression models were tested to investigate the relationship of performance-approach goal structures and perceived teacher autonomy, structure and involvement in math class as well as students' autonomous and controlling reasons for endorsing mastery-approach goal with students' educational outcomes; one for effective learning strategies use, one for experience of challenge and another one for student's score as dependent variables. In all models,

the dependent variable was regressed on gender in step one, perceived teacher autonomy support, perceived teacher structure and perceived teacher involvement in step two, performance-approach goal structure in step three and autonomous and controlling reasons in step 4.

The model for use of effective learning strategies was statistically significant in step two (F [4,108] = 5.94, $p < .01$ adjusted $R^2 = .15$), step three (F [5,107] = 4.71, $p < .01$ adjusted $R^2 = .14$), and step four (F [7,105] = 5.31, $p < .01$ adjusted $R^2 = .21$). As Table 8 shows, however, only autonomous reasons in step four revealed as a significant positive predictor of learning strategies.

Table 8
The hierarchical regression model for learning strategies

Predictors	Learning Strategies											
	Step 1			Step 2			Step 3			Step 4		
	B	*SE*	β	*B*	*SE*	β	*B*	*SE*	β	*B*	*SE*	β
1. Gender -	0.02	(0.09)	-.02	0.06	(0.08)	.06	0.06	(0.09)	.06	0.09	(0.08)	.09
2. Perceived autonomy Support	-	-	-	0.11	(0.10)	.18	0.11	(0.10)	.18	0.12	(0.10)	.19
3. Perceived structure	-	-	-	0.21	(0.13)	.27	0.21	(0.13)	.27	0.22	(0.13)	.28
4. Perceived involvement	-	-	-	0.01	(0.11)	.02	0.01	(0.11)	.02	-0.07	(0.11)	-.10
5. Perf-app goal structures	-	-	-	-	-	-	0.00	(0.05)	.00	0.00	(0.05)	01
6. Controlling reasons	-	-	-	-	-	-	-	-	-	0.03	(0.05)	.06
7. Autonomous reasons	-	-	-	-	-	-	-	-	-	0.26	(0.08)	.29**
F change (3,108)					7.90							
F change (1,107)								0.00				
F change (2,105)												5.77**

Note. * $p < .05$. ** $p < .01$ Gender was dummy-coded (1 = females; 2 = males)

Given that perceived teacher's involvement was related to students' autonomous reasons underlying mastery-approach goal, which in turn was positively related to effective learning strategies, it was examined whether perceived teacher's involvement was indirectly related to learning strategies via autonomous reasons. Sobel test was not significant (*Sobel test* = 1.75, p = .08, *ns*) suggesting that the indirect effect of perceived teacher's involvement to learning strategies through autonomous reasons was not statistically significant. A bootstrap analysis however which included 1000 replications showed that the indirect effects were positive B = 0.07, SE = 0.07, 95% CI: 0.01 – 0.17. Because the lower limit was higher than zero, this is an indication that indeed there were some positive indirect effects of perceived teacher's involvement on learning strategies. This finding implies that autonomous reasons underlying mastery-approach goals could be probably considered as mediating mechanism through which teacher's perceived involvement was related to students'' learning strategies.

The model for the experience of challenge was statistically significant only in step 4 (F [7,105] = 4.26, p < .01 adjusted R^2 = .17). As Table 9 shows, autonomous reasons underlying mastery-approach goals was a positive predictor for experience of challenge in math, whereas controlling reasons underlying the mastery-approach goals was a negative predictor for the same outcome.

Table 9
The hierarchical regression model for experience of challenge

Predictors	Experience of Challenge											
	Step 1			Step 2			Step 3			Step 4		
	B	*SE*	β	*B*	*SE*	β	*B*	*SE*	β	*B*	*SE*	β
1. Gender	0.14	(0.18)	.07	0.08	(0.18)	.04	0.12	(0.18)	.07	0.10	(0.17)	.05
2. Perceived autonomy Support	-	-	-	- 0.12	(0.22)	- .09	-0.10	(0.22)	- .08	- 0.07	(0.20)	-.05
3. Perceived structure	-	-	-	0.26	(0.29)	.16	0.19	(0.29)	.12	0.23	(0.27)	.15
4. Perceived involvement	-	-	-	- 0.24	(0.25)	- .17	-0.21	(0.25)	-.16	-0.33	(0.23)	-.25
5. Perf-app goal structures	-	-	-	-	-	-	- 0.19	(0.10)	-.18	-0.07	(0.10)	-.06
6. Controlling reasons	-	-	-	-	-	-	-	-	-	-0.30	(0.11)	- .26**
7. Autonomous reasons	-	-	-	-	-	-	-	-	-	0.69	(0.17)	.38**
F change (3,108)				0.82								
F change (1,107)								3.37				
F change (2,105)											11.08**	

Note. * $p < .05$. ** $p < .01$ Gender was dummy-coded (1 = females; 2 = males)

Given that perceived teacher's involvement was related to students' autonomous reasons underlying mastery-approach goal, which in turn was positively related to experience of challenge in math, it was examined whether perceived teacher's involvement was indirectly related to experience of challenge via autonomous reasons. The Sobel test showed that the indirect effects of perceived teacher's involvement to learning strategies through autonomous reasons were not statistically significant (*Sobel test* = 1.85, *p* = .06, *ns*). A bootstrap analysis however which included 1000 replications showed that the indirect effects were positive B = 0.17, SE = 0.09, 95% CI: 0.01 – 0.36. Because the lower limit was higher than zero, this is an indication that indeed there were some positive indirect effects of perceived teacher's involvement on experience of challenge. This finding implies that autonomous reasons underlying mastery-approach goals could probably mediate the relationship between teacher's perceived involvement and students' experience of challenge. Alternatively, given that performance-approach structures were related students' controlling reasons underlying mastery-approach goals, which in turn was negatively related to experience of challenge in math, it was examined whether performance-approach goal structure were related to experience of challenge via controlling reasons underlying mastery-approach goals. Sobel test showed that the indirect effects of performance-approach goal structures to experience of challenge through controlling reasons were significant (significant (*Sobel test* = -2.05, *p* = .04, *ns*). A test of indirect effects (Hayes, 2013) with bootstrap analysis however which included 1000 replications showed that the indirect effects were negative B = - 0.08, SE = 0.05, 95% CI: -0.18 – -0.01. Because the lower limit was higher than zero, this is an indication that indeed there were some negative indirect effects of performance-approach goal structures on experience of challenge in math. This finding implies

that perceived performance-approach goal structures could be negatively related to students' experience of challenge in math through controlling reasons underlying mastery-approach goals.

Finally, the model of students' score in math regressed on gender in step one, perceived teacher autonomy support, perceived teacher structure and perceived teacher involvement in step two, performance-approach goal structures in step three and autonomous and controlling reasons in step four. It was statistically significant only in step one (F [1,111] = 6.18, $p < .05$ adjusted $R^2 = .04$). The results are shown in Table 10.

Table 10
The hierarchical regression model for student score

Predictors	Student Score											
	Step 1			Step 2			Step 3			Step 4		
	B	*SE*	β	*B*	*SE*	β	*B*	*SE*	β	*B*	*SE*	β
1. Gender	- 5.36	(2.16)	- .23*	- 4.96	(2.22)	- .21*	- 5.02	(2.25)	- .22*	-5.20	(2.28)	- .22*
2. Perceived autonomy Support	-	-	-	2.93	(2.64)	.19	2.91	(2.66)	.19	3.05	(2.66)	.19
3. Perceived structure	-	-	-	0.28	(3.49)	.01	0.37	(3.53)	.02	0.53	(3.53)	.03
4. Perceived involvement	-	-	-	- 1.71	(2.97)	- .11	-1.75	(2.99)	-.11	-2.09	(3.06)	-.13
5. Perf-app goal structures	-	-	-	-	-	-	0.26	(1.28)	.02	0.84	(1.36)	.06
6. Controlling reasons	-	-	-	-	-	-	-	-	-	-1.50	(1.45)	- .11
7. Autonomous reasons	-	-	-	-	-	-	-	-	-	2.49	(2.20)	.11
F change (3,108)				0.62**								
F change (1,107)							0.04					
F change (2,105)										1.03		

Note. * $p < .05$. ** $p < .01$ Gender was dummy-coded (1 = females; 2 = males)

The only positive predictor of student's score in math was gender which means that girls who adopted mastery-approach goals in math had higher math score compared to boys.

Predictors of students' motivation and educational outcomes when outcome goals were endorsed

Having checked the bivariate correlations (as shown in Table 2) two hierarchical, three-step regression models were tested, one for autonomous reasons underlying the outcome goals and another one for controlling reasons underlying the outcome goals as dependent variable. In both models, the dependent variable was regressed on gender in step one, performance-approach goal structure in step two and perceived teacher autonomy support, perceived teacher structure and perceived teacher involvement in step three.

The model for autonomous reasons was not statistically significant in any of the steps.

The model for controlling reasons was not statistically significant in any of the steps.

Three hierarchical, two-step regression models were tested to investigate the relationship of students' motivation (i.e., autonomous vs. controlling) with their educational outcomes; one for effective learning strategies use when adopting a mastery-approach goal, one for experience of challenge when adopting a mastery-approach goal and another one for student's score when adopting an outcome goal as dependent variables. In all models, the dependent variable was regressed on gender in step one, type of motivation (autonomous vs. controlled) in step two.

The model for use of effective learning strategies was statistically significant only in step two (F [3, 39] = 15.09, $p < .01$ adjusted $R^2 = .50$). The results are shown in Table 11.

Table 11
The hierarchical regression model for use of effective learning strategies

Predictors	Learning Strategies					
	Step 1			Step 2		
	B	*SE*	β	*B*	*SE*	β
1. Gender	-0.23	(0.19)	-.19	-0.20	(0.14)	-.16
2. Autonomous reasons	-	-	-	0.51	(0.09)	.66**
3. Controlling reasons	-	-	-	0.15	(0.09)	.19
F change (2, 39)						21.17**

Note. * $p < .05$. ** $p < .01$ Gender was dummy-coded (1 = females; 2 = males)

The only positive predictor of use of effective learning strategies was autonomous motivation which means that when students who choose outcome goals are motivated in math class because they value the course material and they see it as a way of developing themselves they are able to use effective learning strategies.

The model for experience of challenge in math was statistically significant only in step two (F [3, 39] = 4.05), p <.01 adjusted R^2 = .18. The results are shown in Table 12.

Table 12
The hierarchical regression model for experience of challenge

Predictors	Experience of Challenge					
	Step 1			Step 2		
	B	*SE*	β	*B*	*SE*	β
1. Gender	-0.13	(0.27)	-.08	-0.07	(0.25)	-.04
2. Autonomous reasons	-	-	-	0.37	(0.16)	.34*
3. Controlling reasons	-	-	-	-0.44	(0.16)	-.40**
F change (2, 39)						5.93**

Note. * p < .05. ** p < .01 Gender was dummy-coded (1 = females; 2 = males)

The experience of challenge in math was positively and negatively predicted by autonomous and controlling reasons underlying outcome goals respectively. This finding means that when students were motivated to achieve a high grade they saw it as a way of developing themselves, they wanted to try harder and challenge themselves in math. However when students were motivated to achieve a high grade because others pressed them to do so, they experienced less challenge in math.

The model for student's score in math was not statistically significant in any of the steps.

Three hierarchical, four step regression models were tested to investigate the relationship of performance-approach goal structures and perceived teacher autonomy, structure and involvement in math class as well as students' autonomous and controlling reasons for endorsing an outcome goal with students' educational outcomes; one for effective learning strategies use, one for experience of challenge and another one for students' scores as dependent variables. In all models, the dependent variable was regressed on gender in step one, perceived teacher autonomy support, perceived teacher structure and perceived teacher involvement in step two, performance-approach goal structure in step three, and autonomous and controlling reasons in step four.

The model for use of effective learning strategies was significant only in step four (F [7, 35] = 7.06, $p < .01$ adjusted $R^2 = .50$). The results are shown in Table 13.

Table 13
The hierarchical regression model for effective learning strategies

Predictors	Effective Learning Strategies											
	Step 1			Step 2			Step 3			Step 4		
	B	*SE*	β	*B*	*SE*	β	*B*	*SE*	β	*B*	*SE*	β
1. Gender	- 0.23	(0.19)	- .19	- 0.17	(0.20)	- .14	- 0.09	(0.20)	- .07	-0.11	(0.15)	- .09
2. Perceived autonomy Support	-	-	-	0.19	(0.27)	.21	0.33	(0.27)	.36	-0.06	(0.21)	- .06
3. Perceived structure	-	-	-	0.34	(0.35)	.25	0.13	(0.35)	.10	0.42	(0.27)	.31
4. Perceived involvement	-	-	-	- 0.29	(0.20)	- .33	-0.23	(0.20)	-.25	-0.10	(0.16)	-.12
5. Perf-app goal structures	-	-	-	-	-	-	0.26	(0.13)	.32	0.03	(0.11)	.04
6. Controlling reasons	-	-	-	-	-	-	-	-	-	0.11	(0.10)	.15
7. Autonomous reasons	-	-	-	-	-	-	-	-	-	0.51	(0.09)	65**
F change (3,38)				1.26								
F change (1,37)							3.71					
F change (2,35)										16.18**		

Note. * $p < .05$. ** $p < .01$ Gender was dummy-coded (1 = females; 2 = males)

The use of effective learning strategies in math were positively predicted by the autonomous reasons underlying the outcome goals even while controlling for teacher's motivating style. This result suggests that when students desire to achieve a high grade because this is a personally important goal for them, they use effective learning strategies in math.

The model for experience of challenge in math regressed on gender in step one, perceived teacher autonomy support, perceived teacher structure and perceived teacher involvement in step two, performance-approach goal structure in step three, and autonomous and controlling reasons in step four, was not significant at any step. This finding suggest that when controlling for teacher's motivating style, autonomous and controlling reasons underlying the outcome goal did not predict the experience of challenge in math.

Finally, the model for the score in math was not also significant at any of the steps.

CHAPTER 5: DISCUSSION

Introduction

In the present study, two aspects of Turkish math teachers' instructional behavior were investigated; their need-supportive motivating style (i.e., supporting students' needs for autonomy, relatedness and competence) and their provision of achievement goals as they had been perceived by students. In the present study, Turkish high school students' motivation in math was also investigated. Specifically, it was assessed students' achievement goal in math as well as the autonomous or volitional versus the controlling or pressuring reasons for which these achievement goals were endorsed. The purposes of the study were to investigate the relation of teacher's motivating style to students' functioning. That is the relation of Turkish math teachers' perceived motivating style with students' type of achievement goals and reasons (autonomous and controlling) for adopting them as well as the relation of achievement goal type and underlying reasons to students' educational outcomes in math class. For this study three types of achievement goals were chosen to investigate: mastery-approach, performance-approach and outcome goal. There are several researches about the mastery-approach goal and performance-approach goal relation to educational outcomes but the relation of outcome goal to learning is less investigated. This study aimed to add to the research of achievement goals by investigating, apart from the widely examined mastery-approach and performance-approach goals, the less "popular" in the literature outcome goals as well as the reasons for pursuing them and their relation to educational outcomes (i.e., learning strategies, grades, and experience of challenge in math).

Overview of the study

A cross-sectional research design was used to complete the following investigations:

The relation of different types of achievement goals and underlying reasons to students' learning strategies, grades, and experience of challenge in math

The relation of differences in students' motivation to their perceptions about their math teacher's motivating style

Whether students' motivation in math serve as a mechanism through which perceived math teacher's motivating style is relate to students' learning strategies, grades, and experience of challenge

The study was conducted with 180 students from a non-profit private international school in the eastern part of Turkey. During data analysis 13 outlier students were excluded from the study. Students completed several questionnaires including; perceived autonomy support, perceived structure, and perceived involvement of math teacher, perceived goal structures of math teacher, students' achievement goals, reasons underlying the pursuit of achievement goals, learning strategies, and experience of challenge in math. Students' grades in math were recorded as well. MANOVA, regression and bootstrap analyses were used to analyze the data according to the research questions.

Discussion of major findings

The discussion for each research question of the study is below in details:

Achievement goals and underlying reasons: Their relation to students' outcomes

In this study, students were asked to report their most dominant achievement goal in math out of three achievement goals: mastery-approach, performance-approach and outcome goal. Out of 180 students 49 of them chose the outcome goal as their most important goal in math class, 123 students chose the mastery-approach goal, whereas only 8 students chose the performance-approach goal. When a similar question was asked to students in Greece (i.e., to choose their most dominant goal out of performance-approach, mastery-approach and performance-avoidance goal) students' response was 93% in favor of mastery-approach goals (Michou et al., 2014). According to the responses from students in this study (very low number of performance-approach goal as most important goal in math) and Michou et al.'s study one question arises: What is the ecological validity of performance-approach goals? Is outperforming others a frequent achievement goal in real life situations? It seems that students who are focusing on performance, they are more interested in getting high grades than outperforming their peers.

In Turkey, students' high scores and performance is always highlighted by parents and schools. The education system with many standardized exams focuses on getting high scores at school especially in math lessons since math is seen as one of the most important lessons in school. Even though getting high scores in class is important in Turkey, in this study only 49 students chose the outcome goal as their most important goal in math; the majority of the students (N = 123) chose the mastery-approach goal. One possible explanation for this result can be that students from this particular school are successful students who earned scholarship and they aim to study in high level departments in college so they understand the importance of mastering the

learning materials. Also students from this particular school are assigned to high and standard level mathematics classes and those who attend the high level classes they have to be able to master the material in order to pass their IB (International Baccalaureate Program) exams.

In attempt to study the differences between those students who adopted the mastery-approach goal and those who adopted the outcome goal the two groups were compared regarding the reasons underlying the endorsement of these achievement goals, the perceived math teacher's instructional behavior and students' educational outcomes. As it was expected, the students who adopted the outcome goal as their most dominant achievement goal in math had higher score in controlling underlying reasons and they perceived to a higher degree performance-approach goal structures in their math class compared to the students who adopted the mastery-approach goal. Outcome goals were chosen out of pressure in situations that were perceived as competitive. This finding showed the importance of a less competitive and a more learning oriented classroom environment created by teachers so as students to internalize the value of a course and endorse their achievement goals for autonomous reasons.

Regarding the relation of students' motivation (i.e., the adopted achievement goal and its underlying reasons) to educational outcomes (i.e., effective learning strategy use, experience of challenge and students score) the assumption was that if students works to learn as much as possible (i.e. endorse a mastery goal) or they work to get high grades (i.e., endorse an outcome goal) and they do so out of their personal values and interests (i.e. for autonomous reasons), then he/she will be more

successful in math in terms of having higher grades, using effective learning strategies and experiencing challenge.

This assumption was partially supported as, according to the results of the present study, autonomous reasons underlying both highly chosen achievement goals (i.e., mastery-approach and outcome goals) were indeed positively correlated with students' effective learning strategies and experience of challenge in math. Similarly Michou et al. (2014) found that adoption of mastery-approach goals with autonomous reasons were positively related to need for achievement and effective learning strategies. However opposite to Gaudreau 's (2012) results that showed when mastery-approach goals were adopted for autonomous reasons, students reported more interest and higher performance, neither autonomous reasons underlying mastery-approach goals nor autonomous reasons underlying outcome goals were related to students' score in math. This finding in conjunction with the fact that students with outcome dominant goal did not differ in math score compared to students with mastery-approach dominant goal shows that in the present Turkish sample neither students' achievement goal nor their autonomous underlying reasons predicted students grades. It seems that other factors such as students' gender were more important in the prediction of math grades.

Regarding the controlling reasons underlying the adoption of both achievement goals, they were negatively correlated with experience of challenge in math, whereas they were unrelated with students' learning strategies and grades which were also found in Michou et al.'s (2014) study that controlling reasons for mastery-approach

goals were negatively related to effort regulation. The findings show that when students chose their most important achievement goal out of pressure (i.e., controlling reasons), they did not want to try hard in math.

When either mastery-approach goals or outcome goals were adopted, in both cases, the positive predictor of use of effective learning strategies and experience of challenge was autonomous underlying reasons and in contrast the negative predictor of experience of challenge was controlling underlying reasons. Students who adopted mastery-approach goal or outcome goal out of their personal values, they reported use of effective learning strategies and desire to try hard in math; students who adopted the same goal out of pressure however they did not exhibit a desire to try hard. It seems that the underlying reasons for adopting an achievement goal are more important in educational environments than the type of the achievement goal itself. Despite the fact that students who endorsed the outcome goal as their most important had higher score in controlling reasons than the students who endorsed the mastery-approach goal as their dominant, even these students reported low desire to try hard in math (i.e., low experience of challenge) when the mastery-approach goals were pursuit out of pressuring reasons. Students may want to have high grades or desire to learn as much as possible but the reason underlying these achievement goals may lead to different outcomes.

Differences in students' motivation and their relation to students 'perceptions about their math teacher's motivating style

Regarding to relation of students' motivation and teachers' perceived motivating style the hypothesis was that teacher's need supportive teaching style and the promotion of mastery-approach goals will motivate students to endorse mastery-approach goals with underlying autonomous reasons. It was also hypothesized that the promotion of an outcome goal with a need supportive teaching style will be positively related with students' autonomous reasons for endorsing achievement goals as well as with positive outcomes in math.

To a low degree this assumption was supported by the findings of the study. Specifically, the results showed a positive correlation between teacher's involvement and autonomous reasons underlying the mastery-approach goal. However, neither autonomy support nor structure predicted the autonomous reasons behind mastery-approach goals different than many other study (Bieg, Backes & Mittag, 2011; Black & Deci, 2000; Joesaar, Hein & Hagger, 2012; Standage, Duda & Pensgaard, 2005) findings suggesting that autonomy support and structure were also related to students' autonomous motivation. It seems that teachers' warm and caring style was more important to facilitate students to adopt a mastery-approach dominant goal out of volitional (i.e., autonomous) reasons. It is important also to note that the same mastery-approach goal was adopted to a higher extend for controlling reasons when performance-approach goal structures were perceived by students and outperforming others were considered as a characteristic of the classroom environment.

Regarding the students who adopted an outcome goal, their perception of teachers' need supportive motivating style and their perception of performance-approach classroom structures were unrelated to either autonomous or controlling reasons. However, it is worthy to note that the students with an outcome dominant goal had higher perceived performance-approach goal structures and higher controlling reasons than the students with mastery-approach dominant goal. This finding indicates that when students were encouraged by the teacher to outperform others in the class they were more likely to adopt an outcome dominant goal as well as they were more likely to adopt this goal for controlling reasons.

As the results showed, only few aspects of Turkish math teacher's motivating style predicted student motivation and further research is needed in this area to clarify the relation of teacher's motivating style to students' motivation in Turkey. It was hypothesized that students who perceived need-supportive motivating style from their teacher would adopt mastery-approach or outcome goals for autonomous reasons but teacher involvement was the only aspect of teacher's need-supportive style that predicted student autonomous motivation. There was no evidence in this study that perceived structure or perceived autonomy support from the teacher had effect on autonomous reasons of goal adoption. On the other hand, perceived performance-approach goal structures predicted controlling reasons underlying the mastery-approach goal but failed to predict controlling reasons underlying the outcome goal. Obviously, more research is needed to validate these findings.

Student motivation as a mediator of perceived math teacher's motivating style and educational outcomes

According to the results of the study, autonomous reasons underlying the mastery-approach goal seems to be the mediator between perceived teacher involvement and use of effective learning strategies as well as experience of challenge in math. This means that a possible mechanism for students with mastery-approach dominant goal that related their perception of teacher's involvement with the use of effective learning strategies and experience of challenge was their autonomous underlying reason in the adoption of the mastery-approach goal.

The controlling reasons underlying the mastery-approach goal revealed as the mechanism that related negatively students' perception of performance-approach goal structures to experience of challenge in math. This means that students with mastery-approach dominant goal who perceived being encouraged to outperform others do not try hard in math class because they endorse the mastery-approach goal for pressuring (i.e., controlling) reasons.

In this study, results regarding the mediating mechanisms that relate teacher's motivating style with students' outcomes were not very illuminating. This is because, as it is mentioned above, only few aspects of teacher's motivating style were related to students' motivation in the present study.

Implications for practice

The results from the present study may have important implications for teachers. According to the results students who adopted the mastery-approach goals for pressuring (i.e., controlling) reasons, they perceived a performance-approach goal structures environments in the classroom. Also the students who endorsed an outcome dominant goal, perceived higher performance-approach goal structures in their classroom and endorsed the outcome goal for controlling reasons to a higher extend compared to students with mastery-approach dominant goal. Taking this result together with the fact that controlling reasons were negatively related with experience of challenge in math and unrelated with learning strategies and grades, it seems that the performance-approach goal structures are not beneficial for Turkish students. For this reason, teachers would be better to create classroom environments where students are not encouraged to compete with each other but instead the importance of learning is highlighted. With focus on learning and mastering the material students can be encouraged to value the learning material and internalize it.

The results, as mentioned above, provided information on controlling underlying reasons for adopting the achievement goals being related to less experience of challenge in math. On the other hand, autonomous reasons for adopting the achievement goals were found related to use of effective learning strategies and more experience of challenge in math. It seems that students' autonomous motivation is more beneficial for educational outcomes and therefore teachers need to create the necessary conditions to foster students' autonomous motivation. To this direction, teachers should try to avoid using the controlling language in class and pressuring students either by punishing them, giving them deadlines, rewarding them or even by

making them feel guilt and withdrawing attention. Assessments and classroom activities should be planned accordingly so students would not feel time pressure and rewards and punishments should be discussed in school policies to make it a school wide decision. When students feel the pressure either from the teacher or even pressuring themselves, they seem to not try hard in class. Instead they should be informed about the importance of the course material and how it effects their learning or future goals because, as the results indicated, more important than the type of achievement goal adopted, the reasons of adopting the goal had effect on learning outcomes studied in this research.

More importantly, as the results of this study showed, teacher involvement is an important predictor of students' autonomous reasons for adopting mastery-approach goals. Except of fostering learning instead of competition, teachers should also support students' need for relatedness by being warm toward them, available for them, loving them, acknowledging their feelings and taking their interest in the account. A caring teacher and a less competitive classroom environment could be considered as the most important advices for Turkish math teachers according to the results of the present study.

Implications for further research

In this study the relation of students' motivation to teacher motivating style (autonomy support, structure, and involvement) was investigated but only one aspect of the teacher motivating style (i.e., involvement) was found related to students' autonomous motivation. Similar results were found in Skaalvik and Skaalvik's study

(2013). But as it was mentioned in chapter 2, other research (Bieg, Backes & Mittag, 2011; Black & Deci, 2000; Joesaar, Hein & Hagger, 2012; Standage, Duda & Pensgaard, 2005) showed positive relation between other aspects of teachers' motivation style to students' autonomous motivation such as autonomy support (Hein & Caune, 2014; Shen, McCaughtry, Martin & Fahlman, 2009) and structure (Stroet, Opdenakker & Minnaert, 2013). For this reason, further research is needed in the Turkish education system to investigate the relationship of teacher support of autonomy, structure, and relatedness to students' autonomous motivation.

Further study can be also done to investigate the relation of student motivation and also teacher's motivating style with more educational outcomes such as engagement in class, creativity, self-esteem and satisfaction from the course. Similarly, the possible mechanisms through which teachers' motivating style is related to students' outcomes can also be investigated in further research. For example, gender or other students' personal characteristics may serve as mechanisms that link teaching style with their outcomes at school. Finally, future research could be carried out with a larger sample of Turkish students and in a traditional school environment of Turkish state schools as well as in other than math lessons and with younger students. High school students have the pressure of many exams that has effect on their college applications and that may affect the type of achievement goals they adopt and their underlying reasons.

Limitations

The researcher used correlational, cross-sectional design to assess the relation between teacher motivating style, students' motivation and educational outcomes therefore causal relationships between variables was not shown. Furthermore, limitation in this study is that the sample was relatively small and the participants come from the eastern part of Turkey and a unique school with an international program which might have affected their reports. Some of the measurers (academic self-handicapping and mastery-approach goal structures questionnaires) did not have a good internal consistency and therefore they removed from the analysis remaining unexplored the relevant research questions. When students were asked to choose their most dominant goal in Math performance-approach goal was chosen by very few (N = 8) students and this made impossible to investigate the relation of the autonomous and controlling reasons underlying this goal with perceived teacher motivation style and educational outcomes. Also students were asked to report their dominat goal in math by selecting only one item and not being able to choose also another goal they endorse. Another limitation was that thirteen students were excluded from the analysis because of their unreliable answers in the autonomous reasons underlying the achievement goal scale.

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APPENDICES

APPENDIX A: Survey in Turkish

Değerli öğrenci,

Bu ölçek Matematik dersindeki motivasyonu belirlemek amacıyla yapılan bilimsel bir araştırmanın yürütülmesi amacıyla hazırlanmıştır. Ölçekte yer alan sorulara verdiğiniz yanıtlar, kesinlikle **size not vermek** ya da sizi **eleştirmek** amacıyla **kullanılmayacaktır**. Bu soruların herkes için geçerli **doğru yanıtları bulunmamaktadır**. Bu nedenle lütfen aşağıda verilen tüm soruları dikkatle okuyarak cevabınızı, ifadenin karşısındaki seçeneklerden sizin için en uygun olanı işaretleyerek belirtiniz.

Öncelikle aşağıdaki soruları cevaplayınız.

Cinsiyetiniz:	**Sınıfınız:**	**Doğum günü ve tarihi:**	**Burs durumunuz:**
( ) Kız ( ) Erkek	( ) Hazırlık ( ) 9. Sınıf ( ) 10. Sınıf ( ) 11. Sınıf ( ) 12.Sınıf	**Örnek: 20Nisan2015**	( ) %100 burslu ( ) Burssuz ( ) Diğer

Soruları yanıtlamak için aşağıdaki ölçütleri kullanınız. Soruda geçen ifadeye **tamamen katılıyorsanız (5)**'i; ifadeye **kesinlikle katılmıyorsanz (1)**'i işaretleyin. Eğer ifadenin size göre doğruluğu bunlardan farklı ise sizin için en uygun düzeyi gösteren (1)'le (5) arasındaki rakamı işaretleyin.

		Kesinlikle Katılmıyorum	**Katılmıyorum**	**Kararsızım**	**Katılıyorum**	**Tamamen Katılıyorum**
Matematik dersinde…						
1	Öğretmenim bana seçenekler sunarak seçme hakkı verir.	1	2	3	4	5
2	Doğru şeyler yaptığımda, öğretmenim bunu her zaman söyler ve fark eder.	1	2	3	4	5

3	Öğretmenim beni sever.	1	2	3	4	5
4	Öğretmenim tarafından anlaşıldığımı hissediyorum.	1	2	3	4	5
5	Öğretmenim, bana adil davranır.	1	2	3	4	5
6	Öğretmenim bana gerçekten değer verir.	1	2	3	4	5
		Kesinlikle Katılmıyorum	**Katılmıyorum**	**Kararsızım**	**Katılıyorum**	**Tamamen Katılıyorum**
Matematik dersinde…						
7	Öğretmenim derste başarılı olacağım konusunda bana güven verir.	1	2	3	4	5
8	Öğretmenim bir şey yapacağını söylediği zaman, yapacağından eminimdir.	1	2	3	4	5
9	Öğretmenim hakkımda çok şey bilir.	1	2	3	4	5
10	Öğretmenim soru sormam için beni cesaretlendirir.	1	2	3	4	5
11	Öğretmenim okulda benden ne beklediğini açıkça ifade eder.	1	2	3	4	5
12	Öğretmenim beni iyi tanır.	1	2	3	4	5
13	Öğretmenimin sınıfta benden ne beklediğini bilirim.	1	2	3	4	5
14	Öğretmenim derste benimle birlikte zaman geçirir.	1	2	3	4	5
1	Öğretmenim kuralları sürekli değiştirir. (R)	1	2	3	4	5

5						
16	Öğretmenim benimle konuşur.	1	2	3	4	5
17	Öğretmenim bir şeyleri nasıl yapmak istediğimi anlattığımda beni dinler.	1	2	3	4	5
18	Öğretmenim bana problemlerimi nasıl çözeceğimi gösterir.	1	2	3	4	5
19	Öğretmenim her zaman yanımdadır.	1	2	3	4	5
20	Bir problemi çözemezsem öğretmenim denemem için farklı yollar gösterir.	1	2	3	4	5
21	Öğretmenimin yanımda olacağına güvenim vardır.	1	2	3	4	5
22	Bir problemle karşılaştığımda bile öğretmenim bana yardım etmez. (R)	1	2	3	4	5
23	İhtiyacım olduğunda öğretmenimin destek olacağına güvenim vardır.	1	2	3	4	5
24	Öğretmenim devam etmeden önce benim anladığımdan emin olur.	1	2	3	4	5
25	Öğretmenim bir konuda yeni bir yaklaşım önermeden önce benim o konuya nasıl baktığımı anlamaya çalışır.	1	2	3	4	5

		Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Tamamen Katılıyorum
Matematik dersinde…						
26	Öğretmenim, yeni konuya başlamadan önce hazır olduğumu kontrol eder.	1	2	3	4	5
27	Öğretmenim devam etmeye ne zaman hazır olduğumu bilmez. (R)	1	2	3	4	5

		Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Tamamen Katılıyorum
Matematik dersinde…						
1	Ezberlemek değil anlamak önemlidir.	1	2	3	4	5
2	Öğrenciler diğer öğrencilerden daha iyisini yapmak isterler.	1	2	3	4	5
3	Öğrencilerin başlıca amaçları anlatılanı gerçekten anlamaktır.	1	2	3	4	5
4	Öğrenciler arasında çok fazla rekabet vardır.	1	2	3	4	5
5	Mümkün olduğunca çok şey öğrenmek	1	2	3	4	5

	zorunludur.					
6	En iyi öğrencilerden biri olmak için baskı vardır.	1	2	3	4	5
7	Öğrencinin ne kadar ilerleme kaydettiği gerçekten önemlidir.	1	2	3	4	5

Matematik dersindeki <u>en önemli</u> hedefim (Lütfen en önemli hedefinizi daire içine alınız.) :

1. Yüksek notlar almak
2. Öğretilenleri tam anlamıyla anlamak
3. Diğer öğrencilerden daha başarılı olmak

		Kesinlikle Katılmıyorum	**Katılmıyorum**	**Kararsızım**	**Katılıyorum**	**Tamamen Katılıyorum**
Şimdi bu hedefe ulaşmayı neden istediğinizi düşününüz ve takip eden soruları yanıtlayınız.						
1	Çünkü bu hedefi gerçekleştirmezsem değer verdiğim kişileri hayal kırıklığına uğratırım.	1	2	3	4	5

2	Çünkü şahsen bunun hayatım için en iyi şey olduğuna inanıyorum.	1	2	3	4	5
3	Çünkü bu hedefi gerçekleştirmezsem kendimi kötü hissederim.	1	2	3	4	5
4	Çünkü bu hedefi, kendimi geliştirmek için bir yol olarak seçtim.	1	2	3	4	5
5	Çünkü, bunu yapmazsam kendimi değerli hissetmem.	1	2	3	4	5
6	Çünkü mümkün olduğunca çok şey öğrenmek hedeflerimle tutarlıdır.	1	2	3	4	5
7	Çünkü, bu hedefe ulaşınca etrafımdakiler beni ödüllendirir.	1	2	3	4	5

		Kesinlikle Katılmıyorum	**Katılmıyorum**	**Kararsızım**	**Katılıyorum**	**Tamamen Katılıyorum**
Matematik dersinde…						
1	Derste ya da okuduğum kitaplarda bir görüş, yorum ya da sonuç verildiğinde, bunların doğruluğunu destekleyen yeterli kanıt olup olmadığına karar vermeye çalışırım.	1	2	3	4	5

2	Bu dersle ilgili herhangi bir şey okurken kafam karıştığında, okuduklarıma döner ve bu karışıklığı gidermeye çalışırım.	1	2	3	4	5
3	Bu derse çalışırken o kadar sıkılır ya da kendimi tembel hissederim ki planladığımdan daha önce çalışmayı bırakırım. (R)	1	2	3	4	5
4	Bu derste yaptıklarımızdan hoşlanmasam da derste başarılı olmak için çok çalışırım.	1	2	3	4	5
5	Bu derste söylenen ya da bu dersle ilgili okuduğum bilgilerin, doğru olup olmadığını genellikle sorgularım.	1	2	3	4	5
6	Çalıştığım konuyu anlayıp anlamadığımdan emin olmak için kendi kendime sorular sorarım.	1	2	3	4	5
7	Ödevlerde zorlandığım zaman, ya ödevi yapmaktan vazgeçerim ya da sadece kolay kısımlarını yaparım.(R)	1	2	3	4	5
8	Dersin konuları ilgimi çekmese ve çok anlamlı gelmese bile, bu konuların tamamını bitirinceye kadar çalışırım.	1	2	3	4	5
9	Derste öğrendiğim bilgilerle kendi düşüncelerim arasında bağlantı kurmaya çalışmak hoşuma gider.	1	2	3	4	5
10	Bu derse çalışırken iyi anlamadığım kavramları belirlemeye çalışırım.	1	2	3	4	5
11	Bu derse çalışırken, her aşamada yapacaklarımı belirlemek için kendime hedefler koyarım.	1	2	3	4	5

12	Dersin konularını bir başlangıç noktası olarak görür ve bu konularla ilgili kendi düşüncelerimi geliştirmeye çalışırım.	1	2	3	4	5
13	Yeni bir konuyu ayrıntılı çalışmadan önce genellikle konuların nasıl düzenlendiğini gözden geçiririm.	1	2	3	4	5
14	Bu dersle ilgili bir görüş okuduğumda ya da duyduğumda, bu görüşün alternatiflerini düşünürüm.	1	2	3	4	5

		Kesinlikle Katılmıyorum	**Katılmıyorum**	**Kararsızım**	**Katılıyorum**	**Tamamen Katılıyorum**
1	Matematik problemlerini farklı bir yol denemek yerine alışıldık şekilde çözmeyi tercih ederim.	1	2	3	4	5
2	Bazı öğrenciler sınavdan önceki gece tembellik eder. Bu sizin için ne kadar geçerli?	1	2	3	4	5
3	Bazı öğrenciler isteyerek birçok etkinliğin içinde yer alırlar. Ödevlerini iyi yapamazlarsa da, bu etkinlikler yüzünden yapamadıklarını söyleyebilirler. Bu sizin için ne kadar geçerli?	1	2	3	4	5

4	Beni zorlayacak matematik soruları yerine yapabileceğimden emin olduklarımı seçerim.	1	2	3	4	5
5	Nasıl yapılacağını öğrenmem gereken matematik problemleri yerine bildiklerimi çözmeyi tercih ederim.	1	2	3	4	5
6	Bazı öğrenciler çalışmamak için (kendimi iyi hissetmiyorum, aileme yardım etmek zorundaydım, kardeşlerime baktım gibi) nedenler arayabilirler. Bu sizin için ne kadar geçerli?	1	2	3	4	5
7	Yapmaya alışık olduğum matematik problemlerinden çok farklı olmayanları çözmeyi tercih ederim.	1	2	3	4	5
8	Bazı öğrenciler, sınıfta ders dinlerken veya ödevlerini yaparken arkadaşlarının dikkatlerini dağıtmasına ses çıkarmazlar. Bu sizin için ne kadar geçerli?	1	2	3	4	5
9	Bazı öğrenciler sınıfta bilerek çaba göstermezler. Bu sizin için ne kadar geçerli?	1	2	3	4	5
10	Fazla düşünmemi gerektirmeyen matematik problemlerini çözmeyi tercih ederim.	1	2	3	4	5

11	Bazı öğrenciler ödevlerini son dakikaya bırakırlar. Bu sizin için ne kadar geçerli?	1	2	3	4	5

Ders Notu Ortalaması:

APPENDIX B: Survey in English

Dear Student,

This scale is prepared for a research to investigate the student motivation in Math. Your answers will not be used to grade you or judge you. There is no right answer for the questions. Please read the questions carefully and mark the best answer for you.

Please answer the following questions first.

Gender:	**Grade:**	**Birth date:**	**Scholarship:**
( ) Female ( ) Male	( ) Preparatory ( ) 9th ( ) 10th ( ) 11th ( ) 12th	**Example: April 20, 2015**	( ) %100 ( ) No scholarship ( ) Other

Please use the following directions. If you **strongly agree** with the statement choose **(5)**; if you **strongly disagree** with the statement choose **(1)**. If you have a different opinion choose the most appropriate number from (1) to (5).

		strongly disagree	**Disagree**	**I am not sure**	**Agree**	**strongly agree**
In Math lesson…						
1	My teacher provides me choices and options.	1	2	3	4	5
2	When I do something right, my teacher always lets me know.	1	2	3	4	5
3	My teacher likes me.	1	2	3	4	5
4	I feel understood by my teacher.	1	2	3	4	5

5	My teacher treats me fairly.	1	2	3	4	5
6	My teacher really cares about me.	1	2	3	4	5
		strongly disagree	**Disagree**	**I am not sure**	**Agree**	**strongly agree**
In Math lesson…						
7	My teacher conveyed confidence in my ability to do well in the course.	1	2	3	4	5
8	When my teacher tells me he/she will do something I know he/she will do it.	1	2	3	4	5
9	My teacher knows a lot about me.	1	2	3	4	5
10	My teacher encouraged me to ask questions.	1	2	3	4	5
11	My teacher makes it clear what he/she expects of me in school.	1	2	3	4	5
12	My teacher knows me well.	1	2	3	4	5
13	I know what my teacher expects of me in class.	1	2	3	4	5
14	My teacher spends time with me.	1	2	3	4	5
15	My teacher keeps changing the rules in our class. (R)	1	2	3	4	5
16	My teacher talks with me.	1	2	3	4	5
1	My teacher listens to how I would like to do things.	1	2	3	4	5

7						
18	My teacher shows me how to solve problems for myself.	1	2	3	4	5
19	My teacher is always there for me.	1	2	3	4	5
20	If I can't solve a problem, my teacher shows me different way to try to.	1	2	3	4	5
21	I can count on my teacher to be there for me.	1	2	3	4	5
22	Even when I run into problems, my teacher doesn't help me. (R)	1	2	3	4	5
23	I can rely on my teacher to be there when I need him/her.	1	2	3	4	5
24	My teacher makes sure I understand before he/she goes on.	1	2	3	4	5
25	My teacher tries to understand how I see things before suggesting a new way to do things.	1	2	3	4	5

		strongly disagree	**Disagree**	**I am not sure**	**Agree**	**strongly agree**
In Math lesson…						
26	My teacher checks to see if I'm ready before he/she starts a new topic.	1	2	3	4	5

27	My teacher doesn't know when I'm ready to go on. (R)	1	2	3	4	5

		strongly disagree	**Disagree**	**I am not sure**	**Agree**	**strongly agree**
In Math lesson…						
1	It is important to understand the work, not just memorize.	1	2	3	4	5
2	Students want to do better than other students.	1	2	3	4	5
3	Students' main goal is to really understand the material.	1	2	3	4	5
4	There is a lot of competition among students.	1	2	3	4	5
5	Learning as much as possible is essential.	1	2	3	4	5
6	There is pressure to be one of the best students.	1	2	3	4	5
7	How much the students improve is really important.	1	2	3	4	5

In math class my most important goal is (please circle your uppermost goal) :

1. To have high grades
2. To completely master the material presented
3. To perform better than the other students

		strongly disagree	Disagree	I am not sure	Agree	strongly agree
Now think about why you wanted to achieve this goals and answer the following questions						
1	Because people I care about would be upset with me if I did.	1	2	3	4	5
2	Because I personally believe it is the best thing for my life.	1	2	3	4	5
3	Because I would feel bad about myself if I did.	1	2	3	4	5
4	Because I have chosen this goal as a way to develop myself.	1	2	3	4	5
5	Because I would not feel worthwhile if I did not.	1	2	3	4	5
6	Because learning is consistent with my life goals	1	2	3	4	5
7	Because people around me reward me when I do.	1	2	3	4	5

		strongly disagree	Disagree	I am not sure	Agree	strongly agree
In Math lesson…						
1	When a theory, interpretation, or conclusion is presented in class or in the readings, I try to decide if there is good supporting evidence.	1	2	3	4	5
2	When I become confused about something I'm reading for this class, I go back and try to figure it out.	1	2	3	4	5

3	I often feel so lazy or bored when I study for this class that I quit before I finish what I planned to do. (R)	1	2	3	4	5
4	I work hard to do well in this class even if I don't like what we are doing.	1	2	3	4	5
5	I often find myself questioning things I hear or read in this course to decide if I find them convincing.	1	2	3	4	5
6	I ask myself questions to make sure I understand the material I have been studying in this class.	1	2	3	4	5
7	When course work is difficult, I either give up or only study the easy parts. (R)	1	2	3	4	5
8	Even when course materials are dull and uninteresting, I manage to keep working until I finish.	1	2	3	4	5
9	I try to play around with ideas of my own related to what I am learning in this course.	1	2	3	4	5
10	When studying for this course I try to determine which concepts I don't understand well.	1	2	3	4	5
11	When I study for this class, I set goals for myself in order to direct my activities in each study period.	1	2	3	4	5
12	I treat the course material as a starting point and try to develop my own ideas about it.	1	2	3	4	5
13	Before I study new course material thoroughly, I often skim it to see how it is organized.	1	2	3	4	5
14	Whenever I read or hear an assertion or conclusion in this class, I think about possible alternatives.	1	2	3	4	5

		strongly disagree	Disagree	I am not sure	Agree	strongly agree
1	I prefer to solve the Math problems in a traditional way instead of trying a new way.	1	2	3	4	5
2	Some students fool around the night before a test. How true is this of you?	1	2	3	4	5
3	Some students purposely get involved in lots of activities. Then if they don't do well on their class work, they can say it is because they were involved with other things. How true is this of you?	1	2	3	4	5
4	I choose the Math problems I know I can solve instead of the ones that will challenge me.	1	2	3	4	5
5	I prefer to solve Math problems I know how to solve instead of the ones I have to learn how to solve.	1	2	3	4	5
6	Some students look for reasons to keep them from studying (not feeling well, having to help their parents, taking care of a brother or sister, etc.). How true is this of you?	1	2	3	4	5
7	I prefer to solve Math problems that are not different than the ones I usually solve.	1	2	3	4	5
8	Some students let their friends keep them from paying attention in class or from doing their homework. How true is this of you?	1	2	3	4	5
9	Some students purposely don't try hard in class. How true is this of you?	1	2	3	4	5
10	I prefer Math problems that don't require a lot of thinking.	1	2	3	4	5

11	Some students put off doing their class work until the last minute. How true is this of you?	1	2	3	4	5

Average Score:

APPENDIX C: Consent Form in English

09.11.2015

Dear Parents,

I work at Bilkent Erzurum Laboratory School as an elementary school teacher. I am also a student of Bilkent University's graduate school program. I am conducting research on students' motivation in Mathematics. Major findings of the study will provide information that can be used to improve instructional programs and to provide information for future research studies.

There are 7 questionnaires to complete for this study. The questionnaires should take about 30 to 40 minutes. Students will complete the questionnaires anonymously during a class session and the information provided will be kept confidential. Only the researcher will see the completed forms. Students' names will not be used in any reports of this study and I guarantee that his/her participation will not affect his/her academic grades. The student may withdraw from the study at any time during the data collection session.

Please sign and return the informed consent form by Friday November 13th to your child's homeroom teacher.

Questions may be addressed to:

leylauzun83@gmail.com

Kind regards,

Leyla Goldfinger

I have read the description of the above research study and give permission for my child to participate according to the procedures outlined above.

Parent/Guardian Signature: _____

Name of student participant: _____

Date:_____

APPENDIX D: Consent Form in Turkish

09.11.2015

İngilizce orijinalinden çevrilmiştir.

Değerli Veli,

IDV Erzurum Özel Bilkent İlkokulu'nda üçüncü sınıf öğretmeni olarak çalışmaktayım. Aynı zamanda Bilkent Üniversitesi Eğitim Fakültesi'nde yüksek lisans öğrencisiyim. Matematik derslerinde öğrencilerin motivasyonu üzerine bir araştırma hazırlamaktayım. Bu araştırmanın sonuçları, derslerin işlenişini geliştirmek adına bilgi edinmemizi sağlarken gelecekte yapılacak araştırmalara da ışık tutacaktır.

Araştırma yedi adet formun doldurulmasından oluşmaktadır. Bu formların doldurulması 30 ile 40 dakika arası bir sürede gerçekleştirilecektir. Öğrenciler formları bir ders saatinde, isim belirtmeksizin dolduracaktır ve toplanan bilgiler gizli tutulacaktır. Formların tamamlanmış şekli sadece araştırmacı tarafından görülebilecektir. Öğrencinin adı araştırmanın rapor edilmesi sürecinde kullanılmayacaktır. Bu çalışmanın öğrenci notlarına bir etkisinin olmayacağının garantisini veriyorum. Öğrenci veri toplama aşamasında araştırmadan ayrılma seçeneğine sahiptir.

Lütfen bu formu doldurarak en geç 13 Kasım Cuma gününe kadar okula gönderiniz. Formlar öğrenci tarafından sınıf öğretmenlerine teslim edilmelidir.

Sorularınız için aşağıdaki e-posta adresinden benimle iletişime geçebilirsiniz:

leylauzun83@gmail.com

Saygılar,

Leyla Goldfinger

Yukarıda belirtilen araştırmanın detaylarını okudum ve çocuğumun bu çalışmaya, belirtilen koşullar altında katılmasına izin veriyorum.

Veli İmzası: _____

Öğrenci Adı: _____

Tarih:_____

APPENDIX E: MEB PERMISSION LETTER

FORM:2

T.C.
MİLLİ EĞİTİM BAKANLIĞI
Yenilik ve Eğitim Teknolojileri Genel Müdürlüğü

ARAŞTIRMA DEĞERLENDİRME FORMU

ARAŞTIRMA SAHİBİNİN

Adı Soyadı	Leyla GOLDFİNGER
Kurumu / Üniversitesi	Bilkent Üniversitesi
Araştırma yapılacak iller	Erzurum
Araştırma yapılacak eğitim kurumu ve kademesi.	İDV Özel Bilkent Erzurum Laboratuar Lisesi, Çat Yolu, Erzurum
Araştırmanın konusu	Öğretmenin Motive Etme Şeklinin ve Öğrencinin Sahip Olduğu Motivasyonun Kalitesinin Lise Matematik Derslerindeki Öğrenci Başarısı İle İlişkisi
Üniversite / Kurum onayı	Kurum Onayı İle
Araştırma / Proje /ödev / Tez önerisi	Araştırma
Veri toplama araçları	Uygulama Anketi
Görüş İstenilecek Birim / Birimler.	

Milli Eğitim Bakanlığı Yenilik ve Eğitim Teknolojileri Genel Müdürlüğü'nün Araştırma, Yarışma ve Sosyal Etkinlik İzinleri konulu 2012/13 nolu genelge doğrultusunda yapılan incelemede araştırmanın kabulüne karar verildi.

Komisyon Kararı	Oybirliği ile Kabulüne
Muhalif Üyenin Adı ve Soyadı	

KOMİSYON

1.10.2013

Komisyon Başkanı
Çiğdem HOŞER
Şube Müdürü

Üye
Tunç AĞAVER

Üye
Mesut ARAS