THE INTERPLAY OF STUDENTS' PERCEPTIONS OF CLASSROOM GOAL STRUCTURES, PERSONAL GOAL ORIENTATIONS AND LEARNING RELATED VARIABLES

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Prof. Dr. Sencer AYATA
Director

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

Prof. Dr. Hamide ERTEPINAR
Head of Department

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

Assoc. Prof. Dr. Ceren TEKKAYA
Supervisor

Examining Committee Members

Prof. Dr. Giray BERBEROĞLU	(METU, SSME)	
Assoc. Prof. Dr. Ceren TEKKAYA	(METU, ELE)	
Assoc. Prof. Dr. Jale ÇAKIROĞLU	(METU, ELE)	
Assist. Prof. Dr. Semra SUNGUR	(METU, ELE)	
Dr. Ömer Faruk ÖZDEMİR	(METU, SSME)	

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Name, Last name: Yasemin TAŞ

Signature:

ABSTRACT

THE INTERPLAY OF STUDENTS' PERCEPTIONS OF CLASSROOM GOAL STRUCTURES, PERSONAL GOAL ORIENTATIONS AND LEARNING RELATED VARIABLES

TAŞ, Yasemin
M.S., Department of Elementary Science and Mathematics Education
Supervisor: Assoc. Prof. Dr. Ceren TEKKAYA

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The purpose of the study was to investigate relationships among 7th grade students' personal goal orientations, perceptions of classroom goal structure, and learning related variables of efficacy, self-handicapping strategies, cheating behavior, and science achievement.

This study was carried out during 2006-2007 spring semester at 12 public elementary schools in Keçiören, Ankara. A total of 1950 seventh grade students from 62 classrooms participated in the study. Data were collected through Patterns of Adaptive Learning Scales and Science Achievement Test.

Hierarchical Linear Modeling (HLM) analyses were conducted due to the nested structure of data. Results revealed that students who demonstrated high efficacy, high science achievement, low cheating behavior, and low self-handicapping strategies, which were all adaptive learning patterns, had higher mastery goal orientations. Findings regarding performance-approach goal oriented students, focusing on demonstrating their ability, however, were not as straightforward. Performance approach goals were associated with high efficacy and high demonstration of cheating behavior. Class level analyses, on the other hand, revealed that students' perception of the classroom goal structure was a significant predictor of personal goal orientations they adopted. While learning environments emphasizing understanding of the material and self-improvement promoted students' adoption of mastery goals; learning environments focusing on performance and relative ability of students promoted students' adoption of performance-approach goals. The current study, thus, demonstrated the influence of goal structure of the learning environment on students' personal goal orientations which in turn found to be related with various learning related variables.

Keywords: Personal Goal Orientations, Classroom Goal Structures, Efficacy, Self-Handicapping Strategies, Cheating Behavior, Science Achievement, Hierarchical Linear Modeling.

ÖZ

ÖĞRENCİLERİN ÖĞRENME ORTAMI HEDEF ALGILARI, KİŞİSEL HEDEF YÖNELİMLERİ VE ÖĞRENME İLE İLGİLİ DEĞİŞKENLER ARASINDAKİ İLİŞKİ

TAŞ, Yasemin
Yüksek Lisans, İlköğretim Fen ve Matematik Alanları Eğitimi Bölümü
Tez Yöneticisi: Doç. Dr. Ceren TEKKAYA

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Bu çalışmanın amacı 7. sınıf öğrencilerinin kişisel hedef yönelimleri, öğrenme ortamı hedef algıları ve öğrenme ile ilgili değişkenler olan akademik yeterlilik, akademik olarak kendini engelleme stratejileri, kopya çekme davranışı ve fen başarısı arasındaki ilişkilerin incelenmesidir.

Araşırma 2006-2007 öğretim yılı bahar döneminde Ankara ili Keçiören ilçesinde bulunan 12 devlet ilköğretim okulunun 62 sınıfında okuyan toplam 1950 yedinci sınıf öğrencisi ile gerçekleştirilmiştir. Veriler, Uyumsal Öğrenme Modeli Ölçeği ve Fen Testi ile toplanmıştır.

Hiyerarşik Lineer Modelleme (HLM) analizi kullanılarak öğrencilerin kişisel hedef yönelimlerindeki farklılıklar, öğrenme ile ilgili değişkenler ve öğrenme ortamı hedef algıları ile açıklanmaya çalışılmıştır. Öğrenme hedef yönelimi için geliştirilen modele gore, akademik yeterliliği ve fen başarısı yüksek olan, kopya çekme ve kendini engelleme stratejilerine az başvuran öğrencilerin öğrenme hedef yönelimlerinin yüksek olduğu görülmüştür.

Performans-yaklaşım hedef yönelimi için geliştirilen model ise, akademik yeterliliği ve kopya çekme davranışı yüksek olan öğrencilerin performans-yaklaşım hedef yönelimlerinin de yüksek olduğunu göstermiştir. Sınıf boyutundaki analizler, öğrencilerin öğrenme ortamı hedef algılarının, onların kişisel hedef yönelimlerini anlamlı ölçüde tahmin edebildiğini göstermiştir. Konunun anlaşılmasının ve kişisel gelişimin öneminin vurgulandığı öğrenme ortamlarının öğrencilerin öğrenme hedef yönelimlerini desteklediği, performansın ve yeteneklerin ön planda tutulduğu öğrenme ortamlarının ise öğrencilerin performans-yaklaşım hedeflerine yöneldiği görülmüştür. Bu çalışmada, öğrencilerin sınıf hedef algılarının, kişisel öğrenme yönelimlerine olan etkileri ile bu hedef yönelimlerinin ve öğrenme ile ilgili değişkenlerin arasındaki ilişki bulunmuştur.

Anahtar sözcükler: Kişisel Hedef Yönelimleri, Sınıf Ortamı Hedef Algıları, Akademik Yeterlilik, Akademik Olarak Kendini Engelleme Stratejileri, Kopya Çekme Davranışı, Fen Başarısı, Hiyerarşik Lineer Modelleme.

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LIST OF ABBREVIATIONS

GENDER	: Gender of Students
EFFI	: Efficacy
HANDI	: Self-Handicapping Strategies
CHEAT	: Cheating Behavior
ACHIEV	: Science Achievement
MGO	: Mastery Goal Orientation
PApGO	: Performance-Approach Goal Orientation
PAvGO	: Performance-Avoid Goal Orientation
CMGS	: Classroom Mastery Goal Structure
CPApGS	: Classroom Performance-Approach Goal Structure
CPAvGS	: Classroom Performance-Avoid Goal Structure
PALS	: Patterns of Adaptive Learning Scales
SAT	: Science Achievement Test
HLM	: Hierarchical Linear Modeling

CHAPTER I

INTRODUCTION

Motivation is an important area for educational research since it is in the center of teaching and learning. Individuals' choices of what to do, their determinations in those choices and the quality of their behavior are in the concern of motivation researchers (Maehr & Meyer, 1997). Pintrich and Schunk (2002) defined motivation as "the process whereby goal-directed activity is instigated and sustained" (p. 5). As referred in the definition, motivation entails goals that supply drive for action. One of the theories of motivation is achievement goal theory (Ames, 1992; Dweck, 1986; Nicholls, 1984) which is presently one of the most active areas of achievement motivation studies (Pintrich, Conley, & Kempler, 2003; Urdan, 2004a). The theory concerns students' reasons or purposes for engaging the achievement behavior. For instance, a student's purpose in an achievement setting can be to extend understanding and improve skills, to look smart and show competence, or to avoid appearing incompetent. These personal goal orientations are referred as mastery goal orientation, performance-approach goal orientation, and performance-avoid goal orientation, respectively. Beside students' reasons why they want to achieve the task, the theory concerns the type of standards by which individuals evaluate their performance, such as self-referenced standards, like self-improvement or normatively-based standards, like comparisons relative to others (Pintrich, 2000a).

Research evidence indicated that goal orientations have associations with cognitive, affective, and behavioral student outcomes (Anderman & Midgley, 2004). Generally, it was found that students who are mastery goal oriented demonstrate adaptive patterns of behavior such as higher levels of cognitive engagement, higher academic efficacy, higher levels of self-regulated learning, and lower levels of applying avoidance strategies, lower levels of disruptive behavior. In contrast, students with performance-avoid goal orientations often demonstrate maladaptive patterns of behavior such as less cognitive engagement, lower levels of academic efficacy, higher levels of test anxiety, higher levels of applying avoidance strategies, and higher levels of disruptive behavior (Anderman & Maehr, 1994; Elliot & Harackiewicz, 1996; Kaplan, Gheen, & Midgley, 2002; Maehr & Midgley, 1991; Middleton & Midgley, 1997). Empirical evidence for performance-approach goal orientation, however, is not as consistent as for mastery and performance-avoid goal orientations (Shih, 2005); showing relations with both adaptive and maladaptive student outcomes, or showing no significant relationship in different studies (Kaplan et al., 2002). For instance, Kaplan et al. found that students with performance-approach goal orientation showed higher levels of disruptive behavior whereas, Skaalvik's (1997) study revealed that performance-approach goal orientation was associated with achievement, self-perceptions, and intrinsic motivation. On the other hand, Middleton and Midgley (1997) found no relationship between performance-approach goal orientation and variables of academic efficacy, self-regulated learning, avoiding seeking help and text anxiety. These mixed results imply that there is a need for more research to identify the associations between performance-approach goal orientations and learning related variables (Pintrich & Schunk, 2002; Pintrich et al., 2003).

Another important aspect of achievement goal theory is the role of context, which is students' learning environment, in influencing students' pursuing of achievement goals (Linnenbrink, 2004). According to the theory, students' perceptions of the goal structure of the classroom have influence on students' adoption of personal goal orientations (Ames, 1992). Through instructional practices, such as emphasizing the importance of understanding the material and self-improvement, or emphasizing competition among students and making normative evaluations, teachers convey messages to students about the purposes of instruction. These messages are interpreted by students and form their perception of classroom goal structure (Anderman & Midgley, 2004). The relation between perceived classroom goal structure and students' goal adoption was supported by research evidence (e.g., Church, Elliot & Gable; 2001, Roeser, Midgley & Urdan, 1996). In fact, the belief that making some changes in learning environment can influence students' personal goal orientations puts achievement goal theory in an important place in school reform efforts, since altering specific features of the context are considered to affect students' personal goal orientations which in turn is related with various students outcomes (Linnenbrink, 2004).

1.1 Significance of the Study

The present study intended to explore how students' personal goal orientations relate to their efficacy, self-handicapping strategies, cheating behavior, and science achievement, and also to explore whether students' perception of their science classroom goal structure can be used to explain their personal goal orientations. Previous studies produced mixed results concerning the relations between personal goal orientations, particularly performance-approach goal orientation, and motivational beliefs and behaviors. The association between mastery goal orientation and achievement has not clearly established, either. To date, no research has been found investigating the associations between Turkish students' personal goal orientations concomitantly with perceived classroom goal structure by using hierarchical linear modeling techniques. Thus, the present study aims to contribute our understanding of the relations among classroom goal structures, personal goal orientations, and various learning related variables. This study is also an attempt to clarify regarding relationships in Turkish cultural context by using multilevel analysis techniques by providing research evidence. Furthermore, investigating the influence of classroom goal structures on students' personal goal orientations will provide science teachers with information how to improve science learning environment in the light of achievement goal theory.

1.2 Definition of Important Terms

1. Personal Goal Orientations

Personal goal orientations involve students' reasons for employing academic behavior (Midgley et al., 2000) in science. In the present study, three goal orientations of mastery, performance-approach and performance-avoid goal orientations were measured.

1.1. Mastery Goal Orientation

Students were asked about their reasons for engaging in academic behavior as developing competence, extending their understanding, and improving their skills measured by Mastery Goal Orientation subscale of the Patterns of Adaptive Learning Scales (PALS) developed by Midgley et al. (2000).

1.1.2 Performance-Approach Goal Orientation

Students were asked about their reasons for engaging in academic behavior as demonstrating their competence, especially in comparison to the other students in the class measured by Performance-Approach Goal Orientation subscale of PALS.

1.1.3 Performance-Avoid Goal Orientation

Students were asked about their reasons for engaging in academic behavior as avoiding the demonstration of incompetence measured by Performance-Avoid Goal Orientation subscale of PALS.

2. Perception of Classroom Goal Structure

Perception of classroom goal structure refers to "students' perceptions of the purposes for engaging in academic work that are emphasized in the classroom" (PALS, 2000, p. 17) in the science lesson. In the present study, three classroom goal structures of classroom mastery goal structure, classroom performance-approach goal structures and classroom performance-avoid goal structures were measured.

2.1 Classroom Mastery Goal Structure

Students were asked about their "perceptions that the purpose of engaging in academic work in the classroom is to develop competence" (PALS, 2000, p. 17) measured by Classroom Mastery Goal Structure subscale of PALS.

2.2 Classroom Performance-Approach Goal Structure

Students were asked about their "perceptions that the purpose of engaging in academic work in the classroom is to demonstrate competence" (PALS, 2000, p. 18) measured by Classroom Performance-Approach Goal Structure subscale of PALS.

2.3 Classroom Performance-Avoid Goal Structure

Students were asked about their "perceptions that the purpose of engaging in academic work in the classroom is to avoid demonstrating incompetence" (PALS, 2000, p. 19) measured by Classroom performance-Avoid Goal Structure subscale of PALS.

3. Learning Related Variables

Learning related variables in the concern of the study are efficacy, self-handicapping strategies, and cheating behavior.

3.1 Efficacy

Students were asked about their "perceptions of their competence to do their class work" (PALS, 2000, p. 20) in science measured by Academic Efficacy subscale of PALS.

3.2 Self-Handicapping Strategies

Students were asked about their "strategies that are used by students so that if subsequent performance is low, those circumstances, rather than lack of ability, will be seen as the cause" (PALS, 2000, p. 22) in science measured by Academic Self-Handicapping Strategies subscale of PALS.

3.3 Cheating Behavior

Students were asked about their "use of cheating in class" (PALS, 2000, p. 25) in science measured by Cheating Behavior subscale of PALS.

4. Science Achievement

Students' science achievement was measured by their performance on the Science Achievement Test (SAT).

1.3 Purpose of the Present Study

The present study aims to investigate relationships among 7th grade students' personal goal orientations, perceptions of classroom goal structure, and some of the learning related variables. Those learning related variables in the concern of the study are efficacy, self-handicapping strategies, cheating behavior, and science achievement specifically. The study explores how students' personal goal orientations relate to their efficacy, self-handicapping strategies, cheating behavior, and science achievement. Besides, classroom goal structures are examined whether they predict personal goal orientations students pursue and also the strength of associations between personal goal orientations and student level variables.

For each personal goal orientation, following research problems are addressed:

1. Are there differences in students' personal goal orientations among classrooms?
2. Which of the classroom goal structures are associated with students' personal goal orientations?
3. Which of the student level variables help to explain the difference in students' personal goal orientations?
4. Do classroom goal structures significantly predict personal goal orientations students adopt and also the strength of association between personal goal orientations and student level variables?

In order to answer the research problems, one-way ANOVA with random effects, means-as-outcomes regression, random-coefficients regression, and intercepts- and slopes-as-outcomes models are developed, respectively.

CHAPTER II

LITERATURE REVIEW

This chapter is devoted to a literature review that describes the theoretical background, research on the relationships between personal goal orientations and classroom goal structure, and research on the relationships among learning related variables, personal goal orientations, and classroom goal structures.

2.1 Theoretical Background

Achievement goal theory (Ames, 1992; Dweck, 1986; Nicholls, 1984) is presently one of the most active areas of achievement motivation (Pintrich et al., 2003; Pintrich & Shunk, 2002; Urdan, 2004a). According to the theory, goal orientations students pursue form the framework within which individuals construe and respond to events (Dweck & Leggett, 1988). Achievement goal theory focuses on the purposes of individuals for employing the achievement behavior, in other words, it concerns the reasons of students why they trail achievement tasks. Other than purposes or reasons for appointing the achievement behavior, the theory concerns the type of standards by which individuals evaluate their performance (Pintrich, 2000a).

There are thought to be two main goal constructs students are oriented toward: mastery goals and performance goals (Ames, 1992).[1] Students who

[1] Researchers have used different labels for the same constructs of achievement motivation (Pintrich et al., 2003). For example, mastery goals also have been called as task-focused goals (Maehr & Midgley, 1991) and learning goals (Dweck & Leggett, 1988) while performance goals have been called as ability-focused goals (Maehr & Midgley, 1991) and relative-ability goals (Midgley et al., 1998). Among these terms, mastery and performance goals have been mostly used (Pintrich et al., 2003) and they will be used as labels through out this study.

adopt mastery goals value learning itself and are concerned with improving their competence. Skill development is important for those students. With the belief that effort will guide to success they are more probably to work hard and persevere with learning activities. They prefer demanding tasks and set self-referenced standards (Ames, 1992; Maehr & Midgley, 1991; Meece, Blumenfeld, & Hoyle, 1988). On the other hand, students who adopt performance goals see learning as a way of demonstrating ability relative to others. Public recognition that one is performing better than others is important for those students. They aim to exceed normatively-based standards (Ames, 1992; Ames & Archer, 1988; Meece et al., 1988). Conventionally, mastery goals have been related with more adaptive patterns while performance goals have been related with less adaptive patters (Ames, 1992).

Beside mastery-performance distinction of goal orientations, recent studies have focused on the achievement goal theory from the approach-avoid perspective (e.g., Middleton & Midgley, 1997; Skaalvik, 1997). Middleton and Midgley (1997) discusses that these two goal orientations of improving competence (mastery goal orientation) and demonstrating ability (performance goal orientation) are *approach* motivational tendencies of motivation. However, motivation has been portrayed by theorists regarding both approach and avoidance tendencies (e.g. Atkinson & Feather, 1966). Atkinson and Feather (1966) explains achievement motivation as following:

> …The theory identifies the mainsprings of action as an individual is confronted with the challenge to achieve and the threat of failure that are both present whenever his ability is put to the test and when there is some degree of uncertainty about whether he will succeed or fail... (p. v).

Therefore, the desire to accomplish or to avoid failure can motivate people. For some of the individuals, for example, avoiding from being negatively judged or looking stupid may be more important (Middleton & Midgley, 1997). There is plenty of research evidence supporting division of performance goals into approach and avoid dimensions (e.g., Elliot & Harackiewicz, 1996; Skaalvik, 1997; Middleton & Midgley, 1997), but this is not true for mastery goals (Pintrich & Shunk, 2002). Accordingly, for students with performance-approach goal orientation, it is important to demonstrate superior abilities whereas performance-avoid goal oriented students are concerned with avoiding looking incompetent and being negatively evaluated by others (Skaalvik, 1997). Pintrich (2000b, p. 477) also posits approach and avoid dimensions of mastery goals and summarizes features of each goal orientation in a 2 x 2 model as in Table 2.1. He mentions that some students may be more "perfectionistic" who are concerned with avoiding misunderstanding and doing the task wrongly (mastery-avoid goal oriented).

Table 2.1 Two goal orientations and their approach and avoidance forms

	Approach Focus	Avoidance Focus
Mastery orientation	Focus on mastering task, learning, understanding	Focus on avoiding misunderstanding, avoiding not learning or not mastering task
	Use of standards of self-improvement, progress, deep understanding of task	Use of standards of not being wrong, not doing it incorrectly relative to task
Performance orientation	Focus on being superior, besting others, being the smartest, best at task in comparison to others	Focus on avoiding inferiority, not looking stupid or dumb in comparison to others
	Use of normative standards such as getting best or highest grades, being top or best performer in class	Use of normative standards of not getting the worst grades, being lowest performer in class

Although there are some other studies which suggest the advantage of 2 x 2 achievement goal model (mastery-approach, mastery-avoid, performance-approach, performance-avoid) over trichotomous model (mastery, performance-approach, performance-avoid) (e.g., Elliot & McGregor, 2001), presence of mastery-avoid goal orientation theoretically is ambiguous and little empirical research has been made on a mastery-avoid goal orientation (Anderman et al, 2003; Pintrich & Shunk, 2002). In the present study, the focus is on mastery, performance-approach, and performance-avoid goal orientations, which is the trichotomous goal framework.

Research evidence indicated that goal orientations have associations with cognitive, affective, and behavioral student outcomes (Anderman & Midgley, 2004). Generally, research findings revealed that students who are mastery goal oriented demonstrate adaptive patterns of behavior such as higher levels of cognitive engagement, higher academic efficacy, higher levels of self-regulated learning, and lower levels of applying avoidance strategies, lower levels of disruptive behavior. In contrast, students with performance-avoid goal orientations often demonstrate maladaptive patterns of behavior such as less cognitive engagement, lower levels of academic efficacy, higher levels of text anxiety, higher levels of applying avoidance strategies, and higher levels of disruptive behavior (Anderman & Maehr, 1994; Elliot & Harackiewicz, 1996; Kaplan, Gheen, & Midgley, 2002; Maehr & Midgley, 1991; Middleton & Midgley, 1997). However, empirical evidence for performance-approach goal orientation is not as consistent as for mastery and performance-avoid goal orientations (Shih, 2005); showing relations with both adaptive and maladaptive student outcomes, or showing no significant relationship in different studies (Kaplan et al., 2002). For instance, Kaplan et al. found that students with performance-approach goal orientation showed higher levels of disruptive behavior whereas, Skaalvik’s (1997) study revealed that performance-approach goal orientation was associated with achievement, self-perceptions, and intrinsic motivation. On the other hand, Middleton and Midgley (1997) found no relationship between performance-approach goal orientation and variables of academic efficacy, self-regulated learning, avoiding seeking help and text anxiety.

These inconsistent results imply that there is a need for more research to identify the associations between performance-approach goal orientations and learning related variables (Pintrich & Schunk, 2002; Pintrich et al., 2003).

The probable benefits of performance-approach goals have directed researchers to study multiple goals (high mastery – high performance-approach) versus mastery goals in order to find out the most adaptive goal profile (Linnenbrink, 2004). For example, Barron and Harackiewicz's (2001) conducted a correlational study with 166 undergraduate students to examine the relations between students' goal orientations and interest in math and performance in mathematics. The study involved a 45 minutes learning session on multiplying two-digit numbers together with a different technique. Students were surveyed on their goal orientations and interest in mathematics. In addition, students took a follow-up assessment in which they solved problems with the new technique. Multiple regression analyses revealed that mastery goal was positive significant predictor of interest measures of freetime ($\beta = .22$, $p < .05$), enjoyment ($\beta = .39$, $p < .05$), and inclination ($\beta = .31$, $p < .05$), whereas performance goal was nearly a significant predictor of students' performance on the follow-up assessment ($\beta = .10$, $p < .06$). Accordingly, they suggested that both mastery and performance goals can be beneficial, favoring a multiple goal perspective.

Using self-report questionnaires, Pintrich (2000c) gathered three waves of data from 150 students when they are in eight and ninth grades. He divided students into four groups: high-mastery/high-performance students, high-mastery/low-performance students, low-mastery/high-performance students, and low-mastery/low-performance students. Motivational beliefs, affect, strategy use and classroom performance were the outcomes of interest. Repeated measures ANOVA results indicated that high-mastery/high-performance group and high-mastery/low-performance group were very similar in terms of most of the outcome variables and for some of the outcome variables high-mastery/high-performance group was superior. He concluded that “In line with normative goal theory, mastery goals were adaptive; but also in line with the revised goal theory perspective, approach performance goals, when coupled with mastery goals, were just as adaptive” (p. 544).

Similar to Pintrich, Shih (2005) also divided students into four groups by using median splits of students’ goal orientations. During regular class time, 198 sixth grade Taiwanese students completed a questionnaire composed of subscales from Achievement Goal Questionnaire (Elliot & Church, 1997) and Motivated Strategies for Learning Questionnaire (Pintrich & De Groot, 1990). ANOVA analyses revealed that students in high-mastery/high-performance approach and high-mastery/low-performance approach groups reported significantly higher scores on cognitive strategy use and intrinsic value than the students in other groups. With regard to students’ test anxiety scores, none of the groups were significantly different from each other.

However, there are some other researchers in the achievement goal orientation field who do not support advantages of adopting multiple goals (e.g. Kaplan & Middleton, 2002; Midgley, Kaplan & Middleton, 2001). Midgley et al. (2001) argue that the positive effects of performance-approach goals have been revealed in certain cases. Specifically, they mention that performance-approach goals may be found to be related with particular positive outcomes such as achievement but not with others such as meaningful learning and retention; positive relations between performance-approach goals and positive outcomes may be found for subjects with particular characteristics such as high ability but not necessarily for other students; and positive relations between performance-approach goal orientation and positive outcomes may be found in particular contexts where there may be an advantage of pursing performance-approach goals such as competitive college classrooms (Kaplan & Middleton, 2002). By stating “performance goals may be adaptive for certain students in certain circumstances as long as mastery goals are also high” (p.83) Midgley et al. (2001) concluded that there is no need for the revision of achievement goal theory. Wolters’ (2004) findings also failed to support multiple goal perspective. Five hundred and twenty five American junior high school students with a mean age of 13.2 years participated in the study. Some of the survey items were adapted from PALS (Midgley et al., 1998), Pintrich et al. (1993), and other items were designed by the researcher. He investigated how goal structures and goal orientations were related to students’ motivation, cognition, and achievement. They found that mastery goal orientation and mastery goal structure were associated with adaptive outcomes and no relationship was found between pursing multiple goals and adaptive student outcomes.

In a recent study, Linnenbrink (2005) investigated how mastery goal perspective (normative perspective) and multiple goal perspective relate with twelve student outcomes, namely, self-efficacy, interest, utility, positive affect, negative affect, test anxiety, adaptive help seeking, expedient help seeking, avoidant help seeking, quantity self-regulation, quality self-regulation, achievement in order to shed light on the most adaptive goal pattern. Totally 237 students from 10 classrooms of fifth and sixth grades in three elementary schools in America participated in the study. Analysis results indicated that mastery goals were beneficial for eleven of the outcomes whereas both mastery and performance-approach goal were beneficial only for one of the outcomes (positive affect). Performance-approach goals were deleterious for achievement and test anxiety and no significant relationship was found for the remaining outcomes. Therefore, the study findings revealed that mastery goal perspective was more adaptive than multiple goal perspective. One important point is that both normative goal perspective and multiple goal perspective agree on the harmful effects of performance-avoid goals. The issue of discussion and the proposed revision is on the effects of performance-approach goal orientations (Pintrich & Schunk, 2002).

Another important aspect of achievement goal theory is the role of context, which is students' learning environment, in shaping students' goal orientations (Linnenbrink, 2004). According to the theory, students' perceptions of the goal structure of the classroom have influence on students' adoption of personal goal orientations (Ames, 1992). Goals are dynamic states and can change in reaction to certain features of the learning environment as well as internal feedback. Different goals can be activated as response to situational information. For example, a student in a highly competitive classroom environment may activate a performance goal orientation while the same student may activate a mastery goal orientation in a less competitive learning environment when learning individually (Pintrich, 2000a). In fact, the thought that making some changes in learning environment can influence students' personal goal orientations puts achievement goal theory in an important place in school reform efforts, since altering specific features of the context are considered to affect students' personal goal orientations which in turn is related with various students outcomes (Linnenbrink, 2004).

2.2 Research on the Relationships between Personal Goal Orientations and Classroom Goal Structure

With the belief that circumstantial requirements can have effect on prominence of particular goals which in turn give rise to different student outcomes, Ames and Archer (1988) investigated how students' perceptions of the classroom goals were associated with their learning strategies and motivational processes. A total of 176 students attending 8-11 grades participated in the study. Regression analysis indicated that students who perceived mastery goals as salient in their classrooms were more likely to prefer challenging tasks, had a more positive attitude toward the class, and attributed success to effort. On the other hand, students who perceived an emphasis on performance goals were concentrated on their ability and attributed failure to their inability. The study favored mastery goal emphasis in the classroom as it was found to associate with more adaptive motivational patterns.

The relation between perceived classroom goal structure and students' goal adoption was supported in Roeser, Midgley and Urdan's (1996) survey study. They collected two waves of data from 296 students when they were in sixth and eight grades. Measures used in the study included scales from PALS (Midgley et al., 1996), Positive Affect Scale (Wolters, Garcia & Pintrich, 1992), and a scale developed by Eccles et al. (1993). Regression analyses revealed that students' perception of school performance goal structure was the strongest predictor of students' personal performance goal orientation (β= .40, $p\leq$ .01) while students' perception of school mastery goal structure was the strongest predictor of students' personal mastery goal orientation (β= .34, $p \leq$ .01).

Later, Church, Elliot and Gable (2001) investigated the relations among perception of classroom goal structure, students' personal goal orientations, intrinsic motivation and graded performance. Totally 208 undergraduates from nine chemistry classes in an American university participated in the study. Perceived classroom environment measures was adapted from Ames and Archer (1988), Fraser and Fisher (1986), and Winston et al. (1994), and also from the scale developed by the researcher for the study. Principal-components factor analyses with varimax rotation revealed the presence of three hypothesized perceived classroom environment of lecture engagement, evaluation focus, and harsh evaluation. Achievement goals scale was taken from Elliot and Church (1997) achievement goal questionnaire. Hierarchical

Linear Modeling (HLM) analyses supported that perceived classroom goal structure was related to students' personal goal orientations. Specifically, it was found that for mastery goal orientation, lecture engagement was a positive predictor (γ_{10}= .34, p< .05), while evaluation focus (γ_{10}= -.38, p< .05) and harsh evaluation (γ_{10}= -.23, p< .05) were negative predictors. For performance avoid goal orientation, evaluation focus and harsh evaluation were positive predictors. Lastly for performance approach goal orientation, evaluation focus was a positive predictor (γ_{10}= .50, p< .05) while other goal structures were not significant predictors. Therefore studies suggest that learning environment's characteristics may promote students' adoption of particular goal orientations (Linnenbrink, 2004).

2.3 Research on the Relationships between Learning Related Variables, Personal Goal Orientations, and Classroom Goal Structure

In this part, research on how each of the selected learning related variable namely, efficacy, self-handicapping strategies, cheating behavior, and science achievement, relates with students' personal goal orientations and perceived classroom goal structure is reviewed. Some of the related studies did not make distinction in approach and avoidance dimensions of performance goal and they referred them as performance goals. Other studies, however, distinguished two dimensions for performance goals and they used performance-approach and performance-avoid goal terms.

2.3.1 Efficacy, Personal Goal Orientations, and Classroom Goal Structure

Research evidence suggests that there are links between students' efficacy beliefs and their goal orientations. Generally, it was found that mastery goal orientation had positive relationship with academic efficacy (e.g., Anderman & Young, 1994; Middleton & Midgley, 1997; Wolters, Yu & Pintrich., 1996). However, the relation between performance goals and academic efficacy is not as clearly established. For example, Anderman and Young (1994) examined students' motivation and strategy use in science with a sample of 678 sixth and seventh graders, and 24 science teachers. Data were collected through Patterns of Adaptive Learning Scales (PALS; Midgley et al., 1993). HLM analyses indicated a positive relation between students' self-efficacy at science and their mastery goal orientations ($\gamma = .19$, $p < .001$). In another study, Middleton and Midgley (1997) explored the relations between students' (N = 703, 6^{th} grade) personal goal orientations and some of the educationally relevant variables specific to mathematics domain. Scale items were taken from Patterns of Adaptive Learning Survey (PALS; Midgley et al., 1996), Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich et al., 1991), and measures developed by Zimmerman and Martinez-Pons (1988). Regression equations showed that mastery goal orientation positively predicted academic efficacy ($\beta = .43$, $p < .001$) while performance-avoid goal orientation negatively predicted academic efficacy ($\beta = -.13$, $p < .01$). Performance-approach goal orientation, on the other hand, was not a significant predictor of academic efficacy ($\beta = .06$, $p > .05$).

In contrast to Middleton and Midgley's (1997) research findings, Wolters et al. (1996) and Skaalvik (1997) indicated the relationship between performance-approach goal orientation and self-efficacy. Wolters et al. (1996) examined 434 seventh and eight grade students' goal orientations and their motivational beliefs and self regulated learning in a correlational study. Two waves of data were collected at the beginning and at the end of school year. The scale items were designed by using PALS (Midgley et al., 1996) and MSLQ (Pintrich & De Groot, 1990, Pintrich et al., 1993). Regression analyses revealed that adopting performance-approach goals resulted in higher levels of self efficacy. Skaalvik (1997) studied with sixth and eight grade Norwegian students and investigated how performance-approach and performance-avoid goal orientations were related to some of the student related outcomes. Variables of the study were measured by scales that were developed by the author and also by scales from Norwegian version of Self Description Questionnaire (SDQ-II; Marsh, 1990), Zimmerman, Bandura, and Martinez-Pons (1992), and Skaalvik and Rankin (1995). Multiple regression analysis revealed that while performance-approach goal orientation was positively related to self-efficacy for school work (β= .25, p < .001), performance-avoid goal orientation was negatively related to it (β= -.29, p < .001).

Research also indicated that the goal structure emphasized in the learning environment influence students' academic efficacy. For example, in a study described previously, Roeser et al., (1996) investigated the association between perception of school goal structure and students' academic efficacy. Regression analyses showed that students' perception of a mastery goal structure in the school was positively related to students' academic efficacy mediated through students' mastery goal orientation while perception of school performance goal structure was not significantly related to it. They suggested that school environments that stressed effort and individual progress were associated with more positive patterns than school environments that stressed relative ability and competition.

2.3.2 Self-Handicapping Strategies, Personal Goal Orientations, and Classroom Goal Structure

Several studies indicated that students' personal goal orientations have links with students' engagement in avoidance behaviors, such as, the use of self-handicapping strategies, the avoidance of help-seeking, and avoidance of novelty (e.g. Midgley & Urdan, 2001; Turner et al., 2002).

In one of the studies, Midgley and Urdan (2001) investigated the relations among students' personal goal orientations, perceptions of the classroom goal structure, and reports of the use of self-handicapping strategies in a survey study. Data were collected via PALS (Midgley et al., 1997). Totally 484 seventh grade students from nine middle schools were surveyed specific to mathematics domain. Multiple regression analysis indicated that mastery goal orientation was negatively associated with handicapping (β= -.17, p< .001). On the other hand, performance-avoid goal orientation was positively associated with handicapping (β= .30, p< .001), whereas performance-approach goal orientation was not significantly related (β= -.07, p> .05). Independent of personal goal orientations, perceptions of classroom mastery goal structure was negatively related to handicapping (β= -.09, p< .05) whereas perception of classroom performance goal structure was positively related to handicapping (β= .15, p< .001).

In a longitudinal study, Urdan (2004b) examined students' performance goal orientations as the predictors of academic self-handicapping. Data were collected from 675 high school students over 2 academic years by using the scales developed by the researcher and scales from PALS (Midgley et al., 2000) specific to English domain. Regression analysis were conducted and it was found that performance-avoid goals were positively related to students' use of self-handicapping strategies whereas performance-approach goals were negatively related to self-handicapping. Study results concerning the association between classroom performance goal structure and self-handicapping revealed that students' perceptions of classroom performance goal structure were positively related to students' use of self-handicapping strategies.

In a separate study, Turner et al. (2002) investigated how students' perceptions of the classroom goal structure were related to their use of avoidance strategies. The study included 1092 sixth grade students from 10 classrooms of 10 schools. Data were collected via scales from Ryan et al., (1998), Ryan & Pintrich (1997), and PALS (Midgley et al., 2000). In order to consider both student level and classroom level variables concomitantly

HLM analyses were used. Results revealed that perception of mastery goal structure in the classroom, that is understanding and effort is stressed, resulted in less use of avoidance strategies. However, no relationship was found between perception of performance goal structure and higher reports of avoidance behaviors, which was opposite to what the researchers had predicted. They suggested that a scale which differentiates students' perception of approach and avoidance performance goal structure might be more useful in predicting avoidance strategies.

2.3.3 Cheating Behavior, Personal Goal Orientations, and Classroom Goal Structure

Most of the reviewed research on cheating used university students as participants. Newstead and his colleagues (1996) investigated prevalence and causes of cheating on a sample of 943 university students in the United Kingdom. Subjects completed a questionnaire asking which cheating behaviors they had carried out. From the responses of students to those cheating behaviors, researchers formed a cheating index. In addition, students were asked in an open-ended question about their reasons for studying and then students' answers were categorized. Multivariate analysis of variance (MANOVA) was conducted. Results showed that students who were studying for "personal development" reported lowest scores on cheating index. Students studying to "get a better job" reported intermediate scores on the index. On the other hand, students studying "for a degree or for social reasons" reported highest scores on the cheating index. Researchers asserted that students' personal goal orientation has an important role in explaining why some students cheat while others do not. Students who were working to display their ability or to get high grades (performance goal oriented) had more tendency to cheat than students who were working to learn (mastery goal oriented). More recently, Marsden, Carroll and Neill (2005) worked with 954 students from four Australian universities to examine the associations between students' dishonest academic behaviors and goal orientations. A self-report questionnaire was administrated to the subjects. Some of the subscales were developed by the researchers of the study while others were adapted from Academic Practices Survey (Roig & DeTommaso, 1995), Academic Integrity Survey (McCabe, 2001), LOGO (Eison, 1981), and the Goals Inventory (Roedel et al., 1994). Regression analysis revealed that students who were less mastery goal oriented and more performance goal oriented were associated with higher rates of cheating. These studies reveal that students focusing on relative ability and performance were more likely to demonstrate cheating behavior.

Beside personal goal orientations, research evidence suggests that classroom goal structure stressed in the classroom has influence on students' cheating. For instance, Evans and Craig (1990a) surveyed 601 public school students from grades 7 through 12 and from college undergraduate classes in order to explore causal factors of cheating. They found that teacher characteristics and instructional conditions were identified as underlying reasons of cheating behavior by students. Students were more likely to cheat in classrooms where competition is stressed and normative evaluation techniques, such as grading on a curve, were used (cited in Anderman & Midgley, 2004). Earlier, Shelton and Hill (1969) conducted an experimental study in order to explore the effects of anxiety and knowledge of peer performance on cheating. One hundred eleven high school students participated in the word-construction task sessions and they were administrated Achievement Anxiety Test (AAT; Alpert & Haber, 1960). They found that students cheated more when they knew their peer-reference group performance on the word-construction task. In a longitudinal study, Anderman and Midgley (2004) surveyed more than three hundred students regarding their cheating behaviors in mathematics and goal structures perceived in their mathematics classrooms. Three waves of data were collected when subjects were in eight and ninth grades. Survey scales were composed of cheating scale from Anderman et al. (1998) and classroom goal structures scales from PALS (Midgley et al., 2000). Results of HLM analyses indicated that self-reported cheating was positively related to classroom performance goal structure (γ= .10, p< .001) and negatively related to classroom mastery goal structure (γ= -.16, p< .001). Similarly, Anderman et al. (1998) investigated the influence of school goal structures on 285 sixth, seventh, and eight graders' reported cheating in science. Students completed a survey which included items developed for the study and items from PALS (Midgley et al., 1998). Regression analysis showed that students who perceived their schools as performance focused had more tendency to cheat. They suggested that performance focused learning environments might lead students to see cheating as a way to handle with the environment. These studies show that classroom and school practices that highlight competition and relative ability among students have connections with cheating.

2.3.4 Academic Achievement, Personal Goal Orientations, and Classroom Goal Structure[2]

Studies have not revealed consistent results about the relation between students' personal goal orientations and academic achievement. The expected positive relation between pursuing mastery goal orientation and academic achievement was not found in some of the studies. For instance, Barron and Harackiewicz (2001) correlational and experimental studies, failed to find a relationship between mastery goal orientation and students' performance. Similarly, Skaalvik (1997) study with 434 sixth grade Norwegian students revealed no association between personal mastery goals and achievement. Although these studies showed a null relationship between the two variables, Wolters et al.'s (1996) correlational study with

[2] Since studies of Barron and Harackiewicz (2001), Skaalvik (1997), Wolters et al. (1996) , Wolter (2004), and Midgley and Urdan (2001) were examined before, in this section they were mentioned briefly.

434 seventh and eight grade students showed that adopting mastery goal orientation was positively related to students' academic performance.

As far as the relationship between performance-approach goal orientation and academic achievement is considered, studies revealed inconsistent results. For instance, Skaalvik (1997) study showed that performance-approach goal orientation was positively related to academic achievement whereas Wolters et al. (1996) revealed no association between these two variables. On the other hand, the relationship between performance-avoid goal orientation and achievement is more clearly established. Previous studies found a negative relation between performance-avoid goal orientation and achievement (e.g., Elliot and McGregor, 2001; Skaalvik, 1997).

The relation between academic achievement and students' perception of classroom goal structure is also not clear (Wolters, 2004). For instance, Anderman and Anderman (1999) collected two waves of data from 660 students when they were in fifth and sixth grades. Study measures included scales from PALS (Midgley et al., 1996), Psychological Sense of School Membership Scale (Goodenow, 1993), and also from scales developed by Wentzel (1993). Hierarchical regression analysis revealed that while classroom performance goal structure was negatively related to academic achievement, no relation was found between classroom mastery goal structure and academic achievement. In contrast to Anderman and Anderman (1999), Midgley and Urdan (2001) showed that classroom mastery goal structure was positively related to academic achievement.

2.4 Summary

In this chapter, theoretical framework of the study was explained and studies which examined the variables of the current study were reviewed. It was seen that research found inconsistent results regarding the relationship between students' personal goal orientation and some of the learning related variables. As mentioned by some of the researchers (e.g., Hsieh, Sullivan & Guerra, 2007; Pintrich et al., 2003; Pintrich & Shunk, 2002), there is need to examine the relations particularly for performance-approach goal orientation. Furthermore, the literature point out that goal structure emphasized in the classroom and school have influence on students' pursuing of particular achievement goals. Since research evidence suggests mastery, performance-approach and performance-avoid goal orientations as discrepant predictors of various learning related variables, researchers should explore what promotes students adoption of each type of goal orientation (Church et al., 2001). The associations between goal structures and goal orientations lead researchers to investigate more about goal structures of the learning environment which may contribute to the educational reform.

CHAPTER III

METHODOLOGY

This chapter addresses the methodology of the study in six main sections namely, population and sampling, instruments, procedures, data collection, data analysis, and hierarchical linear modeling.

3.1 Design of the Study

In the present study, the relationship between perceived classroom goal structure and goal orientations 7^{th} grade students pursue are investigated. This study is also interested in how students' personal goal orientations relates with various learning related variables. Since the nature of data is nested, that is students nested within classes, Hierarchical Linear Modeling (HLM) is used as the modeling technique. The study is a quantitative research which relies on data from students' self-reports. The design of the study could be stated as correlational study.

3.2 Population and Sampling

Target population of the study is all 7^{th} grade students in Ankara. Accessible population of the study is all 7^{th} grade students in Keçiören district of Ankara. Twelve elementary schools were randomly selected from 81 elementary schools in Keçiören district. Almost all 7^{th} grade classrooms of these schools' were included in the study. Accordingly, sample of the present study consisted of a totally 1950 seventh grade students, with a mean age of 13.1, from 62 classrooms in 12 elementary schools. There were approximately 32 students in each classroom. In Table 3.1, the number of classes and students in each school participated in the study is presented.

Table 3.1 Number of classrooms and students in each school participated in the study

Participating Schools	*Number of Classrooms*	*Number of Students*
School 1	4	120
School 2	5	119
School 3	1	31
School 4	9	325
School 5	4	147
School 6	8	251
School 7	3	69
School 8	8	200
School 9	3	141
School 10	8	258
School 11	3	94
School 12	6	195
Total	62	1950

The distributions of the gender of the students were presented in Table 3.2. As seen in Table 3.2, there were 951 male and 984 female students in the sample. Fifteen students did not provide their gender. Students' science report card grade mean from the previous semester was found to be 2.64 over 5.00.

Table 3.2 Distributions of sample with respect to gender

	Frequency	*Percent (%)*
Female	984	50.5
Male	951	48.8
Missing	15	0.8
Total	1950	100.0

3.3 Instruments

In the study, two instruments were used to gather relevant data: Patterns of Adaptive Learning Scales (PALS) and Science Achievement Test (SAT).

3.3.1 Patterns of Adaptive Learning Scales (PALS)

It is a self-reported questionnaire developed by Midgley et al. (2000) to assess classroom environment's associations with students' motivation, affect, and behavior from goal orientation theory perspective (Table 3.3). PALS include 123 items scored on a 5 point Likert scale from 1 "not at all true" to 5 "very true". It consists of two main sections; student section (21 subscales) and teacher section (5 subscales).

Table 3.3 Scales of PALS

Student Scales	**Subscales**
Personal Achievement Goal Orientations	Mastery Goal Orientation Performance-Approach Goal Orientation Performance-Avoid Goal Orientation
Perception of Teacher's Goals	Teacher Mastery Goal Teacher Performance-Approach Goal Teacher Performance-Avoid Goal
Perception of Classroom Goal Structures of	Classroom Mastery Goal Structure Classroom Performance-Approach Goal Structure Classroom Performance-Avoid Goal Structure
Academic-Related Perceptions, Beliefs, and Strategies	Academic Efficacy Academic Press Academic Self-Handicapping Strategies Avoiding Novelty Cheating Behavior Disruptive Behavior Self-Presentation of Low Achievement Skepticism About the Relevance of School for Future Success

Table 3.3 continued

Perceptions of Parents, Home Life, and Neighborhood	Parent Mastery Goal Parent Performance Goal Dissonance Between Home and School Neighborhood Space
Teacher Scales	
Perceptions of the School Goal Structure for Students	Mastery Goal Structure for Students Performance Goal Structure for Students
Approaches to Instruction	Mastery Approaches Performance Approaches
Personal Teaching Efficacy	Personal Teaching Efficacy

For the purposes of the study, only student section was utilized and 9 subscales with 42 items were selected. Selected subscales were Mastery Goal Orientation (MGO), Performance-Approach Goal Orientation (PApGO), Performance-Avoid Goal Orientation (PAvGO), Classroom Mastery Goal Structure (CMGS), Classroom Performance-Approach Goal Structure (CPApGS), Classroom Performance-Avoid Goal Structure (CPAvGS), Academic Efficacy (EFFI), Academic Self-Handicapping Strategies (HANDI), and Cheating Behavior (CHEAT). Mastery Goal Orientation, including 5 items, assesses students' purpose of developing competence and extending understanding (e.g., "It's important to me that I thoroughly understand my class work", "It's important to me that I improve my skills this year.). Performance-Approach Goal Orientation, consisting of 5 items, refers to students' purposes of demonstrating competence (e.g., "One of my goals is to show others that I'm good at my class work", "One of my goals is to look smart in comparison to the other students in my class"). Performance-Avoid Goal Orientation with 4 items measures students' purposes of avoiding the demonstration of lack of competence (e.g., "It's important to me that I don't look stupid in class", "One of my goals in class is to avoid looking like I have trouble doing the work"). Classroom Mastery Goal Structure has 6 items and refers to students' perceptions of the purpose of engaging in the academic work emphasized in the classroom is to develop competence (e.g., "In our class, trying hard is very important", "In our class, really understanding the material is the main goal"). Classroom Performance-Approach Goal Structure with 3 items assesses students' perceptions of the purpose of engaging in the academic work emphasized in the classroom is to demonstrate competence ("In our class, getting good grades is the main goal", "In our class, getting right answers is very important"). Classroom Performance-Avoid Goal Structure, consisting of 5 items, measures students' perceptions of the purpose of engaging in the academic work emphasized in the classroom is to avoid from displaying lack of competence (e.g., "In our class, it's important not to do worse than other students", "In our class, one of the main goals is to avoid looking like you can't do the work"). Academic Efficacy, including 5 items, refers to how students perceive their competence in doing the task (e.g., "I'm certain I can master the skills taught in class this year", "I'm certain I can figure out how to do the most difficult class work"). Academic Self-Handicapping Strategies with 6 items assesses strategies that are applied by students so that if the following performance is low, instead of lack of ability, some status will be seen as the cause of the low performance (e.g., "Some students purposely don't try hard in class. Then if they don't do well, they can say it is because they didn't try. How true is this of you?"). Cheating Behavior, consisting of 3 items, measures students' demonstration of cheating behavior in class (e.g., "I sometimes copy answers from other students during tests").

3.3.2 Turkish Version of the PALS

When adopting instruments into another language, rather than a simple literal translation of the instrument, there is need for an adaptation process which includes finding words and expressions that are culturally and psychologically appropriate to use in the second language (Hambleton, 2005). In the present study, during adaptation process Turkish cultural context is considered and words that have equitable meanings in the receiving culture were tried to be used. Another important issue in adaptation to consider is that, since a single translator may produce use of particular words or expressions, multiple translators should be used to avoid from single translator's preferences (Hambleton, 2005). In the present study, 3 translators were used. Forward translation was applied. Translators adapted the instrument from English to target language, Turkish. Then, another translator checked for the equivalence of the original and translated versions of the instrument, and necessary revisions were made. Items were also adapted to measure science domain specific goals and perceptions for the purpose of the study. Pilot study was conducted on a sample of 201 seventh grade students in a school located in the same district of study schools. According to the results of pilot study, some items were re-evaluated and necessary revisions were carried out such as rewording of some of the items and minimizing negative statements to avoid ambiguity.

The last version of PALS (Appendix A) was administered to the whole sample. Data were entered in SPSS. Confirmatory Factor Analysis was conducted using LISREL to see how well the 42 items fit to the proposed 9 latent factors of mastery goal orientation, performance-approach goal orientation, performance-avoid goal orientation, classroom mastery goal structure, classroom performance-approach goal structure, classroom performance-avoid goal structure, efficacy, self-handicapping strategies, and cheating behavior. The chi-squared to degrees of freedom ratio (χ^2/df) was found to be 4.89. Fit indexes of goodness-of-fit index (GFI)= .91, adjusted goodness-of-fit index (AGFI)= .90, root mean square error of approximation (RMSEA)= .046, and standardized root mean square residuals (S-RMR)= .042 suggested that the model fits the data well.

Maximum likelihood estimations of the latent factors for Turkish version of the scales were presented in Table 3.4.

Table 3.4 Lambda-x Estimates

	Indicator	*Lambda-x Estimates*
MGO	q1	0.44
	q4	0.47
	q7	0.48
	q9	0.50
	q18	0.39
PApGO	q2	0.37
	q3	0.29
	q8	0.47
	q15	0.43
	q16	0.59
PAvGO	q12	0.26
	q17	0.20
	q19	0.23
	q21	0.27
EFFI	q5	0.35
	q10	0.45
	q13	0.50
	q20	0.50
	q22	0.47
HANDI	q23	0.46
	q24	0.51
	q25	0.52
	q26	0.42
	q27	0.44
	q28	0.52
CHEAT	q6	0.63
	q11	0.74
	q14	0.60
CMGS	q29	0.55
	q31	0.65
	q35	0.48
	q36	0.57
	q38	0.59
	q40	0.13
CPApGS	q30	0.48
	q32	0.56
	q41	0.54
CPAvGS	q33	0.42
	q34	0.29
	q37	0.37
	q39	0.31

Reliability of the whole scale was found to be 0.81. Reliabilities of the each subscale were also examined. In Table 3.5, PALS English version and Turkish version reliability coefficients were presented. However, due to having low reliability coefficient performance-avoid goal orientation was not included in further analysis. Recently, some other studies (e.g., Beghetto, 2007) which used goal orientation subscales of PALS 2000 version have also come up with low reliability of performance-avoid goal orientation subscale.

Table 3.5 Reliability Coefficients

	Original version	*Turkish version*
MGO	0.85	0.73
PApGO	0.89	0.74
PAvGO	0.74	0.45
CMGS	0.76	0.81
CPApGS	0.70	0.72
CPAvGS	0.83	0.67
EFFI	0.78	0.74
HANDI	0.84	0.80
CHEAT	0.87	0.80

3.3.3 Science Achievement Test (SAT)

A 15-multiple-choice item test was used to assess students' science achievement. Each question had one correct answer and three distracters. The items of the SAT (Appendix B) were chosen from previous years' Secondary Education Entrance Examination and Government Complimentary Boarder and Scholar Examination. It covered various science concepts, such as, living things, sense organs, electricity, space, internal structure of matter, and force-motion-energy. During the development of the test, instructional objectives stated in national curriculum were examined. Each item in the SAT was examined by a group of educators and teachers in the field of science education in terms of relatedness of the test items to the instructional objectives, content validity, and format. SAT was administered to the subjects of the study in order to measure students' science achievement. The reliability coefficient computed by Kuder Richardson 20 was found to be 0.74.

3.4 Data Collection

The participant schools were selected from Keçiören district randomly and the permission was granted from the Ministry of Education. PALS and SAT were administered to 1950 seventh grade students in 62 classrooms of 12 schools in March and April 2007 by the researcher. It took about 40 minutes for the students to complete the instruments. Directions written on the instruments were also read to students and necessary explanations were made by the researcher. Participants were told that there was no right or wrong response in the survey and their opinions were important. Students were not asked to write their names in order to make them more comfortable in their responses. During the administration process, no specific problem was encountered.

3.5 Data Analyses

All the variables in the PALS were examined. Then some of the variables from student scales part and additional variables of interest were selected for the present study. All of the student level and classroom level variables were investigated on the basis of descriptive data analysis such as missing data analysis, data cleaning procedures and descriptive statistical procedures. Descriptive analysis were conducted to see response patterns and to make appropriate conclusions from the results of the analysis.

Since scales of the PALS were translated and adapted into Turkish, there was need to employ inferential data analysis. Confirmatory factor analyses were conducted through LISREL in order to draw common factorial structures and fit indexes.

Since relations between classroom level and student level variables were investigated in the study, Hierarchical Linear Modeling (HLM) was selected as a modeling technique. Nested structure of data, that is students nested within classrooms, requires employing HLM analysis. Therefore, models were developed by using HLM 6.0 in order to examine the relations between classroom level and student level variables.

3.6 Hierarchical Linear Modeling (HLM)

Data of behavioral and social studies usually have a nested structure. For instance, in studies requiring repeated observations made on a set of people, measurement occasions may not be the same for all individuals. In this case, the multiple observations are regarded as nested within persons. Each individual might also be nested within a component such as a school or workplace. These components may in turn be nested within a geographical setting such as community, or country. Each of the levels in the data structure is represented by its own sub-model in the hierarchical linear modeling. At each level, the sub-model signifies the structural relations taking place and the residual variability (Raudenbush, Bryk, Cheong, & Congdon, 2004).

3.6.1 Two-Level Hierarchical Linear Models

"A two-level model consists of two submodels at level-1 and level-2. For example, if the research problem consists of data on students nested within schools, the level-1 model would represent the relationships among the student-level variables and the level-2 model would capture the influence of school-level factors. Formally, there are i= 1,…,n_j level-1 units (e.g., students) nested within j= 1,…, J level-2 units (e.g., schools)" (Raudenbush et al., 2004, pp.7-8).

Level-1 model

The outcome for case i within unit j is represented in level-1 model as:

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{1ij} + \beta_{2j}X_{2ij} + \ldots + \beta_{Qj} X_{Qij} + r_{ij}$$

$$= \beta_{0j} + \sum_{q=1}^{Q} \beta_{qj}X_{qij} + r_{ij},$$

where

β_{qj} (q= 0, 1, …, Q) are level-1 coefficients;

X_{qij} is the level-1 predictor q for case i in unit j;

r_{ij} is the level-1 random effect; and

σ^2 is the variance of r_{ij}, that is the level-1 variance (Raudenbush et al., 2004, p.8).

Level-2 model

Each of the level-1 coefficients, β_{qj}, defined in the level-1 model becomes an outcome variable in the level-2 model:

$$\beta_{qj} = \gamma_{q0} + \gamma_{q1}W_{1j} + \gamma_{q2}W_{2j} + \ldots + \gamma_{qSq} W_{Sqj} + u_{qj}$$

$$= \gamma_{q0} + \sum_{s=1}^{Sq} \gamma_{qs} W_{sj} + u_{qj},$$

where

γ_{qs} (q= 0, 1, …, S_q) are level-2 coefficients;

W_{sj} is a level-2 predictor

u_{qj} is a level-2 random effect; and

τ_{qq} is the variance of u_{qj} (Raudenbush et al., 2004, p.8).

3.6.1.1 One-Way ANOVA with Random Effects

The simplest hierarchical linear model is corresponding to a one-way ANOVA with random effects. Setting β_{1j} in the level-1 model to zero for all *j* gives the equation:

$$Y_{ij} = \beta_{0j} + r_{ij} \quad (1)$$

It is assumed that "each level-1 error, r_{ij}, is normally distributed with a mean of zero and a constant level-1 variance, σ^2. This model predicts the outcome within each level-1 unit with just one level-2 parameter, the intercept, β_{0j}. In this case, β_{0j} is just the mean outcome for the *j*th unit. That is, $\beta_{0j} = \mu_{Yj}$" (Raudenbush & Bryk, 2002, p. 23).

The level-2 model for the one-way ANOVA with random effects and with γ_{01} set to zero is:

$$\beta_{0j} = \gamma_{00} + u_{0j} \quad (2)$$

where γ_{00} represents the grand-mean outcome in the population, and u_{0j} is the random effect associated with unit *j* and is assumed to have a mean of zero and variance τ_{00} (Raudenbush, & Bryk, 2002).

Substituting the first equation into the second equation yields the combined model:

$$Y_{ij} = \gamma_{00} + u_{0j} + r_{ij} \quad (3).$$

This is in fact the one-way ANOVA model with grand mean γ_{00}; with a group (level-2) effect; u_{0j}; and with a person (level-1) effect; r_{ij}. Since the group effects are interpreted as random, it is a random-effects model. In this case, the variance of the outcome is (Raudenbush, & Bryk, 2002):

$$\mathrm{Var}(Y_{ij}) = \mathrm{Var}\,(u_{0j} + r_{ij}) = \tau_{00} + \sigma^2.$$

In hierarchical data analysis, estimating the one-way ANOVA model is a helpful preliminary step. A point estimate and confidence interval for the grand mean, γ_{00} can be generated. Moreover, at each of the two levels, it gives information about the outcome variability. The σ^2 parameter signifies within-group variability, while τ_{00} represents the between-group variability. First and second equations are referred as fully unconditional since predictors are not denoted at neither level 1 nor 2 (Raudenbush & Bryk, 2002, p. 24).

Intraclass correlation coefficient is a useful parameter accompanying with one-way random effects ANOVA. It measures "the proportion of the variance in the outcome that is between the level-2 units" (Raudenbush & Bryk, 2002, p. 24). This parameter is given by the formula:

$$\rho = \tau_{00} / (\tau_{00} + \sigma^2)$$

3.6.1.2 Means-as-Outcomes Regression

"Another common statistical problem involves the means from each of many groups as an outcome to be predicted by group characteristics. This sub-model consists of Equation 1 as the level-1 model, and for the level-2 model;

$$\beta_{0j} = \gamma_{00} + \gamma_{01}W_j + u_{0j} \quad (4),$$

where in this simple case there is one level-2 predictor, W_j. Substituting the Equation 3 into Equation 1 yields the combined model:

$$Y_{ij} = \gamma_{00} + \gamma_{01}W_j + u_{0j} + r_{ij} \quad (5).$$

In this case, u_{0j} has a different meaning as contrasted with that in Equation 2. Whereas the random variable u_{0j} had been the deviation of unit *j*'s mean from the grand mean, it now represents the residual;

$$u_{0j} = \beta_{0j} - \gamma_{00} - \gamma_{01}W_j.$$

Similarly, the variance in u_{0j}, τ_{00}, is now the residual or conditional variance in β_{0j} after controlling for W_j" (Raudenbush & Bryk, 2002, pp. 24- 25).

3.6.1.3 Random-Coefficients Regression Model

"All of the submodels discussed above are examples of random-intercept models. Only the level-1 intercept coefficient, β_{0j}, was viewed as random. The level-1 slope did not exist in the one-way ANOVA or the means-as-outcomes cases.

A major class of applications of hierarchical linear models involves studies in which level-1 slopes are conceived as varying randomly over the population of level-2 units. The simplest case of this type is the random-coefficients regression model. In these models, both the level-1 intercept and one or more level-1 slopes vary randomly, but no attempt is made to predict this variation" (Raudenbush & Bryk, 2002, pp. 26-27). The level-1 model and level-2 models are:

$$Y_{ij} = \beta_{0j} + \beta_{1j} (X_{ij} - \overline{X}_{.j}) + r_{ij} \quad (6),$$

$$\beta_{0j} = \gamma_{00} + u_{0j} \quad (7a),$$

$$\beta_{1j} = \gamma_{10} + u_{1j} \quad (7b).$$

where

γ_{00} is the average intercept across the level-2 units;

γ_{10} is the average regression slope across the level-2 units;

u_{0j} is the unique increment to the intercept associated with level-2 unit *j*; and

u_{1j} is the unique increment to the slope associated with level-2 unit *j*.

The dispersion of the level-2 random effects is represented as a variance-covariance matrix:

$$Var\begin{bmatrix} u_{0j} \\ u_{1j} \end{bmatrix} = \begin{bmatrix} \tau_{00} & \tau_{01} \\ \tau_{10} & \tau_{11} \end{bmatrix} = T$$

where

Var(u_{0j}) = τ_{00} = unconditional variance in the level-1 intercepts;

Var(u_{1j}) = τ_{11} = unconditional variance in the level-1 slopes; and

Cov(u_{0j}, u_{1j}) = τ_{01} = unconditional covariance between the leve-1 intercepts and slopes.

Since no level-2 predictors are included in either equation 7a or 7b these are referred to as unconditional variance-covariance components (Raudenbush & Bryk, 2002).

3.6.1.4 Intercepts- and Slopes-as-Outcomes

Since the variability in the regression coefficients (both intercepts and slopes) across the level-2 units is estimated by the random coefficients regression model, in the next step this variability is modeled. Incorporating level-1 predictors, Xs, and level-2 predictors, Ws, the full model can be employed (Raudenbush & Bryk, 2002).

3.6.2 Choosing the Location of X and W (Centering)

"In the case of hierarchical linear model, the intercepts and slopes in the level-1 model become outcome variables at level-2. It is vital that the meaning of these outcome variables be clearly understood.

The meaning of the intercept in the level-1 model depends on the location of the level-1 predictor variables, the *X*s. In the simple model,

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{ij} + r_{ij}$$

the intercept B_{0j}, is defined as the expected outcome for a student attending school *j* who has a value of zero on X_{ij}. If the researcher is to make sense of models that account for variation in β_{0j}, the choice of a metric for all level-1 predictors becomes important. In particular, if an X_{ij} value of zero is not meaningful, then the researcher may want to transform X_{ij}, or choose a location for X_{ij} that will render β_{0j} more meaningful. In some cases, a proper choice of location will be required in order to ensure numerical stability in estimating hierarchical linear models.

Similarly, interpretations regarding the intercepts in the level-2 models depend on the location of the W_j variables. The numerical stability of estimation is not affected by the location for the Ws, but a suitable choice will ease interpretation of results" (Raudenbush & Bryk, 2002, p. 32).

3.6.2.1 Location of the Xs

There are some possibilities when deciding on the location of X, which is assumed to be measured on an interval scale. Centering around the grand mean, centering around the group mean, and the case for dummy variables are considered here.

3.6.2.1.1 Centering Around the Grand Mean

"It is often useful to center the variable X around the grand mean. In this case, the level-1 predictors are of the form:

$$(X_{ij} - \bar{X}_{..}).$$

Now, the intercept, B_{0j}, is the expected outcome for a subject whose value on X_{ij} is equal to the grand mean, $\bar{X}_{..}$. This is the standard choice of location for X_{ij} in the classical ANCOVA model. As in the case in

ANCOVA, grand mean centering yields an intercept that can be interpreted as an adjusted mean for group *j*,

$$\beta_{0j} = \mu_{Yj} - \beta_{1j} (\bar{X}_{.j} - \bar{X}_{..})$$

Similarly, the Var(β_{0j}) = τ_{00} is the variance among the level-2 units in the adjusted means" (Raudenbush & Bryk, 2002, p. 33).

3.6.2.1.2 Centering Around the Level-2 Mean (Group Mean Centering)

"Another option is to center the original predictors around their corresponding level-2 unit means:

$$(X_{ij} - \bar{X}_{.j}).$$

In this case, the intercept B_{0j} becomes the unadjusted mean for group *j*. That is,

$$\beta_{0j} = \mu_{Y j}$$

and Var(β_{0j}) is now just the variance among the level-2 unit means, $\mu_{Y j}$" (Raudenbush & Bryk, 2002, p. 33).

In the present study, efficacy, self-handicapping strategies, cheating behavior, and science achievement were centered around group mean.

3.6.2.1.3 Centering of Dummy Variables

With X_{ij} is a dummy variable, consider the level-1 model:

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{ij} + r_{ij}$$

Supposing X_{ij} as gender variable coded 1 if subject *i* in school *j* is a female and 0 if male. Here, the intercept β_{0j} is the expected outcome for a male student in group *j* (i.e., the predicted value for student with X_{ij} = 0), while

Var (β_{0j}) = τ_{00} is the variance in the male outcome means across the level-2 unit (schools) (Raudenbush, & Bryk, 2002).

In the present study, gender was included in the models as uncentered.

3.6.2.2 Location of Ws

"In general, the choice of location for Ws is not as critical as for the level-1 predictors. It is often convenient to center all of the level-2 predictors around their corresponding grand means, for example, $W_{1j}-\bar{W}_{1}$.." (Raudenbush & Bryk, 2002, p. 35).

In the present study, all level-2 variables were grand mean centered.

3.6.3 Random versus Fixed Variables

In hierarchical linear models, it is important whether level-1 variables are fixed or random. While random variables include an error term in their equations in level-1, fixed variables do not include this error term. Fixed variables are considered as invariant across level-2 units. If variables are taken as fixed when they are actually fixed; the model becomes simpler, and yields more precise results. If variables are taken as fixed although they are actually random; the biased estimates are obtained.

In the present study, the two-level hierarchical linear models were built by considering the level-1 variables as randomly vary. Then, the results were examined in order to see whether they were significant or not. If the results were significant, the variable were allowed to vary, that is treated as random. Otherwise, the variables were treated as fixed if the non-significant results were found. Accordingly, in the model developed with mastery goal orientation as outcome variable, efficacy and cheating behavior were allowed to vary randomly, while self-handicapping strategies and science achievement were fixed. For the model developed with performance-approach goal orientation, efficacy, cheating behavior, and gender were all fixed.

3.6.4 Handling Missing Data

"HLM2 provides three options for handling missing data: listwise deletion of cases when the MDM file is made, listwise deletion of cases when running the analysis, and analysis of multiply imputed data. These follow the conventional routines used in standard statistical packages for regression analysis and the general linear model. Listwise deletion of cases when the MDM file is made is based on the variables selected for inclusion in the MDM file, while listwise deletion when running the analysis only takes the variables included in the model into account" (Raudenbush et al., 2004, p. 46). In the present study, listwise deletion when making the MDM file choice was selected.

"At level-2, HLM2 assumes complete data. If there are missing data at level-2, automatic listwise deletion will be applied when the MDM file is created" (Raudenbush et al., 2004, p. 46). In the present study, there were no missing values at level-2.

3.6.5 Variables Included in the Study

There were 10 variables in this study. Students' personal goal orientations of mastery goal orientation and performance-approach goal orientation were outcome variables of the study. The reason for choosing personal goal orientations as the outcome variables was that the study aimed to explain the differences in students' goal orientations with the help of learning related variables and classroom goal structures. Depending on the purpose of the study, different variables such as achievement could also be used as the outcome variable.

Student level (level-1) predictors were efficacy, self-handicapping strategies, cheating behavior, science achievement, and gender. Class level (level-2) predictors were aggregate student perceptions of classroom goal structures. That is, class means were calculated for each of the perceived classroom goal structure. Therefore, level-2 variables consisted of classroom mastery goal structure, classroom performance-approach goal structure, and classroom performance-avoid goal structure.

3.7 Assumptions and Limitations

3.7.1 Assumptions

1. PALS and SAT were administrated under standard conditions.
2. Subjects of the study responded to the items of the instruments sincerely.

3.7.2 Limitations

1. Reliability coefficient of performance-avoid goal orientation variable was found to be low and it was not included in further analyses. Thus, this study was limited to mastery and performance-approach goal orientation and it did not reveal information about performance-avoid goal orientation.
2. The sample of the study was consisted of 1950 seventh grade students at 12 public schools of Keçiören, Ankara. This sample may not represent the typical students enrolled in private schools or in other parts of the country. Therefore, the results may not be

reliable if generalized beyond students enrolled in similar situations.

3. The study was limited by its reliance on self-reported data.

3.8 Threats to Internal Validity of the Study

The selection of subjects of the study may produce the individuals or groups differing from one another in unintended ways that are related to the variables to be studied. This threat is known as subject characteristics threat (Fraenkel & Wallen, 2006). In the present study subjects were selected based on some characteristics, such as being in the 7th grade, but all the characteristic of the subjects could not be controlled in a study. Students participated in the study came from Keçiören district and subjects might posses some characteristics special to their district. Therefore, subject characteristics could be a threat for the present study.

There can be loss of subjects (mortality) due to some students' being absent in the administration day (Fraenkel & Wallen, 2006). The present study was not announced to students beforehand, therefore absenteeism probably was not different from other days. Furthermore, the subjects of the study were selected by considering the loss of subjects and more than needed students were involved in the study in order to avoid this threat. Therefore, mortality could not be a threat for this study.

Some locations in which data are collected, or in which an intervention is done, may generate alternative explanations for results. This threat is known as location threat (Fraenkel & Wallen, 2006). In the present study, PALS and SAT were administered in the classes, actual learning environments of the students. Moreover, since the study did not include any manipulation, the location was not a very important issue as in the experimental studies. Therefore, the location could not be an essential threat for the study.

Another threat to the internal validity of a study may come from the way in which instruments are used. Indeed, instrumentation can cause problems if the nature of the instrument is changed in some way or another which is called instrument decay (Fraenkel & Wallen, 2006). In the present study, in order to avoid instrument decay instruments were printed in optic format which ease scoring process. The characteristics of the data gatherers can also affect results (Fraenkel & Wallen, 2006). In the present study, there was one data collector who administered the instruments to the whole sample. Another threat to internal validity is data collector bias. The data collector or scorer may unconsciously distort the data so that results will be in the wanted way (Fraenkel & Wallen, 2006). In the present study, the collector was trained to behave in a standard way throughout the classes, such as making necessary explanations. Therefore, the instrumentation could not be a threat for the present study.

Subjects of the study may be alerted to what is being studied by means of the questions in the pretest, and accordingly make greater effort to learn the material. This increased effort on the part of the students could be the reason for the pre-to-post improvement. In addition, practice on the pretest by itself can be responsible for the improvement. This threat is known as the testing threat (Fraenkel & Wallen, 2006). In the present study, since there was no manipulation and the instruments were used for only one time, testing could not be a threat for the present study.

Unanticipated and unplanned events may occur during the course of a study that can influence the responses of subjects. This is known as history threat (Fraenkel & Wallen, 2006). In the present study, although the conditions were tried to be controlled by the data collector, it was hard to say that history was not a threat for the study.

There may be change during a study due to the factors related with the passing of time rather than to the intervention itself. This is known as maturation threat (Fraenkel & Wallen, 2006). In the present study, maturation was not a threat since there was no condition of passing time.
The way in which subjects view a study and participate in it can create a threat to internal validity. This is known as attitude of subjects (Fraenkel & Wallen, 2006). In the present study, this threat was tried to be controlled by the data collector's explanations, however, still attitude of subjects could be a threat for the study.

In an experimental study, experimental group may be treated in unintended ways by the administrator and this may give them an advantage of one sort or another. This is known as implementation threat (Fraenkel & Wallen, 2006). In the present study, all the procedures were carried out by the trained data collector, and there was no experimental group, consequently, the implementation could not be an essential threat for the study.

Lastly, there can be regression threat due to studying change in a group that is extremely low or high in its pre-intervention performance (Fraenkel & Wallen, 2006). Since, there was no intervention in the present study; regression threat could not be a problem for the present study.

3.9 Ethical Issues in the Study

Protecting participants from harm, ensuring confidentiality of data and the deception of the participants are three ethical principles that researchers should be aware of.

The present study did not constitute any physical or psychological harm for the subjects. Instruments were administrated to students in their own classes. Therefore, protection of participants from harm was ensured. In the present study, participants were informed of the aim of the study.

Furthermore, instructions written were also read to students in every class that study was conducted. Therefore, it could be said that the deception of the students was not an issue in the present study.

Lastly, numbers were assigned to schools, classes, and students participated in the study in order to set the confidentiality of the schools' and students' identities. Thus, the confidentiality was also ensured for the present study.

CHAPTER IV

RESULTS

Results chapter of the study consists of descriptive statistics of the study variables, assumptions of hierarchical linear modeling and models built to investigate the effects of selected student level and classroom level variables on personal goal orientations.

4.1 Descriptive Statistics

Descriptive statistics were examined both for students and classroom level variables in order to see the general pattern (see Table 4.1). The mean score for mastery goal orientation (*M*= 4.35) and performance-approach goal orientation (*M*= 3.82) were above the scales' midpoints which means that participants of the study have high levels of mastery and performance goal orientations. As it can be seen from the mean values, participants generally adopted more mastery goals compared to performance-approach goals, indicating that students were focused on developing competence more than demonstrating competence. They also reported relatively high efficacy (*M*= 4.09), and low usage of self-handicapping strategies (*M*= 2.48), and cheating behavior (*M*= 2.35) which were encouraging. Their science achievement mean was 8.44 over 15 indicating moderate achievement. Student reported relatively close levels of mean scores for classroom mastery goal structure *(M*= 3.57), classroom performance-approach goal structure *(M*= 3.74), and classroom performance-avoid goal structure *(M*= 3.53).

Table 4.1 Descriptive Statistics for Student and Classroom Level Variables

	MGO	*PApGO*	*EFFI*	*HANDI*	*CHEAT*	*ACHIEV*	*CMGS*	*CPApGS*	*CPAvGS*
Mean	4.35	3.82	4.09	2.48	2.35	8.44	3.57	3.74	3.53
Median	4.6	4.0	4.2	2.4	2.0	9.00	3.63	3.80	3.55
Mode	5	5	4.6	1	1	9.00	4.09	4.03	3.80
Standard Deviation	0.64	0.86	0.70	1.00	1.20	3.33	0.40	0.36	0.30
Variance	0.42	0.74	0.49	1.00	1.45	11.08	0.16	0.13	0.02
Minimum	1	1	1	1	1	0.00	2.32	2.78	2.78
Maximum	5	5	5	5	5	15.00	4.27	4.33	4.07
Skewness	-1,36	-0.64	-1.02	0.39	0.54	-0.29	-0.67	-0.60	-0.59
Kurtosis	2.17	-0.10	-1.52	-0.53	-0.85	-0.45	0.37	0.11	0.18

4.2 Assumptions of a Two-Level Hierarchical Linear Model

General level 1 and level 2 models are:

Level 1

$$Y_{ij} = \beta_{0j} + \sum_{q=1}^{Q} B_{qj}X_{qij} + r_{ij}$$

where,

Q is the number of independent variables in the level 1 model

X is may be centered or uncentered level 1 predictors.

Level 2

$$\beta_{qj} = \gamma_{q0} + \sum_{s=1}^{Sq} \gamma_{qs} W_{sj} + u_{qj}$$

where,

S_q is the number of level 2 predictors for the q^{th} level 1 effect

Formally, followings assumptions are made (Raudenbush, & Bryk, 2002, p. 255):

1. Each r_{ij} is independent and normally distributed with a mean of 0 and variance σ^2 for every level-1 unit i within each level-2 unit j.
2. The level-1 predictors, X_{qij}, are independent of r_{ij}.
3. The vectors of $Q + 1$ random errors at level-2 are multivariate normal, each with a mean of 0, some variance τ_{qq}, and covariance among the random elements, q and q', or $\tau_{qq'}$. The random-error vectors are independent among the J level-2 units.
4. The set of level-2 predictors (i.e., all the unique elements in W_{sj} across the $Q + 1$ equations) are independent of every u_{qj}.
5. The errors at both levels (level-1 and level-2) are independent of each other.
6. The predictors at each level are not correlated with the random effects at other level.

"Assumptions 2, 4, and 6 focus on the relationship between the variables included in the structural portion of the model- the *X*s and *W*s- and those factors related to the error terms, r_{ij} and u_{ij}. They pertain to the adequacy of model specification. Their tenability affects the bias in estimating γ_{qs}. Assumptions 1, 3, and 5 focus only on the random portion of the model (i.e., r_{ij} and u_{ij}). Their tenability affects the consistency of the estimates of standard errors of $\hat{\gamma}_{qs}$, the adequacy of β^{*}_{qj}, $\hat{\sigma}^2$, and $\hat{T}$, and the accuracy of hypothesis tests and confidence intervals" (Raudenbush, & Bryk, 2002, p. 255).

In addition to the assumptions above, all variables should be measured adequately, that is reliable scores, free from error, and represent desired construct.

In order to check the tenability of the assumptions HLM residual files can be used. Two different residual files; level 1 residual file and level 2 residual file can be formed in HLM program. A level-1 residual file includes (Raudenbush, et al., 2004, p.15):

- The level-1 residuals (discrepancies between the observed and fitted values).
- Fitted values for each level-1 unit (that is, values predicted on the basis of the model).
- The observed values of all predictors included in the model.
- Selected level-2 predictors useful in exploring possible relationships between such predictors and level-1 residuals.

A level-2 residual file includes (Raudenbush, et al., 2004, p.16):

- Fitted values for each level-1 coefficient (that is, values predicted on the basis of the level-2 model).

- Ordinary least squares (OL) and empirical Bayes (EB) estimates of level-2 residuals (discrepancies between level-1 coefficient and fitted values).
- Empirical Bayes coefficients, which are the sum of the EB estimates and the fitted values.
- Dispersion estimates useful in exploring sources of variance heterogeneity at level 1.
- Expected and observed Mahalanobis distance measures useful in assessing the multivariate normality assumption for the level-2 residuals.
- Posterior variances.

The assumption tests for the study were presented at end of the thesis, in Appendix C. Utilizing Figures C.1 through Figure C.10, it can be said that assumptions are tenable.

4.3 Hierarchical Linear Modeling (HLM) Analyses

In this section, results of HLM analyses were included. In the first part, analyses for mastery goal orientation and in the second part analyses for performance approach goal orientation were presented. In each part, three models were built order to investigate effects of student and class level factors on the particular goal orientation.

4.3.1 HLM Analyses with Mastery Goal Orientation Outcome

First of all models were developed with mastery goal orientation outcome variable.

4.3.1.1 One-Way ANOVA with Random Effects

Related to mastery goal orientation part, in order to answer the first research question of if there are differences in students' mastery goal orientations among classrooms, one-way ANOVA with random effects model was applied.

For i= 1, …, n_j students in class j, and j = 1, …, 62 classes, equations at two levels are:

Level 1 (Students level) Model:

$$Y_{ij} = \beta_{0j} + r_{ij}$$

Level 2 (Class level) Model:

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

where

Y_{ij} = MGO for i^{th} students in j^{th} classroom

β_{0j} = the intercept (the mean MGO for the j^{th} classroom)

r_{ij} = the level-1 error

γ_{00} = the grand mean

u_{0j} = the level-2 error

The final estimation of fixed effects obtained from the one-way ANOVA with random effects model was given in the Table 4.2. Average class mean mastery goal orientation, that is the grand-mean of mastery goal orientation, (γ_{00}), is statistically different from zero. The grand-mean of mastery goal orientation is 4.357 with a standard error of 0.023, indicating a 95% confidence interval of:

$$\text{Confidence Interval} = 4.357 \pm 1.96\ (0.023) = (4.312, 4.402)$$

Table 4.2 Final Estimation of Fixed Effects

Fixed Effects	*Coefficient*	*Standard Error*	*t-ratio*	**p-value**
Average class mean, γ_{00}	4.357	0.023	192.235	0.000

The final estimation of variance components obtained from the one-way ANOVA with random effects model was given in the Table 4.3. At the student level Var(r_{ij}) = σ^2 = 0.3988. At the class level, τ_{00} is the variance of the true class means, β_{0j}, around the grand-mean, γ_{00}. Var(u_{0j})= τ_{00} = 0.0182. The chi-square statistic takes on a value of 147.798 with 61 degrees of freedom (*J*= 62 classes). The test is significant ($p < .001$) indicating significant variation does exist among classrooms in their mastery goal orientation.

Table 4.3 Final Estimation of Variance Components

Random Effect	*Variance Component*	*df*	*Chi-square*	**p-value**
Class Mean, u_{0j}	0.0182	61	147.798	0.000
Level-1 Effect, r_{ij}	0.3988			

The intraclass correlation (ICC), which represents the proportion of variance in Y (mastery goal orientation) between classes, is

$$ICC = \tau_{00} / (\tau_{00} + \sigma^2) = 0.0182 / (0.0182 + 0.3988) = 0.044$$

indicating that about 4.4% of the variance in mastery goal orientation is between classes. In other words, 4.4% of the total variability in mastery goal orientation can be attributed to the class.

In the following models, additional level 1 (student level) variables will be tried to reduce the variation within classes (σ^2) and additional level 2 (class level) variables will be tried to explain between class differences (τ_{00}).

HLM also provides an estimate of the reliability of the sample mean in any class. The reliability is an estimate of the true class mean and is affected by the sample size within each class. The overall estimate of reliability is the average of the class reliabilities. $\rho = .572$ indicating that the sample means tend to be a reliable indicator of true class means. The equation for determining reliability of the mean master goal orientation within each school is: $\rho = \tau_{00} / [\tau_{00} + (\sigma^2 / n_j)]$. Therefore, the reliability of the sample mean varies from class to class because the sample size, n_j, varies.

4.3.1.2 Means-as-Outcomes Regression Model

In order to answer the second research question of which class level variables are associated with students' mastery goal orientation, means-as-outcome model was applied. In this model, student level equation remains unchanged: students mastery goal orientations are viewed as varying around their class means. The class level equation is now elaborated, however, so that each class mean is now predicted by classroom mastery goal structure, classroom performance-approach goal structure, and classroom performance-avoid goal structure.

Equations at two levels are:

Level 1(Students level) Model:

$$Y_{ij} = \beta_{0j} + r_{ij}$$

Level 2(Class level) Model:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\ (CMGS) + \gamma_{02}\ (CPApGS) + \gamma_{03}\ (CPAvGS) + u_{0j}$$

where

β_{0j} = the class mean on mastery goal orientation

γ_{00} = the intercept (grand mean for mastery goal orientation, that is the average of the class means on mastery goal orientation across the population of classes)

γ_{01} = the effect of CMGS on β_{0j}

γ_{02} = the effect of CPApGS on β_{0j}

γ_{03} = the effect of CPAvGS on β_{0j}

τ_{00} = class level variance in β_{0j} after controlling for these class level variables

u_{0j} = the residual

The model was first run with three class level factors, but mean performance-approach goal structure and mean performance-avoid goal structure were not significant and were removed from the final analysis. The final estimation of fixed effects obtained from means-as-outcomes model was given in Table 4.4. The results indicate that classroom mastery goal structure is significantly positively related to mean mastery goal orientation (γ_{01}= .2663, se= .0485). Classroom mastery goal structure will be reexamined during the development of the final full intercepts and slopes as outcomes model.

Table 4.4 Final Estimation of Fixed Effects

Fixed Effect	*Coefficient*	*Standard Error*	*t-ratio*	**p-value**
Model for class means[1]				
Intercept, γ_{00}	4.3582	0.0194	223.832	0.000
CMGS, γ_{01}	0.2663	0.0485	4.659	0.000

[1]The class level variable was grand mean centered before the analysis

The final estimation of variance components obtained from means-as-outcome model was given in Table 4.5. The degrees of freedom for this model is based on the number of classes with sufficient data and number of class level variables included in the model.

Degrees of Freedom = J- Q- 1,

where

J = the number of classes with sufficient data

Q = number of class level variables included in the model

Therefore, degrees of freedom for this model is:

df = 62 – 1 – 1 = 60

Table 4.5 Final Estimation of Variance Components

Random Effect	*Variance Component*	*df*	*Chi-square*	**p-value**
Class Mean, u_{0j}	0.0100	60	109.6116	0.000
Level-1 Effect, r_{ij}	0.3988			

The residual variance between classes from means-as-outcomes regression model (τ_{00} = 0.0100) is smaller than the variance obtained in one-way ANOVA model (τ_{00} = 0.0182). This reduction is due to the inclusion of CGMS factor into the model. The proportion of variance explained in β_{0j} is:

$$\frac{\tau_{00}\text{ (ANOVA)} - \tau_{00}\text{ (Means as Outcomes)}}{\tau_{00}\text{ (ANOVA)}}$$

Thus, the proportion variance explained in the class mean on mastery goal orientation is:

$$\frac{0.0182 - 0.0100}{0.0182} = 0.451.$$

This is indicates that 45.1% of the true between class variance in mastery goal orientation is accounted for by classroom mastery goal structure.

Chi-square statistic was examined in order to find out whether class mastery goal orientation means vary significantly once classroom mastery goal structure is controlled. Chi-square statistic was found to be 109.6116 (df = 60, p< .001). This significant result indicates that classroom mastery goal structure did not account for all the variation in the intercept. In other words, after controlling for classroom mastery goal structure, significant variation among class means mastery goal orientation remains to be explained.

In summary, means-as-outcomes regression model indicates that classroom mastery goal structure is significantly positively related to mean mastery goal orientation. Nonetheless, even after controlling for classroom mastery goal structure, classes still vary significantly in their average mastery goal orientations.

4.3.1.3 The Random Coefficient Model

In order to answer the third research question of which student level variables help to explain the difference in students' orientation toward mastery goals, the random coefficient model was conducted.

Equations at two levels are:

Level 1(Students level):

$$Y_{ij} = \beta_{0j} + \beta_{1j} \text{(EFFI)} + \beta_{2j} \text{(HANDI)} + \beta_{3j} \text{(CHEAT)} + \beta_{4j} \text{(ACHIEV)} + \beta_{5j} \text{(GENDER)} + r_{ij}$$

Level 2(Class level:

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{qj} = \gamma_{q0} + u_{qj}$$

where

Y_{ij} = mastery goal orientation of student i in class j

β_{0j} = the class mean on mastery goal orientation

β_{1j} = the differentiating effect of efficacy

β_{2j} = the differentiating effect of self-handicapping strategies

β_{3j} = the differentiating effect of cheating behavior

β_{4j} = the differentiating effect of science achievement

β_{5j} = the differentiating effect of gender

β_{qj} = the coefficient for variable *q* for class j after accounting for other variables

γ_{00} = the average of class means on mastery goal orientation across the population of classes

γ_{q0} = the average *q* variable-mastery goal orientation slope across those classes

u_{0j} = the unique increment to the intercept associated with school *j*

u_{qj} = the unique increment to the slope associated with school *j*

Building strategy, as recommended by Raudenbush and Bryk (2002), was followed. Level 1 predictors were entered to the model one by one in order to detect if there is any significant relationship between predictors and mastery goal orientation, and also to detect whether they randomly vary or not. First of all efficacy was entered to model. It was seen that efficacy was significantly related to mastery goal orientation and it was also randomly varying across classes.

After detecting efficacy as a significant predictor, self-handicapping was tested. Self-handicapping was found to be significant but non-randomly varying. Thus, self-handicapping was included in the model as fixed.

Next, cheating behavior was tested as a level 1 predictor of mastery goal orientation. It was found cheating behavior was significantly related to mastery goal orientation, and it was randomly varying across classes.

Then, science achievement was added to the model. Science achievement was found to be a significant but non-randomly varying variable.

Lastly, gender variable was tested. Since gender was not found to be significantly related to mastery goal orientation, it was removed from the model.

Therefore, the final random coefficient model includes four variables: efficacy and cheating as randomly varying student level variables, self-handicapping and science achievement as non-randomly varying student level variables. The final estimation of fixed effects obtained from final random coefficient model was displayed in Table 4.6.

Table 4.6 Final Estimation of Fixed Effects

Fixed Effect	*Coefficient*	*Standard Error*	*t-ratio*	**p-value**
Overall mean mastery goal orientation[1], γ_{00}	4.358	0.023	192.091	0.000
EFFI, γ_{10}	0.437	0.027	15.940	0.000
HANDI, γ_{20}	- 0.056	0.012	- 4.830	0.000
CHEAT, γ_{30}	- 0.067	0.015	- 4.647	0.000
ACHIEV, γ_{40}	0.015	0.004	3.478	0.001

[1]The student level variables were Group Mean Centered before analysis.

The Efficacy-Mastery Goal Orientation slope coefficient (γ_{10}= .437, se= .027) indicates that efficacy is positively related to mastery goal orientation. Students who have higher efficacy also demonstrate higher levels of mastery goal orientation.

The Self-Handicapping-Mastery Goal Orientation slope coefficient (γ_{20}= -.056, se= .012) indicates that self-handicapping is negatively related to mastery goal orientation. Students who apply more self-handicapping strategies demonstrate lower levels of mastery goal orientation.

The Cheating - Mastery Goal Orientation slope coefficient (γ_{30}= -.067, se= .015) indicates that cheating is negatively related to mastery goal orientation. Students who demonstrate more cheating behavior have lower levels of mastery goal orientation.

The Science Achievement-Mastery Goal Orientation slope coefficient (γ_{40}= .015, se= .004) indicates that science achievement is positively related to mastery goal orientation. Students who performed better on science achievement test also demonstrate higher levels of mastery goal orientation.

The final estimation of variance components obtained from random coefficient model was displayed in Table 4.7. Variance among the class means τ_{00}= 0.025 with a chi-square statistic of 240.924 is found to be statistically significant (p< .001). This significant difference (variability) between classes implies that there is need to incorporate class level variables into the model that might account for some of the differences. Similarly, the variances of the efficacy slope τ_{11}= .024 (χ^2= 135.455, p< .001) and the variance of the cheating slope τ_{22}= .005 (χ^2= 103.425, p= .001) are found to be significant. That is, slopes are much steeper in some classes than in other classes. This means that the relationship with mastery goal orientation is much stronger in some classes than in other classes. Class level variables will be tried to explain these differences in the relationship between efficacy and mastery goal orientation, and the relationship between cheating behavior and mastery goal orientation as well.

Table 4.7 Final Estimation of Variance Components

Random Effect	*Variance Component*	*df*	*Chi-square*	**p-value**
Class mean, u_{0j}	0.025	61	240.924	0.000
EFFI, u_{1j}	0.024	61	135.455	0.000
CHEAT, u_{3j}	0.005	61	103.425	0.001
Level 1 Effect, r_{ij}	0.245			

In order to calculate how much of the within class variability is explained by incorporating efficacy, self-handicapping, cheating and science achievement as predictors into the model, σ^2 estimates of one way ANOVA with random effects model and the random coefficient model are compared:

$$\text{proportion of variance explained at level 1} = \frac{\sigma^2 \text{(ANOVA)} - \sigma^2 \text{(Ran.Coef.)}}{\sigma^2 \text{(ANOVA)}}$$

$$\text{proportion of variance explained at level 1} = \frac{0.3988 - 0.245}{0.3988} = 0.386$$

Therefore by including efficacy, self-handicapping, cheating and science achievement as student level predictors of mastery goal orientation, within class variance was reduced by 38.6%. In other words, these factors account for about 38.6% of the student level variance in mastery goal orientation.

Reliability estimates of intercepts and slopes indicate that the reliability of intercepts is 0.73, the reliability of slopes are, 0.51 and 0.39 for efficacy and cheating respectively. According to Raudenbush and Bryk (2002) the primary reason for the lack of reliability of the slopes is that the true slope variance across classes is much smaller than the variance of the true means. Also, the slopes are estimated with less precision than are the means because many classes are relatively homogenous on efficacy and cheating.

Tau as correlations obtained from random coefficient model were given in Table 4.8. A little high correlation was obtained between the variables of efficacy and cheating behavior (0.501). This indicates that essentially the same variation across the class level units is being carried and a reduction in the model may be warranted by fixing one of the variables to be non-randomly varying.

Table 4.8 Tau as Correlations

	Intercept	*EFFI*	*CHEAT*
Intercept	1.000	- 0.498	0.285
EFFI	- 0.498	1.000	0.501
CHEAT	0.285	0.501	1.000

Efficacy was fixed and the model was run again. Table 4.9 displays deviance statistics and number of estimated parameters in two model (Efficacy random versus fixed).

Table 4.9 Statistics for Current Covariance Components Model

	Deviance	*Number of Estimated Parameters*
1^{st} Model (EFFI random)	2841.882	12
2^{nd} Model (EFFI fixed)	2875.430	9

The result of the variance-covariance components test was displayed in Table 4.10. From the table it is seen that the deviance statistic between two models (EFFI random versus fixed) was significant ($p < .001$). This indicates that setting efficacy as non-randomly varying did not create a better explanatory model. Thus, efficacy was kept as a randomly varying variable in the final random coefficient model.

Table 4.10 Variance-Covariance Components Test

	Chi-square	*df*	**p-value**
Variance-Covariance Components Test	33.548	3	0.000

4.3.1.4 Intercepts and Slopes as Outcomes Model

In order to answer the fourth research question of which class characteristics influence the effect of student characteristics on the students' mastery goal orientation, intercepts and slopes as outcomes model was conducted. The aim was to build an explanatory model to account for the variability of the regression equations across classes. In other words, why some classes have higher means than others and why in some classes the association between efficacy and mastery goal orientation, and the association between cheating behavior and mastery goal orientation is stronger than in other classes were explored.

Student level model is composed of variables which are found to be significant in the random coefficient model. Class level model is expended to incorporate the class level variable that was found to be significant in means-as-outcomes model. First of all, the intercept is modeled, and then randomly varying coefficients (slopes) are modeled.

Level 1(Students level):

$$Y_{ij} = \beta_{0j} + \beta_{1j} \text{ (EFFI)} + \beta_{2j} \text{ (HANDI)} + \beta_{3j} \text{ (CHEAT)} + \beta_{4j} \text{ (ACHIEV)} + r_{ij}$$

Level 2(Class level):

$$\beta_{0j} = \gamma_{00} + \gamma_{01} \text{ (CMGS)} + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + u_{1j}$$

$$\beta_{2j} = \gamma_{20}$$

$\beta_{3j} = \gamma_{30} + u_{3j}$

$\beta_{4j} = \gamma_{40}$

The reason for estimating γ_{01} was to examine whether high-classroom mastery goal structure classes differ from low-classroom mastery goal structure classes in mean mastery goal orientation. It was found that classroom mastery goal structure was positively related to class mean mastery goal orientation (γ_{01}= .196, *t*= 4.445).

After modeling the intercept, the randomly varying slopes were examined one by one. Classroom mastery goal structure was included in the Efficacy coefficient model with the previous results:

Level 1(Students level):

$Y_{ij} = \beta_{0j} + \beta_{1j}$ (EFFI) + β_{2j} (HANDI) + β_{3j} (CHEAT) + β_{4j} (ACHIEV) $+ r_{ij}$

Level 2(Class level):

$\beta_{0j} = \gamma_{00} + \gamma_{01}$ (CMGS) + u_{0j}

$\beta_{1j} = \gamma_{10} + \gamma_{11}$ (CMGS) + u_{1j}

$\beta_{2j} = \gamma_{20}$

$\beta_{3j} = \gamma_{30} + u_{3j}$

$\beta_{4j} = \gamma_{40}$

The reason for estimating γ_{11} was to examine whether high-classroom mastery goal structure classes differ from low-classroom mastery goal structure classes in terms of the strength of the association between students' efficacy and mastery goal orientation. However, results showed that classroom mastery goal structure was not a significant predictor of the efficacy slope (γ_{11}= -.088, *t*= -1.450) and removed from the model.

Lastly, classroom mastery goal structure was included in Cheating Behavior coefficient model with the previous results:

Level 1(Students level):

$Y_{ij} = \beta_{0j} + \beta_{1j}$ (EFFI) + β_{2j} (HANDI) + β_{3j} (CHEAT) + β_{4j} (ACHIEV) $+ r_{ij}$

Level 2(Class level):

$\beta_{0j} = \gamma_{00} + \gamma_{01}$ (CMGS) + u_{0j}

$\beta_{1j} = \gamma_{10} + u_{1j}$

$\beta_{2j} = \gamma_{20}$

$\beta_{3j} = \gamma_{30} + \gamma_{31}$ (CMGS) + u_{3j}

$\beta_{4j} = \gamma_{40}$

The reason for estimating γ_{31} was to examine whether high-classroom mastery goal structure classes differ from low-classroom mastery goal structure classes in terms of the strength of the association between students' cheating behavior and mastery goal orientation. However, classroom mastery goal structure did not emerge as a significant predictor of the cheating behavior slope (γ_{31}= .053, t= 1.743) and removed from the model.

Consequently, classroom mastery goal structure was a significant predictor for neither efficacy slope nor cheating behavior slope.

Therefore, the equations for the full final intercept and slopes as outcomes model are:

Level 1(Students level):

$Y_{ij} = \beta_{0j} + \beta_{1j}$ (EFFI) + β_{2j} (HANDI) + β_{3j} (CHEAT) + β_{4j} (ACHIEV) $+ r_{ij}$

Level 2(Class level):

$\beta_{0j} = \gamma_{00} + \gamma_{01}$ (CMGS) + u_{0j}

$\beta_{1j} = \gamma_{10} + u_{1j}$

$\beta_{2j} = \gamma_{20}$

$\beta_{3j} = \gamma_{30} + u_{3j}$

$\beta_{4j} = \gamma_{40}$

The results of the final estimation of fixed effects obtained from the full final intercepts and slopes as outcomes model were presented in Table 4.11.

Table 4.11 Final Estimation of Fixed Effects of Final Full Model

Fixed Effect	*Coefficient*	*Standard Error*	*t-ratio*	**p-value**
Overall mean MGO, γ_{00}	4.358	0.020	223.041	0.000
CMGS, γ_{01}	0.196	0.045	4.370	0.000
EFFI, γ_{10}	0.439	0.028	15.965	0.000
HANDI, γ_{20}	-0.055	0.013	-4.134	0.000
CHEAT, γ_{30}	-0.069	0.014	-4.787	0.000
ACHIEV, γ_{40}	0.015	0.004	3.652	0.000

The classroom mastery goal structure coefficient (γ_{01}= .196, se= .045) indicates that classroom mastery goal structure is significantly positively related to mastery goal orientation. The higher the classroom mastery goal structure, the higher the mastery goal orientation students adopt.

In addition, Efficacy, Self-Handicapping, Cheating Behavior, and Science Achievement were found to be significantly related with mastery goal orientation. The Efficacy slope coefficient (γ_{10}= .439, se= .028) indicates that students who have higher efficacy have higher mastery goal orientation. Self-Handicapping slope coefficient (γ_{20}= -.055, se= .013) indicates that students who apply more self-handicapping strategies have lower levels of mastery goal orientation. Cheating Behavior slope (γ_{30}= -.069, se= .014) indicates that students who demonstrate cheating behavior have lower levels of mastery goal orientation. Science Achievement slope coefficient (γ_{40}= .015, se= .004) indicates that students who have higher science achievement also have higher levels of mastery goal orientation.

In the final full model of intercepts and slopes as outcomes, no significant relationship was found between the student level slopes and class level variables.

The results of the final estimation of variance components obtained from the full final intercepts and slopes as outcomes model were presented in Table 4.12. The degrees of freedom for this model are based on the number of classes with sufficient data and the number of class level variables included in the model.

Degrees of freedom = J- Q – 1,

where

J = the number of classes with sufficient data

Q = the number of class level variables included in the model

There were 62 classes with sufficient data.

df for Class Mean = 62- 1 – 1 = 60

df for Efficacy = 62- 0 – 1 = 61

df for Cheating Behavior = 62- 0 – 1 = 61

Table 4.12 Final Estimation of Variance Components

Random Effect	*Variance Component*	*df*	*Chi-square*	**p-value**
Class mean, u_{0j}	0.015	60	179.632	0.000
EFFI, u_{1j}	0.024	61	135.337	0.000
CHEAT, u_{3j}	0.005	61	103.393	0.001
Level-1 Effect, r_{ij}	0.245			

The proportion of variance explained in mastery goal orientation relative to random coefficient model was:

$$= \frac{\tau_{00}\text{ (Random Coefficient)} - \tau_{00}\text{ (Intercepts and Slopes as Outcomes)}}{\tau_{00}\text{ (Random Coefficient)}}$$

$$\text{proportion of variance explained in MGO, } \beta_{0j} = \frac{0.025 - 0.015}{0.025} = 0.400$$

Therefore, it can be said that 40.0% of the variance in the between class differences in mean mastery goal orientation is accounted for by CMGS. However, significant differences still remains ($\chi^2 = 179.632$, $p < .001$) between classes.

4.3.2 HLM Analyses with Performance-Approach Goal Orientation Outcome

Secondly, models were developed with performance-approach goal orientation outcome variable.

4.3.2.1 One-Way ANOVA with Random Effects

Related to performance-approach goal orientation part, in order to answer the first research question of if there are differences in students' performance-approach goal orientations among classrooms, one-way ANOVA with random effects model is applied.

For $i = 1, \ldots, n_j$ students in school j, and $j = 1, \ldots, 62$ schools, equations at two levels are:

Level 1(Students level) Model:

$$Y_{ij} = \beta_{0j} + r_{ij}$$

Level 2(Class level) Model:

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

where

Y_{ij} = Performance-approach goal orientation for i^{th} students in j^{th} classroom

β_{0j} = the intercept

r_{ij} = the students level error

γ_{00} = the grand mean

u_{0j} = the class level error

The final estimation of fixed effects obtained from the one-way ANOVA with random effects model was given in the Table 4.13. The analysis indicates that there are significant differences among classrooms. The grand-mean of performance-approach goal orientation is 3.818 with a standard error of 0.029, indicating a 95% confidence interval of:

$$\text{Confidence Interval} = 3.818 \pm 1.96\ (0.029) = (3.762,\ 3.875)$$

Table 4.13 Final Estimation of Fixed Effects

Fixed Effects	*Coefficient*	*Standard Error*	*t-ratio*	**p-value**
Average class mean, γ_{00}	3.818	0.029	134.122	0.000

The final estimation of variance components obtained from the one-way ANOVA with random effects model was given in the Table 4.16. At the student level Var(r_{ij}) = σ^2 = 0.7162. At the class level, τ_{00} is the variance of the true class means, β_{0j}, around the grand mean, γ_{00}. Var(u_{0j})= τ_{00} = 0.0259. The chi-square statistic takes on a value of 129.693 with 61 degrees of freedom (*J*= 62 classes). The test is significant ($p < .001$) indicating significant variation does exist among classrooms in their performance-approach goal orientation.

Table 4.14 Final Estimation of Variance Components

Random Effect	*Variance Component*	*df*	*Chi-square*	**p-value**
Class Mean, u_{0j}	0.0259	61	129.693	0.000
Level-1 Effect, r_{ij}	0.7162			

The intraclass correlation, which represents the proportion of variance in Y between classes, is

$$\rho = \tau_{00} / (\tau_{00} + \sigma^2) = 0.0259 / (0.0259 + 0.7162) = 0.035,$$

indicating that about 3.5% of the variance in performance-approach goal orientation is between classes.

HLM also provides an estimate of the reliability of the sample mean in any class. The reliability is an estimate of the true class mean and is affected by the sample size within each class. The overall estimate of reliability is the average of the class reliabilities. ρ= 0.515 indicating that the sample means tend to be a reliable indicator of true class means. The equation for determining reliability of the mean performance-approach goal orientation within each school is: $\rho= \tau_{00} / [\tau_{00} + (\sigma^2 / n_j)]$. Therefore, the reliability of the sample mean varies from class to class because the sample size n_j varies.

4.3.2.2 Means-as-Outcomes Regression Model

In order to answer second research question of which class level variables are associated with students' performance-approach goal orientation, means-as-outcome model is applied. In this model, student level equation remains unchanged: students performance-approach goal orientations are viewed as varying around their class means. The class level equation is now elaborated, however, so that each class mean is now predicted by classroom mastery goal structure, classroom performance-approach goal structure, and classroom performance-avoid goal structure.

Equations at two levels are:

Level 1(Students level) Model:

$$Y_{ij} = \beta_{0j} + r_{ij}$$

Level 2(Class level) Model:

$$\beta_{0j} = \gamma_{00} + \gamma_{01} \text{ (CMGS)} + \gamma_{02} \text{ (CPApGS)} + \gamma_{03} \text{ (CPAvGS)} + u_{0j}$$

where

β_{0j} = the class mean on performance-approach goal orientation

γ_{00} = the intercept (grand mean for performance-approach goal orientation, that is the average of the class means on performance-approach goal orientation across the population of classes)

γ_{01} = the effect of CMGS on the class mean on performance-approach goal orientation

γ_{02} = the effect of CPApGS on the class mean on performance-approach goal orientation

γ_{03} = the effect of CPAvGS on the class mean on performance-approach goal orientation

τ_{00} = class level variance in β_{0j} after accounting for these class level variables

u_{0j} = the residual

The model was first run with three class level factors, but mean performance-approach goal structure and mean performance-avoid goal structure were not significant and were removed from the final analysis. The final estimation of fixed effects obtained from means-as-outcomes model was given in Table 4.15.

The results obtained from Table 4.15 indicates that classroom performance-approach goal structure is significantly positively related to mean performance-approach goal orientation (γ_{01}= .217, se = .073). Classroom performance-approach goal structure will be reexamined during the development of the final full intercepts and slopes as outcomes model.

Table 4.15 Final Estimation of Fixed Effects

Fixed Effect	*Coefficient*	*Standard Error*	*t-ratio*	**p-value**
Model for class means				
Intercept, γ_{00}	3.819	0.026	144.432	0.000
CPApGS[1], γ_{01}	0.217	0.073	2.948	0.005

[1]The class level variable was grand mean centered before the analysis

The final estimation of variance components obtained from means-as-outcome model was given in Table 4.16. The degrees of freedom for this model is based on the number of classes with sufficient data and number of class level variables included in the model.

Degrees of Freedom = J- Q- 1,

where

J = the number of classes with sufficient data

Q = number of class level variables included in the model

Therefore, degrees of freedom for this model is:

$df = 62 - 1 - 1 = 60$

Table 4.16 Final Estimation of Variance Components

Random Effect	*Variance Component*	*df*	*Chi-square*	**p-value**
Class Mean, u_{0j}	0.019	60	112.334	0.000
Level-1 Effect, r_{ij}	0.717			

The residual variance between classes from means-as-outcomes regression model (τ_{00}= 0.019) is smaller than the variance obtained in one-way ANOVA model (τ_{00}= 0.0259). This reduction is due to the inclusion of class level factors into the model. The proportion of variance explained in β_{0j} is:

$$\frac{\tau_{00}\text{ (ANOVA) - }\tau_{00}\text{ (Means as Outcomes)}}{\tau_{00}\text{ (ANOVA)}}$$

Thus, the proportion variance explained in β_{0j} is:

$$\frac{0.0259 - 0.019}{0.0259} = 0.266.$$

This is indicates that 26.6% of the true between class variance in performance-approach goal orientation is accounted for by CPApGS. Chi-square statistic is found to be 112.334 (df = 60, $p < .001$). This significant result indicates that classroom performance-approach goal structure did not account for all the variation in the intercept.

4.3.2.3 The Random Coefficient Model

In order to answer third research question of which student characteristics help to explain the difference in students' orientation toward performance-approach goals, the random coefficient model was conducted.

Equations at two levels are:

Level 1(Students level):

$Y_{ij} = \beta_{0j} + \beta_{1j}$ (EFFI) + β_{2j} (HANDI) + β_{3j} (CHEAT) + β_{4j} (ACHIEV) + β_{5j} (GENDER) $+r_{ij}$

Level 2(Class level:

$\beta_{0j} = \gamma_{00} + u_{0j}$

$\beta_{qj} = \gamma_{q0} + u_{qj}$

where

Y_{ij} = performance-approach goal orientation of student *i* in class *j*

β_{0j} = the class mean on performance-approach goal orientation

β_{1j} = the differentiating effect of efficacy

β_{2j} = the differentiating effect of self-handicapping strategies

β_{3j} = the differentiating effect of cheating behavior

β_{4j} = the differentiating effect of science achievement

β_{5j} = the differentiating effect of gender

β_{qj} = the coefficient for variable *q* for class j after accounting for other variables

γ_{00} = the average of class means on performance-approach goal orientation across the population of classes

γ_{q0} = the average *q* variable- performance-approach goal orientation slope across those classes

u_{0j} = the unique increment to the intercept associated with school *j*

u_{1j} = the unique increment to the slope associated with school *j*

Building strategy, as recommended by Raudenbush and Bryk (2002), was followed. Level 1 predictors were entered to the model one by one in order to detect if there is any significant relationship between predictors and performance-approach goal orientation, and also to detect whether they randomly vary or not. First of all efficacy was entered to model. It was seen that efficacy was significantly related to performance-approach goal orientation and it was non-randomly varying across classes.

After detecting Efficacy as a significant predictor, Self-Handicapping variable was tested. However, results showed that Self-Handicapping was not a significant predictor of performance-approach goal orientation. Thus, self-handicapping was removed from the model.

Next, Cheating Behavior was tested as a level 1 predictor of performance-approach goal orientation. It was found Cheating Behavior was significantly related to performance-approach goal orientation, and it was non-randomly varying across classes.

Then, Science Achievement was added to the model. However, results showed that it was not significantly related to performance-approach goal orientation. Thus, Science Achievement was removed from the model.

Lastly, Gender variable was tested and it was found to be significantly related to performance-approach goal orientation. Gender was also found to be non-randomly varying across classes.

Therefore, the final random coefficient model includes three variables: Efficacy, Cheating Behavior, and Gender as non-randomly varying student level variables. The final estimation of fixed effects obtained from final random coefficient model was displayed in Table 4.17.

Table 4.17 Final Estimation of Fixed Effects

Fixed Effect	*Coefficient*	*Standard Error*	*t-ratio*	**p-value**
Overall mean PApGO, γ_{00}	3.769	0.034	109.925	0.000
EFFI[1], γ_{10}	0.382	0.029	13.317	0.000
CHEAT[1], γ_{20}	0.042	0.017	2.479	0.013
GENDER[2], γ_{30}	0.096	0.038	2.548	0.011

[1]The student level variables were Group Mean Centered before analysis.

[2]The student level variables were Un-centered before analysis.

The Efficacy-Performance Approach Goal Orientation slope coefficient (γ_{10}= .382, se= .029) indicates that Efficacy is positively related to performance-approach goal orientation. Students who have higher efficacy also have higher levels of performance-approach goal orientation.

The Cheating Behavior-Performance Approach Goal Orientation slope coefficient (γ_{20}= .042, se= .017) indicates that Cheating Behavior is positively related to performance-approach goal orientation. Students who demonstrate more Cheating Behavior have higher levels of Performance-Approach Goal Orientation.

The Gender-Performance Approach Goal Orientation slope coefficient (γ_{30}= .096, se= .038) indicates that girls have higher performance-approach goal orientations than boys.

The final estimation of variance components obtained from random coefficient model was displayed in Table 4.18. Since none of the student level predictors varied significantly across classes, only variance in performance-approach goal orientation (τ_{00}) and variance within classes (σ^2) were reported in the table. As seen from Table 4.18, significant differences (variability) between classes (χ^2= 142.261, p < .001) still exist, there is need to incorporate class level variables into the model that might account for some of the differences.

Table 4.18 Final Estimation of Variance Components

Random Effect	*Variance Component*	*df*	*Chi-square*	**p-value**
Class mean, u_{0j}	0.0277	61	142.261	0.000
Level 1 Effect, r_{ij}	0.6483			

In order to calculate how much of the within class variability is explained by incorporating Efficacy, Cheating Behavior and Gender as predictors into the model, σ^2 estimates of one way ANOVA with random effects model and the random coefficient model are compared:

$$\text{proportion of variance explained at level 1} = \frac{\sigma^2\,(\text{ANOVA}) - \sigma^2\,(\text{Ran.Coef.})}{\sigma^2\,(\text{ANOVA})}$$

$$\text{proportion of variance explained at level 1} = \frac{0.7162 - 0.6483}{0.7162} = 0.095$$

Therefore by including Efficacy, Cheating Behavior and Gender as student level predictors of performance-approach goal orientation, within class variance was reduced by 9.5%. In other words, these factors account for about 9.5% of the student level variance in performance-approach goal orientation.

Reliability estimates of intercepts and slopes indicate that the reliability of intercepts is 0.56.

4.3.2.4 Intercepts and Slopes as Outcomes Model

In order to answer the fourth research question of which class characteristics influence the effect of student characteristics on the students' performance-approach goal orientation, intercepts and slopes as outcomes model was conducted. In fact, this research question incorporates three previous research questions.

Student level model is composed of variables which are found to be significant in the random coefficient model. Class level model is expended to incorporate the class level variable that was found to be significant in means-as-outcomes model. Since all of the coefficients (slopes) were found to be non-randomly varying, only the intercept is modeled.

Level 1(Students level):

$$Y_{ij} = \beta_{0j} + \beta_{1j}\,(\text{EFFI}) + \beta_{2j}\,(\text{CHEAT}) + \beta_{3j}\,(\text{GENDER}) + r_{ij}$$

Level 2(Class level):

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\,(\text{CPApGS}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

The results of the final estimation of fixed effects obtained from the full final intercepts and slopes as outcomes model were presented in Table 4.19.

Table 4.19 Final Estimation of Fixed Effects of Final Full Model

Fixed Effect	*Coefficient*	*Standard Error*	*t-ratio*	**p-value**
Overall mean PApGO, γ_{00}	3.768	0.033	115.755	0.000
CPApGS, γ_{01}	0.224	0.073	3.063	0.004
EFFI, γ_{10}	0.382	0.029	13.306	0.000
CHEAT, γ_{20}	0.042	0.017	2.491	0.013
GENDER, γ_{30}	0.101	0.038	2.680	0.008

The classroom performance-approach goal structure coefficient (γ_{01}= .224, se= .073) indicates that classroom performance-approach goal structure is significantly positively related to performance-approach goal orientation. The higher the classroom performance-approach goal structure, the higher the performance-approach goal orientation students adopt.

In addition, Efficacy, Cheating Behavior, and Gender were found to be significantly related with performance-approach goal orientation. The Efficacy slope coefficient (γ_{10}= .382, se= .029) indicates that students who have higher efficacy have higher performance-approach goal orientation. Cheating Behavior slope (γ_{30}= .042, se= .017) indicates that students who demonstrate more cheating behavior have higher levels of performance-approach goal orientation. Gender slope coefficient (γ_{40}= .101, se= .038) indicates that girls are more performance-approach goal oriented than boys.

The results of the final estimation of variance components obtained from the full final intercepts and slopes as outcomes model were presented in Table 4.20. The degrees of freedom for this model are based on the number of classes with sufficient data and the number of class level variables included in the model.

Degrees of freedom = J- Q – 1,

where

J = the number of classes with sufficient data

Q = the number of class level variables included in the model

There were 62 classes with sufficient data.

df for Class Mean = 62- 1 – 1 = 60

Table 4.20 Final Estimation of Variance Components

Random Effect	*Variance Component*	*df*	*Chi-square*	**p-value**
Class mean, u_{0j}	0.0206	60	121.813	0.000
Level-1 Effect, r_{ij}	0.6486			

The proportion of variance explained in mastery goal orientation relative to random coefficient model was:

$$= \frac{\tau_{00}\text{ (Random Coefficient)} - \tau_{00}\text{ (Intercepts and Slopes as Outcomes)}}{\tau_{00}\text{ (Random Coefficient)}}$$

proportion of variance explained in PApGO, $\beta_{0j} = \frac{0.0277 - 0.0206}{0.0277} = 0.256$

Therefore, it can be said that 25.6% of the variance in the between class differences in mean performance-approach goal orientation is accounted for by classroom performance-approach goal structure. However, significant differences still remains ($\chi^2 = 121.813$, $p < .001$).

4.4 Summary

Models developed with mastery goal orientation as outcome showed that Efficacy, Self-Handicapping, Cheating Behavior, and Science Achievement were found to be significantly related with mastery goal orientation. While

Efficacy and Science Achievement were positively related to mastery goal orientation, Self-Handicapping and Cheating Behavior were negatively related to it. Furthermore, it was found that classroom mastery goal structure is positively related to students' mastery goal orientation.

Models developed with performance-approach goal orientation as outcome showed that Efficacy, Cheating Behavior, and Gender were significantly related with performance-approach goal orientation. Both Efficacy and Cheating Behavior were positively related to performance-approach goal orientation. In addition, girls were found to be more performance-approach goal oriented than boys. Furthermore, model revealed that classroom performance-approach goal structure was positively associated with students' performance-approach goal orientation.

CHAPTER V

DISCUSSION

This chapter is devoted to the discussion of the results of the present study. Five main sections included in the chapter are summary of the study, discussion of the results, conclusions, implications, and recommendations for further research.

5.1 Summary of the Study

The present study investigated the relationship between students' personal goal orientations and various learning related variables, such as efficacy, self-handicapping strategies, cheating behavior and science achievement. This study was also interested in exploring whether students' perceived goal structures in their classrooms predict the goal orientations they adopt. Consequently, both student level and class level variables were in the concern of the study. Due to the nested structure of data (students nested within classes), Hierarchical Linear Modeling, a multilevel analysis technique, were applied to provide more precise coefficients. Theoretical framework and the models built in the previous research provided the basis in identification of the student and class level variables to be included in the present study. Two separate models were built for each personal goal orientations. While outcome variable of the first model was mastery goal orientation, it was performance-approach goal orientation in the second model. The student level predictors were science achievement, efficacy, self-handicapping strategies, cheating behavior and gender. Class level predictors were aggregate student perceptions of classroom mastery goal structure, classroom performance-approach goal structure, and classroom performance-avoid goal structure.

5.2 Discussion of the Results

In this part, results for mastery goal orientation and performance-approach goal orientation were discussed. HLM analyses regarding mastery goal orientation revealed that significant variation does exist among classrooms in their mastery goal orientation. Intraclass correlation coefficient, which measures the proportion variance in the mastery goal orientation that is between classes (Raudenbush & Bryk; 2002), demonstrated that about 4.4% of the variance in mastery goal orientation was between classes. For student level, the present study demonstrated that efficacy, cheating behavior, self-handicapping and science achievement were significant predictors of mastery goal orientation and these factors accounted for about 38.6% of the student level variance in mastery goal orientation. Among these variables, efficacy and cheating behavior were randomly varying while self-handicapping and science achievement were non-randomly varying (see Table 4.7).

When considering the relationship between efficacy and mastery goal orientation, it was seen that efficacy positively predicted mastery goal orientation ($\gamma = .44$, $p < .001$). That is, students who had higher efficacy tended to have higher mastery goal orientations. In other words, students who believe in their ability to do their class work were likely to be concerned with developing their competence, extending their understanding, and improving their skills. Finding positive relation between efficacy and mastery goal orientation is not surprising since efficacy belief is related to students' judgment about their capability to do their work, if students are highly efficacious, they are confident in performing the task and mastering the skills taught in the class and they are more likely to be concerned with developing their competence (mastery goal orientation). Moreover, students who feel confident in doing the work are likely to engage in the work with more effort, however, students with doubts in succeeding the work, are less likely to participate as much effort (Urdan & Schoenfelder, 2006). This result is consistent with previous study results (e.g., Anderman & Young, 1994; Middleton & Midgley, 1997). For example, studying with 6th and 7th grade students, and science teachers, Anderman and Young (1994) examined individual and classroom level differences in goal orientations specific to science domain. HLM analyses indicated that students who had high self-efficacy at science tended to be mastery goal oriented (γ= .19, p< .001). Likewise, Middleton and Midgley (1997) investigated the relationships among personal goal orientations and some of the educationally relevant variables using 703 sixth graders. Regression analysis showed that academic efficacy and mastery goal orientation was positively related (β= .43, p< .001). Similarly, Wolters' et al. (1996) correlational study with 434 seventh and eight grade students demonstrated positive relation between adopting mastery goals and students' efficacy beliefs.

Besides, the current study demonstrated a negative relation between cheating behavior and mastery goal orientation (γ= -.07, p< .001), as expected. That is, students who demonstrated cheating behavior reported lower levels of mastery goal orientation. In other words, students who did not copy answers from others or cheat on the class work, were focused on improving their skills, learning a lot of new concepts, and engaged in the work with the purpose of developing competence and extending their understanding. This result is consistent with previous study results which reported the negative relation between cheating behavior and mastery goals (e.g., Marsden, Carroll & Neill, 2005; Newstead et al., 1996). For example, Marsden and her colleagues (2005) administrated a self-report questionnaire to 954 university students. Analysis revealed that students who were less mastery goal oriented were associated with higher rates of cheating (r= -.12, p< .01). Investigating prevalence and causes of cheating on a sample of 943 university students Newstead et al. reported that students who were studying for "personal development" (mastery goal oriented) reported lowest scores on cheating index. They concluded that personal goal orientation has a very important role in explaining students' cheating behavior.

Another finding of the present study is that there was a negative relation between self-handicapping strategies and mastery goal orientation (γ= -.06, p< .001). Students who were diminishing their effort purposefully and trying to lead attention away from their ability (Turner et al., 2002) by providing an excuse for the poor academic work (Urdan, 2004b), that is using self-handicapping strategies, had lower levels of mastery goal orientation. The negative relation between self-handicapping strategies and mastery goal orientation is anticipated because mastery goal oriented students are concerned with developing competence and improving their skills, hence it is unlikely for those students to withdraw effort purposefully so that the subsequent low performance is due to some other reasons but not due to their abilities. Mastery goal oriented students, on the other hand, give more effort to extend their understanding. This finding is consistent with Midgley and Urdan's (2001) study which indicated that 7^{th} grade students' mastery goal orientation was associated with lower use of self-handicapping strategies (β= -.17, p< .001). Similarly, Angeliki and Eleftheria (2007) found that senior high school students' pursuing mastery goals and using academic self-handicapping strategies was negatively related.

In the present study, a positive relation was found between science achievement and mastery goal orientation (γ= .02, p< .001), implying that students who performed better at science achievement test had higher levels of mastery goal orientation. Theoretically this result can be expected because students who are mastery goal oriented would be interested in learning the material and would try to improve their skills. Therefore, those students would get higher academic achievement. It was the case in the present study that students who got higher points in the science achievement test reported higher levels of mastery goals. Working with 112 undergraduate students, Hsieh, Sullivan, and Guerra (2007) reported a positive relationship between mastery goals and academic standing (GPA) (r= .40, p< .001). Similarly, Wolters' et al. (1996) correlational study with 434 seventh and eight grade students showed that adopting mastery goals was positively related to students' academic performance. However, the positive relation between mastery goals and academic achievement was not found in some of the previous studies (e.g., Barron & Harackiewizc, 2001; Anderman & Midgley; 1997). For instance, in their correlational study with 166 undergraduate students, Barron and Harackiewizc (2001) failed to find a relationship between mastery goal orientation and students' achievement. Similarly, Anderman and Midgley's (1997) survey study with 341 elementary school students and Skaalvik's (1997) survey study with 434 sixth grade students revealed no association between personal mastery goals and academic achievement. Covington (1992) and Nicholl (1989) suggested that the reason for failing to find consistent positive relations between mastery goals and academic achievement could be due to the problematic educational values promoted in schools. (cited in Urdan, 2004a). Authors claimed that, if students who are bearing on learning the material thoroughly and improving their skills (mastery goal oriented) do not get high grades, but students who are bearing on looking competent and demonstrating ability get higher grades, this means that something is wrong in those schools. It should be noted that since some of the studies failed to indicate a positive relation between mastery goal orientation and academic achievement, some questions aroused about the insight of achievement goal theory as a guide for educational reform which will be mentioned later in this chapter (Urdan, 2004a). By supporting the positive relationship between adopting mastery goals and science achievement, the present study contributes our understanding of the association between mastery goal orientation and achievement.

To sum up, when the relations between mastery goal orientation and student level variables were examined, it was seen that students who had high efficacy, who had high science achievement, who demonstrated less cheating behavior, and who used less self-handicapping strategies, which were all positive patterns, were more likely to be mastery goal oriented. The present study therefore supported the literature in terms of the associations between mastery goal orientation and adaptive patterns of learning.

When class level variables were considered, the only significant predictor of mastery goal orientation was found to be classroom mastery goal structure and it accounted for about 40.0% of the variance in the between class differences in mean mastery goal orientation. Classroom mastery goal structure was significantly and positively related to mastery goal orientation ($\gamma = .20$, $p < .001$), implying that the higher students perceived their classes as mastery goal structured, the higher levels of mastery goals they adopted. More specifically, students in classes where understanding the material was the main goal, trying hard was important, and self-improvement was emphasized reported higher mastery goal orientations. In fact, it can be expected that if in the learning environment the purpose of achievement is emphasized as thoroughly understanding the work, then the students may be influenced by the given messages and develop a goal orientation in accordance. Previous studies also reported the association between personal goal orientations and goal structures of the classes or schools (e.g., Roeser et al., 1996; Church et al., 2001). For example, Roeser and his colleagues (1996) surveyed 296 elementary school students in order to examine the relations among perception of school goal structure, personal goal orientations and some of the psychological variables. Regression analyses revealed that students' perception of school mastery goal structure was a positive predictor of students' personal mastery goal orientation ($\beta = .34$, $p \leq .01$). In another study, Church et al. (2001) investigated the relations among perception of classroom goal structure, students' personal goal orientations, intrinsic motivation and graded performance. Hierarchical Linear Modeling analyses supported that perceived classroom goal structure was related to students' personal goal orientations. Related to mastery goal orientation, it was found that, lecture engagement was a positive predictor (γ= .34, p< .05), while evaluation focus (γ= -.38, p< .05) and harsh evaluation (γ= -.23, p< .05) were negative predictors. These findings support that learning environment's characteristics may promote students' adoption of particular goal orientations (Linnenbrink, 2004). Specifically, mastery goal structured learning environment may support students' adoption of mastery goals.

Since efficacy and cheating behavior slopes were randomly varying, in order to predict the strength of association between each variable and mastery goal orientation (i.e., the association between efficacy and mastery goal orientation, the association between cheating behavior and mastery goal orientation) class level variables were tested. However, results showed that classroom goal structures were not significant predictors of efficacy and cheating behavior slopes. The developed model thus was not able to explain the variation in the slopes.

Considering performance-approach goal orientation as outcome variable, HLM analyses revealed that significant variation does exist among classrooms in their performance-approach goal orientation. Intraclass correlation coefficient demonstrated that about 3.5% of the variance in performance-approach goal orientation was between classes. According to the built model, efficacy, cheating behavior and gender were significant non-randomly varying student level predictors of performance-approach goal orientation. These factors accounted for about 9.5% of the student level variance in performance-approach goal orientation.

Among the variables examined, efficacy was found to be positively related to performance-approach goal orientation (γ= .38, p< .001). This means that, students who had higher efficacy had higher performance-approach goal orientation. A possible interpretation is that students who feel themselves as competent to do their class work (efficacy) may be more likely to demonstrate their competence relative to others in the learning context (performance-approach goal orientation). If a student feels more efficacious about the subject area, he or she may pursue performance-approach goals (Middleton, Midgley & Kaplan, 2004). This result while consistent with studies of Wolters et al. (1996) and Skaalvik (1997), is inconsistent with Middleton and Midgley (1997) study findings.

The present study also revealed a positive relation between cheating behavior and performance-approach goal orientation ($\gamma = .04$, $p < .05$). That is, students who demonstrated cheating behavior had higher levels of performance-approach goal orientation. In other words, students who copied answers from others or cheat on the class work, were concerned with demonstrating their competence to others were more likely to cheat. This result supported the previous study findings (e.g. Newstead et al., 1996; Marsden et al., 2005). For instance, working on 943 university students Newstead et al. (1996) found that students studying "for a degree or for social reasons" reported highest scores on the cheating index. Researchers asserted that students' personal goal orientation has an important role in explaining why some students cheat while others do not. Students who were working to display their ability or to get high grades (performance goal oriented) had more tendency to cheat. In another study, Marsden et al. (2005) revealed that students who were more performance goal oriented were associated with higher rates of cheating ($r = .09$, $p < .01$). These studies reveal that students focusing on relative ability and performance were more likely to demonstrate cheating behavior.

Concerning the relationship between gender and performance-approach goal orientation, it was found that girls were more performance-approach goal oriented than boys (γ= .10, p< .05). This result implied that girls were more likely to engage in academic work to demonstrate ability than were boys. A possible interpretation is that girls may be more concerned with how they are seen from others, if they are appearing smart in comparison to the other students in the class; so that they try to show that they are good at class work by displaying their abilities. Therefore it can be said that girls may be more inclined to endorse performance-approach goals. Only one study was encountered revealing a similar result; Ziegler, Heller, and Broome (1996) study on high-achieving 7th graders found that girls were more performance oriented than boys in physics (cited in Dai, 2000). However, most of the studies typically found out the opposite (e.g., Anderman & Young, 1994; Anderman & Midgley, 1997). For instance, Anderman and Young (1994) showed that 6th and 7th grade girls were less performance goal oriented than boys in science lesson. A similar result was reported in Anderman and Midgley (1997) study for 5th and 6th grade students both in mathematics and English domains. In another study, Middleton and Midgley (1997) surveyed 703 sixth grade American students specific to mathematics domain and results indicated that boys were significantly more performance-approach goal oriented than girls. The discrepancy between the findings of the current study and previous studies may not be attributed to grade level difference, domain difference, or approach-avoid distinction in the measures of performance goals, but may be attributed to the different cultural context where studies were conducted. Further research, however is needed to clarify this finding.

The present study demonstrated that self-handicapping strategy was not a significant predictor of performance-approach goal orientation. Self-handicapping strategies, such as putting of studying until the last minute, fooling around the night before a test, are used with the intention to show others that if the following performance is low, it is because of those circumstances but not lack of ability. Thereby, they can deflect attention away from their ability. The primary reason for students to engage in self-handicapping strategies may be the fear of appearing less capable than others (Urdan & Midgley, 2001). On the other hand, performance approach goal orientation is related to demonstrating competence. Therefore, the null association between these two variables can be expected. Similarly, Midgley and Urdan (2001) found no significant relationship between using self-handicapping strategies and performance-approach goal orientation in 7th grade students. They concluded that self-handicapping strategies were related to avoidance of demonstration of incompetence (performance-avoid goal orientation) rather than demonstration of their competence (performance-approach goal orientation). However, in a longitudinal study with 675 high school students, Urdan (2004b) found negative relationship between performance-approach goal orientation and self-handicapping strategies. He explained that controlling prior achievement and prior performance goals could be the reason for this negative association. However, the effect size was not particularly significant.

The present study also failed to indicate any relationship between performance-approach goal orientation and science achievement. Pintrich's (2000c) longitudinal study with 150 students when they were in the 8th and 9th grade also failed to find a relationship between performance-approach goal orientation and teacher-assigned grades in mathematics. However, Skaalvik (1997) showed in his study with 6th and 8th grade students that performance-approach goal orientation was positively related to academic achievement in mathematics. Research findings revealed more consistent results for the relation between the two variables with older students (Wolters, 2004). For instance, Elliot and McGregor (2001) study with undergraduate students revealed a positive relation between performance-approach goal orientation and exam performance. Similarly, Barron and Harackiewicz (2001) study with undergraduate students revealed a positive relation between performance goals and students performance in the follow-up assessment on the taught new technique. Wolters (2004) claimed that performance-approach goals and grades were positively related in those studies because normative standards were used in evaluation practices.

Briefly, when the relations between performance-approach goal orientation and student level variables were examined, it was seen that performance-approach goal orientation was associated with higher levels of efficacy and higher levels of demonstration of cheating behavior. Hence, findings of the present study supported the earlier research findings which demonstrated that performance-approach goal orientation was related with both adaptive and maladaptive patterns of learning.

When class level variables were considered, classroom performance-approach goal structure was found to be the only significant predictor of performance-approach goal orientation, explaining 25.6% of the variance in the between class differences in mean performance-approach goal orientation. Classroom performance-approach goal structure was significantly positively related to performance-approach goal orientation (γ= 0.22, p< .05), implying that the higher the performance-approach goal structure students perceived in their classes, the higher the performance-approach goal orientation they adopted. That is, students in classes where getting good grades and right answers were emphasized were more likely to adopt higher performance-approach goal orientations. Previous studies also reported this association between personal goal orientations and goal structures of the classes or schools (e.g., Roeser et al., 1996; Church et al., 2001). Roeser and his colleagues examined the relations among perception of school goal structure, personal goal orientations and some of the psychological variables by using elementary school students. Regression analyses revealed that students' perception of school performance goal structure was the strongest predictor of students' personal performance goal orientation (β= .40, $p \leq .01$). In another study, Church et al. investigated the relations among undergraduate students' perception of classroom goal structure, personal goal orientations, intrinsic motivation and graded performance. HLM analyses supported that perceived classroom goal structure was related to students' personal goal orientations. Regarding performance-approach goal orientation, it was found that evaluation focus learning environment was a positive predictor of performance–approach goals students adopted (γ_{10}= .50, p< .05).

5.3 Conclusions

When the relationships between personal goal orientations and learning related variables were examined, it was seen that mastery goal orientation was associated with more adaptive patterns, namely higher efficacy, higher science achievement, lower tendency to use self-handicapping strategies and lower tendency to cheat. On the other hand, performance-approach goal orientation was found to be associated with only one of the positive patterns which was higher academic efficacy. Moreover, results showed that performance-approach goal orientation was also associated with higher levels of cheating which is a maladaptive pattern of learning. These results reveal that the relations between performance-approach goals and learning related variables may be more complex than the relations for mastery goals as the earlier research suggested (e.g., Hsieh et al., 2007).

In the present study, students' perception of the classroom goal structure was found to be related to students' pursuing of particular goals. More specifically, it was demonstrated that students learning in mastery goal structured classes, where hard working, self-improvement, and learning new concepts were emphasized, mistakes were seen as a part of learning, were more likely to adopt mastery goals which in turn found to be associated with adaptive learning patterns as mentioned above. Meanwhile, students learning in performance-approach goal structured classes, where importance of getting right answers and getting good grades were stressed, were more likely to pursue performance-approach goals which were associated with both adaptive and maladaptive learning patterns. It can be said that the study favored mastery goal emphasize rather than performance-approach goal in the classroom since mastery goals were found to be associated with more adaptive patterns.

5.4 Implications

The present study contributes to our understanding of the relations between personal goal orientations and learning related variables as well as the relations between classroom goal structures. Since the study was associational in nature, making causations from the obtained results is not as appropriate. Results provide, however, some suggestions for improving science learning environment based on the comparisons between the developed models.

Since mastery goal structure of science class encouraged its students to pursue mastery goals which in turn found to be related with adaptive learning patterns, the present study findings may encourage science teachers to consider their instructional activities, evaluation techniques, and teacher-student interactions so that they convey the message that in this class developing competence and improving skills are important. Science teachers willing to support students' perception of mastery goal structure in the class may try to emphasize that really understanding the material is the main goal. Likewise, the teacher may highlight that trying hard, giving effort, and persisting on the academic task is important. Furthermore, learning new ideas and concepts may be emphasized in the class. Rather than stressing relative ability and making normative evaluations, the teacher may try to emphasize self-improvement. Through their interactions with students, the teacher may try to give the message that the purpose of instruction is to help them learn deeply and meaningfully, not to compare them in order to determine the best or the worst student in the class. Making grade announcements in concealment and viewing mistakes as a part of learning may also promote mastery goal structure of the classroom.

5.5 Recommendations for Further Research

There is a debate for use of achievement goal theory in guiding educational reform. From the point that mastery goals are beneficial for students and mastery goal structures of the learning environment promote students' adoption of mastery goal orientations, the theory may provide a framework for educational reform effort (Urdan, 2004a). However, longitudinal research should be conducted to explore the causal relationships between personal goal orientations and classroom goal structures. Furthermore, there is need for more research to explore how goal structures of the learning environment can be modified by altering instructional practices. Ames (1992) suggested some instructional strategies in task, authority, and evaluation domains to support mastery goal structure in the classroom. Accordingly, designing meaningful and challenging tasks, giving opportunities to develop responsibility and supporting use of self-management and monitoring skills, focusing on individual improvement, recognizing student effort, viewing mistakes as a part of learning, and making evaluations private would support mastery goal structure. There is need for more research to test these suggestions (Urdan, 2004a). Specially, observational studies, which might provide more objective measures of classroom environment, should be conducted to investigate contribution of particular instructional practices to mastery goal structure of the learning environment.

Furthermore, relations among classroom goal structures, personal goal orientations, and learning related variables should be examined with different grade levels, in different types of schools, and in different disciplines, such as English and Mathematics. In addition, the effect of schools' goal structures should be investigated with a 3-level hierarchical modeling (student-classroom-school) which may allow determining the differences between schools also.

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APPENDICES

APPENDIX A

PATTERNS OF ADAPTIVE LEARNING SCALES (PALS)

Sevgili Öğrenciler,

Bu çalışma sizin Fen Bilgisi dersinize yönelik tutum ve hedeflerinizi ölçmeyi amçlamaktadır. Bu anketin sağlayacağı yarar, bunu yanıtlamakta göstereceğiniz içtenlik ve dikkate bağlıdır. Vereceğiniz yanıtlar kesinlikle gizli tutulacaktır. Yanıtlamadan önce soruları dikkatle okuyunuz. Soruların doğru yada yanlış cevabı yoktur; her soruda size en yakın olan seçeneği işaretleyiniz. Bu anketteki bazı sorular diğerlerine benzemektedir. Bu konuda endişelenmeyin.

Katkılarınız için şimdiden teşekkürler...

1. Cinsiyetiniz: Kız .... Erkek ....
2. Yaşınız: ....
3. I. Dönem Fen Bilgisi karne notunuz: ....
4. Sınıfınız: ....
5. Okulunuz: ....

Aşağıda fen dersinin dersinin bir öğrencisi olarak sizinle ilgili bazı sorular yer almaktadır. Lütfen ifadelere ne derecede katıldığınızı yada katılmadığınızı ilgili seçeneği işaretleyerek belirtiniz.

		Kesinlikle Katılıyorum	**Katılıyorum**	**Kararsızım**	**Katılmıyorum**	**Kesinlikle Katılmıyorum**
1.	Fen dersini en iyi şekilde anlamak benim için önemlidir.	☐	☐	☐	☐	☐
2.	Sınıftaki diğer öğrencilerle karşılaştırıldığımda zeki görünmek benim için önemlidir.	☐	☐	☐	☐	☐
3.	Sınıftaki diğer öğrencilerin, fen dersinde iyi olduğumu düşünmeleri benim için önemlidir.	☐	☐	☐	☐	☐
4.	Fen dersinde bir çok yeni kavram öğrenmek benim için önemlidir.	☐	☐	☐	☐	☐
5.	Fen dersindeki en zor çalışmaları (alıştırma, ödev, etkinlik,...) bile yapabileceğime eminim.	☐	☐	☐	☐	☐
6.	Sınav sırasında cevapları bazen arkadaşlarımdan alırım.	☐	☐	☐	☐	☐
7.	Fen dersindeki hedeflerimden biri, öğrenebileceğimin en fazlasını öğrenmektir.	☐	☐	☐	☐	☐
8.	Hedeflerimden biri, başkalarına fen dersinde iyi olduğumu göstermektir.	☐	☐	☐	☐	☐
9.	Hedeflerimden biri, fen dersinde birçok yeni beceri kazanmaktır.	☐	☐	☐	☐	☐
10.	Gayret edersem fen dersindeki en zor şeyleri bile yapabilirim.	☐	☐	☐	☐	☐
11.	Sınıf içi fen çalışmalarında (alıştırma, ödev etkinlik,...) bazen kopya çekerim.	☐	☐	☐	☐	☐

		Kesinlikle Katılıyorum	Katılıyorum	Kararsızım	Katılmıyorum	Kesinlikle Katılmıyorum
12.	Fen dersindeki hadeflerimden biri, başkalarının, benim zeki **olmadığımı** düşünmelerini önlemektir.	☐	☐	☐	☐	☐
13.	Fen dersinde öğretilenleri en iyi şekilde öğrenebileceğime eminim.	☐	☐	☐	☐	☐
14.	Fen bilgisi çalışmalarını yaparken bazen cevapları arkadaşlarımdan yazarım.	☐	☐	☐	☐	☐
15.	Hedeflerimden biri başkalarına, fen dersinin benim için kolay olduğunu göstermektir.	☐	☐	☐	☐	☐
16.	Hedeflerimden biri, sınıftaki diğer öğrencilerle karşılaştırıldığımda zeki görünmektir.	☐	☐	☐	☐	☐
17.	Fen dersini anlamıyormuş gibi görünmek **istemem**.	☐	☐	☐	☐	☐
18.	Becerilerimi geliştirmek benim için önemidir.	☐	☐	☐	☐	☐
19.	Öğretmenimin, benim sınıftakilerden daha az bildiğimi düşünmemesi benim için önemlidir.	☐	☐	☐	☐	☐
20.	Pes etmezsem, fen dersindeki hemen hemen her çalışmayı yapabilirim.	☐	☐	☐	☐	☐
21.	Hedeflerimden biri, fen dersinde zorlanıyormuş gibi **görünmemektir**.	☐	☐	☐	☐	☐
22.	Yapılması veya öğrenilmesi gereken şey zor olsa bile öğrenebilirm.	☐	☐	☐	☐	☐

Aşağıdaki ifadelerin sizin için ne kadar geçerli olduğunu, ilgili seçeneği işaretleyerek belirtiniz.

		Kesinlikle Geçerli	Geçerli	Kararsızım	Geçersiz	Kesinlikle Geçersiz
23.	Bazı öğreciler sınavdan bir gün önce vaktini boşa geçiiyorlar. Sonra da sınavda iyi yapmazlarsa bunu sebep olarak gösteriyorlar. Bu senin için ne kadar geçerli?	☐	☐	☐	☐	☐
24.	Bazı öğrenciler kendi istekleriyle bir sürü etkinliğe katılıyorlar. Sonra da sınıf çalışmalarını iyi yapamazlarsa başka şeylerle uğraştıkları için böyle olduğunu söylüyorlar. Bu senin için ne kadar geçerli?	☐	☐	☐	☐	☐
25.	Bazı öğrenciler ders çalışmamak için sebep arıyorlar (kendini iyi hissetmemek, annesi ve babasına yardım etmek, kardeşine bakmak gibi). Sonra da sınıf çalışmalarını iyi yapamazlarsa, sebebin bu olduğunu söylüyorlar. Bu senin için ne kader geçerli?	☐	☐	☐	☐	☐
26.	Bazı öğrenciler arkadaşlarının, kendi dikkatini dağıtmalarına ya da ödevlerini yapmasını engellemelerine izin veriyorlar. Sonra da sınıf çalışmalaını iyi yapamazlarsa arkadaşlarının çalışmalarına engel olduklarını söylüyorlar. Bu senin için ne kadar geçerli?	☐	☐	☐	☐	☐
27.	Bazı öğrenciler derste kasıtlı olarak çok gayret etmiyorlar. Sonra da sınıf çalışmalarını iyi yapamazlarsa gayret etmedikleri için olduğunu söylüyorlar. Bu senin için ne kadar geçerli?	☐	☐	☐	☐	☐
28.	Bazı öğrenciler fen çalışmalarını yapmayı son dakikaya bırakıyorlar. Sonra da derslerini iyi yapamazlarsa bu yüzden iyi yapamadıklarını söylüyorlar. Bu senin için ne kadar geçerli?	☐	☐	☐	☐	☐

Aşağıdaki sorular fen dersinde sınıfınızın durumu ile ilgilidir. Gerçekten ne hissediyorsanız onu işaretlemeyi unutmayın.

		Kesinlikle Katılıyorum	**Katılıyorum**	**Kararsızım**	**Katılmıyorum**	**Kesinlikle Katılmıyorum**
29.	Bizim sınıfta gayret etmek çok önemlidir.	☐	☐	☐	☐	☐
30.	Bizim sınıfta asıl hedef, iyi not almaktır.	☐	☐	☐	☐	☐
31.	Bizim sınıfta asıl hedef, derste işlenen konuları gerçek anlamda anlamaktır.	☐	☐	☐	☐	☐
32.	Bizim sınıfta doğru cevap vermek çok önemlidir.	☐	☐	☐	☐	☐
33.	Bizim sınıfta kimse, diğer öğrencilerden başarısız olmak istemez.	☐	☐	☐	☐	☐
34.	Bizim sınıfta diğer öğrencilerin önünde hata **yapmamak** önemlidir.	☐	☐	☐	☐	☐
35.	Bizim sınıfta ne kadar ilerleme gösterdiğin gerçekten önemlidir.	☐	☐	☐	☐	☐
36.	Bizim sınıfta dersi ezberlemek değil anlamak önemlidir.	☐	☐	☐	☐	☐
37.	Bizim sınıfta diğer öğrencilere, derste başarısız **olmadığını** göstermek gerçekten önemlidir.	☐	☐	☐	☐	☐
38.	Bizim sınıfta yeni fikir ve kavramları öğrenmek çok önemlidir.	☐	☐	☐	☐	☐
39.	Bizim sınıfta derse ilgisiz görünmemek çok önemlidir.	☐	☐	☐	☐	☐
40.	Bizim sınıfta eğer birşeyler öğreniyorsak, yanlış yapmamız önemli değildir.	☐	☐	☐	☐	☐
41.	Bizim sınıfta sınavlardan yüksek not almak çok önemlidir.	☐	☐	☐	☐	☐
42.	Bizim sınıfta kimse dersi **anlamıyormuş** gibi görünmek istemez.	☐	☐	☐	☐	☐

APPENDIX B

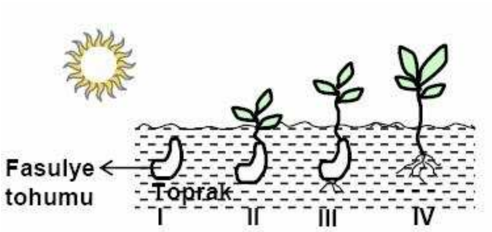
SCIENCE ACHIEVEMENT TEST (SAT)

FEN BİLGİSİ TESTİ

1. Mikroskopta hayvan hücresini inceleyen bir öğrenci aşağıdaki kısımlardan hangisini <u>göremez</u>?

a) Hücre zarı b) Çekirdek
c) Kloroplast d) Sitoplazma

2.



Yukarıdaki şekilde çimlenme sırasında fasulye tohumunun geçirdiği aşamalar verilmiştir. Bitki hangi aşamada fotosentez yapmaya başlamıştır?

a) I b) II c) III d) IV

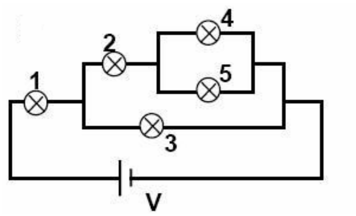
3. Aşağıdakileden hangisi <u>tüm</u> canlıların <u>ortak</u> özelliğidir?

a) Hücreli olma
b) Besin yapma
c) Eşeyli üreme
d) Yer değiştirme

4. Aşağıdakilerden hangisindeki eklemin hareket yeteneği <u>en azdır</u>?

a) Omurga b) Diz
c) Çene d) Kafatası

5. Şekilde verilen elektrik devresindeki eşdeğer ampullerden **en az** ışık veren iki ampul hangileridir?



a) 1 ve 3 b) 2 ve 3
c) 3 ve 4 d) 4 ve 5

6. Biri (-) yüklü diğeri nötr iki küre birbirine dokundurulduğunda kürelerin son yük durumu aşağıdakilerden hangisindeki gibi olur?

a) Her ikisi de (−) yüklü
b) Her ikisi de nötr
c) Her ikisi de (+) yüklü
d) Zıt yüklü

7. Aşağıdakilerden hangisi **iletken** maddedir?

a) Plâstik b) Cam
c) Tahta d) Demir

8. Aşağıdakilerden hangisi güneş sistemimizde <u>bulunmaz</u>?

a) Galaksi
b) Meteor
c) Kuyruklu yıldız
d) Gezegenler

9.

Madde / Özellik	K	L	M
Tanecikler arası uzaklık	Az	Çok fazla	Çok az
Sıkıştırıla-bilme	Çok az sıkıştıra-labilir	Sıkıştırı-labilir	Sıkıştırı-lamaz
Madde taneciklerinin hareketi	Titreşim, yer değiştirme	Titreşim, yer değiştirme	Titreşim

Çizelgede saf maddelerin katı, sıvı ve gaz hallerinin bazı özellikleri verilmiştir.

Bu maddelerin fiziksel hâlleri hangisindeki gibi olur?

	K	L	M
a)	Katı	Sıvı	Gaz
b)	Gaz	Katı	Sıvı
c)	Sıvı	Gaz	Katı
d)	Sıvı	Katı	Gaz

10. Deri aşağıdakilerden hangisinde görev almaz?

a) Sıcaklık hissetmede
b) Solunumda
c) Boşaltımda
d) Sindirimde

11. Aşağıdakilerden hangisi gaz-sıvı homojen karışımına örnektir?

A) Gazoz B) Süt
C) Limonata D) Ayran

12.

Atom	İyon
K	K^{+2}
L	L^{-1}
M	M^{+1}
N	N^{-2}

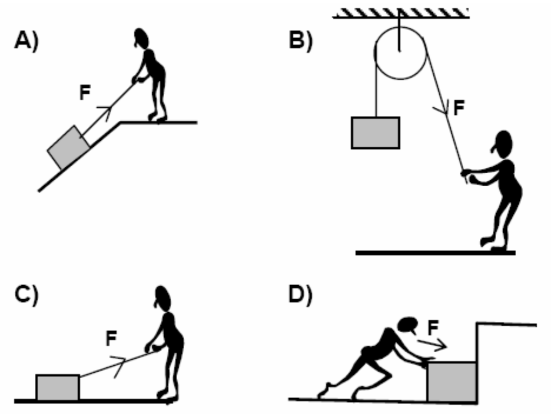
Çizelgeye göre hangi atomlar elektron vermiştir?

a) K ve M b) L ve N
c) K ve L d) M ve N

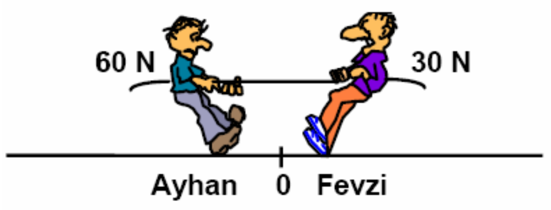
13. Fiziksel anlamda iş yapabilmesi için;

- Kuvvet uygulanmalı
- Kuvvet etkisindeki cisim yol almaldır.

Buna göre aşağıdakilerden hangisinde kesinlikle iş yapılamaz?



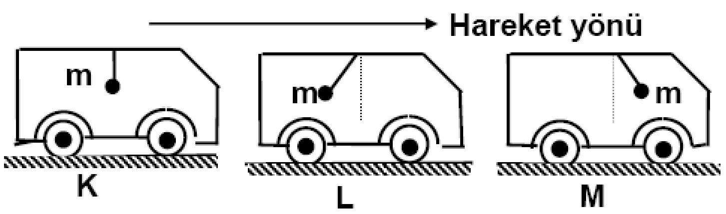
14.



Şekilde halat çekme yarışı yapan Ayhan ve Fevzi'nin dengede kalabilmesi için hangisinin çekme yönüne kaç N'luk kuvvet eklenmelidir?

a) Ayhan'a, 30 b) Fevzi'ye, 30
c) Ayhan'a, 60 d) Fevzi'ye, 60

15.



Şekilde K, L ve M araçlarının tavanlarına iple asılan m kütleli cisimlerin bir anlık durumları görülmektedir. Araçların şekilde verilen ok yönündeki o anki haraket durumları için aşağıdakilerden hangisi söylenebilir?

K	L	M
a) Hareketsiz	Yavaşlamakta	Hızlanmakta
b)Yavaşlamakta	Hızlanmakta	Yavaşlamakta
c) Hareketsiz	Hızlanmakta	Yavaşlamakta
d) Hızlanmakta	Yavaşlamakta	Hareketsiz

APPENDIX C

HIERARCHICAL LINEAR MODEL ASSUMPTIONS

C.1 Assumption Tests for the Model with Mastery Goal Orientation as Outcome

C.1.1 Assumption of Normal Distribution of Level-1 Errors

Figure C.1 displays a normal Q-Q plot of the level-1 residuals based on the final fitted model. The plot is approximately linear, suggesting that there is not a serious departure from a normal distribution.

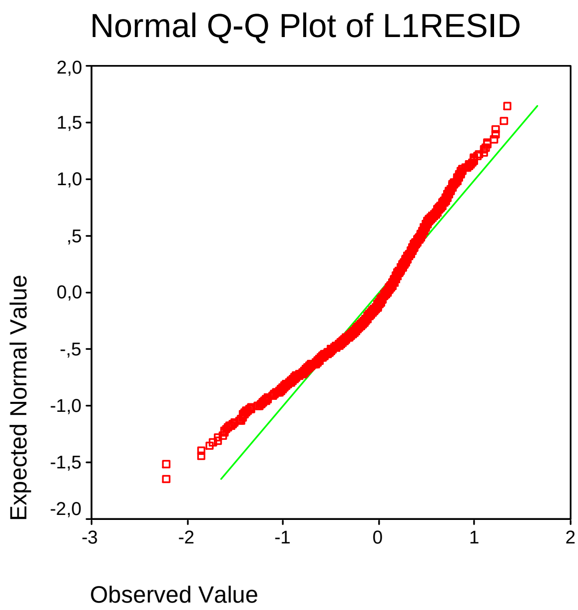


Figure C.1 Q-Q Plot of the Level-1 Residuals

C.1.2 The Homogeneity of Variance Assumption

Test of homogeneity of level-1 variance was tested by *H* statistic. *H* statistic was found to be 132.863 with 61 df, which is significant beyond the .001 level. This result indicates that heterogeneity of level-1 variance exists among the 62 classes. According to Raudenbush and Bryk, one possibility is that a few unusual classes account for most of the observed heterogeneity (2002, p. 264).

For inspection of homogeneity, histogram of natural logarithm of the final model residual standard deviation each unit was drawn (Figure C.2). The histogram shows some groups with extreme values, however, a violation of homogeneity of variance assumption is not a serious problem for estimating level-2 coefficients or their standard errors (Raudenbush & Bryk, 2002).

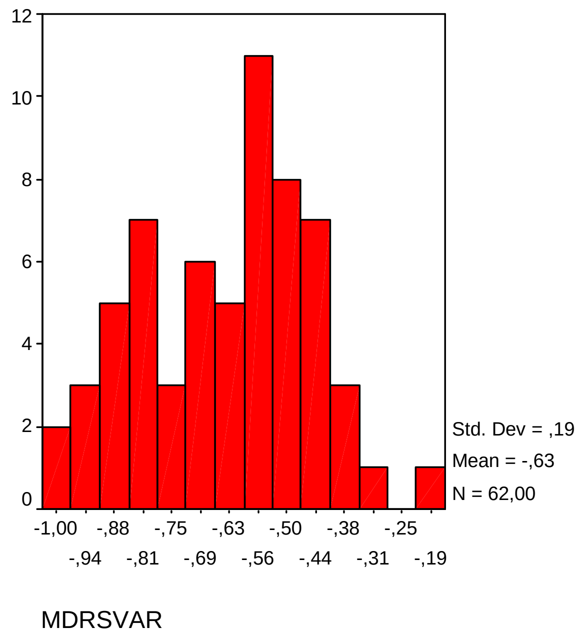


Figure C.2 Histogram of MDRSVAR

C.1.3 Normality Assumption of Level-2 Residuals

Two of the variables in level-2 residual file are CHIPCT and MDIST. "If q level-1 coefficients were modeled MDIST would be the Mahalanobis distance. Essentially, MDIST provides a single, summary measure of the distance of a unit's EB estimates, β^{*}_{qj}, from its "fitted value", $\hat{\gamma}_{q0} + \sum \hat{\gamma}_{q0} W_{sj}$. CHIPCT are the expected values of the order statistics for a sample of size J selected from a population. If a Q-Q plot of MDIST against CHIPCT resembles a 45 degree line, there is evidence that the random effects are distributed v-variate normal. In addition, the plot helps to detect outlying units (i.e., units with large MDIST values well above the 45 degree line)" (Rauenbush et al., 2004, pp. 41-42). Figure C.3 represent Q-Q plot of MDIST against CHIPCT approximating a 45 degree line, and that the assumption is tenable.

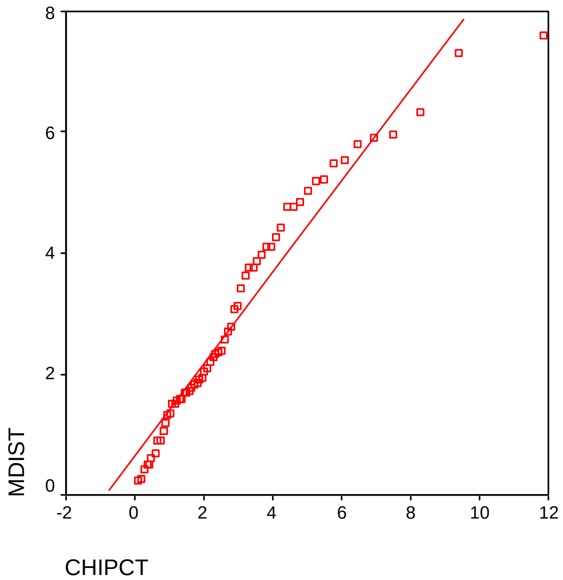


Figure C.3 Plot of MDIST vs CHIPCT

C.1.4 Normality Assumption of Random Coefficients

Table C.1 presents Skewness and Kurtosis values for empirical Bayes (EB) residuals of the slopes for Efficacy and Cheating Behavior. Skewness and Kurtosis values are within acceptable range. Furthermore, histograms of the random coefficients EB estimates (Figure C.4 and C.5) were found to be normally distributed.

Table C.1 Skewness and Kurtosis Values of the EB Estimates of Random Coefficients

	EBEFFI	*EBCHEAT*
Skewness	-0.056	0.092
Kurtosis	-0.562	-0.132

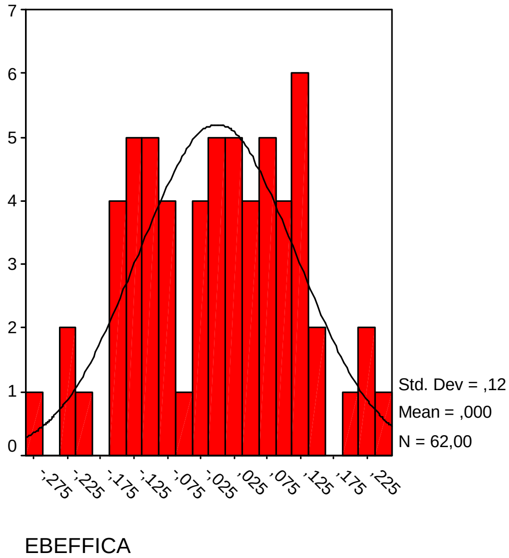


Figure C.4 Histogram of EB Residuals of the slope for Efficacy

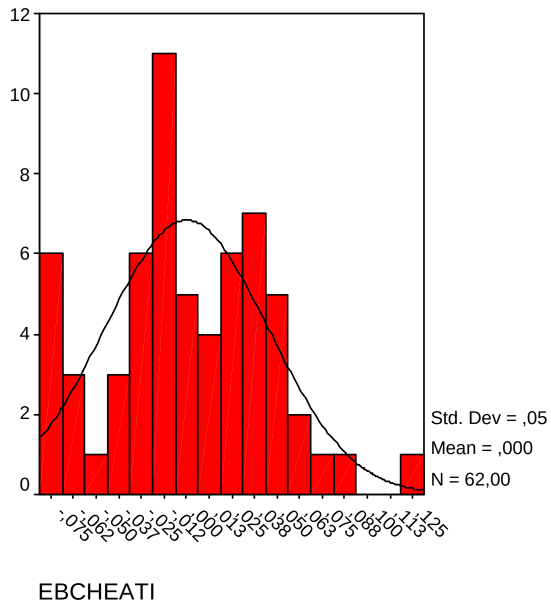


Figure C.5 Histogram of EB Residuals of the slope for Cheating Behavior

C.1.5 Assumption of Linear Relationship between Level-2 Predictors and an Outcome

Plots of EB residuals for Efficacy slope and EB residuals for Cheating Behavior slope against Classroom Mastery Goal Structure (level-2 predictor) were warranted (Figure C.6 and Figure C.7). The plots suggest that residuals randomly distributed around zero line without regard to values of level-2 predictor. Therefore, assumption of linear relationships between Efficacy slope, and Cheating Behavior slope and Classroom Mastery Goal Structure are appropriate.

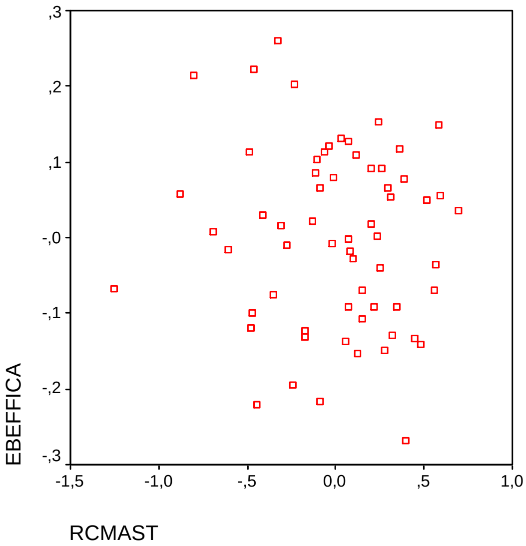


Figure C.6 EB residuals for Efficacy Slope against Classroom Mastery Goal Structure

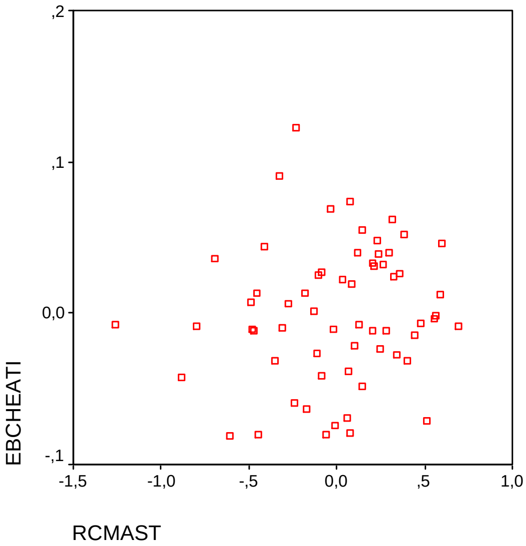


Figure C.7 EB residuals for Cheating Behavior Slope against Classroom Mastery Goal Structure

C.2 Assumption Tests for the Model with Performance-Approach Goal Orientation as Outcome

C.2.1 Assumption of Normal Distribution of Level-1 Errors

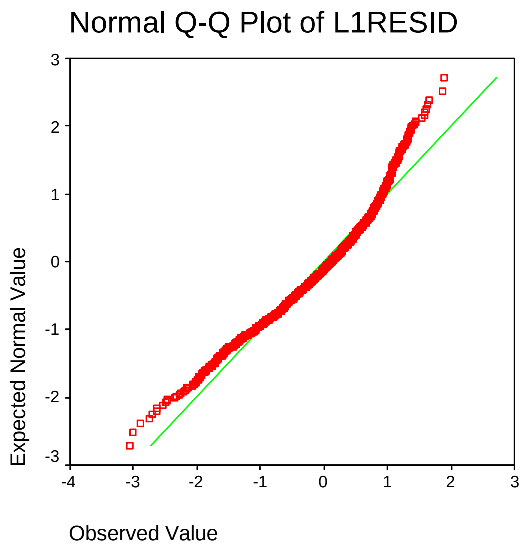


Figure C.8 Q-Q Plot of the Level-1 Residuals

C.2.2 The Homogeneity of Variance Assumption

H statistic was used to test homogeneity of level-1 variance. Test result was not significant (χ^2 = 93.372, df = 61, p > .001) indicating that the variances across classes were equal to each other.

Histogram of natural logarithm of the final model residual standard deviation each unit was drawn (Figure C.9). The histogram shows that some groups have extreme values but there is approximation to normal distribution.

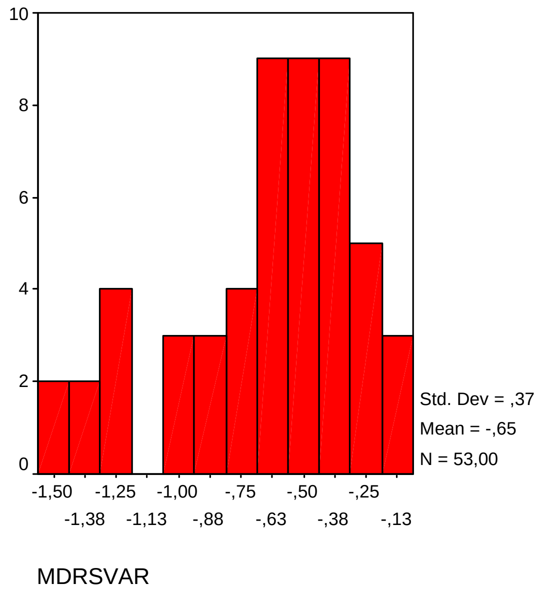


Figure C.9 Histogram of MDRSVAR

C.2.3 Normality Assumption of Level-2 Residuals

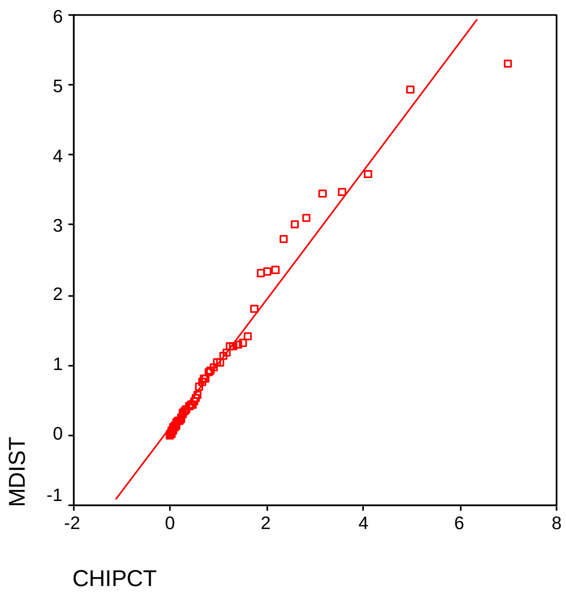


Figure C.10 Plot of MDIST vs CHIPCT