THE ROLE OF PERCEIVED CLASSROOM GOAL STRUCTURES, SELF-EFFICACY, AND THE STUDENT ENGAGEMENT IN SEVENTH GRADE STUDENTS' SCIENCE ACHIEVEMENT

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
THE DEPARTMENT OF ELEMENTARY SCIENCE AND MATHEMATICS EDUCATION

SEPTEMBER 2014

Approval of the Graduate School of Social Sciences

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ABSTRACT

THE ROLE OF PERCEIVED CLASSROOM GOAL STRUCTURES, SELF-EFFICACY, AND THE STUDENT ENGAGEMENT IN SEVENTH GRADE STUDENTS' SCIENCE ACHIEVEMENT

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Semptember 2014, 164 pages

The aim of this study was to explore how students' perceptions of classroom goal structures in terms of motivating tasks, autonomy support, and mastery evaluation; their engagement (i.e. behavioral, emotional, cognitive and agentic engagement), and self-efficacy in science are related to their science achievement. For this purpose, a path model was proposed and tested. In the model, it was hypothesized that perceptions of classroom goal structures are related to all aspect of student engagement and self-efficacy directly. It was also suggested that self-efficacy is linked to all aspects of student engagement and science achievement directly. In addition, direct links from each student engagement variable to science achievement were expected. Finally, significant associations were also expected among each aspect of the engagement.

A total of 744 seventh grade students (403 girls and 337 boys) participated in the study. According to the results, self-efficacy; behavioral, emotional and cognitive engagement in the science course are significant predictors of science achievement. Additionally, students' perceptions of classroom goal structures (i.e. motivating tasks, autonomy support, and mastery evaluation) are found to be significant predictors of their science self-efficacy. Furthermore, autonomy support appeared to be positively linked to all aspects of engagement, whereas motivating tasks were just related to cognitive engagement. In addition, mastery evaluation was found to be positively linked to engagement variables except for cognitive engagement. Finally, results revealed reciprocal relations among engagement variables except for agentic engagement.

Keywords: Perceptions of Classroom Goal Structures, Student Engagement, Self-efficacy, Science Achievement

ÖZ

ALGILANAN SINIF İÇİ HEDEF YAPILARININ, ÖZYETERLİĞİN, VE ÖĞRENCİ KATILIMININ YEDİNCİ SINIF ÖĞRENCİLERİNİN FEN BAŞARISINDAKİ ROLÜ

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Eylül 2014, 164 sayfa

Bu çalışmanın amacı yedinci sınıf öğrencilerinin Fen Bilgisi dersindeki sınıf içi hedef yapıları algılarının, derse katılımlarının ve öz-yeterliklerinin fen başarılarıyla olan ilişkilerini incelemektir. Öğrencilerin sınıf içi hedef yapıları algıları motive edici etkinlikler, özerklik desteği ve öğrenmeye yönelik değerlendirme olmak üzere üç boyutta incelenirken, derse katılımları davranışsal, duygusal, bilişsel ve aracı katılım olmak üzere dört boyutta incelenmiştir. Bu amaçla bir yol modeli tasarlanmış ve test edilmiştir. Modelde sınıf içi hedef yapıları algısının tüm boyutlarının, katılım değişkeninin bütün alt boyutlarıyla ve öz yeterlik ile doğrudan ilişkili olduğu; ancak başarı ile dolaylı olarak ilişkili olduğu önerilmiştir. Ayrıca, öz yeterliğin katılım değişkeninin her bir alt boyutuyla ve fen başarısı ile doğrudan ilişkili olduğu da öngörülmüştür. Son olarak, katılım değişkeninin her bir alt boyutunun birbirleriyle ve fen başarısı ile ilişkili olması da beklenmiştir.

Çalışmaya toplam 744 yedinci sınıf öğrencisi (403 kız ve 337 erkek) katılmıştır. Yol analizi sonuçlarına göre: (1) öğrencilerin fen dersindeki öz yeterlikleri; davranışsal, duygusal ve bilişsel katılımları fen başarıları ile doğrudan ilişkilidir. (2) öğrencilerin sınıf içerisindeki etkinlikleri ne denli motive edici olarak algıladıkları, özerkliklerinin ne denli desteklendiği hakkındaki algıları ve değerlendirmenin ne denli öğrenci gelişimine ve öğrenmesine odaklı olduğu konusundaki algıları fen dersindeki öz yeterlikleriyle doğrudan ilişkilidir. (3) Motive edici etkinlikler sadece bilişsel katılım ile doğrudan ilişkili iken; öğrenmeye yönelik değerlendirme davranışsal, duygusal ve aracı katılım ile; özerklik desteği ise bütün katılım değişkenleri ile doğrudan ilişkilidir. (4) Aracı katılım haricindeki diğer katılım alt boyutları arasındaki karşılıklı ilişkiler anlamlı bulunmuştur.

Anahtar Kelimeler: Sınıf İçi Hedef Yapıları Algısı, Öğrenci Katılımı, Öz Yeterlik, Fen Başarısı

To My Eeyore

ACKNOWLEDGMENTS

Firstly and foremost, I wish to express my deepest gratitude to my supervisor Assoc. Prof. Dr. Semra Sungur for her valuable guidance, advice, criticism, and encouragements throughout of this thesis.

Moreover, I would like to express my sincere gratitude to the examining committee members, Prof. Dr. Ceren Öztekin, Prof. Dr. Jale Çakıroğlu, Assoc. Prof. Dr. Özgül Yılmaz Tüzün, and Assist. Prof. Dr. Yasemin Taş for their valuable suggestions.

I would like to express my heartfelt appreciation to my family for their great support throughout this study. Their endless love and good wishes were always with me. I love you all, and thank you very much.

Lastly, I would also thank my dear friends from METU Science and Society Center Eray Şentürk, Berat Uçar, and Semra Saçıcı; and my dear cousins Reyhan Kahraman and Berrak Santurkaya; and my dear friend Gizem Yarar who made me feel good during stressful and desperate moments of studying, and all people who participated in and supported to this study.

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SCGQ	Survey of Classroom Goals Structures
MSLQ	Motivated Strategies for Learning Questionnaire
EQ	Engagement Questionnaire
MSLQ	Motivated Strategies for Learning Questionnaire
SAT	Science Achievement Test
GPA	Grade Point Average
CFA	Confirmatory factor analysis
CFI	Comparative fit Index
GFI	Goodness-of-fit index
RMR	Root-mean-square residual
RMSEA	Root-mean-square error of approximation

CHAPTER 1

INTRODUCTION

Of various goals of educational systems, the most crucial one is to determine and to enhance factors affecting the academic achievement (Badiee, Babakhani, & Hashemian, 2014). Motivation is one of these factors and also a central focus of educational research in teaching and learning (Pintrich, 2003). Therefore, in recent decades, educational and psychological researchers focused on student motivation and its effect on academic performance. Although there are many definitions in the corresponding literature clarifying the concept of motivation, it is usually defined as the process in which goal-directed activity is started and maintained (Schunk, Pintrich, & Meece, 2008). Motivation enables the researchers to get some clues to understand individuals' behaviors and efforts in doing various activities (Cavas, 2011). From science education perspective, motivation can be described as active engagement of students in the tasks regarding to science in order to understand science better (Lee & Brophy, 1996).

There are many factors, which influence science learning and motivation. These factors are individual factors like home life, influence of parents, and pressure of peers (Singh, Granville, & Dika, 2002); and those factors controlled by teacher such as classroom atmosphere, teaching style, school environment, and relevance of the subject matter (Ames, 1992c). Accordingly, recent motivation research has changed from behaviorist perspective, highlighting the effects of environmental elements such as rewards or punishment, towards a social cognitive view emphasizing the significance of students' beliefs about their own, and the environment where they learn (Palmer, 2005). This social cognitive view suggests that aspects of the classroom context can significantly affect motivational beliefs (Pintrich & Schunk, 1996). One of the social cognitive views supporting this hypothesis is achievement goal theory, which also provides a theoretical basis for the present study. Achievement goal theory suggests that motivation and behaviors

corresponding to students' achievement can be comprehended by examining their reasons and aims to engage in their academic duties (Ames, 1992b; Dweck & Legget, 1988; Urdan, 1997). An important aspect of achievement goal theory is that it emphasizes how students are engaged or how to be engaged with educational contexts. According to this theory, motivation and achievement are related to not only students' characteristics, beliefs or past achievement records but also educational context of their learning (Anderman & Patrick, 2012).

Ames (1992c) defines the classroom structure as a context in which learning takes places, and it influences students' perceptions of what kind of goals are emphasized in the classroom (Ames, 1984). Goal structures involve the achievement goal type stressed by predominant instructional practices and strategies in the learning environment such as grading procedure, characteristics of tasks given to students (Wolters, 2004). These goals include mastery goals (learning or mastering the work), and performance goals (showing their ability to others by getting a good grade, or getting a higher grade than their peers do) (Palmer, 2005). The concepts of personal mastery and performance goal orientations are in similar with the concepts of classroom mastery and performance goal structures, respectively (Anderman & Patrick, 2012). Thus, in classrooms where mastery goal structure is dominant, students value to learn and understand lesson topics for their personal improvement. On the other hand, classroom performance goal structure encourages students to perform better relative to others (Ames, 1992b).

In the related literature, students' perception of mastery oriented classroom goal structures was examined in terms of their perceptions concerning autonomy support, mastery evaluation, and presence of motivating tasks in their classroom (Guo, 2007). Motivating tasks refer to students' motivation and interest level for assignments they get. On the other hand, autonomy support emerges when students are supported by autonomy by making them responsible for their learning. Accordingly, participation of students in decision-making processes in academic or other issues in school or classroom environments can be considered as a part of autonomy structures: if students are supported with some opportunities to participate

in such decision processes, then they can be more motivated in their learning environment. Lastly, mastery evaluation involves evaluation of students based on their individual progress and focuses on personal improvement. In classroom where mastery evaluation is emphasized learning and evaluation mechanisms is considered as fair and appropriate by students (Rostami, Hejazi, & Lavasani, 2011).

Recently, achievement goal theory has been utilized as a framework to understand differences of students' school engagement level and quality better (Elliot, 1999; Pintrich, 1994). Anderman and Patrick (2012) stated that "A classroom mastery goal structure constitutes a holistic system of meanings" (p.182). Accordingly, it is related with all aspects of student engagement (emotional, behavioral, and cognitive). In the widest sense, student engagement can be defined as a desirable trait in classrooms or schools; however, there is little consensus among educators about how to define it (Farmer-Dougan, & McKinney, 2001). Some studies used student engagement to discuss students' attitudes towards school (Willms, 2003), some studies describe it as will of student to joining classroom activities such as fulfilling class works and obeying teachers' directions (Chapman, 2003). One definition of students' engagement in the classroom is that it is a motivational outcome and refers to students' participation in initiating and executing learning activities and it is explained by behavioral as well as emotional factors (Gonida, Grigoris, & Kiosseoglou, 2009). In other words, student engagement comprises students' behaviors and emotions during the school or class activities (Wellborn, 1991). Miserandino (1996) also stated that student engagement was theoretically described as their behaviors such as involvement, persistence in the classroom as well as positive affective experiences corresponding class activities such as curiosity, low anxiety. According to researchers, it is a meta-construct encircling various dimensions of school participation or commitment in learning (Appleton, Christenson, & Furlong, 2008; Fredricks, Blumenfeld, & Paris, 2004). However, according to consensus, student engagement has three aspects, which are behavioral, emotional, and cognitive (Fredricks et al., 2004). Moreover, a new aspect called agentic engagement is also considered as fourth aspect of student engagement

recently. Reeve (2012) stated that student engagement involves four different, but highly intercorrelated aspects (i.e., emotional, behavioral, cognitive, and agentic engagement), and all these aspects are related to students' achievement (Fredricks et al., 2004; Reeve & Tseng, 2011).

Specifically, behavioral engagement can be illustrated as both stimulated and unsettling behaviors including concentration, attending, exerting effort, giving up, and avoiding (Miserandino, 1996; Skinner & Belmont, 1993). It can be also defined as students' participation in learning (Skinner & Belmont, 1993). If a student possesses high behavioral engagement, he or she will be diligent in learning activities (Skinner & Belmont, 1993). In addition, most of the studies concerning the relationships between behavioral engagement and achievement have supported a positive relation for elementary and high school students (Marks, 2000; Newmann, Wehlage, & Lamborn, 1992; Skinner, Wellborn & Connell, 1990). Moreover, Fredrickson (2001) suggested that there is a relationship between emotional engagement and behavioral engagement, since positive emotions point to someone's well-being and therefore it guides behaviors.

Emotional engagement refers to students' positive and negative feelings about learning such as enjoying, being curious, being anxious, becoming angry, or being bored (Connell & Wellborn, 1991; Skinner & Belmont, 1993). The emotions about learning activities reflect intrinsic motivation. If students possess high emotional engagement, they would enjoy learning and attending to school (Lam, Wong, Yang, & Liu, 2012). There is much less research on emotional engagement and achievement. However, several studies using an engagement measure, which includes both emotional engagement and behavioral engagement items, reported that there was a relationship between engagement and achievement (Connell, Spencer, & Aber, 1994; Skinner et al., 1990). Moreover, Voelkl (1997) found that emotional engagement was associated with achievement for elementary white students. Mo (2008) has also found that emotional engagement had a direct positive effect on science achievement. In other words, the more interested students were in science,

the higher they achieved in science. Mo (2008) also noted that emotional engagement is influenced by both cognitive and behavioral engagement.

Cognitive engagement indicated the amount and types of cognitive strategies, which are employed by students (Walker, Greene & Mansell, 2006). Moreover, cognitive engagement refers to the willingness to use sophisticated, deep, and personalized learning and to seek conceptual understanding rather than surface knowledge (Reeve, 2012). According to this definition, cognitive engagement contains the components of self-regulation, investment in learning, and motivation to learn. In contrast to emotional engagement, there is much research concerning the association between cognitive engagement and achievement. Studies have demonstrated that achievement is related to metacognitive and learning strategy use. Greene, Miller, Crowson, Duke, and Akey, (2004) revealed that students' achievement is positively affected by the cognitive strategies that students engage in guiding their learning. In addition, Zimmerman and Schunk (2001) stated that students who use metacognitive strategies (regulate their attention and effort), use learning strategies (associate new knowledge with existing one), monitor their comprehension, and report better results on index of academic achievement. Moreover, Li and Lerner (2013) stated that cognitive engagement is influenced by behavioral engagement.

Agentic engagement emerged as a more authentic and action-oriented form of engagement in recent research (Lawson, & Lawson, 2013). In contrast to static, compliant engagement, Reeve (2012) defined it as students' active contribution to teaching and learning practices. Agentic engagement occurs when students can easily reflect their opinions or feelings during an activity as an active participant (Ainley, 2012; Assor, 2012; Brooks, Brooks, & Goldstein, 2012; Hipkins, 2002). Alternatively, it happens when students manage their learning processes (Cleary & Zimmerman, 2012; Reeve, 2012). Moreover, it emerges when they collaboratively involve with others (Davis & McPartland, 2012; Mahatmya, Lohman, Matjasko, & Farb, 2012; O'Conner, Hanny, & Lewis, 2011; Polman & Miller, 2010). Similarly, agentic engagement occurs when students utilize cultural tools and technological

materials in their learning environment (Dockter, Haug, & Lewis, 2010; Mitra & Serriere, 2012). The findings from Reeve's (2013) study revealed that students' acts of agentic engagement predicted their achievement. He also stated that students who are agentically engaged could be more successful by taking facilitating actions as compared to their efforts, enthusiasm, and strategic thinking Additionally, Reeve and Tseng (2011) found that agentic engagement was significantly and positively associated with the remaining three the other three engagement dimensions which are behavioral, cognitive, and emotional.

According to achievement goal theory, one of the best factors explaining students' motivation, behaviors, and cognitions in learning are their achievement goals in the classroom (Urdan & Maehr, 1995), and thus the goal structure of a classroom have influence on students' involvement quality, cognitive engagement, and motivation (Ames & Archer 1988). Indeed, many empirical studies have revealed that classroom environment has strong effect on students' engagement and their motivation in terms of self- efficacy, intrinsic value beliefs, and goal orientations (Ames, 1990; Ames, 1992b; Greene et al., 2004; Müller & Louw, 2004; Stefanou, Perencevich, DiCintio, & Turner, 2004). According to previous research, there were associations between classroom goal structure and learning goal orientations, cognitive engagement, being emotionally well, belonging to school, enduring against failure situations, and achievement (for reviews see Ames, 1992c; Elliott & Dweck, 1988; Urdan, Midgley, & Anderman, 1998; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). In line with these conclusions, Anderman and Patrick (2012) suggested that in mastery-oriented classroom, student engagement is expected to be at higher levels from both theoretical and practical perspectives. These associations with student engagement can be explained as follows:

In terms of emotional engagement, a positive relationship existed between mastery goal structure and students' positive sensations toward school (Ames & Archers, 1998; Kaplan & Midgley, 1999). Moreover, mastery goal structure is associated with students' school belonging feelings, and their tendency to meet school's expectations (Anderman & Anderman, 1999). Furthermore, students showed

more positive opinions related to their schoolwork such as usefulness of learning strategies (Nolen & Haladyna, 1990), and gratification for learning (Nolen, 2003) in classroom settings possessing higher mastery goal structure. According to Ames and Archer (1998), students demonstrated more tendencies to participate in challenging work in the class and to enjoy the class activities, if they perceive their classroom as having master goal structure.

Classroom mastery goal structure is also positively associated with behavioral engagement. Students who are in a classroom possessing mastery goal structure are tended to spend effort as well as persisting with tasks of class (Wolters, 2004). In addition, they request some clues to understand the topic well or to reach the solution. These behaviors are part of help-seeking strategies (Karabenick, 2004). On the other hand, students in these classrooms exhibited lower levels of maladaptive behaviors such as not questioning when needed in the classroom (Karabenick, 2004), self-handicapping (Midgley & Urdan, 2001), being riotous (Kaplan, Gheen, & Midgley, 2002), postponing (Wolters, 2004), and cheating (Murdock, Hale, & Weber, 2001).

When it comes to cognitive engagement, classroom mastery goal structure showed positive association with students' use of learning strategies (i.e., cognitive and metacognitive strategies) (Ames and Archer, 1988; Young, 1997). Wolters (2004) also stated that mastery goal structure is positively corresponding to utilize of effective cognitive strategies such as elaboration; and metacognitive strategies such as planning, monitoring, and regulating.

Concerning agentic engagement, as it mentioned in the Reeve's (2013) study, "agentic engagement can be viewed not just as a student's contributions into the flow of instruction but also as an ongoing series of dialectical transactions between student and teacher"(p.580) The findings from Reeve's (2013) study demonstrated that students' agentic acts of engagement can create a more motivationally supportive learning environment in terms of how they perceive their teachers as autonomy supportive. It is possible to consider that agentic engagement may play crucial role in transforming learning environment into motivationally supportive one

(i.e., greater autonomy support, greater access to interesting and personally valued learning activities) and therefore that environment may increase students' motivations and classroom engagements (Reeve, 2013).

In sum, the relevant literature suggests that classroom goal structures perception of students are positively associated with their engagement with respect to behavioral, emotional, and cognitive. Moreover, teachers' autonomy supportive motivating style and provision of important, interesting learning activities are expected to be associated with students' agentic engagement. Therefore, in the present study, it was hypothesized that students' perceptions of classroom goal structures in terms of motivating tasks, mastery evaluation and autonomy support are related to their behavioral, cognitive, emotional, and agentic engagement in the science classroom. Moreover, based on the literature, relationships among each aspects of student engagement as well as relationships among these engagement aspects and science achievement were proposed in the current study (see *Figure 1.1*).

Relevant literature also demonstrated that student engagement is highly related to their self-efficacy. Indeed, according to Linnenbrink and Pintrich, (2003), of all motivational constructs, self-efficacy is significant one, since it increases students' engagement and learning. Based on Bandura's (1997) social cognitive theory, self-efficacy is defined as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p.3). These beliefs affect people's choice and mode of actions, and therefore they affect individual's behavior. Linnenbrink and Pintrich (2003) concluded that self-efficacy beliefs are positively related with students' behavioral engagement. Efficacious students who feel able to accomplish the tasks given are significantly tended to study hard, insist, and look for help in an efficient manner. Therefore, the present study proposed that' self-efficacy beliefs of students are associated with their behavioral engagement.

Individuals' efficacy beliefs can also affect their frame of mind and emotional reactions (Pajares, 1996). A less self-efficacious person may find tasks more difficult to accomplish than their actual difficulty. Therefore, the stress and depression rise

up, and problem-solving ability diminishes. Pajares (1996) also revealed that students engage in tasks in which they feel knowledgeable, practiced and assured, whereas avoid those in which they do not. Therefore, in the present study, it was proposed that students' self-efficacy beliefs are associated with their emotional engagement.

In their review, Linnenbrink and Pintrich (2003) stated that self-efficacy beliefs facilitated the use of deeper processing strategies, and students with high self-efficacy try more to understand a problem and think deeply about it. Therefore, self-efficacy beliefs have been found to be positively related to cognitive engagement, and this relationship was also proposed in the present study.

Students' self-efficacy influence their motivation level, resilience to difficulty, capability of overcoming stress (Bandura, 1994), their choices of science related tasks (Lodewyk & Winne, 2005), and the effort they exert on these tasks (Schunk & Ertmer, 2000; Usher & Pajares, 2008; Walker & Greene, 2009). According to Peach and Matthews, (2011) agentic engagement involves students' flexibility and abilities to handle new and challenging situations. In line with these ideas, Reeve and Tseng (2011) suggested that some agency-based constructs of motivation such as self-efficacy, personal goals and interests may contribute to students' agentic engagement. Indeed, Bandura (1997) claimed that self-efficacy is an important basis of human agency. Bandura (1986) described human beings as they represent self-respect beliefs, and ability of having emotions that are used to control their thoughts. Bandura's socio-cognitive viewpoint discussed that people are proactive and self-regulating unlike reactive and controlled by some external forces. This view is coincided with students' agentic engagement in the classroom. Consequently, a relationship between self-efficacy and agentic engagement was hypothesized in the present study.

In addition to relationships between self-efficacy and each aspects of student engagement, and based on the related literature, a association between students' self-efficacy and science achievement was also proposed in the present study: Relevant studies indicated that students' self-efficacy is significantly associated with

achievement in science (Britner & Pajares, 2001, 2006; Britner 2008; Caprara, Fida, Vecchione, Del Bove, Vecchio, Barbaranelli, & Bandura, 2008; Hidi, Ainley, Berndorff, & Del Favero, 2006; House, 2008; Lavonen & Laaksonen, 2009; Yoon, 2009; Zeldin & Pajares, 2000; Zusho & Pintrich, 2003).

1.1 Purpose of the Study

In the light of related research, this study aimed to explore how students' perceptions of classroom goal structures, engagement and self-efficacy in science are related with their science achievement. More specifically, the following research question will be explored in the current study: What is the relationships among seventh grade students' perceptions of classroom goal structures with respect to motivating tasks, autonomy support, mastery evaluation; engagement (i.e. behavioral, emotional, cognitive and agentic engagement), and self-efficacy and achievement in the domain of science?

Current study proposed a path model in order to address the above-mentioned research question (see *Figure 1.1*). As shown in the figure, in the model, it was hypothesized that perceptions of classroom goal structures are related to all aspect of student engagement and self-efficacy. It was also proposed that self-efficacy is linked to all dimensions of student engagement and science achievement. In addition, paths were specified from each student engagement variable to science achievement. Moreover, significant associations were expected among the engagement variables.

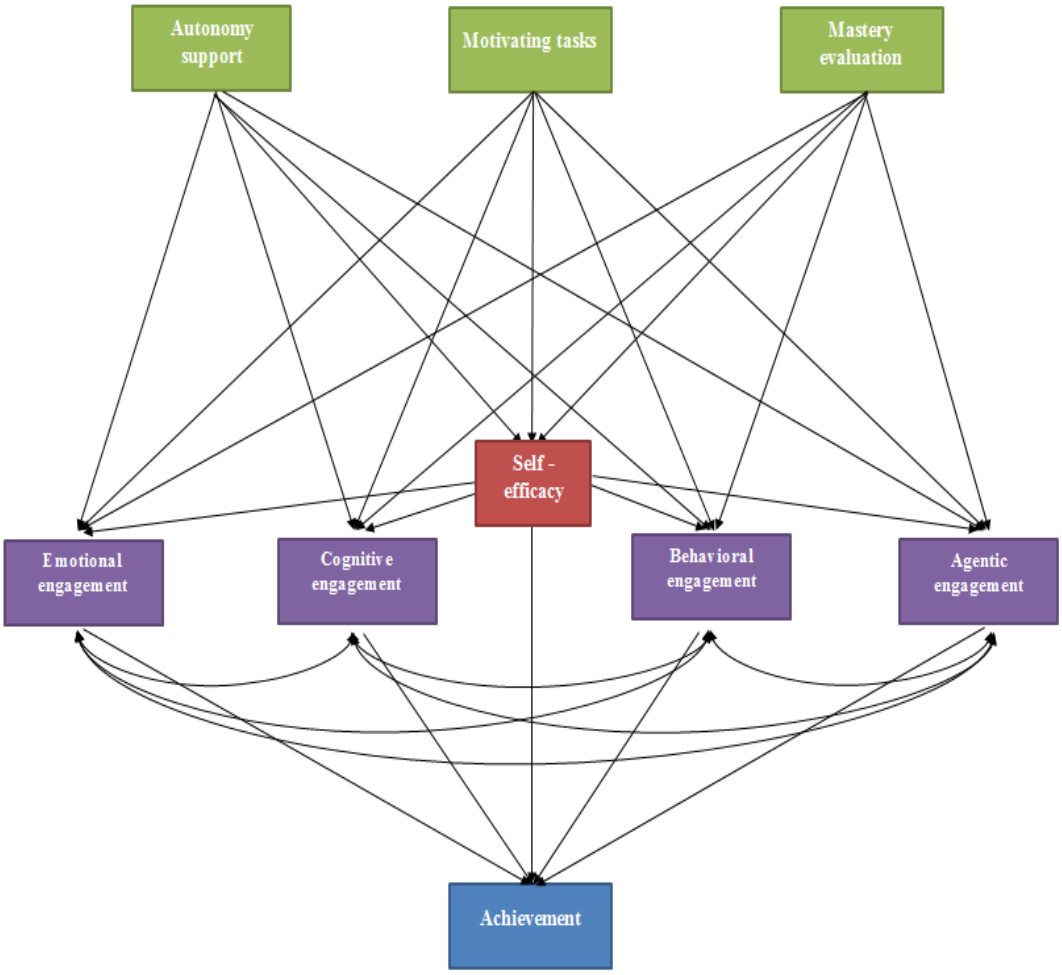

Figure 1.1 The Conceptual Model

1.2 Significance of the Study

The significance of science education has been increased since it prepares young citizens as future's employees and employers in the society for the age of information and technology (Lau & Roeser, 2002). Nowadays, educators, policymakers, and researchers are quite interested in investigating the factors affecting science learning and science achievement in order to prepare students for the future (Lau & Roeser, 2002). For this purpose, some international exams are conducted such as The International Mathematics and Science Study (TIMSS), and The Programme for International Student Assessment (PISA). Turkey also participated in TIMSS in 1999, 2007 and 2011 in order to determine the statuses of

science and mathematics education in Turkey compared with other countries. The data were analyzed in terms of not only students' science achievement but also factors effecting the science achievement. The results showed that Turkey was ranked as 33rd out of 38 countries in 1999; 31st out of 59 countries in 2007; 21st out of 42 countries in 2011. Accordingly, the Turkish eight grade students who participated in the TIMSS fall far behind the other participating countries in science and mathematics. Turkish students' average score on the achievement test were significantly below the average of international scores (Kilic, 2002). Similarly, according to results of PISA (2012), Turkey was ranked 43rd out of 65 countries in science. Thus, Turkey was below both the general average and the average of each area in all tests. The findings from reports of TIMSS and PISA are clear and reliable documents showing that Turkey fall into the third cluster in education area (Kilic, 2002). This situation is very thought-provoking in terms of Turkish science education (Arslan, 2005). Therefore, to enhance the students' achievement level, the structure of achievement and the constructs effecting the achievement should be investigated consistently. Consequently, the present study examined the factors that may affect student achievement and the relationships among these elements.

One of the important determinants of achievement is student engagement (Ferrell, 2012), and student engagement often remains on the teachers' agenda. They were curious about the reason why some students are engaged, participated in, and motivated for tasks, while other students are not engaged and not passionate despite of being members of the same classroom. They considered this as a chronic problem in education field (Pintrich, 2003). Student engagement is considered important due to the fact that it predicts students' academic progress in school, makes learning possible, and plays an important role to develop critical thinking skills, problem solving skills and other cognitive abilities. Most of the researches in this area conducted in terms of behavioral, emotional, and cognitive components of engagement, but Reeve and Tseng (2011) searched out that this three component model presents incomplete understanding, so they added agentic engagement as a fourth aspect. By this means, a full understanding of how students engage themselves

can be provided (Reeve & Tseng, 2011). Considering the importance of this new construct and insufficient research on it, the present study included agentic engagement as well as emotional, behavioral and cognitive engagement to conceptualize student engagement. Thus, it is expected that the gap in the engagement research may be filled by this study.

Student engagement and achievement are affected by the motivational characteristics of classroom and students' perception of the classroom environment (Ferrell, 2012). Previous studies try to propose ideal learning environments so as to raise students'' engagement and ambition of learning (Parsons & Taylor, 2011). In addition, classroom environment has been preferred to be studied by educators widely since students' learning become well when they were in more positive classroom environment (Wei & Elias, 2011). Therefore, understanding the motivational characteristics of classrooms and the relationship between student perception and teachers besides how this perception affects engagement is an important purpose for educators. Although there are many studies concerning classroom climate or goal structures in terms of mastery and performance, there is need for conducting studies which provide an in-depth investigation of students' classroom goal structures in terms of motivating tasks, mastery evaluation, and autonomy support.

This study extends the studies examining the relationship between students' perception of the classroom goal structures and science achievement by exploring their self-efficacy and engagement concomitantly in a single path model. Such a model has not been presented in the literature. Moreover, in Turkish context, there is no research with elementary students that included students' classroom goal structures in terms of motivating tasks, autonomy support and mastery evaluation other than Sungur and Gungoren (2009). Additionally, all four aspects of elementary school students' engagement have never been studied. Therefore, there is a need for research on these issues. By means of this study, elementary students' current situation on the related constructs can be displayed. Thus, this study has potential to contribute to formation of better classroom environments by informing researchers,

educators, preservice teachers and teachers about the relationships among classroom goal structure perception, engagement, self-efficacy, and achievement. For example, suggestions to teacher trainee programs about creating classroom goal structures can be made in order to enhance science achievement. Additionally, based on the findings of the present study, curriculum developers can make revisions to improve classroom goal structures and student related variables found to enhance students' science achievement. Lastly, the implications of this study can help teachers to use appropriate strategies to create classroom mastery goal structures.

1.3 Definition of the Important Terms

Engagement indicates the degree to which student's active participation in a learning activity (Reeve, 2012).

Behavioral engagement indicates how students actively participate in the learning activity with regard to attention, effort, and persistence (Skinner, Kindermann, & Furrer, 2008).

Emotional engagement refers to, during task involvement, the presence of students' positive reactions, such as interest, and the absence of their negative reactions, such as anxiety (Skinner et al., 2008).

Cognitive engagement combines consideration and willingness to use the necessary effort for understanding learning, complex ideas and complicated skills (Fredricks et al., 2004).

Agentic engagement refers to **"**students' constructive contribution into the flow of the instruction they receive" (Reeve & Tseng, 2011, p.258).

The classroom goal structure is defined as an instruction approach given in a specific classroom (Ames & Archer, 1988).

Autonomy support is the interpersonal behavior which teachers supply students during instruction to identify, build, and raise their inner motivational resources (Reeve, Deci, & Ryan, 2004).

Motivating tasks refer to the degree to which students perceive the classroom tasks as meaningful, pertinent, challenging and attractive (Greene et al., 2004).

Mastery evaluation refers to the degree to which students perceive the evaluation procedure as fair, center on learning, and not lead to comparing and competing students (Greene et al., 2004).

Self-efficacy refers to "beliefs in one's capabilities to organize and execute the courses of action required producing given attainments" (Bandura, 1997, p.3).

Science achievement addresses the seventh grade students' scores on science achievement test, which comprises the unit of force and motion, body systems, and electricity in this study.

CHAPTER 2

LITERATURE REVIEW

In this chapter, a review of the literature presented about students' perceptions of classroom goal structures within achievement goal theory framework, student engagement and self-efficacy, in order. Thereafter, the influences of these constructs on each other are stated. Finally, the summary of the findings mentioned in the literature is presented.

2.1 Achievement Goal Theory and the Classroom Goal Structures

2.1.1 Overview of Achievement Goal Theory

Since its emergence at the end of the 1970s, achievement goal theory has made significant contributions to education and psychology area (Elliot & Harackiewicz, 1996; Shih, 2005). It is the one of the most active motivational theories (Anderman, Urdan, & Roeser, 2003; Pintrich, Conley, & Kemper, 2003), so that to conceptualize student motivation, the achievement goal theory has been used as a powerful framework (Alkharusi, 2010). Although research on motivation has a rich history, more recent theories such as achievement goal theory focused on social-cognitive activities as sources of motivation (Meece, Anderman, & Anderman, 2006).

Achievement goal theory mainly focuses on the perceptions, thoughts, and beliefs of students toward learning (Dweck & Leggett, 1988). Moreover, it aims to explain learners' primary reasons and fundamental purposes as they engage in situations related to achievement (Elliot & Harackiewicz, 1996; Pintrich, 2000). It suggests that the goals which students' construe for learning guide their behavior in achievement settings (Ames, 1992c; Pintrich, 2000), and these goals specify their approach to, engagement in, and assessment of performance in their school and learning (Dweck & Leggett, 1988; Schunk, 1996; Urdan, 1997). According to the

theory, having equal motivation of students for performing a task does not imply that their justifications for performing the task are same (Urdan, Anderman, & Roeser, 2003). For this reason, interpreting the reasons of task achievement may direct to find out achievement motivation of students (Pintrinch & Garcia, 1991). As stated in many studies (Eliot & Harackiewicz, 1996; Midgley, Kaplan, & Middleton, 2001; Urdan, Anderman, & Roeser, 2003), achievement goal theory is focused on what incites a student to achieve a task. That is, the reasons why students want to succeed in a task.

Researchers of this theory are interested in types of goals, which individuals follow in achievement situations (Meece, Anderman, & Anderman, 2006). In other words, the theory mainly concerned with students' goal orientations. Initially, the theory suggested two types of goal orientations: "mastery" and "performance". While mastery goals involve understanding and learning a task, and personal improvement; performance goals involve presenting competence or ability, and outperforming others (Anderman & Patrick, 2012; Church & Elliot, 1997; Elliot & Harackiewicz, 1996; Pintrich, 2000; Shih, 2005). Achievement goal theorists concluded that while mastery goals center upon the improvement of competence, performance goals center upon the outward demonstrating of competence (Ames & Archer, 1988; Dweck, 1986; Nicholls, 1984). However these two goals used in different names by different researchers, for example Dweck (1986) labeled as "learning" and "performance" goals, and Ames and Archer (1988) identified as "task-involvement" and "ego- involvement" goals, and Maehr (1984) called as "task" and "ego" goals. Although there are a variety of terms to identify these two goals, all definitions posit that if students adopt mastery goals, they attend to truly mastering the task, and they concern about gaining competence, and they are disposed to make an effort to achieve mastery (Anderman & Patrick, 2012). Conversely, if students adopt the performance goals, they concern about showing their abilities to others, predominating others, and seemed to be competent by others (Anderman & Patrick, 2012).

In the mid-1990s, goal theorists suggested the distinction between approach and avoid orientations should take into consideration to assess students' goal orientations, since achievement goals can be directed by desirable outcomes (approach goal), or undesirable outcomes (avoid goal) (Elliot & Thrash, 2001). The new educational researchers (Elliot & Harackiewicz, 1996; Elliot & Church 1997) have proposed two kinds of performance goals. According to them, performance-approach goals center upon the reaching to positive views of competence, while performance-avoidance goals center upon avoiding negative views of ability. For example, if a student pursues performance approach goals, he or she studies a task to demonstrate his skills to other students and look smart, and if a student pursues performance avoidance goals, he or she studies to avoid appearing like a silly or getting a bad mark (Sungur & Kahraman, 2011). Likewise, Pintrich (2000) claimed that mastery goals should also be applied for mastery goals (i.e., mastery-approach goals and mastery-avoid goals). Mastery-approach goals indicated desiring to master, learn, and truly understand the task. However, mastery-avoid goals indicated avoiding misunderstanding or not being able to learn from a definite task. For example, when students pursue mastery approach goals, they study with the aim of developing their abilities or knowledge. Conversely, when students pursue mastery avoidance goals, they study with the aim of avoiding not understanding and learning (Sungur & Kahraman, 2011). As a result, currently, achievement goal theorists reach a consensus about a combine blended of these two orientations, which are mastery versus performance, and approach versus avoidance. Then they proposed four sets of achievement goals: mastery avoidance, performance avoidance, performance approach, and mastery approach.

2.1.2 Classroom Goal Structures

In addition to enable a framework for investigating the personal differences in student motivation, achievement goal theory is also helpful to analyze the effects of classroom environments on students' learning patterns and their motivation (Meece, Anderman, & Anderman, 2006). Because achievement goal theory supported that

motivation of students is affected by their individual characteristics, beliefs, and previous academic achievement, as well as by the context in which they learn (Anderman & Patrick, 2012). During the time, which was spent by students in classrooms, they build their own schemas and meaning systems reflecting their aims, experiences, and perceptions regarding to what is underlined in the classroom. These perceptions of what is underlined refer to the concept of classroom goal structures (Ames, 1984, 1992b). In other words, the classroom goal structure can be defined as instructional approach given in a certain classroom (Ames & Archer, 1988). More specifically, classroom goal structures involve students' aims for their engaging in schoolwork and personal perceptions about the academic tasks, competence, and achievement (Anderman & Patrick, 2012). When viewed from achievement goal theory, classroom goal structures serve as an effective empirical tool, which can be used to investigate the influence of classroom contexts on students' engagement and motivation (Meece, Anderman, & Anderman, 2006). Therefore, much research has conducted to define the classroom structures that may affect motivation variables (e.g., Ames & Archer, 1988; Ames, 1992a, 1992b; Maehr & Midgley, 1991; Rosenholtz & Simpson, 1984)

Learning environments such as classrooms have often been defined in accordance with specific sorts of instructional requirements, situational restraints, or psychosocial properties regarding to several cognitive and affective results in students. On the other hand, there is a lack of systematic analysis research on the actual classroom structures investigating how specific structures in the classroom can provide different goals to be prominent (Ames, 1992c). However, several instructional strategies have been suggested to encourage the improvement of mastery goals (Palmer, 2005). For example, Epstein (1988) recommended six dimensions of classrooms that influence motivation. These six components can be controlled in the classroom by the teachers. These dimensions are stated as follows: The nature and definition of the *tasks (T)*which are supposed to be performed by student; presence of *autonomy (A)*created by teachers during learning processes*;* in what way teachers *recognize (R)* students*; grouping procedure (G)* employed by

teachers*;* forming *evaluation (E)* which are used*; time (T)* schedule planned for learning. To represent these dimensions the acronym TARGET has been used.

TARGET system was also used by Ames (1992a, 1992b) to distinguish between mastery oriented and performance oriented classrooms. Mastery oriented classrooms are related to positive influences on motivation whereas, the performance oriented classrooms are negatively related or unrelated o motivational and cognitive elements (Ames, 1992a; Ames, 1992b; Ames & Archer, 1988). Ames (1992c) investigated which classroom environment structures cause a mastery goal orientation, and potential effects of these structures on how students adopt and engage in learning. His literature review (e.g., Brophy, 1987; Epstein, 1988; Marshall, 1988; Marshall & Weinstein, 1984, 1986; Mac Iver, 1987, 1988; Meece, 1991; Rosenholtz & Rosenholtz, 1981; Rosenholtz & Simpson, 1984; Stipek & Daniels, 1988) revealed that there is a consensus about description of specific structures which were found to affect motivational components, specifically how students perceive their abilities and the extent to which ability becomes the classroom's evaluative dimension. These structures comprise, but are not restricted to, the organization of learning activities and *tasks*, forms of *evaluation* practices, and *authority and responsibility* distribution have great importance in student related outcomes. In the following sections, each of these three dimensions is explained in detail.

2.1.2.1 Task

The focuses of task structures are learning materials and assignments that are given to students for their learning during or after class. Task structure comprises design of the works in class, homework, and students' perceptions about whether the content is suitable and interesting for them. In sum, it comprises all settings of curriculum (Guo, 2007). Design of learning activities and tasks is the key element of classroom learning (Ames, 1992c). Additionally, some characteristics of the tasks improve students' willingness to make effort and their active engagement in learning. For example, tasks, which offer variety and diversity, enable more curiosity to

learning and promote mastery orientation and active engagement (Marshall & Weinstein, 1984; Nicholls, 1989; Rosenholtz & Simpson, 1984). Furthermore, students tend to engage in learning when tasks are meaningful and relevant to them. Additionally, Lepper and Hodell (1989) suggested that the design and structure of tasks should be challenging, interesting and controlled by students to create an intrinsic purpose to learning for students. Finally, if tasks are identified with regards to specific and short-term goals, students' beliefs about being able to accomplish a task with reasonable effort, and their intentness to exert this effort can be increased (Schunk, 1984, 1989a). At the same time, due to tasks are part of social organization of a classroom, they include social elements (Blumenfeld & Meece, 1987). Therefore, student engagement is affected and designed by the style of assigning tasks to students by teacher, and the interactions with other elements in classroom (Guo, 2007). Briefly, a mastery oriented task structure defined as instruction and tasks that are diverse, interesting, different, challenging, meaningful and relevant; and students more engage in learning in such an environment (Blackburn, 1998).

2.1.2.2 Autonomy

Several researches have specified autonomy as an important element for success in the academic settings (Grolnick & Ryan, 1987; Vansteenkiste, Zhou, Lens, & Soenens, 2005). Autonomy can be defined as a person's desire to be able to make his/her own choices and sense having the control over his/her action. Additionally, the autonomy structure captures the chances, which are given to the students in order to involve in deciding with teachers during learning. Most studies have concluded that students who have more sense of autonomy in school demonstrate higher classroom engagement level, enjoyment, persistence, learning, and achievement (e.g., Deci & Ryan, 2002; Hardre & Reeve, 2003; Grolnick & Ryan, 1987; Miserandino, 1996; Otis, Grouzet, & Pelletier, 2005; Patrick, Skinner, & Connell, 1993; Vallerand, Fortier, & Guay, 1997). In other words, when students have chance to select the tasks, materials, methods of evaluation or learning, then they take their own responsibility for learning, and begin to actively engage in

learning. Moreover, students whose teachers can be described as autonomy supportive are more essentially motivated than students whose teachers cannot be described like that (Grolnick & Ryan, 1987). In addition, it has been demonstrated that autonomy is positively related to task interest, grades, psychological well-being and conceptual understanding (Patrick, Skinner, & Connell, 1993; Reeve, Jang, Hardre, & Omura, 2002; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004; Williams & Deci, 1996). Therefore, classroom structures should support students' responsibility in learning situations and their autonomy (Sungur & Güngören, 2009).

2.1.2.3 Evaluation

The evaluation structure captures the frequency and content of evaluation, and the methods and criteria, which are teachers, used for assessing and controlling students' learning (Guo, 2007). One of the most prominent elements that can influence student motivation is how students are evaluated (Ames, 1992c). However, evaluation of students is not only important issue. Indeed, their perceptions about how they are evaluated are also significant (Mac Iver, 1987). Different evaluation structures can bring out different motivation types, and students may be oriented toward varied goals (Ames & Ames, 1984). Much research presented that if evaluation practices in the classroom are normative, based on ability, and emphasizing social comparison, then they create a negative motivational climate which is making students in that classroom tended to be performance oriented (Butler, 1987, 1988; Covington & Omelich, 1984; Jagacinski & Nicholls, 1984, 1987; Nicholls, 1989). For example, the evaluation practices such as announcements of students' scores, grouping students according to their ability, declaring good papers and high achievements have all negative influences on children's motivation (Ames, 1992c). In contrast, when evaluation practices focus on personal improvement instead of comparative performance, students tend to follow mastery goals, and perceive the mistakes as a part of learning instead of an indicator of lack of ability (Guo, 2007).

Based on these dimensions, Ames (1992c) proposed that *instructional tasks* involving medium challenge, interest, and active participation, *evaluation practices* concentrated on personal improvement, progress, and mastery, and *autonomy support* in terms of supply of real preference and opportunity for building independence and responsibility are interrelated with positive outcomes such as high self-efficacy, positive attitude, and more engagement in learning. Sungur and Gungoren (2009) also supported that students' classroom environment perceptions that are mastery evaluation, autonomy support, and motivating tasks were positively related to motivational constructs such as intrinsic value, self-efficacy, mastery and performance goal orientation, and cognitive constructs such as strategy use. Similarly, Greene et al. (2004) concluded that students' perceptions of autonomy support, mastery evaluation, and motivating tasks were associated with their mastery goal orientation, perceived instrumentality, self-efficacy, and strategy use.

In line with these findings, present study focuses on three dimensions of classroom goal structures which are motivating tasks, autonomy support, and mastery evaluation and aims to investigate the relationships among these three dimensions of classroom goal structures, self-efficacy beliefs, and engagement. Among these three dimensions, motivating tasks involve the extent to which students perceive the classroom tasks as positive in terms of meaning, relevancy, and interest for them (Greene et al., 2004). Autonomy support refers to providing autonomy for students to take responsibilities and attempts or self-regulating their own learning (Greene et al., 2004). Mastery evaluation concerns the extent to which students perceive the evaluation as focusing on learning and fair (Greene et al., 2004).

2.2 Student Engagement

One of the predictors of achievement is student engagement (Fredricks, Blumenfeld, and Paris, 2004; Marks, 2000). Research on student engagement became apparent in 1980s. Early research on student engagement focused on intending to diminish school dropouts and reengage students to the school. However, the focus and reason of the research on student engagement have altered in order to

make progress in learning pedagogy and try to understand how students learn best since 2003. Recently, engagement researchers focus not only on the ways that increase engagement to provide students with behavioral compliance or academic achievement, but also on the ways that enhance students' enjoyment, comprehension ability, interest, and meta-cognitive awareness to gain ability to learn in all parts of life (Parsons, & Taylor, 2011). Therefore, there is some debate about the definition of engagement and the way that it is operationalized and measured in the literature. It was also stated in several studies that there is significant uncertainty in the conceptions and terminology used among researches (Fredricks et al., 2004; Furlong, Whipple, St. Jean, Simental, Soliz, & Punthuna, 2003; Jimerson, Campos, & Greif, 2003).

Based on some researchers' definitions, student engagement is described as students' "psychological investment in and effort directed toward learning, understanding or mastering the knowledge, skills, or crafts that academic work is intended to promote" (Newmann, Wehlage, & Lamborn, 1992, p. 12); students' "involvement with school" (Finn, 1989), and their "interest" and "emotional involvement" with school, including their "motivation to learn" (Steinberg, 1996). Student engagement refers to the extent to which a student involves actively in a learning activity (Connell & Wellborn, 1991). Generally, engagement is defined as students' degree to connectedness and involvement with the school, schooling and therefore social interactions in there (Skinner, Kindermann & Furrer, 2008). Chapman (2003) described student engagement as student's will to join in school activities with engagement, which is indicated by cognitive, behavioral, and affective indicators, on a specific learning task. According to Marks (2000), engagement refers to some psychological components such as investment, attention, curiosity, and effort, which students perform during the learning.

As stated above, since each new study brings a new aspect or a new view to the student engagement construct, it is still hard to define and categorize this construct. Thus, there are many types or subcategories of engagement in the reviewed literature. Some of those are social, psychological, academic, emotional,

behavioral, cognitive, intellectual, and institutional. Moreover, the meaning of these types or categories is not exactly clear, yet. Therefore, Fredricks et al. (2004) qualified the engagement as a "meta-construct", and they gathered different types of research such as motivation, belonging, school climate, and investigates the relationships among them. They concluded that engagement has significant potential as a multidimensional construct, which combine the three elements (behavioral, emotional, and cognitive) in a meaningful way. Although engagement is a multi-dimensional construct, the most frequently used in the literature components of student engagement have been identified as cognitive, behavioral, and emotional engagement from the last twenty years to onward (e.g. Dunleavy, 2008; Fredricks et al., 2004; Jimerson et al., 2003; National Research Council, 2004). According to current reviews of the literature, in addition to these three-component models, Reeve and Tseng (2011) have suggested engagement taxonomy with four aspects: behavioral, emotional, cognitive, and agentic engagement.

2.2.1 Behavioral Engagement

According to Fredricks et al. (2004), behavioral engagement can be identified in three different perspectives: The first one requires developing positive actions (i.e., obeying the rules in classroom, keeping to norms in the class, and avoiding skipping school.) Second is to get involved in academic and learning tasks by paying efforts, showing attentions, concentrating, asking questions, and making contribute to discussions in class. The last definition is "participation in school-related activities such as athletics or school governance" (p. 62). Skinner, Kindermann and Furrer (2008) also described the engaged behaviors as expending effort and persistence, paying attention and concentration. They identified the behavioral engagement as "on-task behavior, academic behavior, and class participation" (p. 495). Behavioral engagement refers to participating in academic, social or other activities done out of school, and it is important since it helps to achieve academic tasks and inhibit school dropout (Connell, 1990; Finn, 1989).

2.2.2 Emotional Engagement

Emotional engagement is identified as students' emotional reactions in the class such as existence of enthusiasm and interest or non-existence of anger, boredom and anxiety (Connell & Wellborn, 1991; Reeve & Tseng, 2011; Skinner & Belmont, 1993). It contains not only positive reactions but also negative reactions to schools, teachers, classmates, and it affects students' willingness to complete tasks (Fredricks et al., 2004). Connell and Wellborn (1991) exemplified emotional engagement as being bored, angry or interested and happy in the classroom.

2.2.3 Cognitive Engagement

Cognitive engagement refers to students' thinking skills that helps them to obtain addressed and intended mental processes in order to learn (Corno & Mandinach, 1983; Fredricks et al., 2004). If a student cognitively engaged, he or she would use strategic and sophisticated learning strategies (e.g. reiterating, summarizing, and understanding topics) (Fredricks et al., 2004). Cognitive engagement comprise of using learning strategies, and self-regulation (Chapman, 2003; Fredricks et al., 2004). In other respects, cognitive engagement indicates that students' willingness to make effort to comprehend difficult notions and skills (Fredricks, Blumenfeld, Friedel & Paris, 2003). Connell and Wellborn (1991) exemplified cognitive engagement as preferring hard work, and having an independent and flexible problem solving style of a student.

2.2.4 Agentic Engagement

Agentic engagement is described as "students' intentional, proactive, and constructive contribution into the flow of instruction they receive" (Reeve, 2012, p. 161). It is a process and in this process, students purposely attempt to create, enrich and personalize both what they learn and the conditions under which they learn (Reeve & Tseng, 2011). If a student is agentically engaged, he or she would response with something useful, such as suggesting proposal, asking questions, asking for an explanation and an example, declaring his or her thoughts and needs, advising an

objective to be achieved, requesting learning opportunities and resources, looking for opportunities for increasing personal interest to the lesson (Reeve, 2012).

2.3 The Concept of Self-efficacy

Self-efficacy beliefs are generally described as ‘‘people’s judgments of their capabilities to organize and execute courses of action required to attain designated types of performances’’ (Bandura, 1986, p. 391). Self-efficacy is a belief about what can people do such as solving a math problem, tying their shoes or riding a bicycle and it contains judgments which individual can or cannot do an activity (Linnenbrink & Pintrich, 2003). However, Bandura (1997) defines self-efficacy as beliefs of persons concerning their capabilities in a specific context or for a definite task. Self-efficacy regards the reply to the question, ‘‘is it possible for me to do this task in this condition?’’ (Linnenbrink & Pintrich, 2003) That is, it is not just “knowing what to do” (Bandura, 1997). Consequently, “perceived self-efficacy is concerned not with the number of skills you have, but with what you believe you can do with what you have under a variety of circumstances” (Bandura, 1997, p. 37).

Although there are many motivational constructs, based on the Bandura’s social cognitive theory, self-efficacy is a key factor, which promotes motivation and engagement, because self-efficacy beliefs provide a basis for motivation, personal skills and wellbeing (Pajares, 2002). Since self-efficacy beliefs mediate the links between knowledge and action, they have significant effects on motivation and behavior partly. In other words, environmental, affective, and cognitive elements affect behavior in part through affecting self-beliefs. This is why individuals’ self-efficacy beliefs predict their subsequent performances influentially (Pajares, 1995).

Bandura’s social cognitive theory (1986, 1997) propounds a framework known as “triadic reciprocal determinism” means that individuals’ behaviors are formed under the effect of three factors: personal(cognitive, affective and biological), behavioral, and environmental. As seen in the *Figure 2.1*, human behavior is performed within *triadic reciprocality* framework, comprising person-behavior, person-social/environment, and behavior-social/environment interactions. As

mentioned in Schunk and Mullen (2012), these interacting effects can be showed using self-efficacy as the personal factor. Considering the links between self-efficacy and behavior, research has demonstrated that self-efficacy affects achievement behaviors (i.e., choice of tasks, effort, persistence, and use of influential learning strategies), and these behaviors also influence self-efficacy. When it comes to the relation between person and environment, it can be said that people judge the individuals considering their performance (e.g., low skills, low grades) rather than considering their real capabilities to perform tasks. This environmental feedback also influences self-efficacy. For example, when a teacher gives support to students by saying "We are sure you can accomplish this!" communicating, students' self-efficacy improves. Finally, environment can affect behavior, for example, "when teachers point to a display and say, "look here" which students do with little conscious effort" (Schunk & Mullen, 2012, p.221). Additionally, behaviors can change students' learning environments, for example, "When students give incorrect answers, teachers are apt to reteach the material, temporarily discontinuing the lesson" (Schunk & Mullen, 2012, p.221).

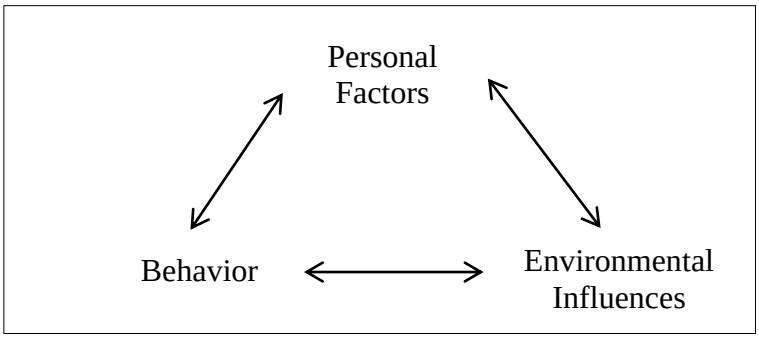

Figure 2.1 Triadic reciprocality model of causation

Overall, Bandura (1986, 1997) asserts that interactions among behaviors, personal elements, and social/environmental conditions determine the achievement. It was assumed that self-efficacy affects behaviors and environments, as well as be affected by them (Bandura, 1986, 1997). Human functioning such as making choice of activities, making effort and persisting is considerably influenced by self-efficacy (Pajares, 2002; Pintrich & Schunk, 2002; Schunk & Mullen, 2012). If individuals

feel confident and skilled, then they choose and engage in an activity. Otherwise, if they think that an activity would not bring in desired results, they tend to avoid engaging in such kind of an activity. From educational perspective, students have higher self-efficacy are disposed to engage in a task even if it is hard, and they are more likely to exert effort to accomplish a task, and set learning goals, use influential learning strategies, and create supportive environments; otherwise, students who have lower self-efficacy tend to avoid it (Pintrich & Schunk, 2002; Schunk & Mullen, 2012). Therefore, "self-efficacy is influenced by the outcomes of behaviors (e.g., goal progress, achievement) and by inputs from the environment (e.g., feedback from teachers, comparisons with peers)" (Schunk & Mullen, 2012, p.222). Students' self-efficacy influences their motivation and learning, even their decisions and events, which may influence their lives (Schunk & Pajares, 2009).

2.4 Self- efficacy and Science Achievement in relation to Perceptions of Classroom Goal Structures

Several studies have confirmed the association between the students' perception of classroom goal structures and their academic self-efficacy (Anderman & Midgley, 1997; Blackburn, 1998; Dorman, 2001; Friedel et al., 2007; Middleton & Midgley, 1997; Roeser et al., 1996). Moreover, some studies using path analysis have also stated that self-efficacy mediates the relationship between classroom perceptions and performance or achievement (Bong, 2008; Greene, Miller, Crowson, Duke, & Akey, 2004).

For example, Greene et al. (2004) examined a model which presents the relationship between perceiving of classroom environment by students with respect to autonomy support, motivating tasks, and mastery evaluations on their motivation (self-efficacy, perceived instrumentality, and achievement goals). Furthermore, effect of these motivation variables on cognitive engagement and achievement was also examined. A series of questionnaires were administered to 220 high school students from English classes. Results showed that among classroom goal structures dimensions, while autonomy support ($\beta = .22$, $t = 2.16$) and mastery evaluation ($\beta = .29$, $t = 2.53$) predicted self-efficacy, motivating tasks did not. Greene et al. claimed

that motivating tasks have effects on the extent to which students perceive learning as important to their future achievement. Moreover, they suggested that an essential goal for motivation investigations should be finding ways that enhance self-efficacy, and one of these ways is to provide students to perceive the classrooms as supporting autonomy and mastery-oriented evaluation. In addition, results revealed that both strategy use and self-efficacy were the only variables, which affected achievement directly. Self-efficacy (β = .38, t =5.29) and strategy use (β = .15, t = 2.08) significantly and positively predicted achievement. Based on the strength of the relationship between self-efficacy and strategy use as well as achievement, Greene et al. revealed that self-efficacy is significant for successful learning.

Similarly, Sungur and Gungoren (2009) conducted a study to explore the associations among students' classroom environment perceptions (autonomy support, motivating tasks, and mastery evaluation) and self- regulation (cognitive and motivational aspects) and science achievement. Participants in this study were 900 students in 6^{th}, 7^{th}, and 8^{th} grades from Bolu, Turkey. Three instruments were used for data collection. (1) In order to assess students' motivational beliefs with regards to perceived self-efficacy and intrinsic value, Motivated Strategies for Learning Questionnaire (Pintrich & De Groot, 1990) was utilized. (2) In order to determine students' performance goal orientation, perceived mastery goal orientation, and strategy use Approaches to Learning Instrument (Greene et al., 2004) was used.(3) In order to examine students' perceptions of classroom environment Survey of Classroom Goals Structures (Blackburn, 1998; Greene et al., 2004) was utilized. Structural equation modeling was conducted to data analysis. It was found that there was strong positive relationships among classroom environment perceptions (β =.22), motivational beliefs (β =.36), goal orientations (β = .33) and strategy use. Moreover, motivational beliefs (β = .11) and goal orientations (β = .21) mediated the influence of perceptions of classroom environment on science achievement. As a result, students' perceptions of classroom environment were found to be directly related to cognitive and motivational aspects of self-regulation and indirectly to science achievement.

In other study, Fast, Lewis, Bryant, Bocian, Cardullo, Rettig, and Hammond (2010) investigated the links between students' classroom environment perceptions, their self-efficacy and standardized math test performance. 1163 students who were fourth, fifth, and sixth graders from southern California participated in the study. A self-report survey was administered to assess the students' self-efficacy beliefs and how much they perceive their classroom environment is mastery-oriented, caring, and challenging. Moreover, students' scores on the California Standards Test for Mathematics were also gathered. Results showed that students who perceived their classrooms as more challenging, caring, and mastery oriented reported significantly higher levels of self-efficacy. Moreover, students who reported to have more self-efficacy scored higher on the math test. Lastly, findings revealed that student's classroom environment perceptions have not direct effect on math performance, but analysis of the indirect effects of classroom environment perceptions on achievement showed a significant mediating effect of self-efficacy.

Recently, Badiee, Babakhani, and Hashemian (2014) conducted a study to predict students' mathematic achievement through a comprehensive model. In the model, relations between perceptions of classroom structures and mathematic achievement were mediated through the achievement goals and self- efficacy. The sample consisted of 360 (180 girls, 180 boys) third grade students from the intermediate schools in Tehran. A series of questionnaires were employed to students. To assess students' classroom environment perception (motivation tasks, mastery evaluation, and autonomy support) perceptions of classroom structure scale (Blackburn, 1998) was utilized. To determine students' achievement goals (mastery, performance, and avoidance goals) the achievement goals scale (Midgley, C. & Middleton, M., 1997) was used. Scale of mathematical self- efficacy (Midgley, C. & Middleton, M., 1997) used to determine the level of students' mathematical self-efficacy. Finally, students' mean of grades across the year and their first semester exam grades indicated their math achievement. Structural equation model was conducted to analyze the data. The proposed model which suggested mathematic achievement predicted by students' classroom structure perceptions, achievement

goals, and self- efficacy fit to data well (GFI= 0.97, RMR=0.04, $\chi 2$=67/85 and RSMEA=0.04). The findings confirmed that classroom environment perception have effects on math achievement directly, as well as over the achievement goals, and over the self-efficacy. Researchers revealed that classroom environment influences students' perceptions, beliefs, attitude and behavior. Namely, if students perceive the tasks as challenging, they will involve in learning more, and select some goals, which help them, succeed. In addition, if students perceive the evaluation as a learning process of problem solving, they will become mastery- oriented, and get more involved in learning. Moreover, it was suggested that classroom environment perception is related with math self-efficacy belief that results in academic achievement. Specifically, if students perceive the classroom as autonomy supportive such as being free about choosing tasks based on their ability, and planning to do it, their self –efficacy and thus their achievement will be increase.

In another study, Gutman (2006) investigated how students' goal orientations, perceptions of classroom goal structures, and their parents affect students' math achievement and their motivational beliefs (self-efficacy) across the high school transition. A total of 50 African American families participated in the study. Student surveys and open-ended parent interviews were used to collect the data. Students' perceptions of classroom goal structures, goal orientations, and academic outcomes were gathered at two times. The first one was at eighth grade, and the second one was at ninth grade. Hierarchical regression analyses revealed that students who adopted more mastery goals had more positive changes in math self- efficacy and grades during the transition. In addition, it was found that students with more mastery goal structured perceptions had higher level of self-efficacy, whereas students who perceived the classroom as more performance classroom goal structured had lower level of self-efficacy. Nevertheless, students' perception of classroom goal structures was not associated with their achievement. Lastly, results showed that students whose parents adopted mastery goals get higher grades in math.

Overall, aforementioned literature demonstrated that a significant link exists between students' perceptions of classroom goal structures and their self-efficacy.

Moreover, students' self-efficacy is seemed to be significantly associational with their achievement. In general, results revealed that students' self-efficacy mediates the influence of perceived classroom environment on achievement. Thus, in this study it is proposed that perceptions of classroom goal structures are indirectly linked to science achievement through its effect on self-efficacy. Specifically, it is predicted that students' perceptions of extent to which their classroom environment is mastery-evaluated, autonomy supportive and degree to which students perceive the tasks to be meaningful is directly linked to self-efficacy, and self-efficacy has a direct and positive association with science achievement.

2.5 Student Engagement in relation to Perceptions of Classroom Goal Structures

Research on the student engagement in relation to classroom goal structure perceptions revealed that students' perceptions of classroom goal structures predict students' cognitive, emotional, motivational, and behavioral engagement both directly and indirectly by the mediation of some motivational factors (i.e., personal achievement goals, self-efficacy, and perceived instrumentality) (Ames, 1992b; Badiee et al., 2014; Roeser et al., 1996; Rostami et al., 2011; Wolters, 2004). Indeed, According to Ames (1992c), if students' cognition, affects, motivation, and behaviors are investigated, their learning environment perceptions should also be added as a factor. She also stated that teacher behaviors affect students' learning environment perceptions. For this reason, teachers' beliefs and behaviors may determine students' motivation, cognition, affect, and behaviors. If teachers provide students with autonomy, and meaningful tasks , or consider students' errors as a piece of learning process, or center on learning and acquiring new skills, and they can create an environment that stresses mastery goals. Such learning environments are found to be related to more adaptive student outcomes such as better cognitive, behavioral, and emotional engagement (Anderman & Patrick, 2012; Gonida, Grigoris, & Kiosseoglou, 2009). However, if they encourage students' ability, or high succeed with little effort, etc., they can create an environment that stresses

performance goals (Ames, 1992b; Garner, 1990; Kaplan et al., 2002; Meece et al., 2006; Nicholls, 1989). Learning environments with performance goals emphasis are generally found to be linked to "students' beliefs and behaviors that are less conducive and often detrimental, to learning and achievement" (Anderman & Patrick, 2012, p.183).

For example, Patrick et al. (2007) proposed a conceptual model to investigate the relations among perception of the classroom social environment, student engagement, motivational beliefs, and achievement. Accordingly, they conducted their study in the following three key areas: First, students' perception of the classroom social environment in terms of teacher support, student support, and the promotion of interaction, and its relationship with student engagement (self-regulation and task-related interaction) were examined. Second, motivational beliefs, which involve mastery goals and self-efficacy, were investigated to see whether they serve as a mediator between the classroom environment perceptions and engagement. Lastly, the relationship between student engagement and academic achievement in mathematics was explored. A total of 602 fifth- grade students in Illinois participated in the study. Structural equation modeling was designed. According to results, it can be concluded that if the classroom environment facilitate students to feel supported in classroom, they tended to more engage in tasks. Moreover, students' motivational beliefs serve as a mediator between students' classroom environment perceptions and their engagement. The study showed that practicing self-regulation strategies were related to grades in math significantly, so researchers deduced that using self-regulation strategies enhances achievement subject to the assessment's nature.

Indeed, relevant literature concluded that students' perceptions of classroom goal structures are also associated with students' cognitive engagement, which involves students' utilization of various cognitive and metacognitive strategies. To illustrate, Young (2007) investigated the influences of perceived classroom goals on students' strategy use. The results showed that students who perceive the learning environments as a place in which learning and understanding of science tasks are stressed tend more to use further cognitive strategies. In the same manner, Ames and

Archer (1988) examined the association between the achievement goals that are stressed in the classroom environment as well as utilization of effective learning strategies. The findings showed that there is a positive relationship between using learning strategies and students' perceptions of mastery goals. Namely, students perceiving mastery goals in the classroom have tendency to utilize more effective learning strategies.

In Young's (1997) longitudinal study, she investigated how to increase effectiveness of middle school students' learning through goal orientation theory perspective. To do this, she examined the relationships among effective learning, motivation, cognition over time, and perceptions of students' classroom context. Data were collected from 316 (169 males, 137 females) students at two times, one (Time 1) was in sixth grade and the other one (Time 2) was in the seventh grade. To assess students' personal motivational beliefs (task-focused goal orientation, extrinsic-focused goal orientation, and relative ability-focused goal orientation), strategy use, and perceptions of the classroom goal structures (performance-focused and task-focused), a survey, which contains original items from the Patterns of Adaptive Learning Survey (PALS) (Midgley, Maehr, & Urdan, 1993) and other sources, were administered. All these dimensions were estimated in English and mathematics courses. According to results, goal orientation and strategy use showed stability. Namely, students who have a great task-focused goal orientation in the 6^{th} grade tended more to have stronger task-focused goal orientation in the 7^{th} grade. Results revealed also that students' perceptions of the classroom goal structure have influence on personal goals and strategy use. Students' perceptions of the classroom as task goal structured correlated with deeper strategy use positively and significantly. Thus, it appeared that task (mastery) oriented classroom goal structures are positively linked to cognitive engagement.

Similarly, Lyke and Young (2006) investigated the following relationships: (1) between students' goal orientations (intrinsic or extrinsic) and their cognitive strategy use (2) between students' goal orientation and their perceptions of the classroom goal structure (task or performance structured) (3) between students'

perceptions of classroom goal structure and their cognitive strategy use. A total of 322 college students were attended in the study. The Patterns of Adaptive Learning Survey (PALS) (Midgley et al., 1996) was administered. Results were consistent with the earlier work. Firstly, a positive relationship between intrinsic goal orientation and use of deep cognitive strategies was found. Secondly, results showed that students' perceptions of classroom environment were significantly related with students' goal orientations. Lastly, there was a positive relationship between students' perceptions of classroom task structure and utilize of deep cognitive strategies as well as use of rehearsal. However, there was no association between students' perceptions of classroom performance structure and use of either cognitive strategy.

In another study, Wolters (2004) examined the relations among different goal structures and goal orientations, as well as how these constructs were related students' academic functioning (motivational engagement, cognitive engagement, and achievement in mathematics. A total of 525 junior high school students (272 female, and 253 male; 299 seventh grade, and 226 eighth grade) participated in the study. He used a seven point Likert-styled survey which contains three subscale; students' personal motivational beliefs and attitudes; students' use of cognitive and metacognitive strategies; and students' perceptions of mathematics classroom. To measure students' perceptions of the mastery and performance classroom goal structures, items adapted from Midgley et al. (1998) were utilized. To determine students' personal motivational beliefs (three personal achievement goal orientations, and perceived self-efficacy) items from Midgley et al. (1998) were utilized. To determine students' motivational engagement, four scales (choice, effort, persistence, procrastination) were developed. To assess students' cognitive engagement (strategy use, metacognitive strategies) items from Pintrich, Smith, Garcia, and McKeachie (1993) were used. Finally, to assess students' achievement, their grades scored in math class were utilized. Findings from the hierarchical regressions predicting students' motivational engagement showed that students who found their mathematics class as more mastery structured had tendency to show more

motivational engagement. When it comes to predicting students' use of cognitive and metacognitive learning strategies, findings revealed that mastery structure positively predicted both types of strategies. Moreover, results showed that when students perceived their classroom as underlining mastery goals (β=.22 and .16, $p < .01$, respectively) and when they adopted mastery goals for themselves (β=.47 and .47, $p < .01$, respectively), they tended to use both cognitive and metacognitive strategies. However, the other motivational predictors did not explain these dimensions of cognitive engagement. Moreover, mastery goal structure and mastery goals were important predictors for achievement. In conclusion, it was suggested that mastery structure and mastery orientation were associated with adaptive outcomes in all areas.

Based on the multiple goal perspective of goal orientation theory, Lau and Lee (2008) investigated students' achievement goals and their relations with classroom environment perceptions, and strategy use. The sample consisted of 925 (502 boys and 423 girls) 8th grade students from junior secondary students schools in Hong Kong. To assess the classroom environment perceptions related to motivating tasks, autonomy support, and mastery evaluation, a scale obtained from the Survey of Classroom Goals Structures was used. To measure the students' achievement goals, as well as strategy use, scales taken from the Motivation and Strategy Use Survey (Greene et al., 2004) were used. They hypothesized that students' classroom environment perceptions would affect mastery goals, performance-approach goals, and perceived instrumentality and, in turn, would affect their strategy use. Besides the indirect effects, it was also hypothesized that classroom environment perception would have direct effects on students' strategy use. Structural equation modelling (SEM) was employed to test the proposed model. Results showed that students' classroom environment perceptions (.26) were significantly and positively associated to their strategy use. Moreover, there were also indirect effects (.29) on students' strategy use through the effect of achievement goals. Especially, the perception of mastery-oriented classroom environment was intimately associated with students'

mastery goals, and the best predicting variable of strategy use was found as having a mastery goal.

In the earlier study of Lau and Lee (2006), in the same vein, relations among students' perceived classroom environment, achievement goals, and strategy use were examined. The sample consisted of 1522 (805 boys and 717girls) 5th and 8th grade students from Hong Kong. Students' classroom environment perceptions were evaluated with respect to motivating tasks, autonomy support, and mastery evaluation via Survey of Classroom Goals Structures (Greene et al., 2004). Together with students' strategy use, achievement goals (mastery goal, performance-approach goal, and perceived instrumentality) were also measured through Motivation and Strategy Use Survey (Greene et al., 2004). Structural Equation Modeling (SEM) was conducted to investigate the hypothesized relationships among students' perceived classroom environment, goal orientation, and strategy use. The model proposed that students' classroom environment perception had influence on their goal orientations and their goal orientations, in turn, had effects on their strategy use. Apart from these indirect effects, classroom environment was also hypothesized to affect students' strategy use directly. Results showed that students' classroom environment perceptions were significantly related to their personal achievement goals and strategy use. In addition to the direct effects (.26), findings also revealed the indirect effects (.42) of classroom environment perception on strategy use mediated through their mastery goals. Despite the strongest predictor of strategy use was mastery goal, perceived instrumentality and performance-approach goals also related with strategy use and mastery goals. Researchers suggested that adding perceived instrumentality to motivation researches should also be highlighted.

The influence of classroom goal structure on students' behavioral engagement has also been studied by several researchers. For example, Karabenick's study (2004) investigated the relationships among students' help seeking as part of behavioral engagement, their classroom goal structure perceptions and their achievement goals in a two-stage study. Study1 included 883 college students, and 852 college students

were participated in Study 2. The results of study1 showed that help seeking is identified by students' demand to get guiding help from teachers and avoidance patterns such as threat, avoidance intentions, seeking expedient help. The results of study 2 revealed that students' help-seeking approach is positively predicted by their perception of mastery goal structure, whereas help-seeking avoidance patterns are negatively predicted.

In a longitudinal study, Turner et al. (2002) examined the relationship among students' avoidance strategies (handicapping themselves, avoiding of help seeking), their perceptions of classroom goal structures (performance goal structure and a mastery goal structure) and teachers' use of instructional discourse in mathematics with regard to motivation of instruction and regulating the classroom activities and time. The sample of the study was 1,197 sixth-grade students. Qualitative and quantitative data were gathered. Results showed that students' mastery goal structure perceptions negatively predicted each of the avoidance strategy (avoiding novelty, avoiding seeking help and self- handicapping strategies). In other words, when students are in a class emphasizing understanding, learning, effort, and enjoying, they use less avoidance strategies. The findings also revealed that student exhibited less avoidance strategies in their classrooms where their teachers supported their learning with both instructional and motivational support. Specifically, teachers in these classrooms assisted them to understand topics, created chances for them to show new competencies, and presented significant motivational support to learn. Authors suggested that if students are in a performance goal structure, they tend to demonstrate avoidance behavior (i.e. less behavioral engagement).

Similarly, Ryan, Gheen, and Midgley (1998) investigated how students' perceptions of classroom goal structures are corresponded to their help seeking avoidance. A total of 516 elementary school students were participated in the study. Results of the hierarchical linear modeling (HLM) showed that a perceived emphasis on self-improvement (students' perceptions of a mastery classroom goal structure) were related to lower level of help avoidance; otherwise, a perceived emphasis on relative skill (students' perceptions of performance goal structure) was associated

with to higher levels help avoidance. Further, students' avoidance of help seeking was associated with their academic efficacy negatively. On the other hand, it was found that students' avoidance from seeking help was not strongly associated with their academic efficacy in classrooms where their teachers thought that students' social and emotional needs should be taken into consideration.

Gonida, Voulala, and Kiosseoglou (2009) examined the predictive roles of students' perceived goal structures and parent goals on students' goal orientations as well as their emotional and behavioral engagement. In addition, they searched if students' goal orientations mediate the links between perceived school or parent goals and engagement. Two hundred and seventy one students (134seventh graders and 137 ninth graders) participated in the study. Student engagement was assessed using the questionnaire developed by Wellborn and Connell (1987). Students' perceived school goal structures assessed by the survey developed by (Midgley et al., 1995). To assess students' perceived parent goals the survey 'Perceptions of Parents, Home Life, and Neighborhood' developed by Midgley et al. (2000) was used. Path analyses were conducted. Results showed that behavioral engagement was predicted by perceived mastery goals directly and indirectly through its effect on student mastery goal orientation, whereas emotional engagement was not predicted. In addition, students' mastery goal orientations predicted behavioral engagement and emotional engagement.

Likewise, Reeve, Jang, Carrell, Jeon, and Barch (2004) conducted a research to test (1) whether or not high school teachers benefit from a workshop experience to develop their existing motivating styles, and (2) how students' engagement would be affected from such an experimentally initiated alteration in their teacher's motivating style. To test first hypothesis, they organized a workshop which aimed to expose teachers to information on how to be autonomy supportive. The data were collected from a sample of 20 high school teachers (9 women and 11 men). A rating sheet, which contained items concerning teachers' autonomy support, two aspects of student engagement (engagement measure1: task involvement; and engagement measure 2: influence attempts), teachers' provision of structure, and teachers'

provision of involvement was prepared. It was a 10-week period study. During the first week, raters observed each teacher. After this, one half of the teachers were randomly assigned into an experimental group, and the other half was into a control group. During weeks 3–5, the experimental group attended an informational session and engaged in independent study concerning ways of being autonomy supportive toward students. During week 5, all 20 teachers were observed by raters again. During weeks 6-8, the control group were exposed to get the informational session, and participated in independent study. Finally, all teachers were observed by the raters for third time. In order to test hypothesis 1, they used analysis of covariance. Teachers' autonomy-supportive behaviors during the second observation was used as the dependent measure, whereas their autonomy-supportive behaviors during the first observation as the covariate. Results showed that the experimental group showed significantly more autonomy-supportive behaviors (Adj.M = 4.57) than the control group (Adj.M = 2.91), $F(1, 17) = 11.68$, $d = 1.94$, $p < .01$. In order to find the extent to which teachers' enhanced use of autonomy-supportive behaviors predicted students' engagement (Hypothesis 2), two sets of hierarchical regressions were conducted. As the outcome measure, students' engagement during the second observation was used in the first part, whereas students' engagement during the third observation was used in the second part of regressions. According to results of first part, teachers' autonomy support affected both measures of engagement uniquely and significantly (for engagement measure 1, F (1, 16) = 9.63, $p < .01$ ($\beta = .59$); and for engagement measure 2, F (1, 16) = 6.74, $p < .01$ ($\beta = .59$). The results from the second part of regressions showed that teachers' autonomy support during the third observation predict the engagement outcomes significantly: For engagement measure 1, $F(1, 16) = 14.70$, $p < .01$ ($\beta = .61$); and for engagement measure 2, $F(1, 16) = 10.04$, $p < .01$ ($\beta = .54$). These results revealed that teachers who were informed about how to support students' autonomy through an informational session could be better in teaching and motivating their students in terms of more autonomy-supportive ways. They also concluded that autonomy support had positive effect on students' engagement.

In a similar study, Shih (2008) investigated the relationships among students' perceptions of autonomy support as an important component of classroom goal structures, achievement goal orientations, and self-regulatory styles. Additionally she examined how much these concepts could predict students' emotional and behavioral engagement. They worked with a sample of 343 (169 boys, 174 girls) eighth-grade Taiwanese students. In order to assess students' achievement goal orientations, she developed a questionnaire. To measure students' autonomy supportive perceptions, Learning Climate Questionnaire (LCQ; Williams & Deci, 1996) was utilized. To determine the degree to which students perceived themselves as autonomously against extrinsically motivated, the Self- Regulatory Style Questionnaire-Academics (Ryan & Connell, 1989; Connell & Ryan, 1987) was utilized. Finally, to measure the degree to which students behaved in specific ways or felt specific feelings in classroom (Miserandino, 1996), the scales from the Rochester Assessment of Intellectual and Social Engagement (RAISE) were used. Hierarchical Regression analysis was conducted. Results indicated that perceived autonomy support significantly predicted each aspect of behavioral engagement (for involvement, β =.55, p < .001; for persistence, β= .39, p <.001; for avoiding, β= -.18, p <.01; for ignoring, β=-.34, p < .001; for participation, β= .46, p < .001). Results of the regressions predicting students' emotional engagement were showed that perception of autonomy support was a meaningful positive predictor for emotions such as curiosity (β=.56, p < .001) and enjoyment (β= .54, p < .001), whereas negative predictor for anxiety (β= -.29, p < .001) and boredom (β=-.42, p < .001). Moreover, to determine if motivational profiles of behaviorally engaged students had effect on their emotional engagement, multivariate analysis of variance was conducted. Results supported that emotionally engaged students perceive their teachers as more autonomy supportive than did behaviorally engaged students. Moreover, behaviorally as well as emotionally engaged students showed higher levels of identified regulation, and mastery-approach goal orientation, intrinsic motivation than behaviorally but not emotionally engaged students. Additionally, this study suggested that besides the benefits of autonomy-related concepts for students'

engagement, there were also beneficial influences of mastery approach goals on engagement.

In another study, Jang, Reeve, and Deci, (2010) examined the relation between two components of teachers' instructional methods: autonomy support, and structure. Structure concerns the extent to which teachers clearly communicate the expectations and ways of successfully fulfilling desired educational outcomes Additionally, they wondered how each of these aspects of teachers' styles predicted students' engagement. Based on the related literature, they hypothesized that autonomy support as well as structure would have positive supports on students' engagement. The study was assessed by two ways (a measure scored by trained raters, and a measure self-reported by students). 133 teachers and their 2,523 (9th, 10th, and11th grade) students were participated in study. Teachers' instructional styles and students' behavioral engagement was assessed by trained observers with a rating sheet, which was a 1–7 Likert scale. In this scale, there were six aspects of students' behaviors at the classroom (attention, effort, verbal participation, persistence, positive emotion, and voice) to assess behavioral engagement. In addition to this, a self-report questionnaire, four worded items from work of Fredricks et al. (2004), was used to measure the degree to which students were behaviorally engaged during class. Correlational and hierarchical linear modeling analyses were conducted. The hierarchical linear modeling analyses showed that autonomy support significantly predicted both measures of students' behavioral engagement, while structure significantly predicted just students' collective behavioral engagement (not students' self-reported measure). According to correlation results, two components of teachers' methods (autonomy supportive and structure) correlated positively and significantly with each other r (133) = .60, $p <$ .01, as well as the two engagement measures. Therefore, they concluded that both of the autonomy support and structure predicted students' behavioral engagement.

Additionally, Thaliah and Hashim (2008) conducted a study to investigate how autonomy support affected student's classroom engagement. A total of 378

students (199 boys and 179 girls) from Malaysia were the sample of the study. According to the results, teachers' autonomy supportive style was a meaningful predictor for students' cognitive and behavioral engagement in ESL classroom.

Providing a support for the abovementioned literature, Reeve and Lee (2014) stated that if teachers create a mastery-oriented classroom climate, their students will pay more attention to exerting effort; focus on emotions of pleasure from hard work; use deeper cognitive strategies; and see other people as sources of knowledge, help and support. In other words, these students will concentrate on their all aspects of engagement (i.e., behavioral, emotional, cognitive, and agentic). The reason is that agentic engagement occurs when students can easily reflect their opinions or feelings during an activity as an active participant (Ainley, 2012; Assor, 2012; Brooks, Brooks, & Goldstein, 2012; Hipkins, 2002). As noted in Reeve and Lee's study (2014), the way of teachers' determination of classroom evaluation criteria, such as reactions to students' mistakes, orient may lead students to have higher or lower behavioral, emotional, cognitive, and agentic engagement.

In the relevant literature, in addition to studies concerning relationships between classroom goal structures and student engagement, some studies concerning the relationships among the each aspects of the student engagement have been existed. Moreover, while conceptualizing the student engagement researchers mentioned that aspects of student engagement (behavioral, emotional, cognitive, and agentic) are interrelated (Reeve & Tseng, 2011; Reeve, 2012; Reeve, 2013). Nevertheless, there is a gap in the relevant literature about how engagement aspects are related with each other (Li & Lerner, 2013). There has been no affirmed model in the literature to predict the interrelationships among all aspects of student engagement. On the other hand, some evidence concerning one or two pairs of associations such as behavioral- emotional, or emotional-cognitive have been existed (Li & Lerner, 2013). For example, Ladd et al., (2000) revealed that the kindergarten students who like school (emotional engagement) are likely to more involve in classroom activities cooperatively (behavioral engagement) during the school year. Skinner et al. (2008) also noted that theories defining how engagement aspects affect

each other over time are existing, but have not been fully tested or determined clearly yet. Therefore, they conducted a longitudinal study, which showed that there are significant links from behavior to emotion, and from emotion to behavior; however, the significant effects of emotional engagement on changes in behavioral engagement were stronger. Likewise, Li et al., (2010) also revealed that young adolescents' emotional engagement result in behavioral engagement. In addition, some studies based on motivational framework proposed that emotional engagement and cognitive engagement provide active participation and cause increases in behavioral engagement (Deci & Ryan 1985; Skinner et al. 2008). By this means, thoughts and emotions can awake or prevent the action (Heckhausen, 2000). Yet, there is no evidence concerning how cognitive engagement related to behavioral or emotional engagement, and therefore there is insufficient knowledge about whether deeper strategy use provides more intense attendance or more positive emotions toward school (Li & Lerner, 2013). Additionally, to investigate the interrelationships among the three components of student engagement (behavioral, emotional, and cognitive) over three years, Li and Lerner (2013) conducted a study. According to results, there is a bidirectional relationship between behavioral and emotional engagement. Moreover, behavioral engagement affects cognitive engagement; however, reverse of this link is not supported.

In sum, aforementioned studies revealed that students' perceptions of classroom goal structures are related their engagement to classroom activities. In addition to direct effects, relevant studies also revealed indirect effects of classroom goal structures on student engagement mediated through motivational constructs such as mastery goals and self- efficacy. There is evidence that students who perceive the classroom as autonomy supportive are likely to engage in activities behaviorally, emotionally, cognitively and agentically than other source of mastery oriented classroom goal structures (i.e., mastery evaluation and motivating tasks). Although there is relatively limited evidence in the literature, it can be deduced that mastery evaluation and motivating tasks are related to students' behavioral, emotional, and cognitive engagement. Among the engagement variables, cognitive

engagement is the most investigated component of engagement construct. Although, studies on the agentic engagement is relatively new and incomplete, the present study predicts that there is an relationship between perceived classroom goal structures and agentic engagement because, when students perceive the classroom as autonomy supportive, they can share their opinions about how to improve the classroom practices or express their preferences easily. Similarly, if students perceive that the evaluation practices focus on learning and fair, they may enthusiastically ask questions to improve their learning. Finally, if students perceive the tasks as interesting and motivating, they may recognize what they are interested in and they may explain these to their teacher.

Thus, in this study it is proposed that perceptions of classroom goal structures (autonomy support, motivating tasks and mastery evaluation) are linked to all aspects of student engagement. It is also proposed that there are correlations among each component of student engagement.

2.6 Student Engagement in relation to Self-Efficacy

According to Bandura's social cognitive theory, it remarked that self-efficacy is a key cognitive variable, which affects students' motivation and engagement. Pintrich and Linnenbrink (2003) also highlighted that despite the presence of many motivational constructs, self-efficacy is the key factor to support students' engagement and learning. Bandura (1993) claimed that students who having higher sense of self-efficacy concerning their learning and understanding have tendency to utilize more various metacognitive strategies. Moreover, these students set higher goals, prefer tasks that are more challenging, insist on against difficulties, use different learning strategies, and show greater effort to accomplish the tasks given (Bandura, 1986; Hoy, 2004). Similarly, Sungur's (2007) study concluded that self-efficacious students do not give up easily when they meet with difficulties or distractions. Additionally, it was revealed that higher levels of self-efficacy beliefs related with higher levels of cognitive engagement in terms of metacognitive strategy use that, in turn, explained higher levels of effort regulation. Moreover, students who

reported higher levels of metacognitive strategy use showed determination to complete the academic tasks successfully.

Numerous studies have established that higher level of self-efficacy have positive influences on learning, self-regulation, achievement, and diverse motivational outcomes associated with student engagement (e.g., students' choice of activities, effort, interests, and persistence) (Bandura, 1997; Pajares, 1996; Schunk & Pajares, 2009; Usher & Pajares, 2008). Additionally, Pintrich, Smith, Garcia, and McKeachie (1993) also stated that higher levels of self-efficacy were positively related to the cognitive and metacognitive strategy use and effort regulation. In other study, Buehl and Alexander (2001) reported that beliefs of students toward what they are able to do for completing academic tasks successfully are highly related with their metacognitive strategy use (e.g. planning, monitoring, and evaluating) and their effort and performance.

Schunk and Mullen (2012) stated that students who perceive themselves as efficacious are motivated and engaged in learning, so that their competences of learning are promoted. In other study, Bandura (1986) reported that these students tend to engage in academic tasks and activities, since they perceive themselves as capable of accomplishing. However, students who perceive themselves as less efficacious are likely to avoid the tasks and activities, since they believe that those are beyond their abilities. Likewise, Pajares (1996) concluded that lower level of self- efficacy about learning and performing well in school have negative influences on student motivation and engagement.

Walker, Greene, and Mansell (2006) conducted a study to investigate the relationships among identification with academics, intrinsic/extrinsic motivation, self-efficacy, and to cognitive engagement. Participants, between the ages of 18 and 22 years, were 191 volunteers from a university. Four questionnaires were used in the study. Intrinsic and extrinsic motivations were estimated with the Academic Motivation Scale (AMS) (Vallerand & Bissonnette, 1992). Seven items from the questionnaire (Greene & Miller, 1996) were used to measure self-efficacy. 16 items, based on Osborne (1997) scale, were used for identification with academics. Finally,

a scale from Greene and Miller (1996) was used to measure cognitive engagement. Path analysis demonstrated that cognitive engagement was positively predicted by self-efficacy, intrinsic motivation, and identification with academics. That is, self-efficacy, academic identification, and intrinsic motivation each contributed uniquely for predicting cognitive engagement resulting in deeper processing of information.

In addition, Warwick (2008) introduced the concept of mathematical self-efficacy, and he deliberated the relationships between student engagement and self-efficacy. He also examined how self-efficacy and student engagement can be increased by way of classroom practices and curriculum designs. Student engagement was assessed in terms of behavioral, cognitive and motivational. According to him, each aspect of student engagement was related to self-efficacy. He asserted that students having high self-efficacy are likely to persistence in completing a task, and thus their response to an encountered difficulty is to ask for help; whereas students with low self-efficacy fear that others will comment their difficulty as stupidity, and thus they are less likely to ask for help. In addition, he claimed that strong self-efficacy beliefs also supports cognitive engagement, since a student who believe that s/he can complete a task, try to use cognitive strategies in order to complete it. Conversely, if a student has doubt about his ability to complete a task, then s/he is less likely to insist on using cognitive and metacognitive strategies. Additionally, he purported that there are reciprocal links between self-efficacy and motivational engagement. Finally, researcher suggested that decreasing anxiety and increasing self-efficacy and engagement significantly promote student performance in mathematics.

In the same way, several studies have revealed that self-efficacy is associated with behavioral engagement with regards to students' attendance, effort, and insistence (Bandura, 1997), and their readiness to seek help (Ryan & Pintrich, 1997). When it comes to emotional engagement, as earlier studies suggested that emotions can affect the efficacy (Wright & Mischel, 1992), emotions can be affected by efficacy beliefs as well. For instance, higher levels of self-efficacy of students caused more positive emotions in academic contexts such as pride or happiness (Harter,

1992). On the other hand, negative emotions rise when students feel lack in meeting the goals or briefly low self-efficacy. The decrease in self-efficacy leads to more negative emotions such as anxiety and depression (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Harter, 1992; Meece, Wigfield, & Eccles, 1990; Pintrich & De Groot, 1990; Pintrich, Roeser, & De Groot, 1994). If anxiety increases, students may start to think that although the situation is important, they have no enough skills to do well. When it comes to cognitive engagement, Pintrich and Schrauben (1992) stated that in addition to the amount of effort, the quality of effort concerning processing strategies that are more deeply and a general cognitive engagement is strongly related to self-efficacy perceptions. For instance, Pintrich and De Groot (1990) revealed that junior high school students with high self-efficacy tended to use diverse cognitive, metacognitive or self-regulatory learning strategies. Other studies (Pintrich & Garcia, 1991; Pintrich, 1999; Wolters, Yu, & Pintrich, 1996; Wolters & Pintrich, 1998) supported these findings with the samples of both students in high school and college.

Aforementioned studies are consistent with Linnenbrink and Pintrich's (2003) findings: In their study, firstly self- efficacy and student engagement with respect to behavioral engagement, cognitive engagement, and motivational engagement were defined, and then a general framework for conceiving efficacy, engagement, and learning was represented. Finally, they discussed how self-efficacy may enable each aspect of student engagement and the learning in the classroom. They used the general framework below to discuss this issue (*Figure 2.2).*

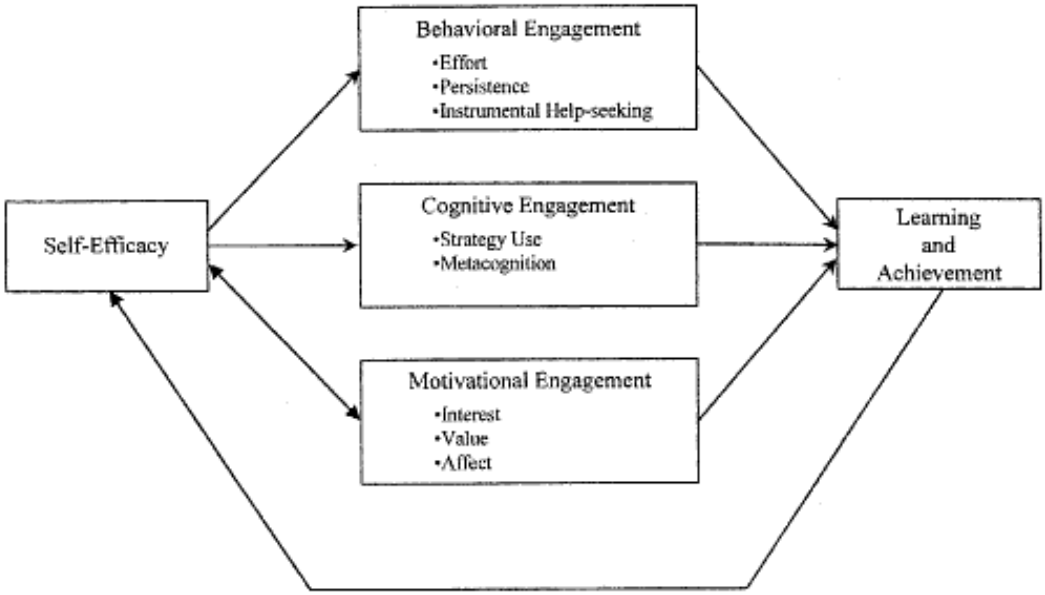

Figure 2.2 A framework for conceiving efficacy, engagement, and learning. Adapted from "The role of self-efficacy beliefs in student engagement and learning in the classroom." by Linnenbrink, E. A. and Pintrich, P.R., 2003, *Reading & Writing Quarterly, 19*, 119-137.

In addition to this model, Linnenbrink and Pintrich noted that, although it was not seen in the figure completely, each aspect of engagement alongside learning and achievement are mutually associated. Namely, self-efficacy can cause to more engagement and, in turn, to more learning and higher achievement; besides, the links also back to self-efficacy over time. Consequently, if a student engages more, and specifically learns more, then and s/he will show higher level of self-efficacy. When it comes to the aspects of student engagement, researchers concluded that students' self-efficacy beliefs and behavioral engagement positively related with each other. Students who have confidence in their capabilities are inclined to make effort hard, continue to do, and look for help. However, students who do not have confidence in their capabilities tended to give up easily when they meet with difficulties or get help to just complete the task, not to learn. When it comes to cognitive engagement, researchers asserted that high self-efficacy beliefs enhanced the use of deeper

processing strategies over time; for example, elaboration, organizational strategies, and metacognitive strategies. If students have confidence in their skills, they tend to strive to understand their tasks and think deeply about it. Moreover, these students project, observe, and adjust themselves, just as doing their school works. Finally, in terms of motivational engagement, researchers concluded that there are positive relationships between self-efficacy and adaptive motivational beliefs, interest, value, as well as positive affective reactions. However, there are negative relationships between self-efficacy and negative emotions. Researchers also stated that these links are reciprocally related to each other. Therefore, they suggested that if students find the tasks and activities as difficult to deal with but not too difficult, their efficacy level will raise. Consequently, interest and value may also rise, since self- efficacy increases.

In addition to relevant literature concerning relationships between self-efficacy and student engagement in terms of behavioral, emotional, and cognitive, a link between self-efficacy and agentic engagement was also proposed in the present study. The reason of this that students with high level of self-efficacy is expected to take an active role in learning process, and ask questions instead of listening to teacher quiescently, and need new and different resources, etc. These behaviors are coincided with students' agentic engagement in the classroom. Moreover, a recent study by Reeve and Lee (2014) has supported this hypothesis. In his 3-wave longitudinal study, the relationships among students' engagement (behavioral, emotional, cognitive, and agentic aspects) and motivation (psychological need satisfaction, self-efficacy, and mastery goals) and their achievement scores were examined. A total of 313 (213 females, 100 males) Korean high school students were participated in the study. He hypothesize that "what enhances motivation would be extra effort, unexpectedly positive emotion, deeper thinking, and more proactive contributions (i.e., greater behavioral, emotional, cognitive, and agentic engagement)" (p.536). The findings of structural equation modeling analysis supported these interactions between engagement and changes in students' classroom motivations. Results showed that changes in engagement predicted alterations in

students' psychological need of satisfaction and self-efficacy, but contrarily not for mastery goals. In addition, changes in engagement also predicted achievement. He pointed out that changes in motivation come before the changes in engagement. High level of interest and self-efficacy can be considered as precursor of later obtaining of students' behavioral engagement such as effort, emotional engagement such as enthusiasm, cognitive engagement such as strategic thinking, and agentic engagement such as proactive contributions into the learning environment

In sum, the relevant literature implies that self-efficacy is positively linked to student engagement in terms of behavioral, emotional, cognitive, and agentic. Therefore, in the present study, it was hypothesized that students' self-efficacy beliefs are corresponded to each aspect of their engagement (behavioral, emotional, cognitive, and agentic).

2.7 Science Achievement in relation to Self-Efficacy

Social learning theorists stated that one's sense of self-efficacy may affect many aspects of behavior which are significant for learning. These aspects can involve selection of activities, persistence, and effort, (Bandura, 1977, 1982, 1989; Schunk, 1989a, 1989b; Zimmerman, Bandura, & Martinez-Pons, 1992). Indeed, considerable research over the past decades has shown that self-efficacy is one of the predictors of academic achievement (Andrew, 1998; Bandura, 1997; Bong, 2008; Chemers, Hu, & Garcia, 2001; Greene & Miller, 1996; Miller, et al., 1996; Multon, Brown, & Lent, 1991; Pajares, 1996; Pintrich & DeGroot, 1990; Silver, Smith, & Greene, 2001) and significantly linked to students' motivation and self-regulation (Bandura, 1997; Pajares, 1997; Schunk & Pajares, 2009; Stajkovic & Luthans, 1998).

For example, Schunk's (1981) study revealed that self-efficacy was directly related to students' achievement and persistence in mathematics. Moreover, Multon, Brown, and Lent (1991) showed that self-efficacy explained 14% of the variance in academic performance, whereas Stajkovic and Luthans (1998) found that percentage

as 28%. It was also stated in the study of Greene et al. (2004) that indicators of self-efficacy are positively related with adaptive student motivation, and grades.

Through path analysis, Pajares and Miller (1994) demonstrated that perceived self-efficacy is one of the significant predictor of academic achievement. In addition, they suggested that self-efficacy is related to engagement with learning and thus to outcome measures of learning. Similarly, in their other study (Pajares & Miller, 1995) the value of self-efficacy to explain different aspects of academic performance was emphasized. Moreover, numerous studies of Schunk and colleagues showed that cognitive skills, modeling, feedback, and goal-setting have effects on self-efficacy beliefs, which then influence performance (Pajares, 1996). Students' beliefs affected quantity of their efforts and perseverance, and eventually their achievement (Pajares, 1996).

In addition, Pintrich and De Groot (1990) conducted a correlational study to investigate the links among motivational beliefs (Intrinsic value, self-efficacy, test anxiety), self-regulated learning (cognitive strategy use, and self-regulatory strategies), and academic performance. The participants of the study were 173 (100 girls, 73 boys) seventh grade students. Motivated Strategies for Learning Questionnaire (MSLQ) was used in their study. Results indicated that self-efficacy and intrinsic value were positively associated with cognitive strategy use and self-regulation. Among the variables of interest, test anxiety, self-regulation, and self-efficacy were found to be the best predictors of achievement.

Moreover, Multon, Brown, and Lent (1991) conducted a meta-analysis to examine the linkage between self-efficacy beliefs and academic performance. The effect size estimates showed that across diverse types of student samples, criterion measures, and designs, efficacy beliefs were related to students' academic performance ($r = .38$) and accounted for roughly 14% of the variance in academic performance, and roughly 12% of the variance in their academic persistence. Thus, the research revealed that self-efficacy, academic performance, and persistence for a number of disciplines were positively and significantly related with each other.

Researchers also stated that the effectiveness of self-efficacy on performance outcomes are related to specific characteristics of the studies, particularly it depends on four factors. The first was the time during self-efficacy and performance were estimated. Namely, a higher association between self-efficacy beliefs and performance was observed in the experimental studies that administered the measurements after treatment. The second factor was students' achievement status. This result showed that there is a stronger relationship for low-achieving students. A third one was age variable indicating a stronger relationship for older students. The last one was the type of performance measure used by researchers. They found stronger relationship between self-efficacy and basic skills.

Relevant literature also revealed the importance of self-efficacy in students' achievement specifically in the science domain. For example, Baldwin, Ebert-May, and Burns (1999) stated that self-efficacy plays important role in learning some difficult courses such as biology and other sciences, since students have fear and anxiety at different levels in such courses. On their empirical study, Britner and Pajares (2006) examined the extent to which sources of self-efficacy (mastery experiences, social persuasions, physiological arousal, and vicarious experiences) predict science self-efficacy of the middle school students' beliefs and achievement in science. In addition, extent to which science self-efficacy predict science achievement was examined. The gender difference in science self-efficacy was also investigated. Bandura's (1986) social cognitive theory was utilized as theoretical framework in the study. A total of 319 public middle school students in grades between 5 and 8 were participated in the study. According to the multiple regression analyses results, science grade was predicted strongly by science self-efficacy. Findings were also consistent with Bandura's (1997) hypothesized sources of self-efficacy, since each of the sources was significantly related with each other, with science self-efficacy, and with science achievement. Moreover, it is revealed that girls had stronger science self-efficacy beliefs as compared to boys.

Zusho, Pintrich, and Coppola (2003) examined (a) how students' motivation and use of cognitive and self-regulatory strategies altered over time, and (b) extent to

which these motivational and cognitive components predicted students' achievement in chemistry. 458 students (243 female, 215 male) were the sample of the study. Over the course of the semester, students' motivation and strategy use were evaluated at three time points by self-report instruments. Motivational measures involved self-efficacy, task value, mastery goal orientation, performance goal orientation, interest, and anxiety. Cognitive measures involved rehearsal, organization, elaboration, and metacognition. Students' course performance was measured by their grades that collected at the end of the semester. Repeated-measures analyses of variance (ANOVAs) were conducted to test the first question. Results showed that students' level of motivation and use of practicing and detailing strategies decrease over time; whereas, students' use of organizational and self-regulatory strategies raised up as time passes. In addition, in order to investigate the second question, few analyses were administered. According to the results, self-efficacy was the best predictor of chemistry achievement. In fact, students' self-efficacy and task value predicted better the latter performance than their prior achievement. Findings revealed that students possessing adaptive motivational beliefs such as ultimate levels of self-efficacy and task value, tended to get higher scores in chemistry.

In addition, Mason, Boscolo, Tornatora, and Ranconi (2013) examined how cognitive and motivational characteristics of three different grade level students contribute to science achievement. The study was conducted with 213 fifth grades, 202 eighth grades, and 281 eleventh grades, totally 696 students across Italia. To collect data, the researchers utilized 26-item questionnaire to measure science epistemic beliefs, 21-item questionnaire to assess three goal orientations, 6-item questionnaire to measure science self-concept, and 6-item questionnaire to assess self-efficacy. Moreover, students' midterm grade in science course to measure science achievement, and open-ended, multiple choices, true-false questions to measure science knowledge were also used. A structural equation modelling was conducted to observe significant paths in the hypothesized model. According to results, the science achievements were found significantly associated with self-

efficacy (β = 0.18, t = 2.49 for fifth grade students, β = 0.34, t = 4.66 86 for eighth grade) and self-concept (β = 0.27, t = 3.71 fifth grade, β = 0.22, t = 2.86 for eighth grade). However, there was no significant relation between self-efficacy and science achievement in eleventh grade students.

In other study, Areepattamannil, Freeman, and Klinger (2011) investigated the predictive effects of students' motivation for learning science and motivational beliefs, and science instructional practices on science achievement. Data were gathered from a sample who participated to the PISA 2006 that contained 13,985 students (15 years old) from Canada. Students' motivation for learning science and motivational beliefs were assessed in terms of delectation of science, general affinity in science, instrumental motivation for learning science and future-focused motivation for learn science; and self-efficacy and self-concept in science. In addition, instructional practices assessed in terms of science teaching including a center on specific applications, utilizing student inquiries, involving active participation activities, and interactive science teaching. Additionally, students' demographics were used as control variables. Hierarchical linear modeling (HLM) analyses were conducted. Results showed that motivational beliefs and enjoying science significantly and positively affected to science achievement. Self-efficacy and self-concept in science showed a quite strong and positive association with science achievement when it compared to other predictors. Areepattamannil et al. suggested that students having higher levels of confidence in performing science-related tasks and having a better perception for their ability in order to learn science are more likely to get higher science achievement.

Apparently, aforementioned literature suggests that self- efficacy is one of the factors that affect academic achievement. According to Bong (2008) self-efficacy continually predicts academic achievement because of its influences on effort and persistence, since students with higher level of self-efficacy are tend to make an effort and insist longer when they face a difficulty (Schunk & Zimmerman, 2006). Self-efficacy beliefs also make a contribution to the academic performance as they affect mental processes, motivation, and behavior (Bandura, 1997). Accordingly, in

the present study, it is hypothesized that there is a positive direct relationship between students' self-efficacy and achievement in science.

2.8 Science Achievement in relation to Student Engagement

Many researches define engagement as a way of enhancing low levels of achievement in schools (Fredricks et al., 2004; Marks, 2000), and according to Patrick et al. (2007) being successful or not in school depends on range of students' engagement to classroom learning activities. Marks (2000) indicated that engaged students are more inclined to understand, to learn and to find the learning activities satisfaction, to carry out the things to do for graduation, and to follow higher education. According to Reschly et al., (2008), studies concerning student engagement have increased, since the construct is related to student academic outcomes and graduation rates. As stated in Reschly et al., (2008), considerable research has concluded that there are strong associations between cognitive and affective engagement and indicators of academic achievement (Appleton et al., 2006; Appleton et al., 2008; Archambault et al., 2009; Fan & Williams, 2010; Furlong & Christenson, 2008; Reschly et al., 2008).

For example, Mo (2008) conducted a study in order to investigate the linkage among science achievement, student engagement, and opportunity to learn. Student engagement was considered as three aspects, which were emotional, behavioral, and cognitive engagement. Mo studied with 8544 students at the eighth grade level in United States. Hierarchical linear models and structural equation modeling were used in this study. It was concluded that both cognitive engagement and behavioral engagement affects science achievement directly and indirectly, while emotional engagement had only direct effect on the science achievement. While the relation of science achievement with emotional and cognitive engagement was found to be positive, the link between behavioral engagement and science achievement was negative. Moreover, a strong relationship was found between students' emotional engagement and cognitive engagement. In the study, behavioral engagement was assessed in terms of scientific investigation activities, and connecting science to

society. When these dimensions were considered separately, while involving in scientific investigation activities was found to be positively associated with science achievement, connecting science to society was found to be negatively linked to science achievement. Overall, Mo's study revealed significant associations between engagement and science achievement.

In a longitudinal study, Avenilla (2003) investigated the relationships among high school students' emotional engagement, behavioral engagement, and academic performance. He also examined the links between students' emotional and behavioral school engagement across years. The results of hierarchical linear models, which used to test the hypotheses, indicated that emotional and behavioral engagement were significantly related with academic outcomes (i.e., GPA and standardized test scores in reading and math) across 8^{th}, 10^{th}, and 12^{th} grade. Additionally, behavioral engagement had a stronger relation with classroom performance and test scores than emotional engagement, specifically, in 8^{th} and 10^{th} grade. Second part of the results supported not much evidence indicating that emotional and behavioral engagement was related with each other. Moreover, emotional and behavioral school engagement was predicted by previous academic performance consistently. In other words, researcher revealed that earlier levels of academic performance conduced to later levels of engagement significantly.

In a more recent study, Sedaghat, Abedin, Hejazi, and Hassanabadi (2011) examined the relationships among perceived ability, perceived instrumentality, achievement goals, cognitive engagement, and academic achievement. 1371 (708 male and 663 female) high school students from Tehran were participated in the study. Researchers assessed student's perceived ability and achievement goals in terms of learning, performance-approach, performance-avoidance, and future goals/perceived instrumentality by Approaches to Learning (ATL) scale (Miller, DeBacker, & Green, 1999). To assess students' cognitive engagement (shallow and deep cognitive learning strategies) cognitive scale of the MSLQ (Pintrich et al., 1993) was used. To examine the proposed model, structure equation model was conducted. According to results, perceived ability (β= 0.20, t= 4.36) and deep

strategy use (β = 0.10, t= 2.10) predicted achievement significantly and positively, whereas shallow strategy (β = -0.15, t=- 3.53) and performance goal (β = -0.20, t= -5.6) predicted it significantly and negatively. Results supported that academic achievement was predicted by cognitive strategy use as an indicator of cognitive engagement directly, and by perceived ability and performance goals directly as well as indirectly.

In a separate study, Miller, Greene, Montalvo, Ravindran, and Nichols (1996) conducted an exploratory study, which consists of two stages. 297 high school math students completed several self-report measures of motivation, perceived ability, and engagement (self-regulatory activities, use of deep or shallow strategies, effort and persistence) and then researchers investigated the extent to which scores predicted achievement. Multiple regression analysis showed that achievement was predicted by three measures of cognitive engagement (for effort β = .26, for persistence β = .19, for self-regulation β = .19) and these variables explained 24% of the variance in achievement. However, the results of second study, which replicated and extended the initial findings, were not consistent with initial results. Accordingly, significant predictors for achievement were the persistence (β = .25) and perceived ability (β = .38) and these explained for 28% of the variance in achievement.

Additionally, Reeve and Tseng (2011) carried out a study with the participation of 369 high school students (10^{th}, 11^{th}, and 12^{th} grade) from Taiwan. There were three purposes in this study. The first one was to confirm a new measure of agentic engagement. The second one was to determine whether agentic engagement is a distinct component of engagement or not. The third one was to question whether agentic engagement was a significant educational construct or not. Engagement questionnaire (EQ) was developed by the researchers to measure four aspects of student engagement (behavioral, emotional, cognitive and agentic). Hypotheses were tested with correlations, multiple regression, structural equation modeling. According to results, agentic engagement (1) correlated with motivation and other aspects of engagement and achievement. (2) was statistically different from the other aspects of student engagement. (3) predicted student achievement, although

excluding the achievement variance that could be affected from the other aspects of engagement. Reeve and Tseng concluded that agency should be added as a new aspect of engagement, since it is the one thing that could explain the variance in students' achievement, and it completes the description of it fills the gap of the description of student engagement.

Recently, Reeve (2013) conducted a study, which was 3-wave longitudinal research design. In the first part of the study, he introduced the concept of "agentic engagement" and designed the Agentic Engagement Scale (AES). In the second part, construct and predictive validity of the scale was tested, and the links between each aspect of student engagement and achievement were examined. Finally, the question of how autonomy supportive learning environments can be created by agentically engaged students was examined in the third part. A total of 248 (132 female, 116 male) college students participated in the second study. Academic Self-Regulation Questionnaire (ASRQ; Ryan & Connell, 1989) was used to assess students' class-specific motivation. Engagement questionnaire (Reeve & Tseng, 2011) was used to assess students' behavioral, emotional, and cognitive engagement, and AES to assess agentic engagement. Students' final semester grades were used to assess their achievement. Hierarchical linear modeling was conducted. Results demonstrated that AES is a reliable and valid scale. Moreover, the model of behavioral, emotional, agentic and cognitive engagement explained 25% of the variance in achievement. However, the links from cognitive (β = -.06) and emotional (β = .07) engagement to achievement was not supported, while the links from behavioral (β = .28) and agentic engagement (β = .25) to achievement was supported. Consequently, the results of these studies revealed that how agentic engagement acts as a proactive, intentional, collaborative, and constructive student-initiated pathway to higher academic achievement (Study 2) and motivational support (Study 3).

Based on the abovementioned literature, current study proposes that there is a positive link between student engagement with respect to cognitive, behavioral, emotional, and agentic engagement and science achievement.

2.9 Summary

Consequently, abovementioned literature demonstrates that students' perceptions of classroom goal structures are directly linked to their self- efficacy and engagement. More specifically, the findings showed that in classrooms where learning and understanding are encouraged, learning task are motivating, and student autonomy is emphasized, students have tendency to possess stronger self-efficacy beliefs and higher levels of engagement. Furthermore, related literature suggested that self-efficacy and engagement are linked to better academic performance. These results were also relevant to science domain. Thus, considering these findings, current study proposed positive relationships between students' perception of classroom goal structures and their self-efficacy and engagement in science. It was also hypothesized that there is a positive relationship between students' science achievement and their self-efficacy and engagement. Moreover, the existing literature has demonstrated direct links between students' self-efficacy beliefs and their behavioral, emotional, and cognitive engagement. On the basis of related literature, it was also hypothesized that self-efficacy is related to agentic engagement in this study. Consequently, in this study, positive associations are proposed between science self-efficacy and behavioral, emotional, cognitive and agentic engagement. Additionally, in the current study, reciprocal relations were hypothesized among each aspect of student engagement based on the relevant literature.

CHAPTER 3

METHODOLOGY

The following chapter aims to provide brief information about research design, population and sample of the study, instruments of the study, procedure, data analysis, threats to internal and external validity, and assumptions and limitations of the study.

3.1 Research Design

In this study, the relationships among 7th students' perceptions of classroom goal structures, engagement, self-efficacy, and science achievement were investigated. Perceptions of classroom goal structures were examined with respect to perceived motivating tasks, autonomy support and mastery evaluations; and engagement was examined in four dimensions namely, behavioral engagement, emotional engagement, cognitive engagement and agentic engagement. Overall, the study is a quantitative research, which relies on data from students' self-reports, and design of the study could be described as a correlational research, which examines the possible relationships among two or more variables (Fraenkel & Wallen, 2006).

3.2 Population and Sample

This study's target population was determined as all 7th grade public elementary school students in Gaziantep province of Turkey. Because accessing the target population was not feasible, all seventh grade students in public schools of Şehitkamil and Şahinbey districts of Gaziantep were described as the accessible population. The results of this study were to be generalized to this population.

In terms of sampling method, cluster random sampling and convenience sampling was determined to reach the sample of this study. During the sampling process, firstly Şehitkamil and Şahinbey districts were chosen by convenience sampling method, considering transportation, money, and administrative restrictions. Then, nine different schools were randomly selected as clusters from these districts.

Table 3.1 exhibits information concerning the number of schools and students within each school participated in this study.

Table 3.1 Frequency and Percentage of Students

Number of Schools	Frequency (f)	Percentage (%)
1	33	4.4
2	66	8.9
3	50	6.7
4	155	20.8
5	108	14.5
6	95	12.8
7	88	11.8
8	32	4.3
9	117	15.7
Total	744	100.00

As shown in Table 3.1, sample of the study consisted of 744 seventh grade students from nine public schools. All these students voluntarily participated in the study. Data were gathered from this sample in the spring semester of 2012-2013 academic year.

Of 744 participants, 403 (54.2 %) were girls and 337 (45.3 %) boys. Their mean age was 13.08 (SD= .39). The mean of their science course grades in the last semester was 3.74 (SD= .99).

Table 3.2 provides detailed information about participants' background characteristics. Students' background characteristics were examined in terms of parents' employment status, their educational level, number of siblings, frequency of buying a newspaper every day, owning of a separate study room, owning of a computer and an internet connection in house, and number of books in home.

As shown in the table, although most of the students' mothers had a high school or lower degree (83.9%), more than half of the students' fathers complete high school or higher educational level (58.9%). While the students' mothers were mostly unemployed (75.0%), the great number of the students' fathers were employed (87.5%). Over the half of the participants were coming from families with 2 or 3 children (58.9%). The majority of the students reported that they sometimes or always buy newspaper (86.9%). Moreover, majority of the students had own room to study (82. 8%), a computer (84.8 %), and

internet access (71.1%) in their homes. However, the number of books in their homes was inadequate: only 17.2 % of the participants had books more than 200 in their homes.

Table 3.2 Socio-economic Status of the Sample

Educational Level of Mother	f	%
Illiterate	31	4.2
Primary School	213	28.6
Secondary School	153	20.6
High School	227	30.5
University	95	12.8
Ms	20	2.7
PhD	0	0
Missing	5	.7
Educational Level of Father		
Illiterate	5	.7
Primary School	141	19.0
Secondary School	150	20.2
High School	215	28.9
University	179	24.1
Ms	42	5.6
PhD	2	.3
Missing	10	1.3
Employment Status of Mother		
Employed	155	20.8
Unemployed	558	75.0
Not a regular work	15	2.0
Retired	13	1.7
Missing	3	.4
Employment Status of Father		
Employed	651	87.5
Unemployed	19	2.6
Not a regular work	26	3.5
Retired	42	5.6
Missing	6	.8
Number of Siblings		
None	20	2.7
1	122	16.4
2	226	30.4
3	212	28.5
4 and over	161	21.6
Missing	3	.4
Buying Daily Newspaper		
Never	95	12.8

Table 3.2 (continued)

Sometimes	472	63.4
Always	175	23.5
Missing	2	.3
Have a Study Room		
Yes	616	82.8
No	127	17.1
Missing	1	.1
Have a Computer at Home		
Yes	631	84.8
No	112	15.1
Missing	1	.1
Have an Internet Connection		
Yes	529	71.1
No	215	28.9
Missing	0	0
Number of Books at Home		
Any or few (0-10)	69	9.3
11-25	198	26.6
26-100	242	32.5
101-200	106	14.2
Over 200	128	17.2
Missing	1	.1

3.3 Data Collection Instruments

The data were collected using five instruments namely, the Demographical Questionnaire (see Appendix A), Survey of Classroom Goals Structures (see Appendix B), Self-Efficacy For Learning and Performance Sub-Scale of Motivated Strategies for Learning Questionnaire (MSLQ) (see Appendix C), Engagement Questionnaire (see Appendix D), and Science Achievement Test (see Appendix E)

3.3.1 The Demographical Questionnaire

The demographical questionnaire included 15 items assessing participants' background namely, gender, age, last semester science grade, and socio-economic status. Information about number of siblings, participants' education level, participants' job status, frequency of getting a daily newspaper, number of books at

home, owning of a room to study, presence of a computer, and internet connection at home were considered as indicators of socio-economic status.

3.3.2 Survey of Classroom Goals Structures (SCGQ)

The SCGQ (Blackburn, 1998; Greene, Miller, Crowson, Duke, & Akey, 2004) was used to assess students' perceptions of classroom goal structures in terms of motivating tasks (e.g. "In this class activities and assignments are interesting"), autonomy support (e.g. "In this class the teacher wants us to take responsibility for our learning"), and mastery evaluation (e.g. The tests in this class coincide with what we learned in class). Students rate themselves on a four point Likert scale ranging from strongly agree to strongly disagree (see Appendix B). It was developed based on Ames' (1992) TARGET acronym, which is a model of classroom structures (tasks, autonomy, evaluation, recognition, grouping, and time). The instrument was initially validated for undergraduate education majors by Blackburn (1998). Blackburn's study revealed a 3-factor structure. Later, Greene et al. (2004) conducted confirmatory factor analysis to replicate the factor structure of the measurement using data from high school students. Greene et al. deleted the items, which did not contribute at least 10% to the explanation of variance. Accordingly, they defined the subscales of motivating tasks consisting 10 items, autonomy support consisting 5 items, and mastery evaluation consisting 11 items. The coefficient alpha values for this revised version were found to be .85 for motivating tasks, .65 for autonomy support, and .80 for mastery evaluation.

The translation and adaptation into Turkish of revised version of SCGQ was made by Sungur and Gungoren (2009). During its adaptation, the researchers conducted a pilot study with 390 elementary school students. Students completed 26 items in three sub-scales namely, motivating tasks *(n = 10),* autonomy support *(n = 5), and* mastery evaluation *(n = 11).* For validation of the factor structure of the instrument for Turkish elementary students, confirmatory factor analyses were conducted. The authors reported four fit indices namely, Goodness of fit (GFI), Standardized Root Mean Square Residuals (SRMR), Comparative Fit Index (CFI), and

the chi-square estimates. Of these fit indexes reported, two of the lied in optimum range (GFI > .90, and SRMR < .10). While CFI was found to be above .90 for motivating tasks, and autonomy support sub-scales, which indicates a good fit, it was found to be below .90 for mastery evaluation sub-scale. Additionally, the chi-square estimates for all subscales were significant, and one reason for this might be due to large size of sample (Tabachnick & Fidell, 1996). Generally, the model has a good fit when considered the fit indices. In addition, Cronbach's alpha estimates indicated that internal consistencies were acceptable for all of the subscales. The coefficient alpha values were estimated as.71 for motivating tasks, .70 for autonomy support, and .74 for mastery evaluation. These values were close to that of the original version.

In order to validate the factor structure for the current study, confirmatory factor analysis and reliability analyses were carried out. Before these analyses, negatively worded items were reverse coded. In this way, higher scores on the sub-scales indicated that students' perceive class work as motivating, meaningful and autonomy supporting; and perceive the evaluation practices as fair, and focus on their learning and effort.

Confirmatory factor analysis (CFA) was conducted by utilizing LISREL 8.80. In order to state a good fit of the model to the data, GFI and CFI values should be greater than .90, and RMSEA and SRMR values should be less than .10 (Kline, 2005). According to results, fit indices were reasonable (GFI = .92, CFI = .98, RMSEA = .05, SRMR = .04). However, when lambda-x estimates were examined, it was found that corresponding values were not acceptable for the negatively worded items (e.g. .13 for item 4; - .02 for item 26)

After this process, reliability analyses were conducted. When item-total correlations were examined for each item, it was also seen that there is a problem with the negatively worded items, which also showed low correlations with scale in CFA. There were three negatively worded items (item 4, 8 and 26) in the mastery evaluation subscale, and one more in the motivating tasks (item 20) subscale, and presence of these items resulted in a low Cronbach alpha coefficient. Deletion of these items led to increase in coefficient values from .75 to .85 for motivating tasks, and from .62 to .74

for mastery evaluation (see Table 3.4). This finding can be due to the age range of participants: There are some studies which reports that elementary school students have problems with understanding negatively worded items, and they are not able to reflect their real attitudes when they encounter with such negative statements (Benson & Hocevar, 1985; Marsh, 1984). Some other studies (Andrich, 1983; Campbell & Grissom, 1979; Simpson, Rentz, & Shrum, 1976) have concluded that phrasing affects findings on the attitude levels from different attitudinal surveys. While these studies were conducted with high school and college students, Marsh (1984), and Benson and Hocevar (1985) agreed that elementary school students experience difficulty in indicating agreement by disagreeing with a negatively worded item. Similarly, it is difficult for them to indicate disagreement by agreeing with a negative statement. Thus, considering all these literature on the use of negatively worded items with elementary students, it was decided to remove the negatively worded items from the SCGQ for the current study.

After deletion of the items, the SCGQ consisted of 22 items: motivating tasks (9 items), autonomy support (5 items), and mastery evaluation (8 items). In order to validate the factor structure of this final form of the scale, CFA was conducted again, and the result of CFA supported the three factor structure of the instrument, and it showed a good model to data fit (GFI = .95, CFI = .98, RMSEA = .04, SRMR = .03). Additionally, Table 3.3 presents, the lambda-ksi estimates of the sub-scales.

Table 3.3 Lambda-Ksi Estimates for the SCGQ Sub-scales.

Subscale	Indicator	Present study LX estimates
Motivating Tasks	q1	.52
	q2	.65
	q7	.22
	q12	.48
	q13	.66
	q16	.68
	q17	.47
	q24	.23
	q25	.53
Autonomy Support	q3	.68
	q9	.49
	q14	.65
	q15	.65
	q21	.66
Mastery Evaluation	q5	.71
	q6	.48
	q10	.57
	q11	.68
	q18	.67
	q19	.64
	q22	.60
	q23	.70

Moreover, reliability analysis conducted again, and reliability coefficients of motivating tasks (α = .85), mastery evaluation (α = .74), and autonomy support (α = .65) suggested that the final instrument had adequate internal consistency (see Table 3.4).

Table 3.4 Subscales and Reliability Coefficients of SCGQ

Subscales	Description	Sample item	Cronbach alphas (Greene et al.,2004)	Cronbach alphas (Sungur& Gungoren, 2009)	Cronbach alphas (Current Study-Before Item Deletion)	Cronbach alphas (Current Study-After Item Deletion)
Motivating Tasks	"The extent to which students find the classrooms task to be meaningful, relevant, and interesting to them."	In this class activities and assignments are interesting.	.85	.71	.75	.85
Autonomy Support	"The interpersonal behaviors which teachers supply students during instruction to identify, build, and raise their inner motivational resources."	Students get to choose projects/topics they want to work on in this class.	.65	.70	.65	.65
Mastery Evaluation	"The extent to which students find that the evaluation and recognition practices are fair, focus on learning, and de-emphasize social comparisons and competition."	The tests in this class match what we learned in class.	.80	.74	.62	.74

3.3.3 Engagement Questionnaire (EQ)

This instrument, developed by Reeve and Tseng (2011), was used to assess student engagement in terms of behavioral, emotional, cognitive and agentic engagement (see Appendix D). It is a seven-point-Likert type self-report instrument, and it has 22 items in four sub-scales. During its development, items from different instruments were utilized, and it was applied to 369 high school students. To assess behavioral engagement, five-item measure was obtained from Miserandino's (1996) task involvement questionnaire, and this measure showed high reliability ($\alpha = .94$). To assess emotional engagement, four items were selected from Wellborn's (1991) conceptualization of emotional engagement, and this measure showed sufficient reliability ($\alpha = .78$). To assess cognitive engagement, Wolters' (2004) learning strategies questionnaire was revised and new combined eight-item scale demonstrated high reliability ($\alpha = .88$). Finally, to assess agentic engagement five-item measure was developed by Reeve and Tseng (2011). This measure showed sufficient reliability ($\alpha = .82$) (see table 3.5).

Table 3.5 Subscale Reliability Coefficients of Engagement Questionnaire

Subscale	Description	Sample item	Number of Items	Cronbach alphas (Reeve & Tseng, 2011)	Cronbach alphas (Pilot Study)	Cronbach alphas (Current Study)
Agentic Engagement	"Students' constructive contribution into the flow of the instruction they receive."	I offer suggestions about how to make the class better	5	.82	.82	.82
Behavioral Engagement	Participation in academic, social or out of curriculum activities, and achieving positive academic outcomes.	I listen carefully in class	5	.94	.92	.88
Cognitive Engagement	Consideration and willingness to use the necessary effort for understanding learning, complex ideas and complicated skills.	When I study, I try to connect what I am learning with my own experiences	8	.88	.86	.86
Emotional Engagement	Students' both positive and negative reactions to their teachers, classmates, tasks, and school.	When I am in class, I feel curious about what we are learning	4	.78	.84	.83

In order to validate the instrument for Turkish elementary school students, it was translated and adapted into Turkish by the researcher. During its adaptation for science classes, "in science class" statement was added to the items in scale. For example, in the behavioral engagement sub-scale, there was an item “I listen carefully in class”, and this item was edited as “I listen carefully in science classes”. An instructor from science education department at a large public university examined the translated instrument for content validity. She also checked the quality of items in terms of clearness, sentence structure, and comprehensiveness. After this process, support from Academic Writing Center was received for the grammar structure of the translation. In the directions of these expert opinions, the instrument was revised. In order to determine if the instrument is comprehensible enough for 7^{th} grade students or not, it was read by five seventh grade students. Some small changes were made on some words. In addition, as different from the original version of EQ, 4-point-likert scale was used in the current study based on the students’ comments. After that, the final form of the questionnaire was administered to 153 seventh grade public elementary school students (68 boys and 85 girls) in Gaziantep in 2012-2013 spring semester. With data obtained from this pilot study, confirmatory factor analysis (CFA) using LISREL 8.80 was conducted to validate factor structure for the pilot study. According to Kline (2005), GFI and CFI values should be greater than .90, and RMSEA and SRMR values should be less than .10. The result of CFA indicated a good fit (GFI = .85, CFI = .98, RMSEA = .05, SRMR = .05). Table 3.6 presents Lambda-Ksi estimates for the subscales of EQ.

Table 3.6 Lambda-Ksi Estimates for EQ Sub-scales (pilot study)

Subscale	Indicator	Pilot study LX estimates
Agentic Engagement	q1	.83
	q2	.63
	q3	.69
	q4	.64
	q5	.69
Behavioral Engagement	q6	.86
	q7	.77
	q8	.84
	q9	.73
	q10	.86
Cognitive Engagement	q15	.67
	q16	.67
	q17	.66
	q18	.75
	q19	.75
	q20	.62
	q21	.65
	q22	.54
Emotional Engagement	q11	.76
	q12	.74
	q13	.73
	q14	.72

In addition, Cronbach's alpha coefficients for pilot study were computed as a measure of internal consistencies of the sub-scales. It was found to be .82 for agentic engagement, .92 for behavioral engagement, .84 for emotional engagement, and .86 for cognitive engagement (see table 3.5). These values were preferable (above .8) for all sub-scales.

Consistent with the results of pilot study, CFA results of the main study showed a good model to data fit (GFI = .93, CFI = .99, RMSEA = .05, SRMR = .04). Table 3.7 displays Lambda-Ksi estimates of the EQ subscales for the main study.

Table 3.7 Lambda-Ksi Estimates for EQ Sub-scales (main study)

Subscale	Indicator	Present study LX estimates
Agentic Engagement	q1	.67
	q2	.68
	q3	.72
	q4	.73
	q5	.67
Behavioral Engagement	q6	.81
	q7	.70
	q8	.80
	q9	.72
	q10	.80
Cognitive Engagement	q15	.68
	q16	.69
	q17	.67
	q18	.68
	q19	.66
	q20	.66
	q21	.67
	q22	.62
Emotional Engagement	q11	.78
	q12	.73
	q13	.78
	q14	.65

In terms of reliability analysis in the main study, the Cronbach alpha values were found to be .82 for agentic engagement, .88 for behavioral engagement, .86 for cognitive engagement and .83 for emotional engagement. These reliability values were close to those of the original version and the pilot study (see table 3.5).

3.3.4 Motivated Strategies for Learning Questionnaire (MSLQ)

The MSLQ, developed by Pintrich, Smith, Garcia, and McKeachie (1991), was administered to assess students' self-efficacy beliefs (see Appendix C). It is a seven-point (1 = not at all true of me to 7 = very true of me) Likert type self-report instrument with two main parts: motivation part (31 items in 6 sub-scales) and learning strategies part (50 items in 9 sub-scales). Subscales of the motivation section

are intrinsic goal orientation, extrinsic goal orientation, control of learning beliefs, task value, self -efficacy for learning and performance, and test anxiety. Subscales of the learning section are rehearsal, elaboration, critical thinking, organization, metacognitive and self-regulation, time and study environment, effort regulation, help seeking, and peer learning. For this study, only one of these sub-scales (self-efficacy for learning and performance) from the motivation section of the MSLQ was used. This sub-scale consists of 8 items. Higher scores on this sub-scale represent higher levels of perceived confidence in performing a given task. Pintrich et al. (1991) administered the instrument to 380 college students and computed alpha coefficients for each subscale. It was found as .93 for self-efficacy for learning and performance subscale (see Table 3.8).

The MSLQ was translated and adapted into Turkish by Sungur (2004). She administered the instrument to 485 high school students. During its adaptation, confirmatory factor analysis was conducted and alpha coefficients for each subscale were computed. Reliability coefficient for self-efficacy for learning and performance sub-scale was found to be .89. These values were similar to that of the original instrument (see Sungur, 2004).

Table 3.8 Reliability Coefficients of Self-efficacy Subscale

Subscale	Description	Sample item	Number of Items	Cronbach alphas (Pintrich et al., 1991)	Cronbach alphas (Sungur, 2004)	Cronbach alphas (Current Study)
Self-efficacy	Students' judgments about their capabilities to learn and to accomplish a given task in classes.	I believe I will receive an excellent grade in the science class.	8	.93	.89	.90

For validating factor structure for current study, Confirmatory Factor Analysis was conducted. Results revealed a good model fit (GFI = .96, CFI = .98, RMSEA = .08, SRMR = .03). Table 3.9 presents the lambda-ksi estimates for the self-efficacy for learning and performance sub-scale of the MSLQ.

Table 3.9 Lambda-Ksi Estimates for the Self-efficacy for Learning and Performance Sub-scale

Subscale	indicator	present study LX estimates
Self-efficacy for learning and performance	q1	.76
	q2	.69
	q3	.79
	q4	.66
	q5	.66
	q6	.80
	q7	.76
	q8	.74

In addition, as shown in Table 3.8 reliability coefficient for current study was high enough (α =.90), so further analysis can be conducted.

3.3.5 Science Achievement Test (SAT)

In order to evaluate the seventh grade students' science achievement, science achievement test (SAT) (Yerdelen, 2013) was used in this study (see Appendix E). During its development, Yerdelen (2013) selected 27 questions from science tests of previous years' nation-wide examinations (e.g. Secondary Education Entrance Examination and Government Complimentary Boarder and Scholar Examination to transition to high schools). While selecting the items, she took into consideration the instructional objectives and content of the seventh-grade national science curriculum. In addition, these items were at knowledge, comprehension, and application levels in Bloom's Taxonomy. For example, the first question was at comprehension level, and aimed to check the following objective: "students will be able to compare the brightness of lamps in serial or parallel circuits." Yerdelen (2013) conducted a pilot study for this 27-item achievement test with 183 seventh grade

students in Ankara. Item analysis of the test was conducted, and based on Ebel's (1965) criteria, 13 items were removed from the test. Final form of the SAT consisted of 14 multiple-choice items with one correct answer and three distracters. Moreover, distribution of items across the content areas was as follows: seven questions for body systems, four questions for force and motion, and three questions for electricity units. Yerdelen (2013) reported that the reliability coefficient for this final form of the SAT was .78. While calculating SAT scores in current study, for each correct answer '1' point, and for each wrong answer '0' point was given, and finally all points were added for each student. The higher SAT score indicated student's science achievement. The reliability coefficient computed by Kuder Richardson 20 (KR 20) formula for current study was found to be 0.74, which indicated sufficient reliability.

3.4 Procedure

In this study, firstly, the research problem and variables were identified. The variables were student engagement, perceptions of classroom goal structures, self-efficacy, and science achievement. Using these variables as the keywords, the related literature was reviewed. In this stage, relevant literature was searched from Educational Resources Information Center (ERIC), Education Research Complete, and the Ebscohost, and other electronic and printed sources from a library at a large public university. Then, the most appropriate instruments for data collection were determined. Necessary permission was taken from the instrument developers. After that, the translation and adaptation period began for Engagement Questionnaire. During the translation procedure, the instrument was translated by the researcher and this version was investigated by an expert in the field. Also, support from an Academic Writing Center was received for the grammar structures of the items. After these controls, translated versions of EQ took its final shape. The necessary permissions from the Research Center for Applied Ethics and Ministry of Education were granted in order to conduct pilot and main study. As part of pilot study, Engagement Questionnaire was administered to 153 seventh grades, volunteer students in Gaziantep in 2012-2013 spring semester. Then, confirmatory factor analysis was conducted to examine proposed factor structures and internal consistencies of the sub-

scales were investigated. After the pilot study and subsequent analyses, the main data collection process started at the end of the semester. The final form of the scales was administered to 744 seventh grade students in the 2012-2013 spring semester in Şehitkamil and Şahinbey districts of Gaziantep. A total of 9 public elementary schools were attended in the study.

The data were collected by the researcher. With support of teacher, all necessary explanations were supplied by the researcher in each classroom. Brief information about the study was given to the participants, and they were guaranteed that their answers would be kept confidential and names of the schools and subjects would not be used in any kind of publication. It was also stated that this study involves volunteer participation, and it is important to fill out the questionnaires sincerely. If any student was unwilling to participate, s/he was not forced to fill out the questionnaires. It took roughly one lesson hour, nearly 40 minutes for students to fill out the questionnaires. Data collection period was completed in two weeks. In order to record the obtained data, Statistical Packages for Social Sciences (SPSS 20) was used. For this purpose, firstly a codebook, statement used to transform the information obtained from each participant into a format that SPSS can understand, was prepared (Pallant, 2007). Within this scope, each of the variables were defined and labelled, and numbers were assigned to each of the possible responses. Secondly, data file was prepared by entering the values from the each student for each variable. This data entry process took about two month. Finally, data set was checked for scores that are out of range, and the errors in the data file were corrected. Thus, data analysis process was started.

3.5 Data Analysis

Both descriptive and inferential statistics were used for analyzing the obtained data. There were two statistical programs (SPSS 20, and LISREL 8.80) to conduct statistical analyses in this study. For descriptive statistics, and analyses of missing data, normality, outlier, and reliability coefficients, SPSS 20 was utilized. In addition, to conduct Confirmatory factor analysis (CFA) and Path analysis LISREL 8.80 was used.

This study's data analysis consists of three main parts; first one is preliminary data analysis, second one is descriptive statistics and third one is inferential statistics.

3.5.1 Preliminary Data Analysis

The data analysis started with checking the data in terms of missing values, because missing values can affect the interpretation of results. Missing value implies that there is no data for variables in a study. If the percentage of missing cases is less than or equal to 5% of the data, it does not affect the results seriously (Tabachnick & Fidell, 1996). The problems caused by missing values can be solved by deletion methods and imputation methods. In this study, all missing values were replaced by multiple imputation with expected maximization (or EM). In multiple imputation, matching response patterns in the data are utilized, and missing data is substituted with several variables at the same time (Schumacker & Lomax, 2004).

Another issue that can affect interpretation of results is outliers. They are the values, which are extremely distant from the rest of the data. If there is any z-score > ±3.29 and any standardized residual greater than 3.3 in the data, it can be defined as an outlier (Tabachnick & Fidell, 1996). Additionally, If there is any Leverage value higher than 3p/n, where p=k+1 and k is the predictors' number, it can be seen as an outlier. Moreover, Cook's distance value utilizes to determine whether the outliers affect the other values or not. If it is greater than 1, it can be said that outliers influence the results (Cook & Weisberg, 1982). In this study, scatter plots, z- values, Mahalanobis distance, and Cook's Distance were used to determine the outliers.

Path Analysis requires multivariate normality. The assumption of multivariate normality comprises that (1) "all the individual univariate distributions are normal", (2) "each variable is normally distributed for each value of every other variable", and (3) "all bivariate scatterplots are linear, and the distribution of residuals is homoscedastic" (Kline, 2011, p.60). In this study, skewness and kurtosis values were assessed to check univariate normality. For normal distribution, these values between -2 and +2 are considered as acceptable (George & Mallery, 2003).

3.5.2 Descriptive Statistics

Descriptive statistics including mean, range, maximum and minimum values, and standard deviation were utilized to describe the characteristics of the participants, and show their profiles about all variables.

3.5.3 Inferential statistics

Since the purpose of this study is examining the links among student engagement, perceptions of classroom goal structures, self-efficacy and science achievement; path analysis was used as inferential statistics. "Path analysis is used to test the likelihood of causal connection among three or more variables" (Fraenkel & Wallen, 2006, p.337). Path analysis is conducted to come up with a theory about the possible reasons of a specific phenomenon (Fraenkel & Wallen, 2006). This analysis was conducted by using LISREL 8.80.

3.6 Threats to Internal Validity

Because this study is a correlational study, subject characteristics, location, instrumentation, testing, and mortality can be threats to the study's internal validity (Fraenkel & Wallen, 2006).

Subject characteristics threat in correlational research can be defined as explaining the obtained relationship with any other characteristics, while investigating the correlation between two or more characteristics of individuals or groups (Fraenkel & Wallen, 2006). In this study, subject characteristics could create a problem, because the relationships revealed may be accounted for by any other characteristics of students such as gender and socio- economic background.

If the data are collected in different locations, this may result in a location threat (Fraenkel & Wallen, 2006). In this study, the data gathered from 9 different schools from two different districts. However, all the schools participated to the study were public schools and all instruments were administrated in classrooms under similar conditions Thus, the location threat was tried to be eliminated.

Instrumentation was not considered as a threat to internal validity in current study. All instruments in this study were used just once and at the same time, and there

was no observation, so instrument decay could not be a threat. Moreover, since the data was collected by the researcher, data collector characteristics could not be a threat in this study. Data collector bias threat may occur when a data collector deflect results of the study without deliberation (Fraenkel & Wallen, 2006). The instruments contained objective type self-report and multiple-choice items. There were not any open-ended questions in the instruments, so during scoring there was no emending on scores.

When students' responses to previous instruments affect their responses to other instrument, testing can be a threat to internal validity of the study. The instruments of this study were administered at the same time, so there could not be a testing threat to internal validity of this study.

If the participants get lost during study, a mortality threat may occur (Fraenkel & Wallen, 2006). However, mortality could not be a threat for this study, because this was not a longitudinal study. Moreover, all students completed the questionnaire during administration process of the questionnaires.

3.7 Threats to External Validity

External validity indicates the degree to which generalize the findings of the studies from sample to population (Fraenkel & Wallen, 2006). The sampling methods were cluster random sampling and convenience sampling method in this study. The sample should be defined completely randomly for generalizability, but because of the difficulties of reaching all districts, administrative restrictions and presence of intact classes, this could not be possible. Therefore, the sample selection might affect the representativeness of the sample, but the large sample size can contribute to the generalizability of the findings.

3.8 Assumptions and Limitations of the Study

Following conditions were assumed in this study, and some limitations of the study were presented below.

3.8.1 Assumptions of the Study

- All conditions were standard during the administration of the instruments.
- Participants of the study responded to the items of the questionnaires sincerely.
- During the administration of instruments, students did not affect each other.
- Characteristics of the sample represented the population.

3.8.2 Limitations of the Study

- This study included just seventh grade students, it can be extended to students in other grade levels.
- The study was administered in two districts of Gaziantep; it can be extended to other districts and provinces in Turkey.
- Self-report instruments were administered in this study, so the results of the study were just based on these instruments. Observations or interviews can be used as qualitative data collection procedures.
- This study is a cross-sectional correlational study. Thus, results do not imply cause-effect nature of the relationships. A longitudinal design can be used to determine cause and effect relations.
- Science Achievement Test (SAT) was used to measure participants' science achievement, and this test limited to the first semester of 7th grade science curriculum. Tests that are more comprehensive can be used in future researches.
- Although achievement goal theory provides a theoretical basis for the present study, students' personal achievement goals were not included in the path model. Personal achievement goals can be used as variables in future researches.

CHAPTER 4

RESULTS

In this chapter, the statistical analyses results were presented as Preliminary Data Analysis, Descriptive Statistics, and Inferential Statistics. The first section includes checking the data in terms of missing values, potential outliers, and normality assumption. Second section presents information about general status of participants related to perceptions of classroom goal structures, engagement, self-efficacy, and achievement. Finally, testing of the proposed model was made through the path analysis in the inferential statistics section.

4.1 Preliminary Data Analysis

4.1.1 Analysis of Missing Data

Because missing values may affect the interpretation of results, all of the items were checked to compute the missing data percentages. These values ranged from 0 percent to 2.4 percent. According to Tabachnick and Fidell (1996), if the amount of missing values at random is less than 5%, any method for handling missing data yields the similar results. In the present study, missing values were handled by using multiple imputation method. All missing values were replaced by multiple imputation with expected maximization (or EM). Multiple imputation utilizes matching response patterns in the data and substitutes missing data with several variables at the same time (Schumacker & Lomax, 2004).

4.1.2 Analysis of Outlier

Outliers are two kinds, which are univariate outliers and multivariate outliers. In order to detect univariate outliers, scatter plots and z- values were examined. In this study, because the large sample size (n>100), z- values between -4 and +4 indicate outliers (Mertler & Vannatta, 2005) Z- values of the all variables were greater than - 4 and less than +4. Hence, there was no univariate outlier on the data.

In order to detect multivariate outliers, Mahalanobis distance was examined. By using the chi square table, the critical value of chi square at $p < .001$ with $df = 8$ was found to be 26.12. There were fifteen values exceeding this critical value. Hence, to determine which outliers were influential data points, Cook's Distance was examined. If Cook D is not between the values of -1 and +1, which is referring to outliers, and then they should be excluded from the study. In this study, Cook's Distance's range was between .00 and .018. Therefore, it was seen that the outliers were no influential, and there was no need to delete them.

4.1.3 Normality

Normality was assessed with skewness and kurtosis values. The skewness and kurtosis values for regarding variables of this study (motivating tasks, autonomy support, mastery evaluation, agentic engagement, behavioral engagement, cognitive engagement, emotional engagement, self- efficacy, and science achievement scores) lied between -2 and +2 as indicated in Table 4.1. Therefore, normality assumptions are sustained.

4.2 Descriptive Statistics

In this part, descriptive statistics related to students' perceptions of classroom goal structures (motivating tasks, autonomy support, and mastery evaluation) and engagement (agentic, behavioral, cognitive, and emotional) and self- efficacy, and science achievement were clarified. Mean scores, standard deviations, skewness and kurtosis values of these variables were presented as descriptive statistics in table 4.1.

As depicted in the Table 4.1, the mean scores for each subscale of classroom goal structure perceptions and engagement were all above the midpoint of the 4-point Likert scale, while self-efficacy was above the midpoint of 7-point Likert scale. These findings suggested that student engagement in science classes tend to be at high level and they feel moderately self-efficacious in science. In addition, students appeared to perceive that autonomy support and mastery evaluation are emphasized at reasonable levels and there are motivating tasks offered to them in their science classes. Moreover, the mean science achievement score of 7.93 out of 14 indicated that, on the

average, students' achievement level was not high enough. A detailed interpretation of the descriptive results is presented in the following sections.

Table 4.1 Mean, Standard Deviation, Skewness and Kurtosis Values for Students' Perceptions of Classroom Goal Structures, Engagement, Self – Efficacy and Science Achievement

	M	*SD*	*Skewness*	*Kurtosis*
Motivating Tasks	2.90	0.66	-.62	-.18
Autonomy Support	2.87	0.64	-.42	-.33
Mastery Evaluation	2.83	0.59	-.52	-.11
Agentic Engagement	2.74	0.78	-.30	-.59
Behavioral Engagement	3.19	0.71	-.99	.78
Cognitive Engagement	2.93	0.67	-.57	.07
Emotional Engagement	3.10	0.77	-.96	.47
Self-Efficacy	4.97	1.65	-.63	-.42
Science Achievement	7.93	3.26	-.12	-1.0

4.2.1 Descriptive Statistics for Students' Perceptions of Classroom Goal Structures

The results revealed that students perceived their science classroom goal structures relatively favorable, as indicated by the mean scores ranging from 2.83 to 2.90 on a four-point scale. As depicted in Table 4.1, the highest mean score was calculated in the motivating tasks sub-scale *(M* = 2.90, *SD* = .66). This result indicated that students perceived the materials and tasks in the science class as interesting, meaningful, and useful. The second highest mean score was on autonomy support sub-scale *(M* = 2.87, *SD* = .65). It reflected that students perceived the science class as a place, which their needs, preferences and interests were recognized and satisfied. Although, the mean score was lowest on the mastery evaluation *(M* = 2.83, *SD* = .61), it was still above the mid-point of four-point scale. This finding indicated that students perceived the evaluation practices in the science class as meaningful, fair, and based on their effort.

4.2.2 Descriptive Statistics for Student Engagement

Examination of the mean scores for student engagement revealed that, on a four-point scale, the highest mean score was obtained for behavioral engagement (*M* = 3.19, *SD* = .71). This result indicated that students tend to show behaviors such as persistence, effort, concentration, and attention in their science classes at higher levels. The next highest mean score (*M* = 3.10, *SD* = .77) obtained on the emotional engagement subscale implied that students tend to demonstrate positive affective reactions such as interest, and enjoyment in the science classes at higher levels as well. The next highest mean score was obtained on the cognitive engagement sub-scale. The corresponding mean score (*M* = 2.93, *SD* = .67) was still well-above the mid-point. Thus, it appeared that, in science classes, students use learning strategies to remember, organize, and understand the material to accomplish tasks. The lowest mean score was obtained for agentic engagement (*M* = 2.74, *SD* = .78). Although, the mean score was lowest on this sub-scale, it indicated a moderate level of agentic engagement. This finding suggested that students try to enrich the learning environment and make constructive contribution to instruction in science classes by responding with something useful such as proposing some suggestions and asking for an explanation.

4.2.3 Descriptive Statistics for Self-efficacy

Examination of the mean score for self-efficacy suggested that seventh grade students have a moderate level of science self-efficacy (*M* = 4.97, *SD* = 1.65). This result indicated that the students feel moderate level of confidence in learning science topics.

4.2.4 Descriptive Statistics for Science Achievement

In order to investigate student's performance in various science subjects, Science Achievement Test (SAT) was used. The SAT scores ranged from '0' to '14'. Concerning the descriptive statistics for SAT, as shown in the Table 4.1, the obtained mean score (*M* = 7.93) on the test reflected that students' achievement in science was not sufficiently high.

4.3 Inferential Statistics

4.3.1 Examination of the Relationships among 7th Grade Elementary Students' Perceptions of Classroom Goal Structures, Engagement, Self-Efficacy, and Science Achievement

Based on the earlier literature, a conceptual model was proposed. The model presenting the relationship among elementary students' perceptions of classroom goal structures, engagement, self-efficacy, and science achievement, was tested through path analysis. In the model, it was hypothesized that perception of classroom goal structure variables (motivating tasks, autonomy support, and mastery evaluation) are directly linked to 7th grade students' self-efficacy and engagement variables (emotional, behavioral, cognitive, agentic). Besides, students' self- efficacy was suggested to have direct effect on science achievement. Moreover, it was proposed that each of the student engagement variables (emotional, behavioral, cognitive, and agentic) would have direct effects on their science achievement. Lastly, six reciprocal relationships between each aspects of students' engagement were proposed (See *Figure 4.1*).

In the proposed model, all the variables were identified as observed variables. LISREL 8.80 program was utilized to conduct the path analysis of the model. Results indicated that there was evidence to support adequate model-to-data fit. For instance, both the GFI and the CFI for the proposed model were found to be .99. These GFI and CFI values that are higher than .90 indicated a good fit to data (Kelloway, 1998).

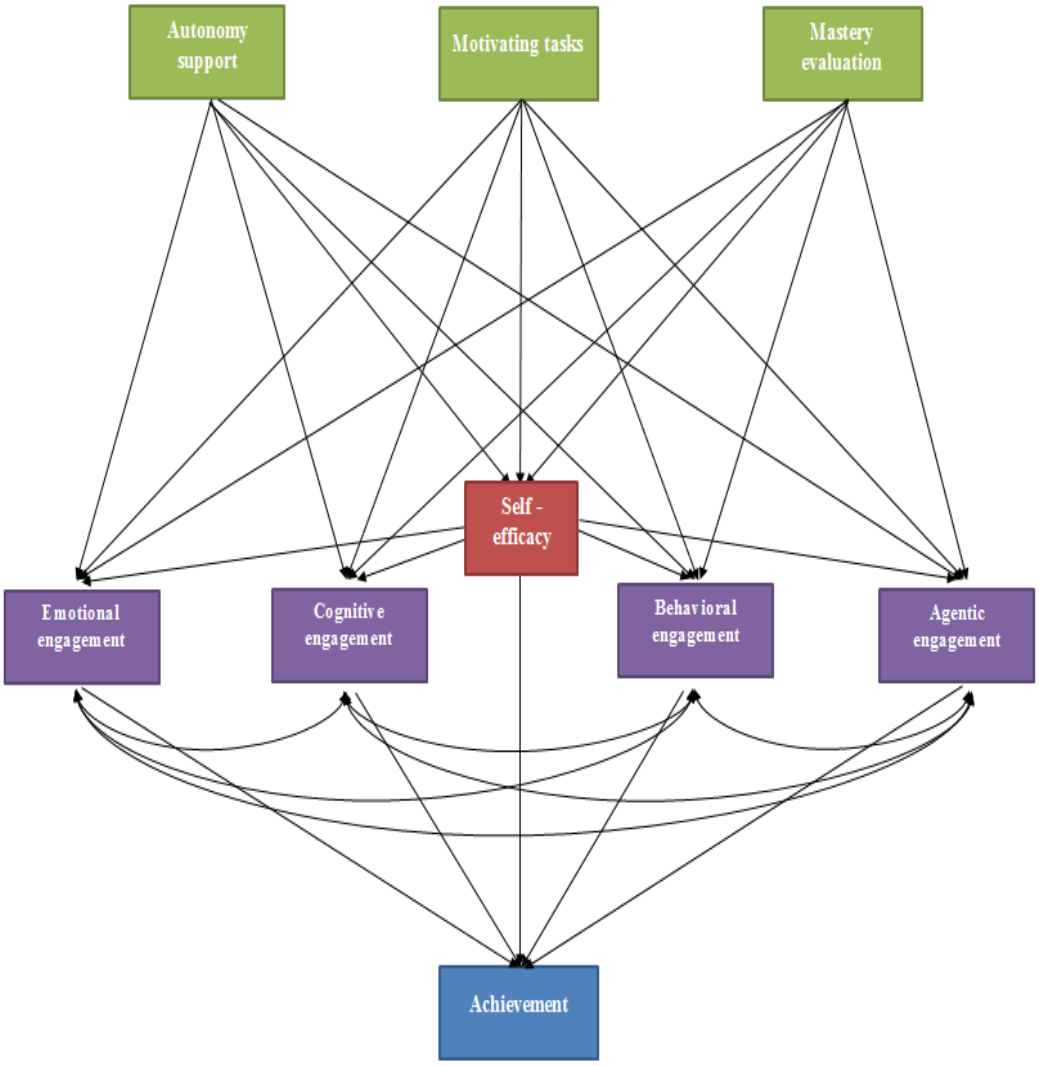

Figure 4.1 Proposed path model evaluating students' perceptions of classroom goal structures, self-efficacy, engagement, and science achievement

In addition, the RMSEA was found to be .04. The RMSEA values below .05 indicate a perfect fit to data (Schumacker & Lomax, 1996). Moreover, the SRMR was found to be .00, and the value of "0" for SRMR shows perfect fit to data (Kline, 2005; Schumacker & Lomax, 1996). Lastly, the chi-square estimate was found to be significant ($\chi 2 = 7.63$, df =3), and ($\chi 2$/df) was calculated as 2.55, which implied perfect fit in large samples (Kline, 2005).

Since the goodness of fit measures indicated that the model fit the data well, the standardized path coefficients for direct effect were analyzed and presented in

Table 4.2 Besides, the standardized path coefficients for direct effects are depicted in Figure 4.2.

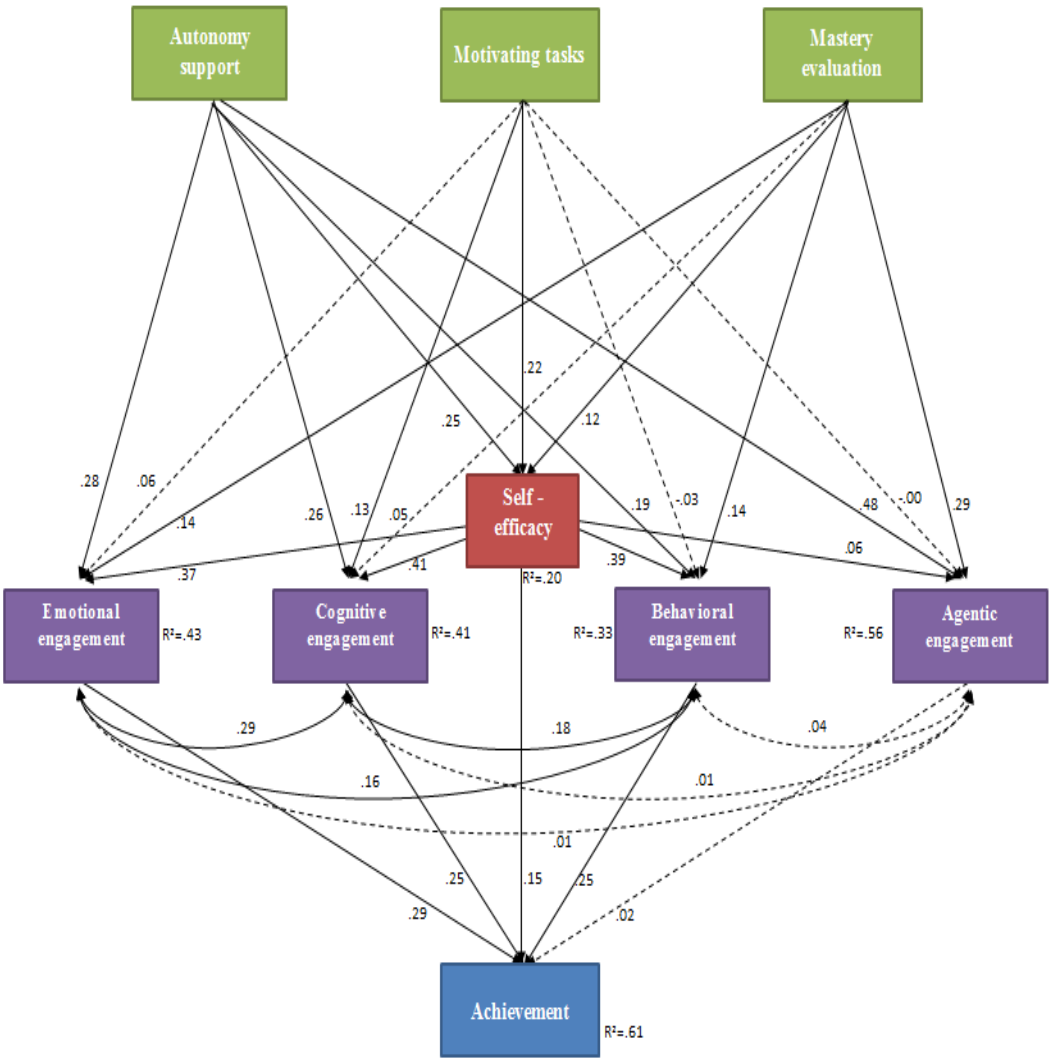

Figure 4.2 Path Model with Standardized Path Coefficients for Direct Effects
*Dashed lines show non-significant paths

Results of the path analysis showed that hypotheses were generally supported. With respect to the predicted paths, it was seen that 7th grade students' perceptions of classroom goal structures (motivating tasks, autonomy support, and mastery evaluation) accounted for 20 % of the variance in self-efficacy. As can be seen from the Table 4.2, self-efficacy was predicted by motivating tasks (β = .22), autonomy support (β = .25), and mastery evaluation (β = .12). To be more specifically, autonomy support had the largest positive effect on the self-efficacy. The second

strongest effect on self-efficacy was from the motivating tasks, and the lowest effect was from the mastery evaluation. This finding suggested that students with the perception that tasks offered to them in science classes are meaningful, relevant, and interesting and their science classes are autonomy supportive and mastery oriented tend to be more self-efficacious in science.

In addition, results regarding the relationship among students' perceptions of classroom goal structures, self-efficacy and agentic engagement revealed that self-efficacy, motivating tasks, autonomy support, and mastery evaluation accounted for 56 % of the variance in agentic engagement. Parameter estimates showed that while the associations between self-efficacy (β = .06), autonomy support (β = .48), and mastery evaluation (β = .29) were significant, the path leading from motivating tasks to agentic engagement (β = .00) was not significant. These results indicated that students who perceived the science class as a place which their needs, preferences and interests were recognized and satisfied, and perceived the evaluation practices in the science class as meaningful, fair, and based on their effort, and had the belief that they can accomplish tasks and activates in science classes, are likely to enrich the learning environment and make constructive contribution to instruction in science classes. The results also demonstrated that self-efficacy, motivating tasks, autonomy support, and mastery evaluation accounted for 33 % of the variance in behavioral engagement. The links from self-efficacy (β = .39), autonomy support (β = .19), and mastery evaluation (β = .14) were all found to be positive. These findings implied that students' perceptions of science classes as autonomy supportive and mastery oriented, and their belief that they can accomplish the tasks successfully are positively related with showing behaviors such as persistence, effort, and concentration in science classes.

Table 4.2 Direct, Indirect, and Total Effects of Related Variables

Effect	Direct Effects	Indirect Effects	Total Effects	Standard Errors of the Estimates	*t*	R^2
on Self-efficacy						.20
of Motivating Tasks	.22	-	.22	.01	6.55*	
of Autonomy Support	.25	-	.25	.01	4.78*	
of Mastery Evaluation	.12	-	.12	.01	2.37*	
on Agentic Engagement						.56
of Self-efficacy	.06	-	.06	.01	2.09*	
of Motivating Tasks	-.00	-.00	-.00	.00	-.06	
of Autonomy Support	.48	.03	.51	.03	12.29*	
of Mastery Evaluation	.29	.01	.30	.04	7.54*	
on Behavioral Engagement						.33
of Self-efficacy	.39	-	.39	.01	11.60*	
of Motivating Tasks	-.03	.01	-.02	.00	-.80	
of Autonomy Support	.19	.07	.26	.05	3.89*	
of Mastery Evaluation	.14	.05	.19	.06	2.82*	
on Cognitive Engagement						.41
of Self-efficacy	.41	-	.41	.01	12.87*	
of Motivating Tasks	.13	.05	.18	.00	4.49*	
of Autonomy Support	.26	.10	.36	.04	5.62*	
of Mastery Evaluation	.05	.02	.07	.05	1.14	
on Emotional Engagement						.43
of Self-efficacy	.37	-	.37	.01	11.88*	
of Motivating Tasks	.06	.22	.28	.00	1.91	
of Autonomy Support	.28	.10	.38	.05	6.40*	
of Mastery Evaluation	.14	.05	.19	.05	3.24*	
on Science Achievement						.61
of Self-efficacy	.15	-	.15	.01	4.93*	
of Agentic Engagement	.02	.00	.02	.02	.70	
of Behavioral Engagement	.25	.09	.34	.02	8.61*	
of Cognitive Engagement	.25	.10	.35	.03	7.21*	
of Emotional Engagement	.29	.10	.39	.03	8.36*	

*Significant paths

Considering the paths towards the cognitive engagement, self-efficacy (β=.41) had the strongest positive relationship with the cognitive engagement.

Furthermore, autonomy support (β=.26) and motivating tasks (β=.13) were significantly linked to cognitive engagement. However, the relationship between mastery evaluation (β =.05) and cognitive engagement was not statistically significant. All variables of classroom goal structure perceptions and self-efficacy explained 41% of the variance in cognitive engagement. These results indicated that students who perceived the science class as autonomy supportive, and perceived the science classroom tasks as meaningful and motivating, and had the belief that they can accomplish tasks and activates in science classes successfully tend to use learning strategies to remember, organize, and understand the materials at higher levels.

With respect to emotional engagement, self-efficacy, motivating tasks, autonomy support, and mastery evaluation accounted for 43 % of the variance in emotional engagement. Only non-significant predictor of emotional engagement was motivating tasks (β=.06), whereas the other three predictors had positive significant effects (β=.37 for self-efficacy, β=.28 for autonomy support, and β=.14 for mastery evaluation). These results suggested that students' level of self-efficacy, and extent to which students find the science class as autonomy supportive, and the extent to which students find the evaluation practices being fair and focus on learning were positively related to extent to which students show positive affective reactions such as interest, and enjoyment in the science classes.

In the model, self-efficacy, agentic engagement, behavioral engagement, cognitive engagement, and emotional engagement accounted for 61 % of the variance in science achievement. Parameter estimates showed that higher levels of self-efficacy (β=.15), behavioral engagement (β= .25), cognitive engagement (β= .25), and emotional engagement (β= .29) were positively related to students' science achievement. However, the predicted link from the other engagement variable (agentic engagement) to science achievement was not significant (β= .02). These results indicated that, students who demonstrate behaviors such as persistence, effort, concentration in science classes, and who put in a lot of effort to truly understand, organize science topics, and who show positive affective reactions such as interest,

and enjoyment in the science classes, and those having higher levels of self-efficacy were likely to be more successful in science.

In addition to one-way paths, as it can be seen in the figure 4.2, reciprocal relations were proposed among the engagement variables. These two-way arrows on the model indicate that some of the measurement errors are correlated. Path analysis results revealed that error covariance between cognitive engagement and emotional engagement; between behavioral engagement and emotional engagement; between behavioral engagement and cognitive engagement were significant. However, error covariance between agentic engagement and emotional engagement; between behavioral engagement and agentic engagement; between agentic engagement and cognitive engagement were found to be non-significant. These findings indicated that all engagement variables except agentic engagement were statistically correlated with each other.

4.3.2 Summary of the Findings

The current study showed that students' self-efficacy, behavioral engagement, emotional engagement, and cognitive engagement in the science course are significant predictors of seventh grade students' science achievement. Additionally, students' classroom goal structures (motivating tasks, autonomy support, and mastery evaluation) are significant predictors of seventh grade students' science self-efficacy. Furthermore, autonomy support was found to be positively linked to all aspects of engagement, whereas motivating tasks just related to cognitive engagement. In addition, mastery evaluation was found to be positively linked to engagement variables except from cognitive engagement. Finally, the present study revealed reciprocal influences between emotional and cognitive engagement; cognitive and behavioral engagement; emotional and behavioral engagement. Agentic engagement did not show any relationship with other aspects of engagement.

CHAPTER 5

DISCUSSIONS, IMPLICATIONS and RECOMMENDATIONS

In this chapter, the results of this study were summarized and discussed in detailed. Afterwards, possible implications of the study were presented in the third part. Finally, limitations of the study and recommendations for further studies were addressed.

5.1. Discussion

The purpose of this study was to examine the relationship among seventh grade students' perceptions of classroom goal structures (motivating tasks, autonomy support, and mastery evaluation), engagement (behavioral, emotional, cognitive, and agentic engagement), self-efficacy, and science achievement. For this purpose, a path model was proposed based on the literature. The proposed model suggested that perceptions of classroom goal structures are associated with self-efficacy and all aspects of student engagement. It was also proposed that self-efficacy is related to all aspects of student engagement and science achievement. Additionally, each student engagement variable is linked to science achievement. Finally, significant relations were expected among the engagement variables. In the following sections, each of the proposed relations will be discussed in detail.

5.1.1 Self- efficacy and Science Achievement in relation to Perceptions of Classroom Goal Structures

Concerning the relationships among students' perceptions of classroom goal structures and self-efficacy, results showed that motivating tasks, autonomy support, and mastery evaluation were significantly related to students' self-efficacy beliefs in science classes. This finding implied that students with the perception of classroom tasks as motivating, and challenging, and classrooms as autonomy supportive and emphasizing personal improvements are likely to be more self-efficacious in science.

In other words, if students perceive that science tasks are interesting and relevant to their daily lives, they tend to believe that they can learn science successfully. Actually, when the tasks are associated with their daily lives, students will concretize abstract science concepts, and thus it will be more meaningful and easier for students to learn these concepts. In this way, their beliefs in their abilities to comprehend and learn science concepts can improve. Furthermore, if students perceive that they are evaluated in science classes based on their own effort, individual progress, and mastery level, they become more self-efficacious in science. In fact, teachers in such learning environments give students opportunities to improve their work, use different evaluation methods, and make the evaluation private. These practices are likely to make students more motivated in science classes, and try hard to be better in the class. Finally, if students perceive that their science teachers provide them with opportunities to feel a sense of responsibility and select science tasks congruent with their interests; they tend to have higher levels of science self-efficacy. In essence, when students are allowed to participate in learning and decision processes, and supported with some choice, autonomy, and control, these opportunities tend to improve their responsibility, independence and leadership skills. Thus, they become more motivated in their learning environment and feel confidence to accomplish tasks given. Overall, these findings were as expected and highlight the importance of classroom goal structures perceptions in students' self-efficacy. Indeed, Pintrich and Schunk (2002) suggested that there are some classroom motivational strategies to improve student self-efficacy. These strategies consist of making learning interesting, using diversity and in individual challenges, guiding students to adopt realistic goals, and improving students' management and organizational skills and use of effective strategies. Furthermore, giving some choice and control to students in classrooms and having students involve in the decision-making process (e.g. giving priority to students' opinions about when work will be completed) were expected to enhance students' self-efficacy. Moreover, using evaluation methods that monitor student individual learning progress, showing sensitivity to make the evaluation private; using feedbacks stressing that mistakes are important for learning; and using some variety in assessment methods and criteria for grading were suggested to develop a

stronger sense of self-efficacy. Similarly, Ames (1992c) described three main classroom structures that have been found to affect some motivational variables, especially how students perceive their capability. These structures consist of the task design, use of evaluation practices and rewards, and authority or responsibility distribution in classroom. Accordingly, classroom environments that (1) provide tasks designed for variety and novelty; (2) focus on the interest of students, meaningfulness of learning activities, and individual progress; and (3) make students adopt "short-term, self-referenced goals" and (4) present reasonable challenge to students are likely to support high perceptions of ability (Ames, 1992c). Moreover, it was proposed that classroom environments that allow students to involve in the process of decision making; support students' self-improvement and "use of self-management and monitoring skills"; provide real choices and opportunities which are based effort; present chances to improve responsibility and independence; enable students to perceive that they have high ability. Furthermore, according to Ames (1992c), classroom environments, which emphasize individual progress and students' effort for grading; make evaluation private instead of public; enable chances for self-improvement; and support the perception that mistakes are part of learning rend to improve students' perceptions of their abilities. These theoretical expectations have been empirically supported by several studies. For example, Greene et al. (2004) showed that students' perceptions of classroom structures concerning autonomy support, motivating tasks, and mastery evaluation, were linked to their adaptive motivation such as self-efficacy, mastery goal orientation, and perceived instrumentality. Similarly, Sungur and Gungoren' study (2009) revealed that students' classroom environment perceptions in terms of motivating tasks, mastery evaluation and autonomy support are related to their adaptive motivational beliefs including science self-efficacy. That is, if students have the perception that the tasks in science classes are motivating, and their autonomy and personal effort are emphasized in the classroom, they tend to have higher levels of self-efficacy. Moreover, Fast et al. (2010) examined the relations among students' classroom environment perceptions, self-efficacy beliefs and math performance. Results supported that students who perceived their classrooms as more challenging, caring,

and mastery oriented reported significantly higher levels of self-efficacy Furthermore, Ames and Archer (1988) reported that perception of emphasis on mastery goals in the classroom was related to use of effective learning strategies, and adaptive motivational beliefs such as choosing challenging tasks, holding positive attitudes toward the classroom, and greater beliefs that achievement results from one's effort.

Additionally, in the current study, autonomy support made the highest contribution to the prediction of self-efficacy implying that seventh grade students' science self-efficacy beliefs are heavily formed by their perceptions of autonomy supportive classroom structure. Thus, it appeared that students whose science teachers guide them to organize and conduct the activities and tasks in the class and encourage them to take responsibility for their own learning, are likely to have higher levels of self-efficacy in science. Similar results were found by Badiee et al. (2014). They investigated the relationships among classroom goal structures concerning motivational tasks, supporting autonomy, and mastery evaluation, goal orientations, self-efficacy and math achievement. They found that each variable of classroom environment perceptions is related to self-efficacy beliefs, but they specifically reported that autonomy supportive classroom environments result in higher levels of student self-efficacy and achievement.

5.1.2 Student Engagement in relation to Perceptions of Classroom Goal Structures

Based on the achievement goal theory, and previous studies it was expected that classroom goal structures can be used as an effective empirical tool to investigate the influence of classroom contexts on students' engagement and motivation. In fact, three classroom structures (autonomy support, motivating tasks, and mastery evaluation) were identified for this purpose. However, results regarding the relationships among students' perceptions of classroom goal structures and engagement showed that while autonomy support was linked to each of the engagement variable, motivating tasks were linked only to cognitive engagement. On

the other hand, mastery evaluation was linked to all aspects of engagement except for cognitive engagement.

The finding concerning the relation between autonomy support and engagement variables was expected and reflects the results of previous research (i.e., Reeve & Tseng, 2011; Reeve, 2012; 2013; Reeve & Lee, 2014). As emphasized in these studies, autonomy supportive classroom structure can be created when students are provided with opportunities to have freedom to ask questions, share their opinions, and choose tasks and activities in line with their interests. Such classroom structures were reported to give rise to better student engagement. That is, when teachers consider their students' feelings, thoughts, and behaviors, students tend to show greater effort, attention and concentration on tasks (behavioral engagement), interest, curiosity, and enthusiasm (emotional engagement), use of deep, self-regulated and personalized learning strategies (cognitive engagement) and proactive, and constructive contributions to the instructional process (agentic engagement). Actually, in their longitudinal study, Reeve et al., (2004) concluded that students, whose teachers use strategies supporting students' autonomy and motivate them in more autonomy-supportive ways, are more likely to exhibit engagement in their learning. Moreover, Shih's (2008) research on how autonomy support as a component of classroom structures predict students' behavioral and emotional engagement showed that students' perceptions of autonomy support meaningfully predicted both behavioral and emotional engagement. Additionally, Jang, Reeve, and Deci, (2010) examined teachers' instructional methods, and they found that students' behavioral engagement was predicted by autonomy supportive methods.

When it comes to the findings concerning the relation between motivating tasks and engagement variables, some results are unexpected. Although it was hypothesized that motivating tasks are related to each aspect of student engagement, in the present study, motivating tasks were linked to only cognitive engagement. This finding implied that, students who perceived the materials and tasks in the science class as challenging, meaningful, and useful, are likely to use more learning strategies to remember, organize, and understand the material to accomplish tasks. This finding was accord with the study of Lau and Lee (2008). They found that

classroom environment perception concerning motivating tasks, autonomy support, and mastery evaluation have both direct effects on students' strategy use (i.e. cognitive engagement) and indirect effects through the effect of achievement goals. Similarly, Sungur and Gungoren (2009) stated that strategy use of students was positively related to their classroom environment perceptions in terms of motivating tasks, autonomy support, and mastery evaluation. Additionally, Reeve (2013) stated that if teachers provide students with interesting and important activities, students tend to engage in learning behaviorally, emotionally, agentically, and cognitively. Although related literature showed a relationship between motivating tasks and all aspects of engagement, the reason of why it is related to just cognitive engagement in the present study may be due to the fact that the items used to assess motivating tasks do not cover all aspects of this construct. Indeed, according to Ames (1992c) and Blackburn (1998), students' willingness to make effort and their active engagement in learning can be enhanced by some characteristics of the tasks such as being diverse, interesting, different, challenging, meaningful, relevant, and not so easy or difficult, as well as including specific and short-term goals. When the scale items used in the present study are considered, it can be seen that items do not involve all these characteristics of the tasks. For example, items concerning whether tasks involve specific and short-term goals and the level of difficulty of tasks were not included in the scale. Additionally, some items did not show high correlations with the motivating tasks subscale. For example, Lambda ksi estimates of the following item 24 (i.e., "Students learn in this class by participating in class activities and discussions") was found to be .23. Thus, in the future studies the items used to assess motivating tasks can be reviewed and additional items can be prepared to represent this construct better.

Finally, the results concerning mastery evaluation showed that it was related to each aspect of student engagement except from cognitive engagement. In other words, if students perceive the evaluation practices in the science class as consistent with what they learned, and meaningful, then they tend to demonstrate behaviors such as persistence, effort, concentration, and attention in their science classes at higher levels (behavioral engagement). Likewise, if students perceive the evaluation

practices in the science class as based on their effort, and perceive their teacher as attending to whether his/her students are improving, they tend to enhance their interest, curiosity and enjoyment, and reduce their anxiety in the science classes (emotional engagement). Similarly, if students perceive that the grading is fair and students' mistakes are welcoming in the science class, they are likely to ask questions and explain their choices, needs, interests and wants about science class, and make suggestions to improve the science class (agentic engagement). These findings show similarities to the findings of the related literature. For instance, Reeve and Lee (2014) stated that the way of teachers' determination of classroom evaluation criteria, such as reactions to students' mistakes may result in higher or lower behavioral, emotional, cognitive, and agentic engagement. Similarly, Ames (1992c) stated that if teachers, in the evaluation process, emphasizes individual improvement, consider students' effort, and show mistakes as a part of learning to students, their students are likely to show high interest, attention and effort in learning activities, use of effective learning strategies, feel belongingness and engage in learning actively. Inconsistent with related literature, path analysis showed non-significant relationships between students' perceptions of having mastery oriented evaluations and their cognitive engagement such as using sophisticated learning strategies. The possible reason of this may be resulted from the effect of competitive and examination oriented education system in Turkey. For example, Turkish elementary students need to have higher exam scores to enroll a higher quality high school. Thus, these exams may force students to get knowledge in order to increase their grades rather than learning the topics to construct their own cognitive schemes. At this point, it is important to note that this explanation is speculative and need to be elaborated using qualitative data collection procedures such as interviews.

5.1.3 Student Engagement in relation to Self-Efficacy

The path model revealed significant links between seventh grade students' self-efficacy beliefs and their emotional, behavioral, cognitive, and agentic engagement. This result implied that students who feel confidence in learning science topics are likely to have higher levels of engagement in their learning. In

other words, students who believe that they will be successful in science lesson are likely to react to learning positively and affectively (emotional engagement), exert effort for learning, and persist in the face of difficulties (behavioral engagement), try to link to what they learn to their own experiences and what they already know (cognitive engagement), and make creative contributions to the schooling such as telling the teacher what they like, dislike, interested in, opinions and choices in science class (agentic engagement). These results are in line with the related literature (Linnenbrink & Pintrich, 2003; Reeve & Lee, 2014). Indeed, relevant literature revealed that students with high self-efficacy are likely to engage in a task, and use effective learning strategies and exert effort to accomplish it even if it is so hard, on the other hand, less self-efficacious students tend to avoid from such tasks (Pintrich & Schunk, 2002; Schunk & Mullen, 2012). Moreover, Pintrich et al. (1993) stated that higher levels of self-efficacy were positively associated with the cognitive and metacognitive strategy use and effort regulation. Similarly, Buehl and Alexander (2001) showed that students' beliefs about their abilities to complete academic tasks successfully are highly related with their use of metacognitive strategies (e.g. planning, monitoring, and evaluating) and their effort and performance. Additionally, Linnenbrink and Pintrich (2003) stated that students' self- efficacy and engagement in terms of behavioral engagement, cognitive engagement, and motivational are all positively related. Moreover, they explained each relationship as follows: Students who have confidence in their capabilities are inclined to persist in completing a task, and thus their response to an encountered difficulty is to ask for help. Additionally, if students have confidence in their skills, they tend to strive to understand their tasks and think deeply about it. Finally, researchers concluded that if students have confidence about doing well in class, they show adaptive motivational beliefs, interest, value, as well as positive affective reactions.

5.1.4 Science Achievement in relation to Self-Efficacy

The link proposed from self-efficacy to science achievement was supported in the path analysis. This result indicated that seventh grade students' confidence about understanding from basic concepts to the most difficult or complex materials

taught in science course is related to their achievement in science. That is, a student who believes that he or she is able to get a high grade and do well in science class tends to be more successful in science. This finding was expected, since self-efficacious students, even under difficulties, use different effective strategies, persist in achievement, and make an effort until they accomplish. When this finding was assessed with the results of self-efficacy and engagement relationships, it can be interpreted that self-efficacy lead to more engagement and, in turn, to more learning and higher achievement.

These findings show similarity with the related literature. For instance, Britner and Pajares (2006) examined extent to which sources of self-efficacy and self-efficacy predict science achievement. Results showed that science self-efficacy was the most consistent predictor of students' science grade. Similarly, Mason et al., (2013) revealed that students' science achievement was significantly associated with their self-efficacy level. In their study with the data from the 13,985 participations of PISA 2006, Areepattamannil et al., (2011) examined how much students' motivation for learning science and motivational beliefs, and science instructional practices predict their science achievement. They concluded that self-efficacy and self-concept in science showed a quite strong and positive association with science achievement when it compared to other predictors. Areepattamannil et al. suggested that students having higher levels of confidence in performing science- related tasks and having a better perception for their ability in order to learn science are more likely to get higher science achievement. Additionally, Bong (2008) noted that self-efficacy continually predicts academic achievement because of its influences on effort and persistence. That is, students with higher level of self-efficacy tend to make an effort and insist longer when they face a difficulty (Schunk & Zimmerman, 2006) leading to better achievement.

5.1.5 Science Achievement in relation to Student Engagement

In the current study, the path model suggested that students' engagement is an important factor in their science achievement. According to the findings, students who are cognitively, behaviorally, and emotionally active in their science classes

using a variety of strategies, persisting in the face of difficulties, and having interest in what they are learning tend to have higher scores on the science achievement test. These findings were expected, and they supported the previous studies (Fredricks et al., 2004; Linnenbrink & Pintrich, 2003; Marks, 2000). That is, students' emotions about learning activities reflect their intrinsic motivation. If students possess high emotional engagement, then they will be motivated, enjoy learning, and attend to class activities more, in turn, this will bring success. Additionally, students' use of learning strategies makes learning more interiorized and meaningful for them, in turn, makes them successful. Similarly, students' behavioral engagement reflects extent to which they exert effort and pay attention. Students who show behavioral engagement will make effort, concentrate, and pay attention for learning, and therefore, learning will be accomplished. In fact, in a number of studies student engagement was found to be significantly linked to achievement (Fredricks et al., 2004; Linnenbrink & Pintrich, 2003; Marks, 2000; Patrick et al., 2007; Reschly et al., 2008). For example, Avenilla (2003) investigated the links between emotional and behavioral engagement and academic outcomes across 8^{th}, 10^{th}, and 12^{th} grade. She revealed that emotional and behavioral engagement were significantly related with academic outcomes such as GPA and standardized test scores in reading and math. Additionally, considerable research has concluded that there are strong associations between cognitive and affective engagement and indicators of academic achievement (Appleton et al., 2006; Appleton et al., 2008; Archambault et al., 2009; Fan & Williams, 2010; Furlong & Christenson, 2008; Reschly et al., 2008). For example, in a recent study, Sedaghat et al., (2011) examined the relationships among motivational factors, cognitive engagement, and academic achievement. According to results, academic achievement was predicted by cognitive strategy use as an indicator of cognitive engagement directly, and by perceived ability and performance goals directly as well as indirectly. In another study, Mo (2008) investigated the linkage among opportunity to learn, science achievement, and student engagement considering emotional, behavioral, and cognitive aspects. Findings showed that emotional engagement and cognitive engagement affected science achievement

positively, while behavioral engagement found to have negative effects on science achievement.

Most of the findings of the present study are consistent with these studies, but contrary to the proposed model concerning literature, the path from agentic engagement to science achievement was not found to be significant. However, Reeve and Tseng (2011) found that student achievement was predicted by agentic engagement. In a more recent study, Reeve (2013) found that the model of behavioral, emotional, agentic and cognitive engagement accounted for 25% of the variance in achievement. Nevertheless, the links from cognitive (β = -.06) and emotional (β = .07) engagement to achievement was not supported, while the links from behavioral (β = .28) and agentic engagement (β = .25) to achievement was supported. Overall, researcher concluded that agentic engagement acts as a proactive, intentional, collaborative, and constructive student-initiated pathway to higher academic achievement and motivational support. Similarly, Reeve (2012) stated that engagement mediates the relation between motivation and achievement. At this point, it is worth mentioning that participants in the study of Reeve and Tseng (2011) were high school students from Taiwan, and college students from South Korea in the study of Reeve (2013). Thus, sample characteristics and context of the studies were different from that of the current study. The focus of the present study was science classes. In Turkey, all science teachers follow the same textbook and national science curriculum implemented countrywide. Although the curriculum is student-centered with the aim of developing scientifically literate individuals, the implemented curriculum is different from the written curriculum (Genc & Kucuk, 2003; Yangın & Dindar, 2007). Science teachers tend to use the suggested activities to justify the given content rather than encouraging students' contribution to learning process (Kozandagı, 2001; Ozmen, 2003; Gokce, 2006). Thus, seventh grade students are not expected to be agentically active in science classes at higher levels in Turkey. Even some students intend to offer suggestions to make contributions to instruction and inform their science teachers about what they prefer to learn in science classes and what they are interested in, science learning environment with little room for such student contributions to teaching and learning process may

hinder expected positive link between agentic engagement and achievement. Indeed, in the current study, when the mean scores were examined, it was found that the lowest mean score belongs to agentic engagement sub-scale implying that students' agentic engagement is at the lowest level compared to other student engagement variables (i.e., cognitive, behavioral, and emotional engagement). Therefore, in order to increase the generalizability of the findings, the relation between agentic engagement and achievement should be investigated with different samples in different domains.

5.1.6 Relationships among Each Aspects of Student Engagement

In the proposed model, significant associations were expected among the engagement variables. Findings of the path model demonstrated that emotional engagement was related with behavioral engagement and cognitive engagement. In the same way, behavioral engagement was found to be related with cognitive engagement and emotional engagement. Similarly, cognitive engagement was found to be related with behavioral engagement and emotional engagement. That is, all these relations were reciprocal. For example, students who demonstrate behaviors such as persistence, effort, concentration in science classes, tend to put in more effort to truly understand, organize science topics, and show more positive affective reactions such as interest, and enjoyment in the science classes. In the same manner, students who exert more effort to understand deeply tend to hold more positive emotions for science classes and pay more attention, concentration and persistence in science classes.

These findings were consistent with related literature. For example, Mo (2008) found a strong relationship between students' emotional engagement and cognitive engagement. When students have more positive opinions and feelings to learning, they perceive learning strategies as useful and essential, and thus they make effort to use learning strategies. Similarly, Fredrickson (2001) suggested that there is a relationship between emotional engagement and behavioral engagement. That is, positive emotions indicate someone's psychological well-being, and behaviors reflect these feelings through exerting more effort or concentrating more for learning.

Likewise, Avenilla (2003) has also found that emotional and behavioral engagement was related with each other. Additionally, Li and Lerner (2013) stated that cognitive engagement is influenced by behavioral engagement. That is, students' use of metacognitive strategies and learning strategies indicate regulating their attention and effort, and associating new knowledge with existing one. These efforts reflect students' behavioral engagement as well. Moreover, Reeve and Tseng (2011), Reeve (2012), and Reeve (2013) reported that there are significant associations among the engagement variables in terms of behavioral, cognitive, emotional, and agentic. Although these studies of Reeve's stated that agentic engagement associated positively and significantly with the other three aspects of engagement (behavioral, cognitive and emotional), agentic engagement was not found to be related with any other student engagement variable in the current study.

5.2 Implications of the Study

Purpose of this study was to investigate the relationships among seventh grade students' perceptions of classroom goal structures in terms of motivating tasks, autonomy support, mastery evaluation; engagement (i.e. behavioral, emotional, cognitive and agentic engagement), self-efficacy and achievement in the domain of science. Path analysis results showed that science achievement of seventh grade students directly and positively linked to their self-efficacy and emotional, behavioral, and cognitive engagement.

Moreover, the strongest predictor of achievement was behavioral engagement. In the light of these findings, enhancing students' behavioral engagement seems to be very important to enhance science achievement of seventh grade students. Moreover, according to the results of the current study, to make students behaviorally engaged, classroom environments supporting students' self-efficacy and autonomy, and emphasizing mastery evaluation should be established. To do this, it is suggested that teachers should provide students with opportunities to make their own choices and decisions, to take their responsibilities for learning, and to control their own actions in science class.

However, the studies concerning autonomy support conducted in Turkey reported that teachers generally did not display autonomy supportive behaviors in the classroom, although they found providing autonomy support necessary (Oguz, 2013). There are some reasons underlying why Turkish teachers cannot display autonomy support high level. One of these reasons is teachers' approach to teacher-centered instruction, and their beliefs that learning should be under the control of teachers, and students cannot take responsibility for learning, since they do not know anything (Gunes, 2012; Ustunoglu, 2009; Yılmaz, 2011a; 2011b). Additionally, teachers may avoid from giving autonomy to students, because they may not want to lose control in the classroom and try to protect their authority (Oguz, 2013). On the other hand, teachers may not receive adequate education concerning the importance of supporting autonomy and how can it be carried out, and therefore they may not display autonomy supportive behaviors. For example, Ustunoglu (2009) revealed that teachers do not have sufficient knowledge and skill about autonomy, and therefore they cannot direct students to be autonomous. In fact, there is some evidence that teachers can learn how to become more autonomy supportive through participating in a training program (Reeve, 2006; 2012). Therefore, it can be suggested that MONE should organize in-service trainings in order to provide teachers to improve their autonomy supportive style of teaching. In addition to this problem of teachers, similar issues are valid for teacher candidates. As stated in study of Sert (2006), preservice teachers also cannot perform autonomy supportive learning strategies, since they were not trained about this issue. Therefore, it is suggested teacher education programs that emphasize the importance of creating autonomy supportive classrooms, and creating such a learning environment can be possible with constructivist approach and learner centeredness. Such teachers that manage to organize supporting environments should be able to organize the lesson with their students, and make students involve in decision making through giving priority to them about when and what task will be done. At this point, it is worth to touch upon Turkish education system. Due to the fact that Turkish education system has a centralized management, students' autonomy does not appear in context of education programs (Ergür, 2010). As a result of this system, students cannot choose to take

responsibility for principal components of education program such as targeting, building the content of lesson, choosing material, determination of instruction method and techniques. In this respect, giving students the right to speak in different phases of education program; allowing classroom activities that provide students to take more responsibility in teaching-learning process; supporting the improvement of students' autonomous behaviors through non-class activities and homework; taking students' opinions about the teaching process; using multiple evaluation approach, through which teacher, student, and peers will be able to assess themselves in measurement and evaluation process; and enhancing the use of portfolios are suggested to curriculum developers.

If science teachers succeed in creating such a learning environment, findings demonstrated that they will also succeed in engaging their students in learning not only behaviorally, but also emotionally, cognitively, and agentically. Reeve (2012) has also supported that teachers' more autonomy supportive behaviors lead to greater engagement with respect to all aspects.

In addition to autonomy support, mastery evaluation had also impact on students' behavioral engagement, so that firstly teachers should focus on students' personal improvement instead of making normative evaluation. To do this, teachers should avoid from calling out the students' grades and displaying only selected papers in public spaces, since the publicness of the evaluation practices can enable the social comparison information to all students about their relative ability and performance. Additionally, teachers should use more than one way for grading, since all students cannot show their best work in same formats. Diversity in evaluation methods, such as using portfolios, not just multiple-choice exams, provides all students an opportunity to show their ability and performance as well as allow teachers to treat their students fairly. Last suggestion for making evaluation mastery is welcoming the mistakes that students make, and providing corrective feedback. Ames (1992c) recommended giving feedbacks stressing that mistakes and effort are important for learning, and giving students opportunities to improve their work through allowing them to revise their homework for a higher grade.

Finally, self-efficacy seems to be a prominent factor in 7th grade students' learning since it was found to be predictor of not only behavioral engagement, but the other engagement variables and science achievement. Therefore, it is also suggested that teachers should try to improve students' judgments about their abilities to accomplish science tasks. In order to achieve this, *firstly*, teachers should make tasks, activities and materials interesting, relevant, useful, and acquainted to students. Additionally, they should encourage students to involve in activities and discussions and should appreciate creative thinking and original ideas in science class. Therefore, it is suggested that teachers utilize inquiry-based and hands-on science activities and tasks in order to enhance students' science self-efficacy because such activities and tasks allow students to engage in learning process actively. With the appropriate guidance of teachers to students, they may accomplish the tasks better, and their self-efficacy eventually increases through these successful practices. Indeed, many studies found the mastery experience as the most influential source of self-efficacy (Kıran & Sungur, 2012; Lent, Lopez & Bieschke, 1991; Palmer, 2005; Usher & Pajares, 2006a). Additionally, the challenge level of these learning activities should be set at optimum level, since students should be able to experience successes in learning to improve their self-efficacy (Kıran & Sungur, 2012). *Secondly*, as mentioned before, teachers should establish autonomy-supportive learning environments through determining and satisfying students' needs; taking the students' opinions; considering their interests, feelings, and preferences; and stressing learning goals (Reeve, Deci & Jang, 2010). *Finally*, whether the evaluation is mastery oriented has also important influence on students' self-efficacy beliefs. In order to enhance students' self-efficacy and engagement, Ames (1992c) suggested some strategies supporting mastery goals for the evaluation progress. Since social comparison was found to be as negative effector for self-efficacy and using effective learning strategies, she suggested that social comparison should not be stressed and not made public by teachers in the classroom. For example, teachers should not announce the highest and lowest grades on science exams; and should not present students' papers, grades, and improvement process. Additionally, teachers should also avoid grouping students in terms of their ability or

performance. Instead of this, teachers should focus on self-improvement and mastery; concern with students' effort while grading. Moreover, they should enable students to improve themselves and perceive mistakes as a part of learning process.

5.3. Limitations and Suggestions for Further Research

Although the present study shed light on predictors of students' science achievement, some limitations need to be noted for future studies. First, the present study included just seventh grade students in two districts of Gaziantep, this can cause a problem for generalizability of findings. Therefore, sample can be extended to students in other grade levels and other districts and provinces in Turkey. The second limitation concerns the measurement of the constructs. That is, self-report instruments were administered in this study, so the results of the study were just based on these instruments. Observations or interviews can also be used as qualitative data collection procedures in order to obtain deeper understanding of the issue from both students' and teachers' views and validate the data obtained from the self-report instruments. In this way, more real-like understanding about students' perceptions of classroom goal structures, self-efficacy beliefs, engagement and achievement can be provided. The third limitation concerns the method that was used to data analysis in this study. A cross-sectional design was used in the current study, so results of the path model do not reflect cause-effect nature of the relationships. A longitudinal design can be used in future studies to determine how these concepts change by time and environment. Another limitation is the form of measurement of achievement, because content of the Science Achievement Test (SAT) used to measure participants' science achievement was limited to the first semester of 7th grade science curriculum. More comprehensive tests and students' science grades can be used to assess students' science achievement in future researches. Another limitation concerns the theoretical content of the study. Although achievement goal theory provides a theoretical basis for the present study, students' personal achievement goals were not included in the path model. Personal achievement goals can be integrated to model as variables in future researches in order to get a more comprehensive picture of the motivation and achievement. Finally, most of the

expectorations related to agentic engagement were not confirmed in this study. Therefore, the study can be replicated using the new version of the agentic engagement scale (AES) (Reeve, 2013). In this version, two new items that assess students' proactive contributions into the learning environment were added. Additionally, two items were removed from the original scale, since they showed weak correlation with agentic-centric motivations. Furthermore, some items were strengthened. Reeve (2013) showed that this revised scale reflects the agentic engagement construct better. Therefore, this revised scale can be used in future studies.

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APPENDICES

APPENDIX A

A. DEMOGRAPHICAL QUESTIONNAIRE

Sevgili Öğrenci,

İlköğretim öğrencilerinin Fen Bilgisi dersindeki tutum ve davranışlarını belirlemek amacıyla bir araştırma yapılmaktadır. Bu nedenle sizlerin görüşlerinin alınmasına gerek duyulmuştur. Birinci bölümde sizinle ilgili kişisel bilgileri doldurmanız istenmektedir. Diğer bölümlerde ise fen bilgisi dersindeki öğrenci tutum ve davranışlarına yönelik bir dizi ifade bulunmaktadır. Bu ifadelere ne ölçüde katıldığınızı belirtmek için uygun rakamı yuvarlak içersine alınız.

Araştırma sonuçları kesinlikle gizli tutulacaktır. Araştırmanın amacının gerçekleşmesi cevaplarınızın içtenliğine ve soruları eksiksiz olarak cevaplamanıza bağlıdır.

Çalışmaya katıldığınız için teşekkür ederim.

F. Melike Hıdıroğlu
Orta Doğu Teknik Üniversitesi Yüksek Lisans Öğrencisi

1.Bölüm: Kişisel Bilgiler

1. Cinsiyetiniz nedir? ❑ Kız ❑ Erkek

2. Kardeş sayısı: ……

3. Doğum tarihiniz (Yıl olarak belirtiniz): …….

4. Geçen dönemki fen dersi karne notunuz: …….

5. Okulunuzun adı:.....

6. Şubeniz : ❑ 7A ❑ 7B ❑7C ❑7D ❑7E ❑7F ❑7G ❑7...

7. Anneniz çalışıyor mu?
❑ Çalışıyor ❑ Çalışmıyor
❑ Düzenli bir işi yok ❑ Emekli

8. Babanız çalışıyor mu?
❑ Çalışıyor ❑ Çalışmıyor
❑ Düzenli bir işi yok ❑ Emekli

9. Ne kadar sıklıkla eve gazete alıyorsunuz?
❑ Hiçbir zaman ❑Bazen ❑Her zaman

Anne ve babanızın eğitim düzeyi nedir?

10. Anne	11. Baba
❑ Hiç okula gitmemiş	❑ Hiç okula gitmemiş
❑ ilkokul	❑ ilkokul
❑Ortaokul	❑Ortaokul
❑ Lise	❑ Lise
❑ Üniversite	❑ Üniversite
❑ Yüksek Lisans	❑ Yüksek Lisans
❑ Doktora	❑ Doktora

12 Evinizde bir çalışma odanız var mı?
❑ Evet ❑ Hayır

13 Evinizde bilgisayarınız var mı?
❑ Evet ❑ Hayır

14 Bilgisayarınızın internet bağlantısı var mı?
❑ Evet ❑ Hayır

15. Evinizde kaç tane kitap bulunuyor? (Magazin dergileri, gazete ve okul kitapları **dışında**)
❑ Hiç yok ya da çok az (0 - 10)
❑ 11 – 25 tane
❑ 26 – 100 tane
❑ 101 – 200 tane
❑ 200 taneden fazla

APPENDIX B

B. SURVEY OF CLASSROOM GOALS STRUCTURES (SCGQ)

		Kesinlikle Katılmıyorum	Katılmıyorum	Katılıyorum	Kesinlikle Katılıyorum
1	Bu dersteki etkinlikler ve ev ödevleri ilgi çekicidir.	1	2	3	4
2	Bu derste öğretmen, konuların anlayarak öğrenilmesini vurguluyor.	1	2	3	4
3	Bu derste öğretmen, konuları öğrenmemizden kendimizin sorumlu olmamızı istiyor.	1	2	3	4
4	Bu derste sadece bir kaç öğrenci yüksek not alıyor.	1	2	3	4
5	Bu derste öğretmen öğrencilere not vermek için birden fazla değerlendirme yolu (sınavlar, projeler, sunuşlar, vb.) kullanıyor.	1	2	3	4
6	Bu derste yapılan sınavlar sınıfta öğrendiklerimizle uyumludur.	1	2	3	4
7	Bu derste öğretmen; konuları öğrencilerin ilgisini çekecek, onlara tanıdık gelecek ve günlük yaşamla bağlantı kurabilecekleri tarzda sunuyor.	1	2	3	4
8	Bu derste yüksek not almak için öğrencilerin birbirleriyle yarışması gerekiyor.	1	2	3	4
9	Öğrenciler, bu derste üzerinde çalışmak istedikleri konuları/projeleri seçebiliyor.	1	2	3	4
10	Bu derste verilen sınav ve ödevlerin sonucunda alınan bir notu, sadece o notun sahibi olan öğrenci görebiliyor.	1	2	3	4
11	Bu derste öğrenciler bir hata yaptığında bu durum öğretmen ve öğrenciler tarafından saygıyla karşılanıyor.	1	2	3	4
12	Bu derste öğretmen; derste yapılan etkinliklerin, öğrencilerin günlük hayatları ve gelecekteki meslekleriyle olan ilişkisini gösteriyor.	1	2	3	4
13	Bu derste öğretmen, her bir öğrencinin öğrenmek istediği konuları belirlemeye çalışıyor.	1	2	3	4
14	Öğretmen, bu dersteki hedeflerimizi gerçekleştirebilmek için nasıl plan yapabileceğimizi anlatıyor.	1	2	3	4
15	Bu derste öğrencilere yaptıkları hataları düzeltmeleri için fırsat veriliyor	1	2	3	4
16	Öğretmen; bu derste yapılan etkinlik ve ödevlerin, bizim için gelecekte ne kadar yararlı olacağını anlamamıza yardımcı oluyor.	1	2	3	4
17	Bu derste öğretmen konuları öğrencilere anlamlı gelecek tarzda açıklıyor.	1	2	3	4
18	Bu derste öğrenciler notlarını yükseltmek için ödevlerini tekrar yapabiliyorlar.	1	2	3	4
19	Bu derste öğretmen adil olarak not veriyor.	1	2	3	4
20	Bu derste öğrenciler büyük ölçüde öğretmeni dinleyerek ve not alarak öğreniyor.	1	2	3	4
21	Öğretmen bu derste yapılan etkinlik ve ödevlerin organize ve idare edilmesinde rehberlik yapıyor ve önerilerde bulunuyor.	1	2	3	4
22	Bu derste öğretmen, gelişim gösterip göstermediğimizle ilgileniyor.	1	2	3	4
23	Öğrencilere bu dersteki sınav yada diğer etkinlikler yoluyla nasıl	1	2	3	4

	değerlendirileceklerine dair bilgi veriliyor.				
24	Bu derste öğrenciler sınıf içi etkinliklere ve tartışmalara katılarak öğreniyor.	1	2	3	4
25	Bu derste öğretmen yaratıcı düşünceye ve orijinal fikirlere değer veriyor.	1	2	3	4
26	Bu derste yalnızca yüksek not alan öğrenciler dersin temposuna ayak uydurabiliyor.	1	2	3	4

APPENDIX C

C. MOTIVATED STRATEGIES FOR LEARNING QUESTIONNAIRE (MSLQ)

		Beni hiç yansıtmıyor						**Tam olarak yansıtıyor**
1	Fen ve teknoloji dersinden çok iyi bir not alacağımı düşünüyorum.	1	2	3	4	5	6	7
2	Fen ve teknoloji dersi ile ilgili okumalarda yer alan en zor konuyu bile anlayabileceğimden eminim.	1	2	3	4	5	6	7
3	Fen ve teknoloji dersinde öğretilen temel kavramları öğrenebileceğimden eminim.	1	2	3	4	5	6	7
4	Fen ve teknoloji dersinde, öğretmenin anlattığı en karmaşık konuyu anlayabileceğimden eminim.	1	2	3	4	5	6	7
5	Fen ve teknoloji dersinde verilen sınav ve ödevleri en iyi şekilde yapabileceğimden eminim.	1	2	3	4	5	6	7
6	Fen ve teknoloji dersinde çok başarılı olacağımı umuyorum.	1	2	3	4	5	6	7
7	Fen ve teknoloji dersinde öğretilen becerileri iyice öğrenebileceğimden eminim.	1	2	3	4	5	6	7
8	Dersin zorluğu, öğretmen ve benim becerilerim göz önüne alındığında, fen ve teknoloji dersinde başarılı olacağımı düşünüyorum.	1	2	3	4	5	6	7

APPENDIX D

D. ENGAGEMENT QUESTIONNAIRE (EQ)

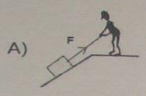
	Kesinlikle katılmıyorum	Katılmıyorm	Katılıyorum	Kesinlikle Katılıyorum
1) Fen dersinde öğretmenime sorular sorarım.	1	2	3	4
2) Dersle ilgili sevdiğim ya da sevmediğim şeyleri fen öğretmenime söylerim.	1	2	3	4
3) Fen dersiyle ilgili nelere ilgi duyduğumu öğretmenime söylerim.	1	2	3	4
4) Fen dersiyle ilgili tercihlerimi ve düşüncelerimi açıkça ifade ederim.	1	2	3	4
5) Fen dersini daha iyi hale getirebilmek için önerilerde bulunurum.	1	2	3	4
6) Fen dersini dikkatle dinlerim.	1	2	3	4
7) Fen dersine çok çalışırım.	1	2	3	4
8) Fen öğretmenimiz yeni bir konuya başladığında, dikkatle dinlerim.	1	2	3	4
9) Fen dersinde yeni bir konuya başladığımızda, çok çalışırım.	1	2	3	4
10) Fen dersine dikkatimi veririm.	1	2	3	4
11) Fen dersinde yeni şeyler öğrenmekten hoşlanırım.	1	2	3	4
12) Fen dersinde herhangi birşey üzerinde çalışmak ilgimi çeker.	1	2	3	4
13) Fen dersinde öğrendiklerimize karşı merak duyuyorum.	1	2	3	4
14) Fen dersi eğlencelidir.	1	2	3	4
15) Fen dersindeki yeni bilgileri eski bilgilerimle ilişkilendirmeye çalışırım.	1	2	3	4
16) Fen dersine çalışırken yeni bilgilerle kendi deneyimlerim arasında bağlantı kurmaya çalışırım.	1	2	3	4
17) Fen dersine çalışırken tüm farklı fikirleri bir araya getirerek, onları anlamlandırmaya çalışırım.	1	2	3	4
18) Fen dersine çalışırken, kendi örenkelerimi oluşturarak önemli kavramları anlamaya çalışırım.	1	2	3	4
19) Fen dersine çalışmaya başlamadan önce, ulaşmak istediğim hedefi belirlerim.	1	2	3	4
20) Fen dersine çalışırken, ara sıra durur, yaptıklarımı gözden geçiririm.	1	2	3	4
21) Fen dersine çalışırken, yalnızca doğru cevapları bulup bulamadığıma değil, ne kadar anladığıma da dikkat ederim.	1	2	3	4
22) Eğer bir fen konusunu anlamakta zorlanıyorsam, onu öğrenmek için izlediğim yolu değiştiririm.	1	2	3	4

APPENDIX E

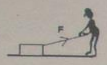
E. SCIENCE ACHIEVEMENT TEST (SAT)

7. **Fiziksel anlamda iş yapılabilmesi için;**
- Kuvvet uygulanmalı
- Kuvvet etkisindeki cisim yol almalıdır.

buna göre aşağıdakilerden hangisinde kesinlikle iş yapılamaz?

A) 

B) 

C) 

D) 

8. **Aşağıdakilerden hangisi burnumuzun görevi değildir?**

A) Koku alma
B) Alınan havayı süzme
C) Alınan nemli havayı kurutma
D) Alınan soğuk havayı ısıtma

9. **Aşağıdakilerden hangisi diğer iç salgı bezlerinin çalışmasını denetler ve düzenler?**

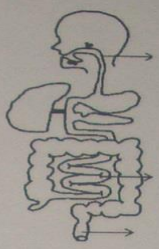
A) Böbrek üstü bezi
B) Hipofiz bezi
C) Tiroit bezi
D)Yumurtalık

10. Korku, heyecan, mutluluk ve öfke gibi durumlarda vücutta adrenalin hormonu seviyesi artar.
Buna göre, aşağıdaki durumların hangisinde Hülya'nın adrenalin hormonu seviyesinde artma beklenir?

A) Yemek yerken su içtiğinde
B) Ders çalıştıktan sonra uyuduğunda
C) Her gün, ev işlerinde annesine yardım ettiğinde
D) Sınavda başarılı olunca aşırı sevindiğinde

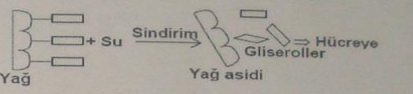
11. **Göze gelen ışık ışınları ilk önce aşağıdakilerin hangisinden geçer?**

A) Sarı benekten
B) Göz merceğinden
C) İristen
D) Korneadan

12. 

Şekilde sindirim sisteminin bazı organları okla gösterilmiştir.
Aşağıda verilen olaylardan hangisi okla gösterilen organlardan birinin görevi değildir?

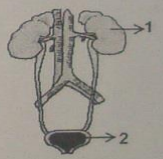
A) Atık maddelerin vücuttan uzaklaştırılması
B) Besinlerin ağızdan yemek borusuna iletilmesi
C) Besinlerin bulamaç hâline getirilmesi
D) Besinlerin kana geçirilmesi

13. 

Yağlar, şekilde de görüldüğü gibi sindirim sisteminde sindirilerek yağ asidi ve gliserole ayrılır.
Bu bilgilere göre aşağıdakilerden hangisine ulaşılamaz?

A) Yağların büyük moleküllü olduğuna
B) Yağ asidi ve gliserolün hücre zarından geçebilecek büyüklükte olduğuna
C) Yağların kan yoluyla taşındığına
D) Yağların sindiriminde su kullanıldığına

14. **Öğretmen;**
Şekildeki boşaltım sisteminde verilen 1 ve 2 numaralı organların isim ve görevlerini söyler misin?



Öğrenci;
1 numaralı organ böbrektir, idrarı depo eder.
2 numaralı organ idrar kesesidir, kanı süzer.
Bu açıklamalara göre öğrenci ile ilgili olarak aşağıdakilerden hangisi söylenebilir?

A) Boşaltım sistemi organlarını bilmiyor.
B) Boşaltım sistemi organlarının şeklini biliyor, ancak görevlerini birbirine karıştırıyor.
C) Boşaltım sistemi organları ile diğer sistemlerin organlarını ayırt edemiyor.
D) Boşaltım sistemi organlarını ve görevlerini çok iyi biliyor.

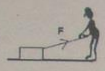
TEST BİTTİ
...

7. **Fiziksel anlamda iş yapılabilmesi için;**
- Kuvvet uygulanmalı
- Kuvvet etkisindeki cisim yol almalıdır.

buna göre aşağıdakilerden hangisinde kesinlikle iş yapılamaz?

A) 

B) 

C) 

D) 

8. **Aşağıdakilerden hangisi burnumuzun görevi değildir?**

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A) Sarı benekten
B) Göz merceğinden
C) İristen
D) Korneadan

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Şekilde sindirim sisteminin bazı organları okla gösterilmiştir.
Aşağıda verilen olaylardan hangisi okla gösterilen organlardan birinin görevi değildir?

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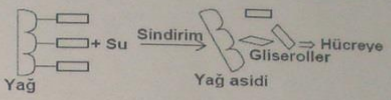
13. 

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Bu bilgilere göre aşağıdakilerden hangisine ulaşılamaz?

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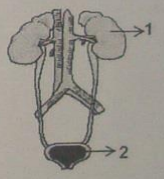
B) Yağ asidi ve gliserolün hücre zarından geçebilecek büyüklükte olduğuna
C) Yağların kan yoluyla taşındığına
D) Yağların sindiriminde su kullanıldığına

14. **Öğretmen;**
Şekildeki boşaltım sisteminde verilen 1 ve 2 numaralı organların isim ve görevlerini söyler misin?



Öğrenci;
1 numaralı organ böbrektir, idrarı depo eder.
2 numaralı organ idrar kesesidir, kanı süzer.
Bu açıklamalara göre öğrenci ile ilgili olarak aşağıdakilerden hangisi söylenebilir?

A) Boşaltım sistemi organlarını bilmiyor.
B) Boşaltım sistemi organlarının şeklini biliyor, ancak görevlerini birbirine karıştırıyor.
C) Boşaltım sistemi organları ile diğer sistemlerin organlarını ayırt edemiyor.
D) Boşaltım sistemi organlarını ve görevlerini çok iyi biliyor.

TEST BİTTİ
...

APPENDIX F

F. EXTENDED TURKISH SUMMARY

(Genişletilmiş Türkçe Özet)

ALGILANAN SINIF İÇİ HEDEF YAPILARININ, ÖZ-YETERLİĞİN VE ÖĞRENCİ KATILIMININ YEDİNCİ SINIF ÖĞRENCİLERİNİN FEN BAŞARISINDAKİ ROLÜ

Giriş ve İlgili Literatür

Eğitim sisteminin çeşitli hedefleri arasından en önemli olanı şüphesiz ki akademik başarıyı etkileyen faktörleri belirlemek ve geliştirmektir (Badiee, Babakhani, ve Hashemian, 2014). Bu faktörlerden biri öğrencilerin motivasyonudur. Bu nedenledir ki özellikle son yıllarda motivasyon, eğitim araştırmacılarının odak noktası olmuştur. Motivasyon, ev hayatı ya da aile etkisi gibi bireysel (Singh, Granville, ve Dika, 2002); ve sınıf iklimi, öğretim yöntemleri gibi öğretmen tarafından kontrol edilebilen faktörlerden etkilenmektedir (Ames, 1992c). Sosyal-bilişsel görüşlere göre sınıf ortamı öğrencilerin motivasyonel inançlarını etkilemektedir. Bu görüşlerden bir tanesi de başarı hedefleri teorisidir ve bu çalışmanın temelini bu görüş oluşturmaktadır. Başarı hedefleri teorisi, öğrencilerin başarı durumlarına nasıl yaklaştıklarını, deneyimlerini ve performanslarını tespit ettiği gibi, aynı zamanda bu kişilerin neden başarılı olmak istedikleri üzerinde durmaktadır. Başka bir deyişle, öğrencilerin başarısını değerlendirmek için onun temel başarı hedeflerinin belirlenmesi gerektiğini belirtir. Bu başarı hedefleri temelde iki şekilde karşımıza çıkmaktadır. Birincisi öğrencinin öğrenme, ilerleme ve beceri kazanması üzerine odaklı olan ustalık yönelimli hedefler; ikincisi ise sosyal karşılaştırma ve başkalarına karşı yeterliliğin gösterilmesi üzerine odaklı olan performans yönelimli hedeflerdir. Öğrencilerin bu hedef yönelimlerinden hangisini benimseyecekleri, sınıf içi hedef yapıları algılarına bağlıdır (Ames, 1984). Sınıf içi

hedef yapıları, sınıftaki öğretim yöntem ve stratejilerinin vurguladığı başarı hedeflerini içermektedir. Bu nedenle ustalık hedef yapılarının baskın olduğu sınınflardaki öğrenciler öğrenmeye, anlamaya ve kişisel gelişimlerine değer verirken; performans hedef yapılarının vurgulandığı sınıfta öğrenciler kendilerini diğerleriyle kıyaslayarak daha iyi performans göstermek için çabalamaktadır. İlgili literatürde öğrencilerde ustalık hedef yapıları algısının oluşmasında üç sınıf yapısı ön plana çıkmaktadır. Bunlar sınıf içi motive edici etkinlikleri içeren, özerkliği destekleyen ve öğrenme odaklı değerlendirmeleri içeren yapılardır. Ames (1992c)' e göre sınıf içi etkinliklerin düzenlenmesi öğrenmenin temel faktörüdür; çünkü öğrencilerin katılımı, öz-yeterlikleri, tutumları ve ilgileri de bu yapılara göre şekillenmektedir. Bu sebeple, etkinlikler net, anlamlı olmalı ve kısa dönem hedefler içermelidir. Öğrenciler sınıfta kendi seçimlerini yapabilmeli, öğrendiği şeylerin kontrolünü kendinde hissedebilmelidir. Ayrıca değerlendirmeler adil, öğrenmeye ve öğrenci çabasına yönelik yapılmalı, sosyal karışılaştırmaya fırsat vermemelidir. Bu çalışmada da sınıf içi hedef yapıları algıları özerklik desteği, motive edici etkinlikler ve öğrenmeye yönelik değerlendirme olmak üzere bu üç boyutta incelenmiştir.

Günümüzde başarı hedefleri teorisi çerçevesinde öğrencilerin derse katılım seviyelerindeki farklılıklar da incelenmektedir (Elliot, 1999; Pintrich, 1994), ve bu çalışmalar öğrencilerin ustalık hedef yapıları algılarının onların derse katılımlarını etkilediğini göstermektedir (Anderman ve Patrick, 2012). Öğrenci katılımı başarıyı etkileyen faktörlerin bir diğeridir ve çok boyutlu bir kavram olmakla birlikte genel kanıya göre üç alt boyutta incelenmektedir (Fredricks ve diğerleri, 2004). Bunlar; etkinliklere katılmak, sınıf kurallarına uymak gibi davranışları tanımlayan davranışsal katılım boyutu; öğrencilerin ilgili ya da bıkkın, sıkılmış olması gibi sınıftaki duygusal reaksiyonlarını tanımlayan duygusal katılım boyutu; öğrencilerin öğrenmek için düşünme becerilerini, stratejik öğrenme yöntemlerini kullanmasını tanımlayan bilişsel katılım boyutudur. Ancak 2011 yılında Reeve ve Tseng tarafından yapılan bir araştırmanın sonuçlarına göre bu boyutların öğrenci katılımını tam olarak tanımlayamadıkları tespit edilmiştir. Bu nedenle dördüncü bir boyut olarak, öğrencilerin öğrendikleri şeyleri kişiselleştirerek derse yaptıkları olumlu katkılar olarak tanımlanan, aracı katılımın eklenmesi gerektiği vurgulanmaktadır. Bu

nedenle bu çalışmada da öğrenci katılımı bu dört alt boyut çerçevesinde incelenmiştir.

Bu çalışmadaki diğer bir değişken ise öğrencilerin öz-yeterlik düzeyleridir çünkü bütün motivasyonel yapılar arasında öğrenci katılımını ve öğrenmeyi etkileyen en önemli faktör öz-yeterliktir (Linnenbrink ve Pintrich, 2003). Öz-yeterlik, Bandura (1997) tarafından bireyin belli bir performans göstermesi için gerekli etkinlikleri düzenleyip başarılı bir biçimde gerçekleştirme kapasitesi olarak tanımlanmıştır. Öz-yeterlikleri yüksek olan kişilerin daha sıkı çalışma, zorluklar karşısında bile pes etmeden devam etme gibi davranışlar sergiledikleri bilinmektedir (Linnenbrink ve Pintrich, 2003). Bu nedenle öz-yeterlik inançlarının öğrenci katılımının bütün alt boyutları ile ilgili olması beklenmektedir.

Özetle daha önce yapılan çalışmalarda öğrenci katılımının öğrenci başarısıyla doğrudan ilişkisi tespit edilmişken, sınıf içi hedef yapıları algısının başarı ile arasında dolaylı bir ilişki olduğu belirlenmiştir. Yapılan çalışmaların bulgularına göre sınıf ortamı algısının öğrencilerin motivasyonunu (öz-yeterlik algısı ve içsel değer) etkilediği ve bunların da başarı öğrenci katılımı ve başarısı üzerinde etkisi olduğu belirlenmiştir (Sungur ve Güngören, 2009).

Yukarıda belirtilen teorik çatı altında bu çalışmada "yedinci sınıf öğrencilerinin sınıf içi hedef yapıları algıları, katılımları, öz-yeterlik algıları ve fen başarıları arasındaki ilişki nedir?" sorusuna cevap aranmıştır. Bu amaçla bir yol modeli tasarlanmış ve test edilmiştir. Modelde sınıf içi hedef yapıları algısının tüm boyutlarının, katılım değişkeninin bütün alt boyutlarıyla ve öz-yeterlik ile doğrudan ilişkili olduğu; ancak başarı ile dolaylı olarak ilişkili olduğu önerilmiştir. Ayrıca, öz-yeterliğin katılım değişkeninin her bir alt boyutuyla ve fen başarısı ile doğrudan ilişkili olduğu da öngörülmüştür. Son olarak, katılım değişkeninin her bir alt boyutunun birbirleriyle ve fen başarısı ile ilişkili olması da beklenmiştir.

Yöntem

Bu çalışma öğrencilerin öz-bildirim ölçeklerine vermiş oldukları cevaplara dayandığı için nicel bir çalışma olup, çalışmanın dizaynı ikiden fazla değişken arasındaki olası ilişkileri incelemesi bakımından korelasyon araştırması olarak tanımlanabilir.

Bu araştırmanın hedef evrenini Gaziantep ili merkez okullarında okuyan tüm yedinci sınıf öğrencileri oluşturmaktadır. Erişilebilir evreni ise Gaziantep'in Şehitkamil ve Şahinbey ilçelerindeki devlet okullarında eğitim gören tüm yedinci sınıf öğrencileri oluşturmaktadır. Çalışmanın örneklemini toplamda 744 yedinci sınıf öğrencisi (403 kız ve 337 erkek) oluşturmuştur.

Bu çalışmanın verileri, Kişisel Bilgiler Anketi (Bkz. EK-A), Sınıf-içi Hedef Yapıları Anketi (Bkz. EK-B), Öğrenmede Güdüsel Stratejiler Anketi (Bkz. EK-C), Katılım anketi (Bkz. EK-D) ve Fen Bilgisi Başarı Testi (Bkz. EK-E) olmak üzere beş farklı ölçekten oluşan bir anket aracılığıyla toplanmıştır:

Öğrencilerden öncelikle örneklemi tanımlamak ve öğrencilerin sosyo-ekonomik statülerini belirlemek için 15 maddelik kişisel bilgiler formunu doldurmaları istenmiştir (Bkz. EK-A).

Öğrencilerin sınıf ortamı algıları Sınıf-içi Hedef Yapıları Anketi (Survey of Classroom Goals Structures) kullanılarak "motive edici etkinlikler", "özerkliğin desteklenmesi" ve "öğrenmeye yönelik değerlendirme" olmak üzere üç alt boyutta ölçülmüştür. Bu ölçeğin temelini Ames (1992) tarafından oluşturulan TARGET modeli oluşturmaktadır. Ölçek 4'lü likert tipinde bir öz-bildirim ölçeğidir. (Bkz. EK- B) Ölçeğin her alt boyutunda alınan yüksek puanlar öğrencilerin; sınıf içi etkinlikleri motive edici, sınıfı öğrenci özerkliğini destekleyici ve değerlendirmeleri öğrenme odaklı bulduklarını göstermektedir. Ölçeğin Türkçe' ye uyarlanması Güngören *ve* Sungur (2009) tarafından yapılmış ve tüm alt boyutlar için güvenirliğin yeterince yüksek olduğu gözlenmiştir. Bu çalışmada faktör yapılarını ve testin güvenirliğini geçerli kılmak amacıyla doğrulayıcı faktör analizi ve her alt boyut için güvenirlik katsayıları hesaplanmış ve bu analizler sonucunda 4 maddenin (4, 8, 20 ve 26. soruların) anketten çıkarılması uygun görülmüştür. Anketin bu son şekli ile analizler tekrarlandığında testin yeterince güvenilir *(*motive edici etkinlikler (α = .85), özerkliğin desteklenmesi (α = .65), öğrenmeye yönelik değerlendirme (α = .74)) ve geçerli olduğu belirlenmiştir (GFI = .95, CFI = .98, RMSEA = .04, SRMR = .03).

Reeve ve Tseng (2011) tarafından oluşturulan Katılım Anketi öğrenci katılımının 'davranışsal', 'aracı', 'bilişsel' ve 'duygusal' katılım olmak üzere dört alt boyutta incelenmesini sağlayan bir öz-bildirim ölçeğidir. Bu dört alt boyut nedeniyle

anket oluşturulurken her alt boyut için farklı ölçeklerden yararlanılmıştır ve her ölçeğin güvenirliği yeterince yüksek olarak belirlenmiştir. Sonuç olarak geliştirilen anket 22 maddeden oluşan 7'li likert tipinde bir ankettir. Verilen cevaplar 7'den (kesinlikle katılıyorum) 1'e (kesinlikle katılmıyorum) şeklinde derecelendirilmiştir. Literatürde anketin Türkçe çevirisi bulunmamaktadır. Bu nedenle çevirisi araştırmacı tarafından yapılmıştır. Ayrıca, literatürde belirtildiği üzere, yedinci sınıf öğrencilerine daha uygun olduğu düşünülerek ölçek 4'lü likert tipinde düzenlenmiştir (Bkz. EK- C). Bu anket için pilot çalışma yapılarak anketin yapı geçerliği ve güvenirliği incelenmiştir. Sonuçlar anketin faktör yapılarının iyi uyum gösterdiğini (GFI = .85, CFI = .98, RMSEA = .05, SRMR = .05) ve güvenirliğinin iyi olduğunu göstermiştir (davranışsal katılım için α = .92; duygusal katılım için α = .84; bilişsel katılım için α = .86 ve aracı katılım için α= .82). Faktör analizi ve güvenirlik katsayısı hesaplamaları ana çalışma için de uygulanmış ve pilot çalışma ile benzer sonuçlar elde edilmiştir (GFI = .93, CFI = .99, RMSEA = .05, SRMR = .04) ve (davranışsal katılım için α = .88; duygusal katılım için α = .83; bilişsel katılım için α = .86 ve aracı katılım için α= .82).

Öğrencilerin öz-yeterlik algıları, Pintrich ve DeGroot (1990) tarafından geliştirilen Öğrenmede Güdüsel Stratejiler Anketi'nin (Motivated Strategies for Learning Questionnaire (MSLQ) öz-yeterlik alt boyutu (self-efficacy for learning and performance sub-scale) kullanılarak ölçülmüştür. Ölçek 7'li likert tipinde bir öz-bildirim ölçeğidir. Verilen cevaplar 7'den (beni tam olarak yansıtıyor) 1'e (beni hiç yansıtmıyor) şeklinde derecelendirilmiştir (Bkz. EK- D). Öz-yeterlik alt boyutundan alınan yüksek puanlar öğrencilerin fen dersi çalışmalarını başarma konusunda kendilerini ne kadar çok güvenli hissettiklerini yansıtmaktadır. Ölçek, Sungur (2004) tarafından Türkçe' ye çevrilmiş ve adapte edilmiştir. Ölçeğin öz-yeterlik alt-boyutunun güvenirliği ".89" olarak belirtilmiştir. Bu çalışmada ise ölçeğin güvenirliği ".90" olarak hesaplanmıştır. Ayrıca doğrulayıcı faktör analizi sonuçları iyi bir model uyumu göstermiştir (GFI = .96, CFI = .98, RMSEA = .08, SRMR = .03).

Yedinci sınıf öğrencilerinin fen başarısını ölçmek için Yerdelen (2013) tarafından geliştirilen fen başarı testi kullanılmıştır (Bkz. EK- E). Bu test ülkemizde

yapılan merkezi sınavlardan seçilen 14 çoktan seçmeli sorudan oluşmuştur. Test, kuvvet ve hareket, vücudumuzdaki sistemler ve elektrik ünitelerini içermektedir. Sorular bilgi, kavrama ve uygulama düzeyindeki kazanımlara yöneliktir. Öğrencilerin aldıkları puanlar hesaplanırken her doğru cevap için "1" puan verilirken her yanlış cevap için "0" puan verilmiş ve her öğrenci için tüm puanlar toplanmıştır. Güvenirlik katsayısı bu test için Kuder Richardson 20 (KR 20) formülü ile ".74" olarak hesaplanmış ve yeterince güvenilir olduğu görülmüştür.

Sonuçlar

Bu çalışmada veri analizi, başlangıç analizleri, betimsel istatistik ve çıkarımsal istatistik olmak üzere üç aşamada yapılmıştır.

Öğrencilerin sınıf içi hedef yapıları algıları, katılımları, öz-yeterlikleri ve fen başarıları ile ilgili betimsel istatistik olarak ortalama değer ve standart sapma değerleri hesaplanmıştır. Bu sonuçlara göre, sınıf içi hedef yapıları algısının her bir alt boyutu 4'lü likert ölçeğinin orta noktasının üzerindedir. Başka bir deyişle, öğrenciler fen dersinde özerklik desteğinin *(M* = 2.87, *SD* = .65) ve öğrenme odaklı değerlendirmenin *(M* = 2.83, *SD* = .61) yeterince vurgulandığını ve motive edici etkinliklerin *(M* = 2.90, *SD* = .66) sunulduğunu düşünmektedir. Öğrenci katılımının her bir alt boyutunun ortalama skorları da 4'lü likert ölçeğinin orta noktasının üzerindedir. Başka bir deyişle, sonuçlar öğrencilerin fen dersinde sabır, çaba ve dikkat gösterme gibi davranışlar sergileme eğiliminde olduklarını (*M* = 3.19, *SD* = .71); ilgi ve memnuniyet gibi duygusal reaksiyonlar gösterme eğiliminde olduklarını (*M* = 3.10, *SD* = .77); materyalleri anlamak için öğrenme stratejilerini kullandıklarını (*M* = 2.93, *SD* = .67); ve öğretime yapıcı katkıda bulunma eğiliminde olduklarını (*M* = 2.74, *SD* = .78) göstermiştir. Ayrıca, öz-yeterlik skorlarının ortalama değeri (*M* = 4.97, *SD* = 1.65) öğrencilerin fen konularını öğrenme konusunda orta derecede güvende hissettiklerini göstermiştir. Son olarak, fen başarı testi için elde edilen ortalama değer (*M* = 7.93) öğrencilerin fen başarılarının yeterince yüksek olmadığını göstermiştir.

Literatür çerçevesinde önerilen kavramsal modeli test etmek amacıyla LISREL 8.80 programında yol analizi uygulanmıştır. Analizde tüm değişkenler

gözlenen değişken olarak tanımlanmıştır. Sonuçlar modelin data ile iyi uyum gösterdiğini desteklemiştir (SRMR= .00, RMSEA= .04, GFI= .99, CFI= .99).

Yol analizi sonucu elde edilen standardize edilmiş yol katsayıları öz-yeterliğin yordayıcıları bakımından incelendiğinde yedinci sınıf öğrencilerinin öz-yeterliklerinin motive edici etkinlikler (β = .22), özerklik desteği (β = .25) ve öğrenme odaklı değerlendirme (β = .12) tarafından yordandığı görülmüştür. Bu sonuçlar sınıfta sunulan etkinlikleri anlamlı, kullanışlı ve ilginç bulan; fen dersinde özerkliklerinin desteklendiğini ve değerlendirmenin kendi çabalarına göre yapıldığını düşünen öğrencilerin fen dersindeki hedefleri başarmada kendilerine daha çok güvendikleri anlamına gelmektedir.

Sonuçlar öğrencilerin aracı katılımları bakımından incelendiğinde öz-yeterliğin (β = .06), özerklik desteği (β = .48),ve öğrenme odaklı değerlendirme algısının (β = .29) aracı katılım ile ilişikli olduğunu; ancak beklenenin aksine motive edici etkinlikler (β = .00) ile arasındaki ilişkinin anlamlı çıkmadığını göstermiştir. Bu bulgu fen dersinde yapılan değerlendirmeleri anlamlı, adil ve öğrenci çabasına yönelik bulan; fen dersinde özerkliğinin desteklendiğini düşünen; fen dersindeki hedefleri tamamlayabileceğine inanan öğrencilerin sınıfta öğrenmeye yönelik yapıcı katkılarda bulunma eğiliminde olduğunu desteklemiştir.

Sonuçlar öğrencilerin davranışsal katılımları bakımından incelendiğinde ise yine öz-yeterliğin (β = .06), özerklik desteği (β = .48) ve öğrenme odaklı değerlendirme algısının (β = .29) davranışsal katılım ile ilişkili olduğunu; ancak beklenenin aksine motive edici etkinlikler (β = .00) ile arasındaki ilişkinin anlamlı çıkmadığını göstermiştir. Bu bulgu fen dersinde yapılan değerlendirmeleri anlamlı, adil ve öğrenci çabasına yönelik bulan; fen dersinde kendi karar ve tercihlerinin önemsendiğini düşünen ve fen dersindeki amaçlarına başarıyla ulaşabileceğine inanan öğrencilerin sınıfta öğrenmek için daha çok çaba sarf etme, sabır ve dikkat gösterme ve konsantre olma gibi davranışlar sergileme eğiliminde olduğunu desteklemiştir.

Sonuçlar öğrencilerin bilişsel katılımları bakımından incelendiğinde ise öz-yeterlik (β=.41), motive edici etkinlikler (β=.13) özerklik desteği (β=.26) ile arasındaki ilişkilerinin anlamlı olduğunu; ancak ve öğrenme odaklı değerlendirme

(*β*=.05) ile olan ilişkisinin anlamlı olmadığını (*β*=.06) göstermiştir. Bu sonuçlar fen dersinde başarılı olacağına inanan; fen dersinde tercihlerinin, ihtiyaçlarının ve ilgilerinin dikkate alındığını düşünen; yapılan etkinlikleri ilgi çekici, günlük hayatla ilişkili ve anlamlı bulan öğrencilerin materyalleri hatırlamak, organize etmek ve anlamak için öğrenme stratejilerini ve bilişsel stratejileri kullanma eğiliminde oldukları anlamına gelmektedir.

Sonuçlar öğrencilerin duygusal katılımları bakımından incelendiğinde ise duygusal katılımın öz-yeterlik (*β*=.37), özerklik desteği (*β*=.28) ve öğrenme odaklı değerlendirme (*β*=.14) ile arasındaki ilişkilerinin anlamlı olduğunu; ancak motive edici etkinlikler ile olan ilişkisinin anlamlı olmadığını (*β*=.06) göstermiştir. Bu bulgular fen dersinde tercihlerinin, kararlarının ve ilgilerinin dikkate alındığını düşünen; fen dersinde başarılı olacağına inanan; yapılan değerlendirmeleri adil ve öğrenme odaklı bulan öğrencilerin fen dersini daha ilgi çekici ve eğlenceli bulduklarını desteklemiştir.

Yol analizi sonuçları fen başarısı açısından incelendiğinde öz-yeterlik, aracı katılım, davranışsal katılım, bilişsel katılım ve duygusal katılımın fen başarısındaki varyansın % 61'inin açıklandığı görülmüştür. Yol katsayıları öz-yeterlik (*β=.15*), davranışsal katılım (*β*= .25), bilişsel katılım (*β*= .25) ve duygusal katılımın (*β*= .29) fen başarısı ile doğrudan ilişkili olduğunu; ancak aracı katılımın (*β*= .02) fen başarısı ile olan ilişkisinin anlamlı olmadığını göstermiştir. Bu sonuçlar fen dersinde sabır, çaba ve dikkat gösteren; konuları gerçekten anlamak ve organize etmek için çaba harcayan; fen dersine karşı ilgi gösterme, sevme gibi olumlu duygusal tepkiler veren ve fen dersinde başarılı olacağı konusunda kendine güvenen öğrencilerin fen dersinde daha başarılı olduklarını desteklemiştir.

Son olarak yol analizi sonuçları tüm bu tek yönlü ilişkilerle beraber katılım değişkenleri arasındaki karşılıklı ilişkileri de ortaya koymuştur. Bu ilişkiler arasından davranışsal ve bilişsel katılım arasındaki ilişki; bilişsel ve duygusal katılım arasındaki ilişki; davranışsal ve duygusal katılım arasındaki ilişki anlamlı bulunmuşken; aracı değişkenin diğer katılım değişkenleri ile olan ilişkilerinin anlamlı olmadığı belirlenmiştir.

Özetle yol analizi sonuçlarına göre: (1) öğrencilerin fen dersindeki öz-yeterlikleri; davranışsal, duygusal ve bilişsel katılımları fen başarıları ile doğrudan ilişkilidir. (2) öğrencilerin sınıf içerisindeki etkinlikleri ne denli motive edici olarak algıladıkları, özerkliklerinin ne denli desteklendiği hakkındaki algıları ve değerlendirmenin ne denli öğrenci gelişimine ve öğrenmesine odaklı olduğu konusundaki algıları fen dersindeki öz-yeterlikleriyle doğrudan ilişkilidir. (3) Motive edici etkinlikler sadece bilişsel katılım ile doğrudan ilişkili iken; öğrenmeye yönelik değerlendirme davranışsal, duygusal ve aracı katılım ile; özerklik desteği ise bütün katılım değişkenleri ile doğrudan ilişkilidir. (4) Aracı katılım haricindeki diğer katılım alt boyutları arasındaki karşılıklı ilişkiler anlamlı bulunmuştur.

Tartışma ve Öneriler

Öğrencilerin sınıf içi hedef yapısı algıları ile öz-yeterlikleri arasındaki ilişki incelendiğinde sonuçlar motive edici etkinliklerin, özerklik desteği ve öğrenme odaklı değerlendirmenin öz-yeterlikle ilişkili olduğunu göstermiştir. Başka bir deyişle eğer öğrenciler fen dersindeki etkinlikleri ilgi çekici, günlük hayatla ilintili ve anlamlı bulurlarsa dersteki soyut kavramlar onlar için somutlaşacak ve daha kolay öğrenecekleri için fen dersindeki hedeflerini başarma konusunda kendilerine daha çok güveneceklerdir. Benzer şekilde, öğrenciler kendi çabalarına yönelik ve adil bir şekilde değerlendirildiklerini düşünürlerse öz-yeterlik inançları yükselecektir. Çünkü böyle bir öğrenme ortamında öğrencilere kendilerini geliştirmeleri için fırsatlar verilir, faklı değerlendirme metotları kullanılır ve öğrenciler arasında kıyaslama yapılmaz; bu da öğrencilerin daha çok motive olmalarını ve daha iyi öğrenmek için çabalamalarına fırsat verir. Son olarak eğer öğrencilerin dersin öğretimi ile ilgili karar verme aşamalarına katılmalarına ve kendi sorumluluklarını almalarına izin verilir ve öğrencide kontrolün kendisinde olduğu hissi yaratılabilirse, öğrencilerde sorumluluk alma, bağımsız ve lider olma isteği ve becerileri artacak; bu da verilen görevleri başarı ile tamamlama konusunda kendilerine güvenlerinin yükselmesini sağlayacaktır. Bu sonuçlar, ilgili çalışmalar tarafından da desteklenmektedir (Örn. Ames, 1992c; Pintrich ve Schunk, 2004; Greene ve diğerleri, 2004; Sungur ve Güngören, 2009).

Öğrenci katılımı ve öğrencilerin sınıf içi hedef yapıları algıları arasındaki ilişkiler incelendiğinde ise özerklik desteğinin tüm katılım değişkenleri ile ilgili olduğu görülmüştür. Bu nedenle sınıflarda öğrencilere özerklik desteği sağlanması son derece önemlidir. Bu amaçla öğrencilere sorularını sormaları, düşüncelerini paylaşmaları, ödev ve aktiviteleri kendi ilgilerine göre seçmeleri için fırsatlar verilmelidir. Bu bulgular literatürdeki bazı çalışmalarla da desteklenmiştir (Reeve ve diğerleri, 2004; Shih, 2008; Jang, Reeve, ve Deci, 2010). Diğer taraftan, motive edici etkinlikler ve öğrenci katılımı ile ilgili sonuçlardan bazıları literatürle tezat oluşturmaktadır. Motive edici etkinliklerin tüm katılım değişkenleri ile ilişkili olması beklenirken, sadece bilişsel katılım ile ilişkili olduğu bulunmuştur. Bu sonuç fen dersindeki materyalleri, etkinlikleri ve ödevleri ilgi çekici, anlamlı ve kullanışlı bulan öğrencilerin öğrenmek için daha fazla bilişsel stratejiler kullanma eğiliminde olduğu anlamına gelmektedir. Strateji kullanımının motive edici etkinlikler, özerklik desteği ve öğrenme odaklı değerlendirme bakımından sınıf ortamı algısı ile ilişkili olduğu Lau ve Lee (2008) ve Sungur ve Güngören (2009) tarafından da desteklenmiştir. Motive edici etkinliklerin literatürün aksine diğer katılım değişkenleri ile ilişkili çıkmaması ise motive edici etkinlikleri değerlendirmek için kullanılan maddelerin bu yapıyı tüm yönleriyle yansıtmamasından kaynaklanmış olabilir. Örneğin, Ames (1992c) ve Blackburn (1998) etkinliklerin kısa dönem hedefler içermesi gerektiğini ve çok zor ya da çok kolay olmaması gerektiğini belirtmiştir; ancak bu çalışmada kullanılan ölçekte bu özelliği değerlendirecek bir madde bulunmamaktadır. Ayrıca bazı anket maddeleri ölçeğin motive edici etkinlikler bölümü ile yüksek korelasyon göstermemektedir. Bu nedenle, sonraki çalışmalarda, kullanılan ölçek gözden geçirilerek, ankete motive edici etkinliklerin tüm özelliklerini değerlendirmek amacıyla yeni maddeler eklenebilir. Son olarak, öğrenme odaklı değerlendirmenin katılım değişkenleri ile ilişkisi incelendiğinde bu yapının bilişsel katılım hariç diğer katılım değişkenleri (davranışsal, duygusal, aracı katılım) ile ilişkili olduğu bulunmuştur. Oysa ki, Ames (1992c) değerlendirme sürecinde kişisel gelişimi vurgulayan; öğrencinin çabasını göz önünde bulunduran ve öğrencilerin yapmış olduğu hataları, öğrenmenin bir parçası olarak gören öğretmenlerin öğrencilerinin de öğrenme etkinliklerine daha çok ilgi, dikkat ve çaba gösterdiğini; öğrenme

stratejilerini daha fazla kullandıklarını ve ait olma hissi duyarak öğrenme etkinliklerine katılma eğilimi gösterdiklerini belirtmiştir. Buna rağmen bilişsel katılımın öğrenme odaklı değerlendirme ile olan ilişkisinin anlamsız çıkmasının nedeni Türkiye'deki kıyaslama ve sınav odaklı eğitim sisteminden kaynaklanmış olabilir. Örneğin, Türkiye' de ilköğretim öğrencileri daha iyi bir liseye gidebilmek için sınavlardan daha iyi sonuçlar elde etmek zorundalar. Dolayısıyla, bu sınavlar öğrencileri derin bir öğrenme yerine sadece notlarını yükseltmek için bilgi edinmeye zorluyor olabilir. Ancak bu açıklamalar bir araştırma sonucuna bağlı olmayıp, kesinliği belli değildir. Bu nedenle bu bulgunun nedenleri nitel bir çalışma ile derinlemesine incelenebilir.

Öğrenci katılımı ve öz-yeterlik ile ilgili sonuçlar incelendiğinde beklenildiği gibi öz-yeterliğin katılım değişkenin tüm alt boyutları ile ilişkili olduğu görülmüştür. Buna göre, fen dersinde başarılı olacağına inanan öğrenciler fen dersindeki görevleri tamamlamak ve öğrenmek için zorluklar karşısında daha çok ısrar eder, sabır ve çaba gösterirler; bilişsel stratejiler kullanırlar; öğrenmeye karşı olumlu duygular beslerler; öğretmenleriyle dersle ilgili sevdikleri ya da sevmedikleri konular hakkındaki düşüncelerini ve ilgi duyduğu konular hakkındaki tercihlerini paylaşırlar. Bu sonuçlar ilgili literatür ile de desteklenmektedir (Linnenbrink ve Pintrich, 2003).

Öz-yeterlik ve fen başarısı arasındaki ilişki yol analizi sonuçlarınca da desteklenmiştir. Bu sonuca göre, öğrencilerin fen dersindeki en basit kavramlardan en zor ve kompleks materyallere kadar hepsini öğrenebileceği konusundaki kendilerine olan güvenleri fen başarıları ile doğrudan ilişkilidir. Literatüre bakıldığında bu beklenen bir bulgudur (Örn. Britner ve Pajares, 2006; Mason ve diğerleri, 2013; Areepattamannil ve diğerleri, 2011). Bu çalışmalarda da belirtildiği gibi, öz-yeterliği yüksek olan öğrenciler derste zorluklarla karşılaşsalar bile, farklı öğrenme metotları kullanarak öğrenmede ısrar eder, çabuk vazgeçmezler ve başarana kadar çaba sarf ederler.

Son olarak, yol analizi sonuçları fen başarısının bilişsel, davranışsal ve duygusal katılım tarafından yordandığını ancak beklenenin aksine aracı katılım ile fen başarısı arasında anlamlı bir ilişki olmadığını göstermiştir. Bununla beraber, aracı katlım beklenenin aksine diğer katılım değişkenleri ile de ilişkili bulunmamıştır.

İlgili literatürle böyle bir tezatlığın ortaya çıkması, aracı katlımı inceleyen araştırmaların ilköğretim düzeyindeki öğrencilerle yapılmamış olması veya aracı katılımı değerlendirmek için kullanılan ölçekteki maddelerin aracı katılımı yeterince iyi ifade etmemesinden kaynaklanmış olabilir. Bu nedenle sonraki çalışmalarda Reeve (2013)' in çalışmasında kullanılan aracı katılım ölçeğinin yeni versiyonu kullanılabilir.

Özetle öz-yeterlik, davranışsal, duygusal ve bilişsel katılım öğrencilerin fen başarısında önemli rol oynamaktadır. Bu nedenle öğrenci özerkliğini ve öz-yeterliğini destekleyen sınıf ortamlarının yaratılması öğrenci katılımını ve dolayısıyla fen başarısını artırması bakımından önemlidir. Bununla birlikte, duygusal, davranışsal ve aracı katılımı artırmak için öğrenme odaklı değerlendirmeye önem verilmelidir.

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