



The Role of Classroom Environment Perceptions in Self-Regulated Learning and Science Achievement

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ABSTRACT. This paper focused on the relationship between classroom environment perceptions, self-regulation, and science achievement. Classroom environment perceptions were measured in terms of motivating tasks, autonomy support, and mastery evaluation. Self-regulated learning was conceptualized as consisting of two main components, namely, motivation and strategy use. Motivated Strategies for Learning Questionnaire, Approaches to Learning Instrument, and Survey of Classroom Goals Structures were used as data collection instruments. Studying with 900 elementary students, structural equation modelling showed that students' perception of classroom environment concerning motivating tasks, autonomy support, and mastery evaluation were positively associated with motivational and cognitive components of self-regulation and science achievement. Findings suggested that classroom environments emphasizing motivating tasks, autonomy and the link between personal effort and accomplishments can encourage self-regulation and achievement in science.

Keywords: Motivation, strategy use, classroom environment perceptions; self-regulation, science achievement.

INTRODUCTION

Recently, considerable research in educational psychology has focused on investigation of the ways in which motivational and cognitive components of academic learning work together. One major research vein within this area involves exploration of academic self-regulation. Zimmerman (2000) defined academic self-regulation as the degree to which students are motivationally, metacognitively, and behaviorally active in their learning process and in accomplishing their goals. From this perspective, it is clear that students are active participants of their own learning. Indeed, self-regulation involves monitoring, management and control of cognition, motivation, behavior, and environment in order to achieve self-set goals (Wolters, Pintrich, & Karabenick, 2003). In line with this idea, Pintrich (2000, 2004) proposed that self-regulation entails four phases, namely forethought, monitoring, control, and reaction and reflection. Forethought phase concerns students' goal setting, planning, perceptions of task value and demands, prior knowledge activation, and efficacy judgments in relation to task. Monitoring phase involves processes whereby students become metacognitively aware of self, task or context and self-observe their behavior. Control phase concerns selection and use of appropriate strategies for learning, motivation, and affect. In this phase, students may enhance or diminish their effort depending on task demands. Reaction and reflection phase involves affective reactions, cognitive judgements, choice behavior, and task evaluation (Pintrich, 2004).

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Many research has shown that self-regulation is closely linked to academic outcomes including achievement. For example, in a study conducted by Zimmerman and Martinez-Pons (1986) self-regulated learning strategies like reviewing text, environmental structuring, seeking information, and goal settings were found to significantly contribute to students' achievement. In addition, it was found that high achievers tended to use self-regulatory strategies more than low-achievers. Similarly, Ee, Moore, and Atputhasamy's study (2003) revealed that high achieving students had greater disposition to use of self-regulatory strategies which was positively related to their achievement. Furthermore, Pintrich, Smith, Garcia, and McKeachie (1993) reported that components of self-regulation including motivation and use of various cognitive and metacognitive strategies and achievement were all significantly correlated with each other.

In sum, it appears that self-regulated learners, who are active in their own learning motivationally, behaviorally, and metacognitively, are likely to achieve at high levels (Risemberg & Zimmerman, 1992). These students monitor and control their learning against their goals by using different strategies and managing their time and study environment effectively. They hold positive beliefs about their abilities and future successes (Dembo & Eaton, 2000). Therefore, self regulated learners have high motivation to use cognitive and metacognitive strategies to regulate their cognition and effort. Indeed, McCoach and Siegle (2003) suggested that if students have no motivation to use various cognitive and metacognitive strategies, possessing knowledge on these strategies will not be sufficient for them to learn and perform effectively. In other words, students must have both skill and will to improve their academic functioning (Zusho & Pintrich, 2003).

On the other hand, Ross, Salisbury-Glennon, Guarino, Reed, and Marshall (2003) reported that contextual variables like teaching approach have influence on students' self-regulation and achievement. In general, classroom environments which encourage complex thinking skills and active student participation are likely to promote student self-regulation. According to Paris and Paris (2001), student centered classrooms where students have choice and control over their learning, have opportunity to use variety of strategies, and interact with peers encourage development of self-regulation.

In the subsequent section influence of classroom environment on students self-regulation will be discussed.

Classroom environment perceptions and self-regulation

Many educational research have focused on the relations between learning environment and student motivation and cognition. These studies have shown that students' perceptions of their abilities to succeed on academic tasks and intrinsic interest in these tasks are positively associated with their academic performance, choice, and persistence (Ames & Archer, 1988; Ley & Young, 2001; Pajares, 1996; Paris & Paris, 2001; Pintrich, Smith, Garcia, McKeachie, 1993; Pintrich & De Groot 1990; Schunk & Pajares, 2001, Wigfield & Eccles, 2000). Indeed, expectancy value theory proposes that students' engagement in academic tasks is associated with two key questions: "can I do this task?" and "why am I doing this task?" (Eccles, 2002; Linnenbrink & Pintrich, 2003; Pintrich & De Groot 1990; Wigfield & Eccles, 2000; Wigfield, 1994). The former question is suggested to be related to students' expectancy for success while later question is related to students' task value beliefs and goal orientations. Expectancy for success (self-efficacy) involves beliefs about how well one can perform academic activities. Linnenbrink and Pintrich (2003) reported

that these efficacy beliefs are directly associated with behavioral, cognitive and motivational engagement of students on academic tasks. In general, self-efficacious students tend to put greater effort to succeed on a task, do not give up easily in the face of difficulties, use meaningful learning strategies, and show intrinsic interest in the academic work. Furthermore, studies revealed that self-efficacy beliefs affect students' academic goal orientations, attributions, and career choices (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Bandura, 1993, Hoy, 2004; Linnenbrink & Pintrich, 2003, Pajares, 1996, Usher & Pajares, 2006).

In addition to self-efficacy beliefs, students' intrinsic interest and goal orientations are found to be related to students' academic performance and behaviours. Intrinsic value involves enjoyment of an activity or a task. (Wigfield & Eccles, 2000). Students who develop an intrinsic interest in academic tasks and perceive academic tasks as important and useful are more likely to have higher levels of cognitive engagement in the tasks and higher levels of achievement. Moreover, goal orientation which also concerns the students' perception of the reasons why to engage in an academic task is found to be related to students' attributions, their use of various strategies for learning, and their attitudes toward academic tasks (Pintrich & Schunk, 2002, Pintrich, 2000b, Sungur, 2007). Dweck (1995) suggested that students' perception about how ability changes over time is associated with two distinctive goal orientations: mastery goal orientation and performance goal orientation. Students with mastery goal orientation focus on developing new skills, mastering the task, improving the competence, or achieving self-set standards. They seek for challenge and persist in the face of difficulties. In contrast to mastery goal orientation, students with performance goal orientation focus on performing better than others, looking smart and showing their abilities by going beyond normative-based standards (Ames, 1992). Dweck proposed that students with a view that ability can change and be improved tend to adopt mastery goal orientation while students with a view that ability can not change are tend to adopt performance goal orientation.

Thus, it is expected that classroom environments which encourage student autonomy and control, and help students realize the link between their effort and success promote development of mastery goal orientation. In fact, many research have shown that classroom environment has great influence on students' motivation in terms of self-efficacy, intrinsic value beliefs, and goal orientations (Ames, 1992; Ames, 1990; Greene, Miller, Crowson, Duke, and Akey 2004; Müller & Louw, 2004; Stefanou, Perencevich, DiCintio, Turner, 2004). According to Ames (1990), there are six classroom structures which are manipulable and have impact on these motivational variables: task, authority, recognition, grouping, evaluation, and time. She proposed that in order to promote mastery goal orientation, effective strategy use, active engagement, intrinsic interest, and attributions to effort, there should be novelty and variety in tasks. Moreover, tasks should provide students with an optimal level of challenge, help students set short-term goals and focus on the meaningful aspects of activities (Ames 1992). Moreover, classroom structures should encourage student autonomy and responsibility in the learning process. Students should be able to make choices and feel that they have control over their learning. Indeed, self-determination theory suggests that classroom structures supporting autonomy promote adaptive motivational beliefs and intrinsic motivation (Deci, Vallerand, Pelletier, & Ryan, 1991). Furthermore, classroom structures focusing on individual improvement and mastery are suggested to help development of adaptive motivational beliefs (Ames, 1992). In fact,

in an empirical study conducted by Müller and Louw (2004), it was found that students' interest, intrinsic motivation, and self-determined forms of extrinsic motivation were related to perceived support of autonomy and competence, relevance of the contents, and transparency of requirements. In line with these findings, the authors proposed that learning environments in which students are autonomous in their learning, receive informative feedback concerning their progress, experience a friendly and positive atmosphere, and interact with each other during the learning process are likely to promote intrinsic motivation.

Besides, Ley and Young (2001) proposed that organizing instructional activities to promote cognitive and metacognitive processes, helping students prepare and structure a learning environment conducive to their academic performance, and providing students with opportunities to monitor and evaluate their learning can promote self-regulation. According to the authors, embedding instruction with strategies such as concept mapping, and chapter summaries, encouraging students to set their own goals, and requiring students to evaluate their performance against self-set standards will improve their self-regulatory skills.

Actually, Ames and Archer (1988) reported that perceived classroom mastery goal structures was related to junior high school students' reported use of self-regulatory strategies, adaptive attributions, and positive affect.

Moreover, results of the study conducted by Greene et al. (2004) to investigate the relationship among student perceptions of classroom environment in terms of motivating tasks, autonomy support, and mastery evaluations and their motivation and strategy use showed that perception of the tasks as important, relevant, and interesting was related to higher levels of self-efficacy, mastery goal orientation, and perception that the task is instrumental to the future successes. Results also revealed that students perceiving the classroom environments as supporting autonomy and mastery-oriented evaluation were more likely to hold adaptive motivational beliefs (self-efficacy, mastery goal orientation, and perceived instrumentality). In addition, effects of classroom environment perceptions on strategy use were found to be mediated through their effect on the motivational beliefs.

Furthermore, in their longitudinal study, Urdan and Midgley (2003) investigated the changes in the perceived classroom goal structure and pattern of adaptive learning across the transition from elementary to middle school. Results showed that perceived decline in the emphasis on mastery classroom goal structure after the transition to middle school level was associated with a decline in adaptive outcomes such as self-efficacy, positive affect, and personal mastery goals. In line with the findings, the authors concluded that changes in cognition, motivation, and performance were largely related to changes in mastery goal structures rather than changes in performance goal structures and thus, efforts should be directed toward increasing the emphasis on mastery goal structures more than decreasing the emphasis on performance goal structures.

However, it should be noted that student self-regulation is affected by familial and socio-cultural influences as well as school influences. Therefore, research investigating the relationship between classroom environment and student motivation and cognition should take these factors into consideration. Sometimes there can be conflict between classroom goal structures and students' personal goals that can be influenced by family and social-cultural environment in which students live. Therefore, it is possible that the classroom goal structure can be perceived differently by different students, and has differential effect

on student motivation and cognition. Indeed, Olaussen and Braten, (1999) suggested that in order to determine the generalizability of the theoretical self-regulated learning models and their implications, it is necessary to conduct research on the academic self-regulation in different contexts and countries since students in different countries experience different contexts and curricular approaches reflecting different values and beliefs about education. Given the fact, Turkey is a new participant in self-regulated learning research with a few related studies (Sungur & Tekkaya, 2006; Yumusak, Sungur, & Cakiroglu, 2007, Sungur & Şenler, 2009), the overarching aim of the current study is to explore the relationship among students' classroom environment perceptions, self-regulation, and science achievement. Although the abovementioned constructs to be examined in the present study are well known and discussed in many previous studies, the study has potential to make sound and unique contribution to field through the investigation of the relationships using the structural equation modelling (SEM). The SEM has the ability to reveal all the relations among several variables simultaneously, demonstrating the relative contribution of each variable to the variance in a result. In addition, it allows the investigation of both indirect and direct effects, and provides statistical indices for evaluating the global fit (DeMarie, Miller, Ferron, & Cunningham, 2004).

Specifically, the present study aimed at addressing the following research question: What is the relationship among students' perception of classroom environment, motivational (mastery goal orientation, performance goal orientation, self-efficacy, and intrinsic interest) and cognitive (strategy use) components of academic self-regulation, and science achievement?

METHOD

Sample

Participants were 900 students (464 boys, 436 girls) in grades 6-8 from 5 public elementary schools in Bolu, Turkey. The socioeconomic status of the schools was largely middle class. Mean age of the students was 12.56.

Instruments

Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich & DeGroot (1990) was used to measure students' perceived self-efficacy and intrinsic value. It was a 7-point-likert type self-report instrument. In contrast to the original MSLQ, in the present study, 4-point-likert scale was used since it may be difficult for young students to handle 7-point Likert scale (Popham, 2008). Higher scores on the self-efficacy sub-scale ($n = 9$) reflected higher levels of perceived confidence in performing class work while higher scores on intrinsic value ($n = 11$) reflected higher levels of perceived usefulness, interestingness, and importance of class work. The instrument was translated and adapted into Turkish by Ozkan (2004). Reliabilities of the self-efficacy and the intrinsic value sub-scales for the present study were found to be .83 and .78, respectively.

Approaches to Learning Instrument (Greene, Miller, Crowson, Duke, & Akey, 2004) was used to measure students' perceived mastery goal orientation, performance goal orientation, and strategy use. It was a 4-point-likert type self-report instrument. The items that assess students' goal orientations listed possible reasons for why students engage in a

class work in terms of mastery goals ($n=5$) and performance-approach goals ($n=4$). Higher scores on mastery goals indicate that students tend to involve in a class work to improve their understanding, skills, and abilities. In contrast, higher scores on performance-approach goals show that students are likely to involve in a class work to get better grades or look smart. Concerning strategy use ($n=12$), higher scores indicate variety of strategy use (deep processing strategies, metacognitive strategies, persistence, etc.,) that lead to meaningful understanding.

Survey of Classroom Goals Structures (Blackburn, 1998; Greene, Miller, Crowson, Duke, & Akey, 2004) was used to determine students' classroom environment perceptions. The instrument mainly based on Ames' (1992) TARGET model consisted of three sub-scales, namely motivating tasks ($n =10$), autonomy support ($n =5$), and mastery evaluation ($n =11$). It was a 4-point-likert type self-report instrument. Higher scores on the sub-scales reflect that students perceive the class work as motivating and autonomy supporting and they have the perception that evaluation is made based on their effort not against normative standards. Sub-scale reliabilities found in the current study were presented in Table 2.

In order to validate the factor structure of the Approaches to Learning Instrument and the Survey of Classroom Goals Structures for their use with Turkish students, a pilot study was conducted with a sample of 390 Turkish elementary school students. Collected data were analyzed through confirmatory factor analyses (CFA). As shown in Table 1, of the four fit statistics reported, two were in optimal range (Goodness of fit (GFI) $> .90$, and Standardized Root Mean Square Residuals (SRMR) $< .10$). While the Comparative Fit Index was found to be above .90 for four sub-scales (mastery goals, performance goals, motivating tasks, and autonomy support) indicating a good fit, it was below .90 for strategy use and mastery evaluation sub-scales. In addition, the chi-square estimates for all sub-scales except for the mastery goals were statistically significant. However, these estimates were likely elevated due to large sample size (Tabachnick & Fidell, 1996). Overall, interpretation of fit indices revealed that there was a good model fit.

Table 1. *Fit statistics*

Subscale	χ^2	<i>df</i>	<i>p</i>	GFI	CFI	SRMR
Mastery goals	7.34	5	.197	.99	.99	.03
Performance goals	18.92	2	.000	.98	.92	.05
Strategy use	156.35	54	.000	.94	.88	.05
Motivating Tasks	120.56	35	.000	.94	.92	.05
Autonomy support	18.22	5	.000	.98	.90	.05
Mastery Evaluation	80.89	35	.000	.96	.85	.05

Pilot study also showed that reliabilities were sufficiently high for all of the sub-scales namely, mastery goals ($\alpha = .75$), performance goals ($\alpha = .74$), strategy use ($\alpha = .81$), motivating tasks ($\alpha = .71$), autonomy support ($\alpha = .70$), and mastery evaluation ($\alpha = .74$).

RESULTS

Descriptive Statistics

The mean, standard deviation for each scale are given in Table 2. As shown in the table, the scores for mastery goals, performance goals, strategy use, motivating tasks, autonomy support, and mastery evaluation were all above the midpoint of the 4 point Likert scale. This meant that, on the average, students had mid to high levels of each of the abovementioned constructs. Similarly, scores for self-efficacy and intrinsic value were found to be above the midpoint of the 4 point Likert scale which indicated that students had tendency to have mid to high levels of self-efficacy and intrinsic value for the academic tasks.

Table 2. *Descriptive statistics*

Variables	M	SD	α
Self-efficacy	3.05	0.51	.83
Intrinsic Value	3.21	0.48	.78
Mastery goals	3.33	0.58	.81
Performance goals	3.11	0.73	.80
Strategy use	3.11	0.51	.85
Motivating Tasks	3.10	0.56	.84
Autonomy support	3.07	0.57	.67
Mastery Evaluation	2.97	0.48	.70

In addition, mean science achievement was found to be 3.5. Students' self-reported science grade was used as a measure of their science achievement and it ranged from 1 to 5.

Inferential Statistics

As a preliminary analysis, the relationship between the set of classroom environment perceptions variables and the set of self-regulated learning variables was investigated through canonical correlation analysis. The first canonical correlation was .69 (48 % overlapping variance), accounting for the significant relationships between the two sets of variables.

Data on the first canonical variate were presented in Table 3. As shown in the table, with a cutoff correlation of 0.30 (Tabachnick & Fidell, 1996), all the variables in the classroom environment variables set were correlated with the first canonical variate. The first canonical variate was positively associated with all these variables. Similarly, all self-regulated learning variables were positively correlated with the first canonical variate. In addition, the first pair of canonical variates indicated that all classroom environment perceptions variables and all the self-regulated learning variables were positively related with each other. In other words, perception that the classroom environment provides motivating tasks, encourage autonomy and personal effort were associated with higher levels of self-efficacy, intrinsic value, mastery goal orientation, performance goal orientation, and strategy use.

Moreover, the percent of variance values indicated that the first canonical variate pair extracts 77 % of variance from classroom environment perceptions variables and 60 % of variance from the self-regulated learning variables. Also, redundancy values revealed that the first classroom environment perceptions variate accounts for 37 % of the variance in the self-regulated learning variables. Similarly, the self-regulated learning accounts for 29 % of the variance in the classroom environment perceptions variables.

Table 3. Correlations, standardized canonical coefficients, canonical correlations, percents of variance, and redundancies between classroom environment perceptions variables and self-regulated learning variables.

	First Canonical Variate	
	Correlation	Coefficient
Classroom environment perceptions		
Motivating Tasks	-.85	-.19
Autonomy support	-.98	-.70
Mastery Evaluation	-.80	-.19
Percent of Variance	77	
Redundancy	37	
Self-regulated learning		
Self-efficacy	-.82	.05
Intrinsic value	-.60	-.30
Mastery goals	-.68	-.20
Performance goals	-.81	-.16
Strategy use	-.92	-.58
Percent of Variance	60	
Redundancy	29	
Canonical Correlation	.69	

In order to address the research question of the present study, structural equational modelling was used. In the proposed model, it was expected that students' classroom environment perceptions have direct effects on motivational and cognitive components of self-regulation and indirect effects on science achievement (see Figure 1). In the context of the current study, *classroom environment perceptions* were measured as a latent variable and motivation tasks, autonomy support, and mastery evaluation were the observed variables. In a similar way, *motivational beliefs* were measured as a latent variable of self-efficacy and intrinsic value. In addition, mastery goal orientation and performance goal orientation were collapsed into overall *goal orientations* latent variable. Cognitive component of self-regulation (*strategy use*) and *science achievement* were measured with only one observed variable. While GPA was used as the observed variable of the science achievement, learning strategy use in science was used as observed variable of learning strategy.

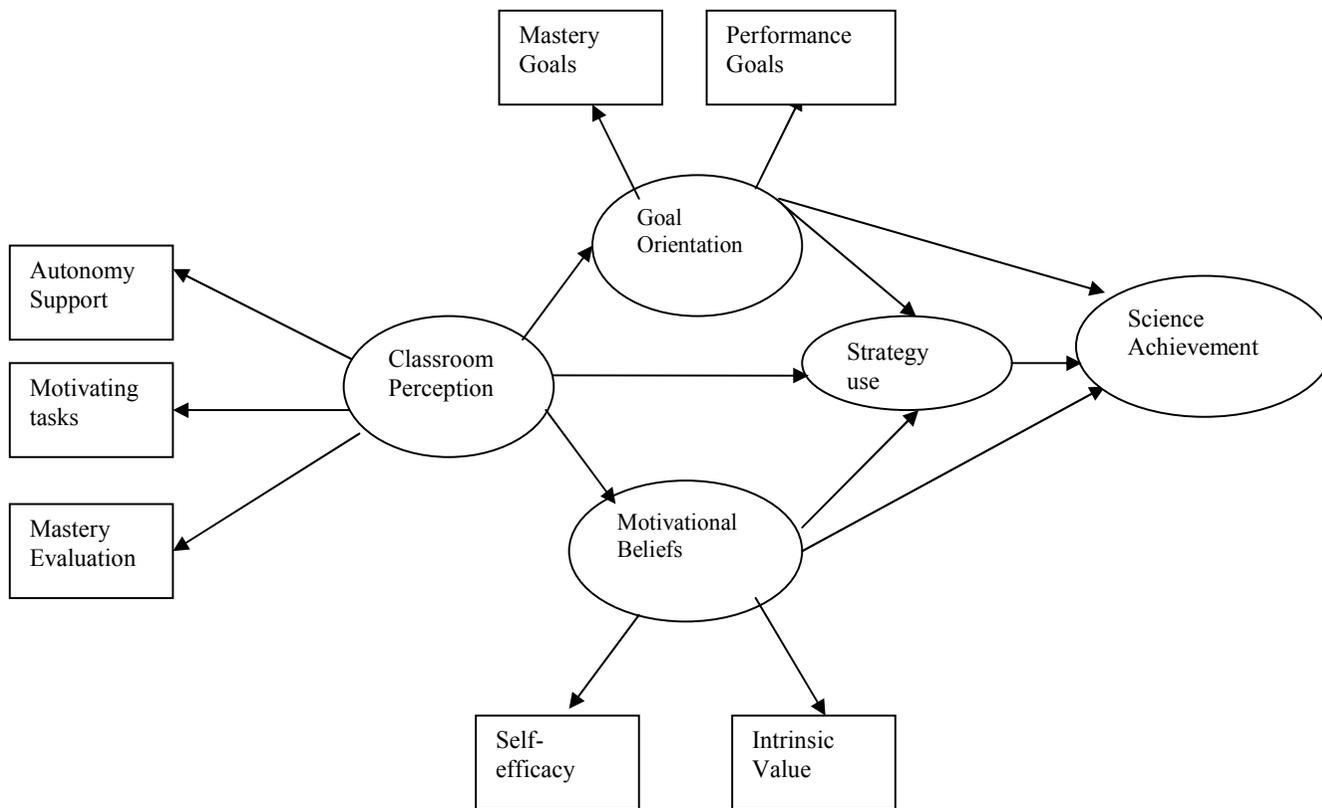


Figure 1. *Conceptual model*

The analysis results suggested that there was evidence to support adequate model-to-data fit. However, the chi-square estimate which is quite sensitive to sample size (Tabachnick & Fidell, 1996) was found to be significant ($\chi^2=445.90$, $df=21$). Fit indices for the model were presented in Table 4.

Table 4. *Fit indices*

Subscale	Fit statistics					
	χ^2	<i>df</i>	<i>p</i>	GFI	CFI	SRMR
Conceptual Model	445.90	21	.00	.90	.90	.08

In the model, parameter estimates revealed *strong positive* associations between the latent variables (classroom environment perceptions, motivational beliefs, and goal orientations) and their indicator variables (see Figure 2). In addition, it was found that students having the classroom environment perception that the classroom environment provides motivating tasks and emphasizes autonomy and personal effort are likely to hold adaptive motivational beliefs ($\beta=.73$) and have higher levels of goal orientations ($\beta=.75$). Findings also suggested that while classroom environment perceptions explain 54% of variance in motivational beliefs, they accounted for 57 % of variance in goal orientations.

Moreover, strong positive relationships were found between classroom environment perceptions ($\beta=.22$), motivational beliefs ($\beta=.36$), goal orientations ($\beta=.33$) and strategy use. Sixty-two percent of variance in strategy use was explained by classroom environment perceptions, motivational beliefs and goal orientations. Furthermore, effect of classroom environment perceptions on science achievement was mediated through motivational beliefs ($\beta=.11$) and goal orientations ($\beta=.21$). The relationship between strategy use and science achievement was non-significant ($\beta=-.04$). The indirect effect of classroom environment perceptions on achievement was .21. Motivational component of self-regulation (motivational beliefs and goals orientations), cognitive component of self-regulation (strategy use) were found to account for 7 % of variance in science achievement.

DISCUSSION

The aim of this study was to explore the relationship among classroom environment perceptions, motivational (mastery goal orientation, performance goal orientation, self-efficacy, and intrinsic interest) and cognitive (strategy use) components of academic self-regulation, and science achievement. Preliminary canonical analysis and the following structural equation modelling revealed that motivational beliefs (self-efficacy and intrinsic value), goal orientations (mastery and performance goal orientation) and

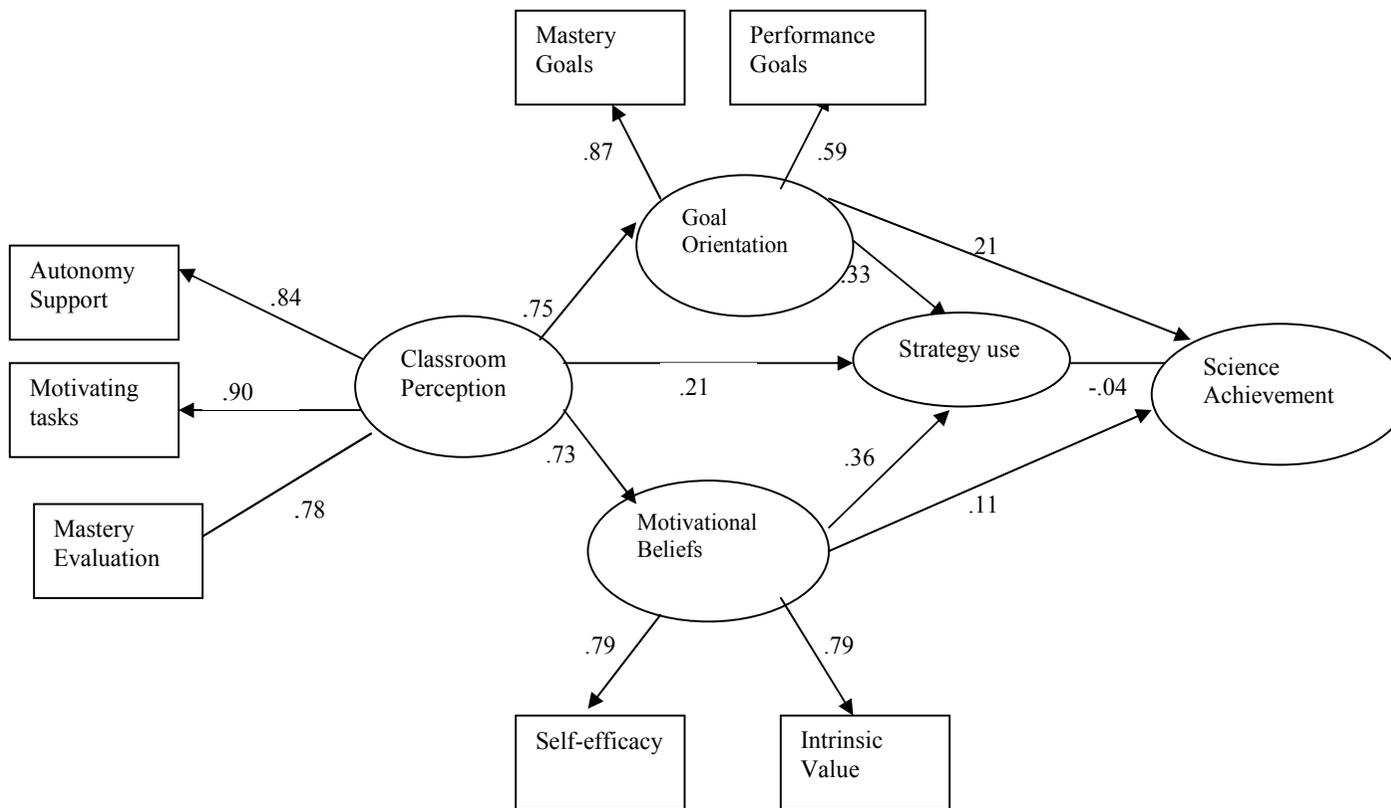


Figure 2. Conceptual model with path coefficients

students' strategy use were positively associated with classroom environment perceptions. Therefore, it appeared that students with the perception that classroom environment provides them with opportunities to deal with motivating tasks and feel autonomous and emphasizes personal efforts tend to be more self-efficacious, show intrinsic interest in the academic tasks, and study for the reasons of both learning and getting higher grades. In fact, in such learning environments students can realize the link between their effort and academic accomplishments. Accordingly, students experiencing these learning environments are likely to make adaptive attributions. For example, when a student in a mastery oriented class fails, he/she expends effort to learn and understand the course material. The student seeks for activities that can improve his/her knowledge, skills and learning, persist longer in the face of difficulties, and use more effective strategies (Ames & Archer, 1988, Pintrich & Schunk, 2002). Indeed, attributions have an effect on self-regulation mainly through their influences on self-efficacy judgments (Schunk, 1994). Students with higher sense of self-efficacy do not give up easily when they encounter a difficulty, select challenging tasks, and work harder (Hoy, 2004). In general, it is expected that classroom environments supporting autonomy and control are more likely to encourage use of different strategies and promote intrinsic interest (Ames, 1992; Eccles, Wigfield, Midgley, Reuman, MacIver, & Feldlaufer, 1993; Pintrich & Schunk, 2002). Moreover, person-environment fit perspective predicts that if there is a fit between students' needs and maturity levels and classroom structure, they can perform optimally (Eccles et al., 1993). In the current study, sample consisted of sixth to eight grade students with a mean age of 12.56. Students at these grade levels and age are developmentally mature enough to use variety of cognitive and metacognitive strategies. So, if they are provided with opportunities to use their capabilities and exercise control over their learning, they can motivationally, cognitively, and behaviorally involve in the academic work (Eccles, et al., 1993). Indeed, Greene et al. (2004) demonstrated, in their study with high school students, that students perception of autonomy support, mastery evaluation, and motivating tasks was related to adaptive motivational beliefs (mastery goal orientation, self-efficacy, perceived instrumentality) and strategy use. Moreover, Ames and Archer (1988) found that perceived emphasis on mastery goals were associated with use of effective learning strategies and adaptive motivational beliefs. According to Kaplan and Midgley (1999) classroom structures emphasizing effort, learning, and understanding help students focus on the academic task, make attributions to effort, and use effective strategies.

Concerning the relationship among motivational beliefs, goal orientations, strategy use, and academic performance, related research consistently showed that students studying for the reasons of gaining new knowledge and skills and learning and mastering appear to use cognitive and metacognitive strategies which promote deeper processing of information (Ames & Archer, 1988; Neber, & Schommer-Aikins, 2002; Pintich & DeGroot, 1990; Wolters, Yu and Pintrich, 1996). Similarly, students who are self-efficacious in their learning are expected to use variety of strategies which will help them realize their goals (Bandura, 1993; Pajares, 1996). Moreover, students having an intrinsic interest in academic tasks appear to persist in the face of difficulties and succeed on academic tasks by using different cognitive, metacognitive, and self-regulatory strategies (Wigfield,& Eccles 2000). Thus, results, in general, supported the idea that students

motivation is highly related to strategy use and in order to use the strategies effectively they should have motivation to use them (Sundre & Kitsantas, 2004).

In sum, results of the present study revealed that students' perception of classroom environment concerning motivating tasks, autonomy support, and mastery evaluation were positively related with motivational beliefs, goal orientations, strategy use, and achievement. Classroom environment perceptions had direct effect on motivational beliefs and goal orientations, and strategy use and indirect effect on achievement as well as strategy use. Results were, in general, in congruence with the findings in the literature supporting the generalizability of self-regulated learning models emphasizing the role of motivational and contextual factors in students' learning and cognition. Therefore, it is suggested that teachers and educators are aware of the vital importance of classroom environment in student motivation, strategy use, and achievement. Accordingly, they should create learning environments conducive to student motivation and strategy use. Since, in the present study, students' self-efficacy beliefs, intrinsic value, and goals orientations were found to be positively linked to students' strategy use and science achievement, classroom environments should help development of these adaptive motivational beliefs. In order to do so, science classes should be designed so that students can realize real life applications of they have learned in the school and should feel autonomous in their learning. In order to do this, field works, projects, laboratory experiments and simulations may be used as instructional activities Also, brainstorming, group working, problem-solving and cooperative learning can enhance students' motivation. Actually, such kind of instructional activities can help students feel that they have control over their learning and effort is the main reason of their success: Students with adaptive beliefs about their abilities to learn and perform effectively do not give up easily in the face of difficulties, persist longer using variety of strategies. When the new science curriculum implemented in Turkey is examined concerning its role in student motivation and strategy use, it can be inferred that the new curriculum has potential to enhance student motivation and strategy use with the student centered activities suggested to be implemented in the science classrooms. Moreover, the emphasis given on the performance assessment in the new curriculum can help students realize their own progress over time improving their motivation to learn

On the other hand, it should be noted that in the current study self-report instruments were used to measure academic self-regulation. Therefore, results were obtained based on students' own reports of motivational and cognitive processes occurring during their learning and studying and it may not be sufficient to reveal the actual, on-going dynamic processes in students' learning concerning motivation and cognition. So, it is possible that there can be discrepancy between students' perceived and actual self-regulatory processes. Thus, relying on just perceived self-regulation can be considered as a limitation of the present study. Moreover, in the present study, self-reported GPA was used as a measure of science achievement. This study can be replicated using standardized tests. Finally, it is suggest that further studies integrate qualitative research methods to the research design in order to get an in depth understanding of students' self-regulation and achievement in relation to learning environment.

REFERENCES

- Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84*, 261-271.
- Ames, C. (1990) Motivation: What teachers need to know. *Teachers College Record, 91*, 409-421
- Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Student learning strategies and motivation processes. *Journal of Educational Psychology, 80*, 260-267.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York:W.H.Freeman.
- Bandura, A., Barbaranelli, C., Caprara, G.V., & Pastorelli, C. (1996). Multifaceted impact of self-efficacy beliefs on academic functioning. *Child Development, 67* , 1206-1222.
- Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28*, 117-148.
- Blackburn, M. (1998). Academic cheating. Unpublished doctoral dissertation, University of Oklohoma.
- Deci, E.L., Vallerand, R.J., Pelletier, L.G. and Ryan, R.M. (1991). Motivation in education: The self-determination perspective. *Educational Psychologist, 26*, 325-346.
- Dembo, M.H., & Eaton, M.J.(2000). Self-regulation of academic learning in middle-level schools. *The Elementary School Journal, 100*, 473-490.
- DeMarie, D., Miller, P. H., Ferron, J., & Cunningham, F. R. (2004). Path analysis tests of theoretical models of children's memory performance.*Journal of Cognition and Development, 5*, 461–492.
- Dweck, C. (1995). *Self-theories: Their role in motivation, personality, and development*. Philadelphia, P.A: Psychology Press.
- Eccles, J.S. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology, 53*, 109-132.
- Eccles, J.S., Wigfield, A., Midgley, C., Reuman, D., Mac Iver, D. & Fldlaufer H. (1993). Negative effects of traditional middle schools on students' motivation. *The Elementary School Journal, 93*, 553-574.
- Ee, J, Moore, P. J. & Atputhasamy, L. (2003). High-achieving Students: their motivational goals, self-regulation and achievement and relationships to their teachers' goals and strategy-based instruction. *High Ability Studies, 14*, 23 – 39
- Greene, B.A., Miller, R.B., Crowson, M., Duke, B.L., & Akey L. (2004). Predicting high school students' cognitive engagement and achievement: Contributions of classroom perceptions and motivation. *Contemporary Educational Psychology, 29*, 462-482.
- Hoy, A.W. (2004). What do teachers know about self-efficacy? The paper presented at the Annual Meeting of the American Educational Research, San Diego, USA.
- Ley, K. & Young, D.B. (2001). Instructional principles for self-regulation. *Educational Technology research and Development, 49*, 93-103.
- Kaplan, A. & Midgley, C. (1999). The relationship between perceptions of the classroom goal structure and early adolescents' affect in school: The mediating role of coping strategies. *Learning and Individual Differences, 11*, 187-212.

- Linnenbrink, E.A., & Pintrich, P.R. (2003). The role of self-efficacy beliefs in student engagement and learning in the classroom. *Reading & Writing Quarterly*, 19 , 119-137.
- McCoach, D.B. & Siegle, D. (2003). Factors that differentiate underachieving gifted students from high achieving gifted students. *Gifted Child Quarterly*. 47(2), 144-154.
- Müller, F.H. & Louw, J. (2004). Learning environment, motivation and interest: Perspectives on self-determination theory. *South African Journal of Psychology*,34, 169-190.
- Neber, H., & Schommer-Aikins, M. (2002). Self-regulated science learning with highly gifted students: The role of cognitive, motivational, epistemological, and environmental variables. *High Ability Studies*, 13, 59-74.
- Olaussen, B. S., & Braten, I. (1999). Students' use of strategies for self-regulated learning: Cross-cultural perspectives. *Scandinavian Journal of Educational Research*, 43, 409-432.
- Ozkan, S. (2003). The roles of motivational beliefs and learning styles on tenth grade students' biology achievement. Unpublished Master Thesis. Ankara: Middle East Technical University
- Popham, W.J. (2008). *Classroom Assessment: What Teachers Need to Know* (5th ed.). Boston: Allyn and Bacon.
- Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, 66, 543-578.
- Paris, S. C. & Paris, A. H. (2001) Classroom applications of research on self-regulated learning, *Educational Psychologist* 36, 89-101.
- Pintrich, P.R., & De Groot, E. (1990) Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82, 33-40.
- Pintrich, P. R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review*, 16, 385-407.
- Pintrich, P. R. (2000a). The role of goal orientation in self-regulated learning. In M.Boekaerts, P. R. Pintrich & M. Zeidner (Eds), *Handbook of Self-Regulation* (pp. 452-502). San Diego, CA: Academic Press.
- Pintrich P R, Smith D, Garcia T and McKeachie W J (1993) Reliability and Predictive Validity of The Motivated Strategies for Learning Questionnaire (MSLQ) *Educational and Psychological Measurement*, 53, 801-813.
- Pintrich, P.R., Smith, D.A.F., Garcia, T., & Mckeachie, W.J. (1991) *A Manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ)*. Ann Arbor, MI: National Centre for Research to Improve Postsecondary Teaching and Learning, The University of Michigan.
- Pintrich, P. R., & Schunk, D. H. (2002). *Motivation in education: Theory, research, and applications*. Columbus, OH: Merrill.
- Risemberg, R., & Zimmerman, B. J. (1992). Self-regulated learning in gifted students. *Roeper Rivew*, 15, 98-101.
- Ross, M. E., Salisbury-Glennon, J. D., Guarino, A., Reed, C. J. & Marshall, M. (2003). *Situated Self-Regulation: Modeling the Interrelationships Among Instruction,*

- Assessment, Learning Strategies and Academic Performance. *Educational Research and Evaluation*, 9, 189 - 209
- Schunk, D.H. & Pajares, F. (2001). The development of self-efficacy. Chapter in A. Wigfield & J. Eccles (Eds.), *Development of achievement motivation*. San Diego: Academic Press.
- Schunk, D.H. (1994). Motivating self-regulation of learning: The role of performance attributions. The paper presented at the Annual Meeting of the American Educational Research, New Orleans, USA
- Stefanou, C., Perencevich, K.C., DiCintio, M., & Turner, J.C. (2004). Supporting autonomy in the classroom: Ways teachers encourage student decision making and ownership. *Educational Psychologist*, 39, 97-110.
- Sundre, D.L., & Kitsantas, A. (2004). An exploration of the psychology of the examinee: Can examinee self-regulation and test taking motivation predict consequential and non-consequential test performance? *Contemporary Educational Psychology* 29, 6-26.
- Sungur, S. (2007). Modeling the relationships among students' motivational beliefs, metacognitive strategy use, and effort regulation. *Scandinavian Journal of Educational Research*, 51, 315-326.
- Sungur, S. & Tekkaya, C. (2006). Effects of problem-based learning and traditional instruction on self-regulated learning. *The Journal of Educational Research*, 99, 307-317.
- Sungur, S., & Şenler, B. (2009). An Analysis of Turkish High School Students' Metacognition and Motivation. *Educational Research and Evaluation*, 15, 43-59.
- Tabachnick, B.G., & Fidell, L.S. (1996). *Using multivariate statistics* (3rd edition). New York: HarperCollinsCollegePublishers.
- Urduan, T., & Midgley, C. (2003). Changes in the perceived classroom goal structure and pattern of adaptive learning during early adolescence. *Contemporary Educational Psychology*, 28, 524-551.
- Usher E.L. & Pajares, F. (2006). Sources of academic and self-regulatory efficacy beliefs of entering middle school students. *Contemporary Educational Psychology*, 31, 125-141.
- Wigfield, A. (1994). Expectancy-value theory of achievement motivation: A developmental perspective. *Educational Psychology Review*, 6, 49-78.
- Wigfield, A., & Eccles, J.S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology*, 25, 68-81.
- Wolters, C. A., Pintrich, P. R., & Karabenick, S. A. (2003, March). Assessing academic self-regulated learning. Paper prepared for the Conference on Indicators of Positive Development: Definitions, Measures, and Prospective Validity, Washington, DC, USA.
- Wolters, C.A., Yu, S.Y., & Pintrich, P.R. (1996). The relation between goal orientation and students' motivational beliefs and self-regulated learning. *Learning and Individual Differences*, 8, 211-238.
- Yumusak, N., Sungur, S., & Cakiroglu, J. (2007). Turkish High School Students' Biology Achievement in Relation to Academic Self-Regulation. *Educational Research and Evaluation*, 13, 53-69.

- Zimmerman, B. J. (2000) Attaining self-regulation. In M Kaerts, P.R. Pintrich, & M. Zeidner (Eds). *Handbook of Self-Regulation*. pp. 13-39.
- Zimmerman, B.J. & Martinez-Pons, M. (1986). Development of a structured interview for assessing student use of self-regulated learning strategies. *American Educational Research Journal*, 23, 614-628.
- Zusho, A., & Pintrich, P.R. (2003). Skill and will: The role of motivation and cognition in the learning of college chemistry. *International Journal of Science Education*, 25, 1081-1094.

Sınıf Ortamının Öğrencilerin Öz-Düzenleme Becerileri ve Fen Başarıları Üzerindeki Rolü

ÖZ. Bu çalışmanın amacı algılanan sınıf ortamı, öz-düzenleme becerileri ve fen başarıları arasındaki ilişkiyi araştırmaktır.. Sınıf ortamı, sınıf içersinde motivasyonu artırıcı etkinliklere ne denli yer verildiği, öğrenci özerkliğinin ne denli desteklendiği ve değerlendirilmenin ne denli öğrencinin gelişimine, öğrenmesine odaklandığı alt boyutlarında incelenirken öz-düzenleme becerileri motivasyon ve strateji kullanımı alt boyutlarında incelenmiştir. Veri toplama aracı olarak Öğrenmede Güdusel Stratejiler Anketi, Öğrenme Yaklaşımları Anketi ve Sınıf-içi Hedef Yapıları Anketi kullanılmıştır 900 ilköğretim öğrencisinin yer aldığı çalışmada uygulanan yapısal eşitlik modeli, algılanan sınıf ortamının öz-düzenleme becerilerinin motivasyon ve bilişsel alt boyutlarıyla ve fen başarılarıyla ilişkili olduğunu göstermiştir. Bu sonuçlar, öğrencilerin motivasyonunu artırıcı etkinliklere yer verilen, öğrencilerin öğrenen olarak özerkliklerinin desteklendiği ve öğrenme sürecinde gösterdikleri çaba ve başarıları arasındaki bağın vurgulandığı sınıf ortamlarının öz-düzenleme becerileri ve başarı üzerinde olumlu bir etkisi olduğunu göstermektedir.

Anahtar kelimeler: Motivasyon; strateji kullanımı, algılanan sınıf ortamı, öz-düzenleme, fen başarıları

Amaç ve Önem: Günümüzde birçok araştırma öğrencilerin motivasyon düzeylerinin ve bilişsel özelliklerinin öğrenme sürecindeki etkisine araştırmaya odaklanmıştır. Bu amaçla yapılan araştırmaların bir kısmı öz-düzenleme becerileri üzerine yoğunlaşmıştır. Zimmerman'a (2000) göre öz-düzenleme, öğrenme sürecinde bilişsel, davranışsal ve motivasyon olarak ne denli aktif olunduğunun bir derecesidir. Dolayısıyla öz-düzenleme çok boyutlu bir kavramdır ve öğrencilerde öz-düzenleme becerileri farklı seviyelerde olabilir. Yapılan pek çok araştırma sınıf ortamının öğrencilerin motivasyonu (öz-yeterlik algısı, hedef yönelimi, içsel değer vb) ve kullandıkları bilişsel öğrenme stratejileri (anlamlandırma, izleme vb.) üzerinde önemli bir etkisi olduğunu göstermiştir (Ames, 1992; Ames, 1990; Greene, Miller, Crowson, Duke, and Akey 2004; Müller & Louw, 2004; Stefanou, Perencevich, DiCintio, Turner, 2004). Ayrıca öz-düzenleme becerileri yüksek olan öğrencilerin başarılarının da yüksek olduğu bulunmuştur. Bu çalışmanın amacı da algılanan sınıf ortamı, öz-düzenleme becerileri ve fen başarıları arasındaki ilişkiyi araştırmaktır. Benzer çalışmalar literatürde yer almakla beraber, bu çalışmada kullanılan yapısal eşitlik modeli, literatürde farklı çalışmalarda yer alan değişkenlerin tek bir modelde toplanarak bu değişkenler arasındaki ilişkilerin kapsamlı bir şekilde ortaya konup tartışılmasına olanak sağlayacaktır. Ayrıca bu tür modellerin ortaya konması farklı ortamlara genellenebilen başka model ya da yaklaşımların ortaya konması ve test edilmesi için faydalı olabilecektir.

Yöntem: Bu çalışmada Öğrenmede Güdusel Stratejiler Anketi (ÖGSA), Öğrenme Yaklaşımları Anketi (ÖYA) ve Sınıf-içi Hedef Yapıları Anketi (SHYA) veri toplama araçları olarak kullanılmıştır. Bu çalışmada ilköğretim 2. Kademe öğrencileri yer almıştır. Öğrencilerin öz-yeterlik algısı ve içsel değeri

ÖGSA ile ölçülürken, hedef yönelimleri ve strateji kullanımları ÖYA ile ölçülmüştür. Sınıf ortamına yönelik algının ölçülmesi için ise SHYA kullanılmıştır.

Bulgular: Elde edilen veriler kanonik korelasyon analizi ve yapısal eşitlik modeli kullanılarak analiz edilmiştir. Sonuçlar algılanan sınıf ortamının öz-düzenleme becerilerinin motivasyon ve bilişsel alt boyutlarıyla ve fen başarısıyla ilişkili olduğunu göstermiştir. Ayrıca hedef yönelimi, öz-yeterlik algısı ve içsel değer ile başarı arasında da anlamlı bir ilişki bulunmuştur.

Tartışma, Sonuç ve Öneriler: Bu sonuçlar, öğrencilerin motivasyonunu artırıcı etkinliklere yer verilen, öğrencilerin öğrenen olarak özerkliklerinin desteklendiği ve öğrenme sürecinde gösterdikleri çaba ve başarıları arasındaki bağın vurgulandığı sınıf ortamlarının öz-düzenleme becerileri ve başarı üzerinde olumlu bir etkisi olduğunu göstermektedir. İleriki çalışmalarda, nitel araştırma yöntemlerinin araştırma desenine entegre edilmesi ile daha detaylı sonuçların elde edilebileceği düşünülmektedir.