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Relationship between Learning Strategies and Goal Orientations: A Multilevel Analysis

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Abstract

Problem Statement: Motivation plays an important role in explaning students' academic achievement. In an effort to explain students' purposes for learning and their reasons why they engage in a learning activity, different achievement goal models (dichotomous, trichotomous, and 2x2) has been proposed over time. The present study aimed to extend previous research by employing the most recent model -2x2 achievement goal framework-, using multilevel analysis techniques at the high school level.

Purpose of Study: The purpose of this study was to examine the relationship between Turkish high school students' learning strategies and their goal orientations in chemistry course using multilevel analysis. Learning strategies included rehearsal, elaboration, organization, critical thinking, and metacognitive self-regulation; while, goal orientations consisted of performance-approach, performance-avoidance, mastery-approach, and mastery-avoidance goals.

Method: A total of 1157 (620 females, 537 males) high school students coming from 50 classrooms (classroom size ranged from 14 to 33) participated in the study. Learning strategies were assessed by the Cognitive and Metacognitive Strategies Scale. Students' goal orientations were measured by the Goal Orientation Scale based on the 2x2 achievement goal framework. Since students were nested in classrooms, multilevel approach as a statistical technique was employed. For each strategy type, Hierarchical Linear Modeling analysis was run. Students'

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cognitive and metacognitive strategies were predicted with student-level predictors, namely four achievement goals.

Findings and Results: Findings revealed the same pattern for all strategy types: performance-approach and mastery-approach goals positively predicted students' learning strategies, with higher beta coefficients for the mastery-approach goals. For example, the variation in elaboration strategy was explained more by the mastery-approach goals (β = .42) than performance-approach goals (β = .17).

Conclusions and Recomendations: Results showed that performance-approach and mastery-approach goals significantly predicted students' learning strategies. In contrast to the literature which relates mastery type goals to deeper level strategies, in the current study performance-approach goals were also linked to strategy use. This result can be attributed to the grade-focused evaluation practices and dominance of nationwide exams in the Turkish educational context. Teachers can promote use of mastery-goals by helping students develop new skills, creating challenging activities, avoiding comparison among students, and giving control of learning to students. Present study can be extended by including variables such as classroom goal structure, personal characteristics, and academic achievement.

Keywords: Achievement goals, learning strategies, cognitive and metacognitive strategies, Hierarchical Linear Modeling (HLM) analysis, chemistry education

Introduction

This study aimed at exploring the relationship between high school students' motivational beliefs and cognitive learning strategies regarding chemistry class. Motivation is an important construct to explain students' academic achievement (Pintrich & Schunk, 2002). Pintrich and Schunk (2002) define motivation as "the process whereby goal-directed activity is instigated and sustained" (p.5). Motivated students engage in difficult tasks, expend higher effort, and persist more when they encounter with obstacles, resulting in an increase in their academic achievement. Researchers propose different theories in order to explain student motivation. Among these, the achievement goal theory (AGT) is one of the most commonly studied one which explains why students engage in a learning activity (Elliot, 1999).

The AGT has been revised many times as empirical evidence comes to light. In the initial studies, students' goal orientations were classified mainly in two categories: mastery goals versus performance goals. While mastery goals focus on task mastery, development of competency, challenge, and curiosity; performance goals focus on grades, rewards or approval from others (Ames, 1992). Mastery goals are associated with more adaptive learning outcomes such as persistence in the event of failure, choosing challenging tasks, using deep-processing strategies, and intrinsic motivation (Dweck & Leggett, 1988; Harackiewicz, Barron, Tauer, Carter, & Elliot,

2000; Kaplan & Midgley, 1997; Meece, Blumenfeld, & Hoyle, 1988; Pintrich & De Groot, 1990) whereas performance goals are linked to grades and other extrinsic rewards (Ames, 1992; Dweck & Leggett, 1988; Harackiewicz et al., 2000; Jagacinski & Nicholls, 1987). Although the dichotomous framework revealed consistent results for mastery goals, the findings for performance goals were inconsistent. Elliot and his colleagues, therefore, proposed a trichotomous framework keeping mastery goals in the original form and dividing performance goals into two categories as performance-approach goals and performance-avoidance goals. They found empirical evidence to support their suggestion (Elliot, 1999; Elliot & Church, 1997; Elliot & Harackiewicz, 1996). Recently, Elliot and McGregor (2001) has drawn attention to the fact that mastery goals studied in the dichotomous and trichotomous frameworks are not the combination of mastery-approach and mastery-avoidance goals, rather they reflect only mastery-approach goals. Consequently, Elliot and McGregor (2001) have proposed the 2x2 achievement goal framework in which they define mastery goals in terms of approach and avoidance aspects.

In this framework, goal constructs are defined in two dimensions according to (a) *definition of competence (*performance versus mastery) and (b) *valence of competence* (approach versus avoidance). Accordingly, Elliot and McGregor (2001) propose four constructs explaining students' goal orientations: performance-approach, performance-avoidance, mastery-approach, and mastery-avoidance. Performance-approach goal is defined in terms of normative standards where competence is positively valenced. Students with performance-approach goals give importance to doing better than others or getting higher grades than peers. Likewise, performance-avoidance goal is defined in terms of normative standards but negatively valenced. Not getting lower grades than classmates or not failing in the exams are important for these students. Mastery-approach goal, on the other hand, is defined related to absolute or interpersonal standards and positively valenced. Mastery-approach goals include developing new skills or mastering new tasks. Finally, mastery-avoidance goal is also defined with respect to absolute or interpersonal standards and negatively valenced. For these students, avoiding misunderstanding is quite important. Although there is still a debate on the definition of achievement goals (Hulleman, Schrager, Bodmann, & Harackiewicz, 2010), in line with the revisions in the theory, the present study was guided by the 2x2 achievement goal framework.

Recent studies have provided empirical evidence for the 2x2 framework (Bartels & Magun-Jackson, 2009; Conroy & Elliot, 2004; Cury, Elliot, Da Fonseca, & Moller, 2006; Kadioglu, Uzuntiryaki, & Capa-Aydin, 2009, 2011; Van Yperen, 2006). For example, Cury, Elliot, Da Fonseca, and Moller (2006) and Van Yperen (2006) investigated whether goal orientations with similar characteristics in terms of definition or valence of competence were associated with similar achievement-related constructs. In the former study, researchers explained the relationship between each type of goal orientation and implicit theories of ability (entity theory and incremental theory). Regarding definition of competence, they found that performance-oriented goals were associated with entity theory while mastery-oriented goals were associated with incremental theory. With respect to valence of competence, approach-type goals were positively related to perceived competence

while avoidance-type of goals negatively linked. In a similar vein, the latter study, Van Yperen (2006), concluded that mastery-approach goals were associated with only positively valenced variables like need for achievement and interest while performance-avoidance goals were linked only to negatively valenced variables like socially prescribed perfection and amotivation. Moreover, performance-approach goals were linked to both positively and negatively valenced variables whereas mastery-avoidance goals showed low scores in both positively and negatively valenced variables. Kadioglu, Uzuntiryaki, & Capa-Aydin (2009, 2011) also found empirical evidence for the 2x2 achievement goal framework: The goal orientation variables except for the performance-avoidance goals were linked to higher level learning strategies and more sophisticated epistemological beliefs.

In the current study, we investigated the 2x2 framework in association with strategy use. Students' cognitive strategies are divided into two general categories: low-level (surface level) strategies versus high-level (deep processing) strategies (VanderStoep & Pintrich, 2008). While surface level strategies include rehearsal strategy, deep processing strategies consist of strategies such as elaboration and organization. Rehearsal strategies are used for simple tasks such as memorizing items; students repeat the information several times until they memorize it. These strategies simply help students encoding new information; students do not need to connect new information with their existing knowledge. On the other hand, deep processing strategies require higher level of cognition and help conceptual understanding. For example, elaboration strategies such as paraphrasing and creating analogies help students connect new information with existing knowledge. Likewise, organization strategies require connecting different parts of course material together for learning such as clustering and outlining. Generally, mastery goals are linked to deeper processing strategies such as elaboration strategy; while, performance goals are associated with surface level strategies (Elliot, McGregor, & Gable, 1999; Elliot & McGregor, 2001; Harackiewicz et al., 2000; Yumusak, Sungur, & Cakiroglu, 2007). For instance, Yumusak, Sungur, and Cakiroglu (2007) run canonical analysis in order to test the relationship between students' motivational beliefs and their strategy use. They found positive association between mastery goals and elaboration and organization strategies while no significant relationship was found for rehearsal strategies. Harackiewicz et al. (2000) also revealed that mastery goals significantly predicted deep-processing strategies while performance goals predicted surface level strategies.

Although the associations between students' goal orientations and learning strategies were frequently studied in literature, this study aimed to extend previous works in three ways: (1) clarifying the conceptualization of the 2x2 achievement goal framework which takes mastery-avoidance goals into account; (2) employing multilevel analysis as opposed to previous studies using single level statistical models; (3) studying with high school students, in contrast to the most of the earlier studies conducted with undergraduate students. Accordingly, the purpose of this study was to examine the relationship between Turkish high school students' learning strategies and their goal orientations in the chemistry course using multilevel analysis. Learning strategies included rehearsal, elaboration, organization, critical thinking, and metacognitive self-regulation; while, goal orientations consisted

of four types of goals (performance-approach, performance-avoidance, mastery-approach, and mastery-avoidance).

Method

Research Context: High Schools in Turkey

There are sixteen kinds of high schools defined by the Ministry of National Education (MoNE) in Turkey; even this number can be increased considering specific kind of vocational high schools. These schools fall into the categories of *general* and *vocational* according to the programs they follow. Vocational high schools aim to train individuals for a profession while general high schools prepare students for higher education. General high schools can be further classified into nine categories (MoNE, 2011). The students from three school types (state, Anatolian, and private high schools) which represent the highest ratio in the general high school population were participated in the present study. All three schools follow the same chemistry curriculum offered by MoNE.

State and Anatolian high schools are funded by the government whereas private schools are financed by students' families. Students at Anatolian and private high schools improve their skills in at least one foreign language, usually English as a second language and German as a third. Private schools differ from government high schools in terms of academic and social opportunities depending on the financial status of the school. Generally, private school students have more social activities (artistic, sportive etc.) than other school types. In addition, regarding chemistry course, students have better laboratory facility and other opportunities like science fairs (Erdogan, 2002). On the other hand, students at government high schools very seldom conduct experiments in chemistry laboratories; generally instruction is guided by algorithmic problems rather than conceptual understanding.

One of the most salient features of Turkish education system is that students are required to take nationwide exams when they transit from one education level to the other, and they can be admitted to desired schools if they attain a minimum required score for that particular school. For example, in order to attend Anatolian high schools, students must score high on a nationwide examination called Level Determination Examination. This examination includes four topics namely social sciences, mathematics, natural science and Turkish literature. Similarly, students wanting to pursue higher education must take two nationwide examinations, the University Entrance Examinations (namely YGS and LYS) when they graduate from high school. In addition to their YGS and LYS scores, students' high school grade point averages (GPA) are also taken into account for entry into university. The number of students entering the desired universities is very low; consequently, the competition is very high among students. Students believe that if they can attend a respected high school (like the Anatolian high schools), they will be better prepared for the YGS and LYS.

Sample of the Study

Because we run multilevel regression analysis in this study, we defined the sample size for both student level and classroom level. Maas and Hox (2005) suggest that about 50 cases at classroom level can be accepted for unbiased estimation. Totally, there were 1157 students enrolling in chemistry course at student level and 50 classrooms at classroom level in the present study. The students were from different grade levels: 468 ninth (246 females, 222 males), 355 tenth (184 females, 171 males), and 334 eleventh (190 females, 144 males) graders. The age of the students ranged between 14 and 17 (M=15.22) for ninth graders, between 15 and 18 (M=16.07) for tenth graders and between 15 and 18 (M=16.94) for eleventh graders. Table 1 presents the frequencies of the students participated in the study in terms of school types, grade level, and gender. At classroom level, while classroom size ranged from 14 to 33 in state schools (M = 27.91), it was between 13 and 29 (M = 24.25) for Anatolian high schools and between 12 and 19 (M = 14.93) for private schools (see Table 1).

Table 1

Frequencies at Student and Classroom Levels with Respect to School Type, Grade Level, and Gender

School	Grade	School	Number of Classes	Number of Students	Number of Females	Number of Males
State	9th	School 1	4	93	55	38
		School 2	4	127	70	57
	10th	School 1	4	119	64	55
		School 2	4	116	67	49
	11th	School 1	4	101	64	37
		School 2	3	86	49	37
	Total		23	642	369	273
Anatolian	9th	School 1	5	138	62	76
	10th	School 1	4	76	40	36
	11th	School 1	3	77	45	32
	Total		12	291	147	144
Private	9th	School 2	4	65	35	30
		School 3	3	45	24	21
	10th	School 2	1	13	6	7
		School 3	2	31	7	24
	11th	School 1	2	33	20	13
		School 2	1	13	5	8
		School 3	2	24	7	17
	Total		15	224	104	120
	Grand Total		50	1157	620	537

Instruments

Goal orientation scale. It was administered to determine the type of goals students pursue while studying for chemistry course. It was developed by Elliot and McGregor (2001) based on the 2x2 achievement goal framework. The scale was translated and adapted to Turkish culture by Senler and Sungur (2007) for elementary school students and piloted with high school students by Kadioglu, Uzuntiryaki, & Capa-Aydin (2009). It included 12 five-point Likert type items ranged from 1 (never) to 5 (always) and four subscales as mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance.

Confirmatory Factor Analysis (CFA) was performed to test factorial validity of the scale using Mplus statistical package 5.2 (Muthén & Muthén, 1998-2010). The $\chi 2/df$ ratio, Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI), and Non-Normed Fit Index (NNFI) were used as goodness-of-fit indices. For χ^2/df ratio the values less than 5, for SRMR the values less than .05, and for CFI and NNFI the values above .90 and are accepted as showing a good fit to the data (Jöreskog & Sörbom, 1993; Kline, 2005). For RMSEA, values less than .05 indicate good model data fit, values between .05 and .08 indicate mediocre fit, and values greater than .10 indicate poor fit (Browne & Cudeck, 1993). In the present study, findings indicated a good model fit for the scale with the following fit indices: χ^2/df (220.915/48) = 4.60, RMSEA = .055 (90% CI =.048, .063), SRMR = .045, CFI = .96, and NNFI = .94. The Cronbach's alpha coefficients for the subscales of the Goal Orientation Scale together with 95% confidence interval are depicted in Table 2.

Table 2

Cronbach Alpha Reliability Coefficients and 95% Confidence Intervals for the Subscales of the Goal Orientation Scale

Subscale	Reliability coefficients	95% Confidence Interval	
		Lower Bound	Lower Bound
Performance-approach	.80	.78	.82
Performance-avoidance	.71	.68	.74
Mastery-approach	.83	.81	.84
Mastery-avoidance	.78	.76	.80

Cognitive and metacognitive strategies scale. The cognitive and metacognitive strategies section of the Motivated Strategies for Learning Questionnaire (Pintrich, Smith, Garcia, & McKeachie, 1991) was used to measure learning strategies students employ in chemistry course. The scale was translated and adapted into Turkish by Sungur (2004). It was a seven-point rating scale ranging from 1 (not at all true for me) to 7 (very true for me). The instrument was composed of 31 items and five

dimensions as rehearsal, elaboration, organization, critical thinking, and metacognitive self-regulation.

CFA was run to examine how well the items in the scale fit to the five-factor model for our data. The analysis yielded the following fit indices: χ^2/df (1616.499/424) = 3.81, RMSEA = .049 (90% CI =.046, .051), SRMR= .049, CFI = .89, and NNFI = .87, which indicated a good fit to the data. The reliability coefficients and along with 95% confidence intervals are displayed in Table 3.

Table 3

Cronbach Alpha Reliability Coefficients and 95% Confidence Intervals for the Subscales of Cognitive and Metacognitive Strategies Scale

Subscale	Reliability coefficients	95% Confidence Interval	
		Lower Bound	Lower Bound
Rehearsal	.74	.72	.76
Elaboration	.77	.75	.79
Organization	.68	.65	.71
Critical thinking	.78	.76	.80
Metacognitive self-regulation	.82	.81	.84

Procedure

This study was conducted in six high schools (two state schools, one Anatolian high school, and three private schools) chosen randomly in Ankara in Turkey. The instruments were employed with the help of a cooperative teacher from each school. Students completed them during class hours. It took approximately 20 minutes to complete the instruments. Students were informed about the confidentiality of the results: The data would be examined only by the researchers for this study and the school administration or their chemistry teachers would not see the data. Additionally, students' names or any information distinguishing their identity was not collected.

Analysis of Data

Generally, the data collected from educational settings are multilevel in nature: Students are clustered within classrooms and classroom environment (teacher's messages about learning, or peers' perceptions) affects how students perceive learning and achievement related outcomes. That's why rather than running single-level ordinary least squares (OLS) regression analysis to predict student's learning strategies, a multilevel approach (namely, hierarchical linear modeling - HLM - analysis) is a statistically better approach to predict students' learning strategies via their goal orientations (Bickel, 2007). Thus, in this study, HLM analysis was used considering the students clustered within the classrooms. Additionally, the variance on the dependent variable was divided into two parts: within-classroom variance

(the variation on dependent variable among the students in the same classroom) and between classroom variance (the variation on dependent variable among classrooms). Initially, unconditional models were run and interclass correlation coefficient (ICC) was calculated to test the accuracy of multilevel analysis for each dependent variable: namely, rehearsal, elaboration, organization, critical thinking, and metacognitive self-regulation. Then, five different HLM analyses using IBM SPSS version 20 were run for each dependent variable. The independent variables (students' goal orientation types: performance-approach, performance-avoidance, mastery-approach, and mastery-avoidance goals) were measured at student level. Before conducting the HLM analyses, means and standard deviations for all variables and canonical correlations among variable sets were calculated as descriptive data using IBM SPSS 20.

Results

Descriptive Statistics

The means and standard deviations for each variable are given in Table 4. High values for the mean scores indicated that students used those learning strategies and goal orientations more often. When mean scores for the learning strategies were examined, they were found to be close to each other and a little higher than the midpoint of the 7 point Likert type scale indicating that students were not using cognitive and metacognitive strategies very often. It was found that students were using the metacognitive self-regulation strategy most frequently (M=4.63) and critical thinking strategy (M=4.09) least frequently. On the other hand, for the goal orientation types, the mean scores varied from 3.08 to 4.04, above the midpoint of the five-point scale: Students were found to employ mastery-avoidance goals least frequently and mastery-approach goals most frequently.

Table 4

Means and Standard Deviations for All Variables in the Study

Subscale	Mean	Standard Deviation
Rehearsal	4.52	1.43
Elaboration	4.49	1.30
Organization	4.53	1.38
Critical thinking	4.09	1.33
Metacognitive self-regulation	4.63	1.08
Performance-approach	3.57	1.05
Performance-avoidance	3.14	1.10
Mastery-approach	4.04	.94
Mastery-avoidance	3.08	1.04

The relationship between two variable sets (learning strategy and goal orientation variables) was also examined. Each variable set represented a canonical variate: *learning strategy variate* versus *goal orientation variate*. Results of the canonical correlation analysis revealed only one significant canonical variate pair (see Table 5). The canonical correlation coefficient between two canonical variates was found to be .58 accounting for 34% of overlapping variance. The first canonical variate (learning strategy) and the second canonical variate (goal orientation) accounted for 69% and 35% of the variance, respectively. When the canonical loadings were examined, the values greater than .30 were accepted as meaningful (Tabachnick & Fidell, 1996). All of the learning strategy types were positively correlated with the first canonical variate; Elaboration strategy made the highest contribution (r_s=.97). On the other hand, performance-approach, mastery-approach and mastery-avoidance goals were positively associated with the second canonical variate, while performance-avoidance goals made no significant contribution to the second covariate with the canonical loading of .19 less than .30. Mastery-approach goals (r_s=.97) accounted for the highest proportion of variance in the second canonical variate.

Table 5

Correlations, standardized canonical coefficients, canonical correlations, percentage of variance and redundancies between self-regulatory learning strategy and goal orientation variables

	First Canonical Variate	
	Correlations	Coefficients
Self-regulatory learning strategy variables		
Rehearsal	.81	.16
Elaboration	.97	.60
Organization	.72	.07
Critical thinking	.75	.06
Metacognitive self-regulation	.87	.22
Percentage of variance	.69	
Redundancy	.23	
Goal Orientation variables		
Performance-approach	.56	.30
Performance-avoidance	.19	-.12
Mastery-approach	.97	.87
Mastery-avoidance	.31	.03
Percentage of variance	.35	
Redundancy	.12	
Canonical correlation	.58	

HLM Analysis

In an effort to examine the relationship between students' motivational beliefs and their cognitive learning strategies regarding chemistry class, HLM analysis was run. As a preliminary analysis, interclass correlation coefficient (ICC) which examines the variance of dependent variable attributed to the variation between classrooms was calculated for each strategy type to understand whether multilevel analysis (HLM analysis) or single-level analysis (OLS regression analysis) was more appropriate to analyze the data. For this purpose, five different unconditional models were run for each dependent variable. The between-classroom and within-classroom variances are given in Table 6. For example, ICC was found to be .073 for rehearsal strategy indicating that 7.3% of the total variance on rehearsal strategy was explained by the between-classroom variance and the remaining 92.7% was explained by the within-classroom variance. Results indicated that the ICCs ranged from .062 for critical thinking strategy to .13 for metacognitive self-regulation strategy. As a result, most of the variances of the dependent variables were attributed to the within-classroom variance (indicating dependency of observations) and multilevel analysis was better method for analyzing the nested data than single-level analysis.

Table 6

Between and Within-Classroom Variances for Each Dependent Variable

Dependent Variable	ICC (between-classroom variance)	Within-classroom variance
1. Rehearsal	.073	.927
2. Elaboration	.121	.879
3. Organization	.107	.893
4. Crit. Think.	.062	.938
5. Metac. self-reg.	.131	.869

As the main analysis, conditional models were tested by adding student-level predictors (performance-approach, performance-avoidance, mastery-approach, and mastery-avoidance goals) to the unconditioned models. Five separate HLM analyses were run for each learning strategy type. Results of the final models for each dependent variable are presented in Table 7. Findings revealed the same pattern for all the dependent variables: performance-approach goals and mastery-approach goals were significantly associated with each learning strategy type with the greater beta coefficients for the mastery-approach goals. For example, the variation in elaboration strategy was explained more by the mastery-approach goals (β = .42) than performance-approach goals (β = .17). On the other hand, no statistically significant relationship was found between all dependent variables and mastery-avoidance and performance-avoidance goals.

Table 7

Goal Orientation Types as Predictors of Learning Strategies

Dependent Variable	Predictors	β Coefficient	SE	t
Rehearsal	Intercept	.01	.04	.19
	Performance approach	.16	.04	3.94*
	Performance avoidance	.05	.04	1.13
	Mastery approach	.29	.04	7.95*
	Mastery avoidance	.06	.04	1.51
Elaboration	Intercept	-.01	.04	-.30
	Performance approach	.17	.04	4.52*
	Performance avoidance	-.05	.03	-1.43
	Mastery approach	.42	.04	10.88*
	Mastery avoidance	-.04	.04	-1.19
Organization	Intercept	-.01	.04	-.21
	Performance approach	.11	.04	3.06*
	Performance avoidance	-.01	.04	-.07
	Mastery approach	.39	.04	10.95*
	Mastery avoidance	.01	.03	.07
Critical thinking	Intercept	-.01	.04	-.19
	Performance approach	.15	.04	4.21*
	Performance avoidance	-.05	.04	-1.33
	Mastery approach	.35	.05	7.86*
	Mastery avoidance	.01	.04	.16
Metacognitive self-regulation	Intercept	-.02	.04	-.42
	Performance approach	.14	.04	3.88*
	Performance avoidance	-.05	.03	-1.37
	Mastery approach	.47	.04	13.27*
	Mastery avoidance	-.01	.03	-.26

Note. β coefficients represent standardized scores.

Number of students = 1157; number of classrooms = 50.

*. Significant at α=.05

Discussion and Conclusion

In this study, we investigated the relationship between the learning strategies and goal orientations among Turkish high school students taking chemistry course. Students' goal orientations were used to predict their learning strategies utilizing multilevel regression models (HLM analysis). Descriptive statistics showed that metacognitive self-regulation strategies and mastery-approach goals were used most frequently. In addition, canonical correlation analysis revealed that students, who set mastery goals more frequently, used all of the self-regulatory learning strategies more frequently while studying for the course supporting the findings of previous studies (e.g., Ames & Archer, 1988; Kadioglu, Uzuntiryaki, & Capa-Aydin, 2009; Kaplan & Midgley, 1997; Pintrich, 1999). This indicated that students, who set interpersonal standards for learning and give importance to developing new skills, were aware of and had more control on their cognition and used strategies such as planning, monitoring and regulating more frequently while studying for the chemistry course.

Results of HLM analysis supported the findings of canonical correlations: only approach-type of goals (namely, performance-approach and mastery-approach) significantly predicted students' learning strategies. Students studying for getting higher grades than peers and for understanding the topic were expected to use cognitive and metacognitive strategies more often. In contrast to the literature which relates mastery goals to deeper level strategies like elaboration (Elliot, McGregor, & Gable, 1999; Elliot & McGregor, 2001; Harackiewicz, et al., 2000; Yumusak, Sungur, & Cakiroglu, 2007); in the current study, performance-approach goals were also linked to strategy use. This result can be attributed to the common evaluation practices in the Turkish educational context such as grade focused evaluation, dominance of nationwide exams, addition of high school GPA scores to calculate final YGS scores, etc. From this point of view, therefore, contribution of performance-approach goals to the HLM model was not surprising. Still, in this study, mastery-approach goals made higher contribution to the prediction of learning strategies than performance-approach goals.

Avoidance-oriented goals, on the other hand, were not significant predictors of learning strategies. Indeed, it appeared that avoidance goals were less frequently used among the students in the study. Related literature clearly states that the goal orientations which students possess are affected by classroom practices, the messages their teachers send and/or the messages coming from peers (Meece, Anderman, & Anderman, 2006; Urdan, 2004; Wolters, 2004). For example, if the teacher continually mentions the detrimental consequences of getting low grades or the students getting poor grades are accepted as dumb by the peers, students in those classrooms are expected to set performance-avoidance goals for themselves. Therefore, we would need to know more about classroom environment (i.e., classroom goal structures). In the further studies, classroom practices can be observed or classroom goal structures can be investigated to have a better understanding of the phenomena.

This study has some limitations. First of all, the data in this study were gathered through self-report measurement in one shot from different schools and grade levels. Although the present study provided us with empirical evidence for the relationship between goal orientations and learning strategies, it is not clear whether students keep their goals or strategies throughout their learning process and whether they set same goals and utilize same strategies in different learning contexts. Secondly, it should be kept in mind that the present study is correlational in nature; therefore, it is not possible to make causal explanations for results.

In spite of these limitations, the current study contributes to the literature employing the 2x2 framework and analyzing the data considering students nested in classrooms. The present study has some suggestions for both practice and research. Considering the role of mastery-approach goals on the learning strategies, teachers can create tasks that require some degree of challenge, help students gain new skills, give students some degree of control over their learning process, and present opportunities to make their own decisions about the process or product of their learning. Teachers also need to evaluate the students' progress without making comparisons and with emphasizing self-referenced standards as also stated by Ames (1992). Thereby, teachers can help students set mastery-approach type of goals, support use of higher order strategies, and enhance their learning. This study provided evidence that performance-approach goals can also support student's learning. However, how these two types of goals work together remained unclear: focusing only on mastery-approach goals may not be helpful in every context or for all students. Therefore, teachers should critique their classroom practices and make the necessary adjustments in the classroom goal structures based on their students' needs.

Researchers can extend the present study by investigating classroom goal structures to understand the interaction between classroom goals and students' personal goal orientations. Classroom goals can be measured through classroom observations or by getting teachers' or students' personal interpretations through questionnaires. In addition, in this study, we considered chemistry as a context. Future studies can investigate goal structure and learning strategies in different courses. Moreover, school-related variables like school size, school type, average SES of the school, percentage of students enrolling to university at the first year etc. can be included to the analysis as classroom level predictors. Furthermore, structural equation models can be employed to test the direct and indirect paths between goal orientation variables, their relationship to classroom goal structure, personal characteristics and/or academic achievement. In addition, experimental studies can be employed to understand the effect of the classroom environment on students' goal orientation types and in turn their learning process. Finally, qualitative approach can also be conducted to understand how students decide to utilize a particular goal orientation type and how they regulate their goals based on their own learning progress and/or the requirements of the classroom tasks.

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Öğrenme Stratejileri ve Hedef Yönelimleri Arasındaki İlişki: Çok Düzeyli Veri Analizi

Atıf:

Kadioglu, C., & Uzuntiryaki-Kondakci, E. (2014). Relationship between learning strategies and goal orientations: A multilevel analysis. *Eurasian Journal of Educational Research*, xx, xx-xx.

Özet

Problem Durumu: Öğrencilerin akademik başarılarını açıklamada motivasyon önemli bir yer tutar. Motivasyon hedefe yönelik çaba ve çalışmayı başlatan ve devam ettiren süreç olarak tanımlanmaktadır. Motivasyonu yüksek olan öğrenciler zorlayıcı görevleri seçer, daha çok çaba harcar ve engellerle karşılaştıklarında vazgeçmezler; bunun sonucunda da daha başarılı olurlar. İlgili alanyazında motivasyonu açıklayan farklı teorilere rastlanmaktadır. Öğrencilerin bir öğrenme sürecine neden katıldığını, öğrenmenin amacını ve gerekçelerini açıklayan Başarı Hedefleri Kuramı (*Achievement Goal Theory*) bunlardan en yaygın kullanılanıdır.

Başarı Hedefleri Kuramı zaman içinde birkaç kez gözden geçirilmiştir. İlk çalışmalar ikili modele (performansa yönelik ve öğrenmeye yönelik hedefler) göre yapılmıştır. Performansa yönelik hedeflere sahip öğrenciler başarıyı başkalarına göre değerlendirirken, öğrenmeye yönelik hedefleri olan öğrenciler beceri geliştirmeye önem vermektedir. Ampirik çalışmaların sonucunda zaman içinde üçlü model (öğrenmeye yönelik, performans-yaklaşma, performans-kaçınma hedefler) ortaya atılmıştır. Daha sonra, performans-yaklaşma, performans-kaçınma, öğrenme-yaklaşma ve öğrenme-kaçınma hedeflerini içeren dörtlü bir model ortaya atılmış ve bu model 2x2 Başarı Hedefleri Yapısı (2x2 Achievement Goal Framework) olarak isimlendirilmiştir. Bu modelde hedef yönelimleri tanımlanırken yeterliğin tanımı ve değerliği dikkate alınmıştır. İlgili alanyazında, hedef yönelimlerini açıklamak için en uygun modelin hangisi olduğu üzerine tartışmalar sürmektedir. İkili ve üçlü modele dayalı pek çok çalışmaya rastlanırken, dört boyutlu yapıyı araştıran az sayıda çalışma yer almaktadır. Bu çalışma, önceki çalışmalarda kullanılan tek düzeyli istatistiksel analiz yöntemlerinin aksine iç içe geçmiş veri yapısını dikkate alan çok düzeyli analiz yöntemi içerdiğinden önceki çalışmaları genişletmeyi hedeflemektedir.

Araştırmanın Amacı: Bu çalışmanın amacı, Türkiye'deki lise öğrencilerinin kimya dersi çalışırken kullandıkları öğrenme stratejileri ile sahip oldukları hedef yönelimleri arasındaki ilişkiyi çok düzeyli analiz yöntemi kullanarak incelemektir.

Araştırmanın Yöntemi: Toplanan verinin yapısı iki düzeyli (öğrenci ve sınıf düzeyi) olduğundan, örneklem her iki düzey için ayrı ayrı tanımlanmıştır. Örneklemi 50 sınıftan 1157 (620 kız, 537 erkek) öğrenci oluşturmaktadır. Öğrenci düzeyini kimya dersi alan 468 dokuzuncu, 355 onuncu ve 334 onbirinci sınıf öğencisi oluşturmaktadır. Sınıf düzeyinde altı farklı liseden toplam 50 sınıf yer almaktadır. Sınıflardaki öğrenci sayısı 14 ile 33 arasında değişmektedir.

Veri toplama aracı olarak öğrencilerin kimya dersi çalışırken kullandıkları öğrenme stratejilerini (tekrarlama, ayrıntılandırma, örgütleme, eleştirel düşünme ve bilişüstü özdüzenleme) ölçmek için Bilişsel ve Bilişüstü Stratejiler Anketi ve sahip oldukları hedef yönelimlerini (performans-yaklaşma, performans-kaçınma, öğrenme-yaklaşma ve öğrenme-kaçınma hedefler) belirlemek için Hedef Yönelimi Anketi kullanılmıştır. Doğrulayıcı faktör analizleri sonucunda elde edilen uyum indeksleri değerleri Bilişsel ve Bilişüstü Stratejiler Anketi için $\chi 2/df$ (1616,499/424) = 3,81, RMSEA = 0,049 (90% CI =0,046, 0,051), SRMR= 0,049, CFI = 0,89, NNFI = 0,87 ve Hedef Yönelimi Anketi için $\chi 2/df$ (220,915/48) = 4,60, RMSEA = 0,055 (90% CI =0,048, 0,063), SRMR = 0,045, CFI = 0,96, NNFI = 0,94 olarak bulunmuştur. Sonuçlar her iki anket için verinin modelle iyi derecede uyum sağladığını göstermektedir. Cronbach alfa iç güvenirlik katsayısı Bilişsel ve Bilişüstü Stratejiler Anketi için 0,68 ile 0,82; Hedef Yönelimi Anketi için 0,71 ile 0,83 değerleri arasındadır.

Çalışmada öğrencilerin sınıflara kümelendiği gözönünde bulundurularak çok düzeyli veri analizi yöntemlerinden Hiyerarşik Lineer Modelleme (HLM) kullanılmıştır. Her bir öğrenme stratejisi için ayrı ayrı beş farklı HLM yapılmıştır. Analizlerde bağımlı değişken öğrenme stratejileri (tekrarlama, ayrıntılandırma, örgütleme, eleştirel düşünme ve bilişüstü özdüzenleme), bağımsız değişken hedef yönelimleridir (performans-yaklaşma, performans-kaçınma, öğrenme-yaklaşma ve öğrenme-kaçınma hedefler).

Araştımanın Bulguları: Her bir değişkene ait ortalama ve standart sapma değerleri incelendiğinde; öğrencilerin en yaygın bilişüstü özdüzenleme stratejisini, en seyrek eleştirel düşünme stratejisini kullandığı bulunmuştur. Bununla birlikte, öğrenciler en çok öğrenme-yaklaşma, en az öğrenme-kaçınma hedeflerine yönelmektedir. Kanonik korelasyon sonuçlarına göre ise öğrenme stratejisi değişken setindeki tüm bilişsel ve bilişüstü stratejiler, hedef yönelimi değişken setindeki performans-kaçınma hedefleri dışındaki tüm hedeflerle ilişkilidir. Kanonik korelasyon katsayısı 0,58 olarak bulunmuştur.

HLM öncesinde, bağımsız değişkenlerin yer almadığı *koşulsuz model* incelenmiş, ICC (gruplararası varyans) değerleri 0,062 (eleştirel düşünme) ile 0,131 (bilişüstü özdüzenleme) arasında bulunmuştur. Buna göre bağımlı aynı sınıftan toplanan veriler tamemen bağımsız olmadığından verilerin analizinde tek düzeyli basit doğrusal regresyon analizi yerine çok düzeyli HLM analizi yapmak daha uygundur. HLM sonuçlarına göre, her bir bağımlı değişken için aynı sonuç bulunmuş, öğrencilerin kullandıkları öğrenme stratejilerini kestirmede performans-yaklaşma ve öğrenme-yaklaşma hedefleri anlamlı katkıda bulunmuş, öğrenme-yaklaşma hedeflerinin daha çok varyansı açıkladığı görülmüştür. Örneğin, eleştirel düşünme becerisi için varyansın % 42'si öğrenme-yaklaşma (β = 0,42) hedefleri ile açıklanırken, % 17'si performans-yaklaşma (β = 0,17) hedefleri tarafından açıklanmaktadır.

Araştırmanın Sonuçları ve Öneriler: Bu çalışmada, lise öğrencilerinin kimya dersine çalışırken kullandıkları öğrenme stratejileri ile sahip oldukları hedef yönelimleri arasındaki ilişki çok düzeyli veri yapısı dikkate alınarak araştırılmıştır. Betimsel analizlerin sonucunda en yüksek ilişki öğrenme-yaklaşma hedefleri ile bilişüstü

özdüzenleme stratejileri arasında bulunmuştur. Bu sonuçlar yeni beceri geliştirmeye önem veren öğrencilerin, bilişsel farkındalıklarının yüksek olduğunu ve bu öğrencilerin kimya dersine çalışırken plan yapma, çalışmalarını izleme ver düzenleme stratejilerini sıklıkla kullandıklarını göstermektedir. HLM sonuçları da bunu desteklemiş, yaklaşım odaklı hedeflerin öğrenme stratejilerini tahmin etmede anlamlı katkı sağladığını ortaya koymuştur. İlgili alanyazın derin öğrenme stratejileri ile öğrenme-yaklaşma hedefleri arasında bir ilişkiyi ortaya koymaktadır. Oysa bu çalışmada performans-yaklaşma hedefleri de strateji kullanımıyla ilişkilendirilmiştir. Bu durumu açıklamada Türkiye'deki sınav odaklı değerlendirme sisteminin etkili olduğu düşünülmektedir. Sınıf içi not odaklı değerlendirmelerin ağırlıklı olması, kademeler arası geçişlerde ulusal sınavların kullanılması, ortaöğretim not ortalamasının YGS notuna katkısı düşünüldüğünde bu sonuç şaşırtıcı değildir. Bu çalışmada, alanyazına paralel olarak öğrenme odaklı hedeflerin daha yüksek katkı sağladığı bulunmuştur. Bu nedenle, öğretmenler yeni becerilerin geliştirilmesi üzerinde durarak, belli zorluk derecesinde aktiviteler geliştirerek, öğrenciler arasında karşılaştırma yapmaktan kaçınarak ve öğrencilere belli derecede otorite vererek öğrencilerini öğrenme hedeflerini kullanmaya yönlendirebilirler. İleriki çalışmalarda mevcut değişkenlere sınıfiçi hedef yapısı, öğrencilerin kişilik özellikleri ve akademik başarı gibi değişkenler eklenebilir.

Anahtar Kavramlar: Başarı hedefleri, öğrenme stratejileri, bilişsel ve bilişüstü stratejiler, Hiyerarşik Lineer Modelleme (HLM), kimya eğitimi