The Extent to Which the Characteristics of a Metacognitive Oriented Learning Environment Predict the Characteristics of a Thinking-Friendly Classroom

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Abstract

Problem Statement: Based on information presented in previous literature, that the characteristics of learning environments foster metacognition and thinking, it is believed that metacognitive oriented classrooms can contribute to the formation of environments needed to teach thinking, and when metacognitive oriented learning environment characteristics of classrooms are developed, their suitability for thinking education will be enhanced. However, in literature, there is no research looking at the predictive relationship between the characteristics of a metacognitive oriented learning environment and the characteristics of a thinking-friendly classroom.

Purpose of the Study: The purpose of the current study is to investigate the predictive relationships between the characteristics of a metacognitive oriented learning environment in science classes and the characteristics of a thinking-friendly classroom based on the opinions of secondary school students.

Method: The study is a predictive study designed in the relational survey model. The sampling of the study consists of 378 students attending secondary schools in the city of Kutahya. In the study, The Metacognitive Orientation Learning Environment Scale–Science (MOLES-S) and Thinking-Friendly Classroom Scale (TFCS) were employed as data collection instruments. In the analysis of the data, Pearson correlation analysis and multi-linear regression were used.

Findings and Results: The results of the regression analysis revealed that all the predictive variables together can meaningfully explain 53% of the total

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variance in TFCS total score: 57% of the variance in teacher behaviors promote thinking; 39% of the variance in student behaviors promote thinking; and 6% of the variance in behaviors prevent thinking.

Conclusion and Recommendations: In light of the findings of the study, it can be argued that the characteristics of a metacognitive oriented learning environment can account for nearly half of the characteristics of thinking-friendly classrooms (in total score) and for the student and teacher behaviors that are part of these characteristics. Thus, theoretical explanations of metacognitive oriented learning environments and thinking-friendly classrooms have been confirmed to a great extent in actual classroom environments. Strong predictive relationships found in the study indicate a need to establish metacognitive oriented learning environments to inculcate students' thinking skills.

Keywords: Metacognition, thinking, metacognitive oriented learning environment, thinking-friendly classroom environment, secondary school students

Introduction

Metacognition, thinking, and learning are mental operations affecting each other and having strong relationships between each other. Learners' effective use of their metacognition and thinking skills motivated researchers to investigate how learning takes place and what the characteristics of ideal learning environments are. In this respect, in literature, much research has been produced focusing on how learning takes place and attempting to explain the relationship between effective learning environments and learning outcomes since the 1970s. Since the late 1990s, based on the previously produced information, many researchers have been discussing the characteristics of learning environments that promote metacognition and thinking. These research attempts were accelerated by findings demonstrating that learning environments that promote metacognition and thinking enhance learning outcomes.

The concept of metacognition was first introduced by Flavell in 1976 based on research in developmental psychology and unconsciousness, and to him, metacognition meant the information possessed by an individual about his/her own cognitive system, structure, and functioning (Flavell, 1985). The concept, which has aroused a great deal of research interest, can be defined as an individual's being aware of his/her own learning and thinking processes and directing and controlling mental operations in a purposeful manner; planning, monitoring, checking, and evaluating the learning process (Baird, 1990; Crick, 2000; Flavell, 1979; Flavell, 1985; Huitt, 1997; Jager, Jensen & Reezigt, 2005; Klausmeier, 1985; Reeve & Brown, 1985). Metacognition that can also be defined as thinking about thinking (Livingston, 1997) has been associated with different constituents by different researchers in literature (Flavell, 1979; Pintrich, 2002; Roberts & Erdos, 1993; Schraw & Dennison, 1994; Schraw & Moshman, 1995). When the relevant literature is reviewed, it is generally seen that metacognition consists of two components. One of them is metacognitive knowledge, representing an individual's knowledge about and awareness of his/her own cognitive processes. The other is metacognitive experience, including strategies such as the planning, monitoring, and evaluation of cognitive operations. Through these strategies, it becomes easier for an individual to control his/her learning and achieve his/her cognitive objectives.

After the clarification of the meaning and components of metacognition, the basic issue dealt with in literature today is the teaching of metacognition. One of the two approaches proposed in literature is teaching metacognitive strategies, and the other is creating social environments that promote metacognition (Yurdakul & Demirel, 2011). Initially, some programs, models, or learning strategies were developed for fostering students' metacognition (Butler, 1998; El-Hindi, 1996; Lin, 2001; Pressley & Woloshyn, 1995; Schoenfeld, 1985; Schraw, 1998). In recent years, on the other hand, the focus has been on the characteristics of learning environments that enable students to recognize their own cognitive structures and to make effective use of metacognitive strategies (Duffy et al., 2009; Lin, Schwartz & Hatano, 2005; Lin, 2001; Thomas, 2003). Drawing on the outcomes yielded by constructivism in relation to the function of learning's social context, many researchers made suggestions for teachers to improve their students' metacognitive skills (Blakey & Spence 1999; Mclnerney & Mclnerney, 2002; Santrock, 2004).

In this regard, the characteristics of metacognitive oriented learning environments, specifically those proposed by Thomas (2003) for science classes, made tremendous impact. Based on the principles of social constructivism, he argues that metacognition is a product of a social activity (Thomas, 2003). Social constructivism fosters metacognitive development (Kuiper, 2002) and suggests that environments promoting metacognition should be established (Dunlop & Grabinger, 1996). Based on this suggestion, Thomas (2002; 2003; 2013) defines a metacognitive oriented learning environment as an environment where the teacher and students demonstrate metacognitive participation in learning. The research shows that the constituents of a metacognitive oriented learning environment are metacognitive demands, teacher modeling and explanation, student-student discourse, student-teacher discourse, student voice, distributed control, teacher encouragement and support, and emotional support. In such a classroom environment, students' opinions are respected, students help the teacher to decide which tasks they will be engaged in, students can discuss how well they have learned the lesson with their peers, students may ask why they have to do an activity, and the teacher wants students to think about how they learn during the science course.

Thinking is viewed as the sum of active, purposeful, and organized mental processes conducted to understand a state or a situation (Cuceloglu, 1994). Preliminary studies focusing on the teaching of thinking aimed to develop educational programs to promote thinking, as was the case in metacognition. Towards the end of the 1990s, many researchers focused on the question of what the characteristics of a classroom environment that promotes thinking should be (Alkin, 2012; Berman, 2001; Beyer, 2001; Costa, 1991; French & Rhoder, 2011; Kline, 2002;

Newmann, 1991; Ritchhart, 2002; Ritchhart & Perkins, 2008; Robinson, Shore & Enersen, 2007). Berman (2001) contends that a classroom environment where student thinking is fostered should be a place that makes students feel safe and secure, where students' thoughts are monitored, cooperative thinking is encouraged, great importance is attached to asking questions, how to make connections is taught, multiple viewpoints are imparted to students, students' sensitivities are enhanced, and opportunities are created for students to put their thoughts into action. The first researchers to work on the concept of thinking-friendly classroom, Doganay and Sari (2012a), identified the characteristics of a thinking-friendly classroom within the context of teacher behaviors that promote thinking, student behaviors that promote thinking, and behaviors that prevent thinking. According to the researchers, in a thinking-friendly classroom, the teacher encourages students to compare and evaluate different ideas and to share their opinions with other students, and the teacher also asks students to access to information from different resources on their own; students explain the reasons for their answers when possible with evidence and ask questions to themselves about what they have read.

On the basis of the information presented in literature about characteristics of environments that promote metacognition and thinking, it is thought that metacognitive oriented classrooms will be effective in forming environments necessary for the teaching of thinking, and when the metacognitive oriented characteristics of classrooms are developed, their suitability for thinking instruction will also be enhanced. However, in literature, there is no research statistically testing this thesis and looking at the predictive relationship between the characteristics of a metacognitive oriented learning environment and the characteristics of a thinking-friendly classroom. The basic reason for this gap in literature is that there are no assessment tools allowing the measurement of metacognition primarily in terms of its constituents (e.g. strategies and skills), and the measurement of thinking primarily in terms of its sub-skills (e.g. critical thinking, problem solving, and creative thinking). Therefore, the research in literature mostly focuses on evaluation of individuals' metacognitive awareness, skills, or strategies. In a similar token, thinking is usually evaluated as a product. However, in recent years, development of scales to evaluate the characteristics of learning environments promoting metacognition (Yildiz & Ergin, 2007) and thinking (Doganay & Sari, 2012a) has made the testing of the above-mentioned thesis possible. In literature, it is seen that the number of studies looking at the relationships between the characteristics of learning environments promoting different skills/approaches (Alkin-Sahin, Tunca & Oguz, 2015; Doganay & Sari, 2012b; Karakelle, 2012; Kirbulut & Gokalp, 2014; Kiremitci, 2011; Yildirim & Ersozlu, 2013) is increasing. Thus, the purpose of the current study was to determine the predictive relationships between the characteristics of metacognitive oriented learning environments in science classes and the characteristics of thinking-friendly classrooms based on the opinions of secondary school students. For this purpose, an answer to the question "Do the scores taken from the metacognitive orientation learning environment scale in science classes significantly predict the scores taken from thinking-friendly classroom scale?" was sought. As the reliability and validity studies of the metacognitive oriented learning environment scale were conducted for science classes, the current research is limited to determining the characteristics of learning environments that promote metacognition and thinking within the context of science classes. Thus, the predictive relationships to be determined are true only for science classes.

Method

Research Design

The relationships between the secondary school students' opinions about the suitability of science class environments for promoting metacognition and their opinions about the suitability of science class environments for promoting thinking were attempted to be described by evaluating the existing state. In this respect, the current study is a predictive study in the relational survey model.

Research Sample

The universe of the study consists of 25.157 students attending secondary schools in the city of Kutahya in 2014-2015 school year. In the selection of the sampling, a disproportional cluster sampling technique was employed. This technique helps to overcome the control problems caused by data collection in cases where the scope of the universe is very large (Fraenkel & Wallen, 1990); thus, it was employed in the current study. Each school eligible to be a member of the sample is regarded to be a set and the data were randomly collected from the sets. The size of the sampling for 95% reliability level was calculated to be 378. Of the participants, 41.8% (n=158) are males and 57.2% (n=220) are females. Of the participating students, 19% (n=72) are fifth graders, 15.9% (n=60) are sixth graders, 36.2% (n=137) are seventh graders, and 28.8% (n=109) are eighth graders.

Research Instrument and Procedure

As data gathering tools, The Metacognitive Orientation Learning Environment Scale–Science (MOLES-S) and Thinking-Friendly Classroom Scale (TFCS) were used in the present study.

MOLES-S was developed by Thomas (2003) and adapted to Turkish by Yildiz and Ergin (2007). MOLES-S includes 21 items aiming to elicit how students perceive science classes in terms of their metacognitive orientation and what kinds of experiences they have about metacognition in science classes. MOLES-S is comprised of five dimensions: emotional support, distributed control, student-student discourse, student voice, and metacognitive demands. The items in the scale are scored ranging from "1-Never to 5-Always." A total score is taken from the whole scale. A high score taken from the scale means that the students' perception of science classes in terms of their metacognitive orientation is positive. The construct validity of the scale was tested with exploratory and confirmatory factor analyses. Five dimensions of the scale explain 48.68% of the total variance. Confirmatory factor analysis was administered to the 21-item structure of the scale subsumed under five factors. The chi-square (x^2) value statistical significance levels (x^2/sd=1.77) suitable for the model constructed for the scale with confirmatory factor analysis were calculated. Moreover, other goodness of fit indices for the model (GFI=0.93, AGFI=0.91, RMSEA=0.04, CFI=0.95, NFI=0.94, RMR=0.07) show that the recommended model is suitable. The reliability of MOLES-S was tested through the Cronbach's Alpha coefficient, item sum correlations, and comparison of end groups. The Cronbach's alpha coefficient was found to range from 0.57 to 0.87 for the sub-dimensions of the scale and to be 0.87 for the whole scale. In the current study, Cronbach's alpha coefficient was found to range from 0.60 to 0.80 for the sub-dimensions of the scale and to be 0.88 for the whole scale.

Developed by Doganay and Sari (2012a), TFCS consists of 30 Likert-type items aiming to determine the suitability level of classroom environments for promoting students' thinking. TFCS is comprised of three dimensions: teacher behaviors that promote thinking, student behaviors that promote thinking, and behaviors that prevent thinking. The items in the scale are scored ranging from "1 Never to 4 Always." Six items included in the dimension of "behaviors preventing thinking" are reversely scored. A total score is taken from the whole scale. A high score taken from the scale indicates that the classroom environment has positive characteristics in relation to the related dimension. As the items involved in behaviors that prevent thinking are scored in a reverse order in the analyses, high scores taken from this dimension indicates the scarcity of such behaviors, and they are interpreted positively. Three factors involved in the scale explain 42.36% of the total variance. Cronbach's alpha coefficients of the scale were calculated to range from 0.69 to 0.89 for sub-dimensions and to be 0.73 for the whole scale. In the current study, Cronbach's alpha coefficient was found to be ranging from 0.78 to 0.92 for the sub-dimensions of the scale and to be 0.89 for the whole scale.

Data Analysis

In order to determine the correlations between the suitability of classroom environments for promoting metacognition and for promoting thinking, the Pearson correlation analysis was used. When the absolute value of the correlation coefficient is between 0.70 and 1.00, it indicates a high level of correlation; when it is between 0.69 and 0.30, it indicates a medium level of correlation; and when it is between 0.29 and 0.00, it indicates a low level of correlation (Buyukozturk, 2005). In the present study, scores taken from TFCS constitute dependent variables and scores taken from the sub-dimensions of MOLES-S constitute independent variables. A multi-linear regression analysis was run to determine the extent to which the thinking-friendly characteristics of secondary school science classroom environments is predicted by the scores taken from the sub-scales of MOLES-S (emotional support, distributed control, student-student discourse, student voice, and metacognitive demands). The significance level was set to be .05.

Results

In this section, the correlation values and multi-regression analysis results are presented in Tables 1, 2, 3 and 4.

Table 1.

Multi-Regression Analysis Results Related to the Prediction of the Characteristics of a Thinking Friendly Classroom on the Basis of the Total Score

Variable	*B*	*Standard Error*	*β*	*T*	*p*	*Binary r*	*Partial r*
Constant	29.818	3.16		9.44	0.00		
Emotional support	1.345	0.18	.308	7.31	0.00	0.57	0.35
Distributed control	.517	0.14	.177	3.59	0.00	0.56	0.18
Student-student discourse	.595	0.14	.195	4.18	0.00	0.53	0.21
Student voice	.446	0.17	.117	2.70	0.01	0.49	0.14
Metacognitive demands	1.198	0.30	.176	3.94	0.00	0.55	0.20

$R=0.73$ $R^2=0.53$

$F_{(5-372)}=84.62$, $p=0.00$

As seen in Table 1, in science classes, there is a positive, medium level correlation between the characteristics of a thinking-friendly classroom and emotional support (r=0.57), distributed control (r=0.56), student-student discourse (r=0.53), student voice (r=0.49), and metacognitive demands (r=0.55). When the other variables are examined, it is seen that there is a positive, medium level correlation between the characteristics of a thinking-friendly classroom and emotional support (r=0.35); and a positive, low level correlation between the characteristics of a thinking-friendly classroom and distributed control (r=0.18), student-student discourse (r=0.21), student voice (r=0.14), and metacognitive demands (r=0.20). All of the characteristics of a metacognitive oriented learning environment together show a significant correlation with the scores taken from the thinking-friendly classroom scale (R=0.73, p<0.01). The characteristics of a metacognitive oriented learning environment explain 53% of the total variance involved in the characteristics of a thinking-friendly classroom. According to standardized regression coefficient *(β)*, the relative order of importance of the characteristics of a thinking-friendly classroom is as follows: emotional support, student-student discourse, distributed control, metacognitive demands, and student voice. When the results of the t-test conducted to investigate the significance of regression coefficients are examined, it is seen that all the dimensions related to the characteristics of a metacognitive oriented learning environment are predictors of the characteristics of a thinking-friendly classroom. Based on the findings, the regression equation of the characteristics of a thinking-friendly classroom can be expressed as follows:

Thinking-friendly classroom characteristics total score=29.818+1.345 Emotional support+.517 Distributed control+.595 Student-student discourses+.446 Student voice+1.198 Metacognitive demands

Table 2.

Regression Analysis Results Relating the Prediction of Teacher Behaviors that Promote Thinking

Variable	*B*	*Standard Error*	*β*	*T*	*p*	*Binary r*	*Partial r*
Constant	7.560	2.13		3.56	0.00		
Emotional support	1.297	0.12	.423	10.50	0.00	0.65	0.48
Distributed control	.276	0.10	.134	2.84	0.00	0.52	0.15
Student-student discourse	.284	0.10	.133	2.96	0.00	0.48	0.15
Student voice	.246	0.11	.091	2.21	0.03	0.47	0.11
Metacognitive demands	.981	0.20	.205	4.81	0.00	0.57	0.24

R=0.76 R^2=0.57

$F_{(5\text{-}372)}$=98.86, p= 0.00

As seen in Table 2, there is a positive medium level correlation between teacher behaviors that promote thinking in science classes and emotional support (r=0.65), distributed control (r=0.52), student-student discourse (r=0.48), student voice (r=0.47), and metacognitive demands (r=0.57). When the other variables are examined, it is seen that there is no correlation between teacher behaviors that promote thinking and student voice; there is a positive medium correlation between teacher behaviors that support thinking and emotional support (r=0.48); and there is a positive low level correlation between teacher behaviors that promote thinking and distributed control (r=0.15), student-student discourse (r=0.15), and metacognitive demands (r=0.24). All of the characteristics of a metacognitive oriented learning environment together show a significant correlation with the scores taken from the dimension of teacher behaviors that promote thinking (R=0.76, p<0.01). The characteristics of a metacognitive oriented learning environment explain 57% of the total variance involved in teacher behaviors that promote thinking. According to standardized regression coefficient *(β)*, the relative order of importance of the characteristics of a metacognitive oriented learning environment is as follows:

emotional support, metacognitive demands, distributed control, student-student discourse, and student voice. When the results of t-test conducted to investigate the significance of regression coefficients are examined, it is seen that all the dimensions related to the characteristics of metacognitive oriented learning environment in science classes are predictors of teacher behaviors that promote thinking. Based on the findings, the regression equation of teacher behaviors that promote thinking can be expressed as follows:

Teacher behaviors that promote thinking=7.560+1.297 Emotional support+.276 Distributed control+.284 Student-student discourse+.246 Student voice+.981 Metacognitive demands

Table 3.

Regression Analysis Results Relating the Prediction of Student Behaviors that Promote Thinking

Variable	*B*	*Standard Error*	*β*	*T*	*p*	*Binary r*	*Partial r*
Constant	8.226	1.15		7.17	0.00		
Emotional support	.331	0.07	.239	4.96	0.00	0.45	0.25
Distributed control	.111	0.05	.120	2.12	0.03	0.47	0.11
Student-student discourse	.215	0.05	.222	4.15	0.00	0.47	0.21
Student voice	.308	0.06	.253	5.12	0.00	0.49	0.26
Metacognitive demands	-.037	0.11	-.017	0.34	0.74	0.36	-0.02

$R=0.62$ $R^2=0.39$

$F_{(5\text{-}372)}=46.89$, $p=0.00$

As seen in Table 3, there is a positive medium level correlation between student behaviors that promote thinking in science classes and emotional support (r=0.45), distributed control (r=0.47), student-student discourse (r=0.47), student voice (r=0.49), and metacognitive demands (r=0.36). When the other variables are examined, it is seen that there is no correlation between student behaviors that promote thinking and distributed control and metacognitive demands; and there is a positive low level correlation between student behaviors that promote thinking and emotional support (r=0.25), student-student discourse (r=0.21), and student voice (r=0.26). All of the characteristics of a metacognitive oriented learning environment show a significant and medium level correlation with the scores taken from the dimension of student behaviors that promote thinking (R=0.62, p<0.01). The characteristics of a metacognitive oriented learning environment explain 39% of the total variance involved in student behaviors that promote thinking. According to the standardized regression coefficient *(β)*, the relative order of importance of the characteristics of a metacognitive oriented learning environment is as follows: student voice, emotional support, student-student discourse, distributed control, and metacognitive demands. When the results of the t-test conducted to investigate the significance of regression coefficients are examined, it is seen that emotional support, distributed control, student-student discourse, and student voice are predictors of student behaviors that promote thinking. Metacognitive demands do not have a significant influence on student behaviors that promote thinking. Based on the findings, the regression equation of student behaviors that promote thinking can be expressed as follows:

Student behaviors that promote thinking=8.226+.331 Emotional support+.111 Distributed control+.215 Student-student discourse+.308 Student voice-.037 Metacognitive demands

Table 4.

Regression Analysis Results Relating the Prediction of Behaviors that Prevent Thinking

Variable	*B*	*Standard Error*	*β*	*T*	*p*	*Binary r*	*Partial r*
Constant	14.068	1.51		9.30	0.00		
Emotional support	-0.273	0.09	-0.186	3.11	0.00	-0.09	-0.16
Distributed control	0.132	0.07	0.133	1.90	0.06	0.13	0.10
Student-student discourse	0.1	0.07	0.097	1.46	0.14	0.13	0.08
Student voice	-0.106	0.08	-0.082	1.34	0.18	-0.01	-0.07
Metacognitive demands	0.236	0.15	0.103	1.63	0.11	0.09	0.08

$R=0.24$ $R^2=0.06$

$F_{(5-372)}=4.45$, $p=0.00$

As seen in Table 4, there is no correlation between behaviors that prevent thinking in science classes and the sub-dimensions related of the characteristics of a metacognitive oriented learning environment. When the other variables are examined, it is seen that there is only a negative low level correlation between behaviors that promote thinking and emotional support (r=-0.16). No correlation was found between behaviors that prevent thinking and other sub-dimensions. All of the characteristics of a metacognitive oriented learning environment show a significant and low level correlation with the scores of the dimension of behaviors that prevent thinking (R=0.24, p<0.01). The characteristics of a metacognitive oriented learning environment explain 6% of the total variance involved in behaviors that prevent thinking. According to standardized regression coefficient *(β)*, the relative order of importance of the characteristics of a metacognitive oriented learning environment on behaviors that prevent thinking is as follows: emotional support, distributed control, metacognitive demands, student-student discourse, and student voice. When the results of the t-test conducted to investigate the significance of regression coefficients are examined, it is seen that only emotional support is a predictor of behaviors that promote thinking. Distributed control, student-student discourse, student voice, and metacognitive demands do not have a significant influence on behaviors that prevent thinking. Based on the findings, the regression equation of behaviors that prevent thinking can be expressed as follows:

Behaviors that prevent thinking=14.068-.273 Emotional support+.132 Distributed control+0.1 Student-student discourse-.106 Student voice+.236 Metacognitive demands

Discussion and Conclusion

The current study's purpose is to determine the extent to which the characteristics of a metacognitive oriented learning environment in science classes predict the characteristics of a thinking-friendly classroom on the basis of the secondary students' opinions. The results of the regression analysis revealed that all the predictive variables together can meaningfully explain 53% of the total variance in TFCS total score; 57% of the variance in teacher behaviors promoting thinking; 39% of the variance in student behaviors promoting thinking; and 6% of the variance in behaviors preventing thinking. In light of the findings of the study, it can be argued that the characteristics of a metacognitive oriented learning environment can account for nearly half of the characteristics of a thinking-friendly classroom (in total score), and for student and teacher behaviors, which are a part of these characteristics. As the dimension of behaviors that prevent thinking includes negative items, it is expected that the characteristics of a metacognitive orientation learning environment do not explain this dimension. All these results show that theoretical explanations made about metacognitive oriented learning environments and thinking-friendly classrooms have been confirmed to a great extent in actual classroom environments.

Another important finding of the study is that each of the predictive variables significantly predicts TFCS total scores, teacher behaviors that promote thinking, and (except for metacognitive demands) student behaviors that promote thinking. According to Thomas (2003), one of the predictive variables, emotional support, indicates a classroom environment where students' efforts, opinions, and individual differences are appreciated and respected, and students are therefore emotionally motivated to learn. Metacognitive demands indicate a classroom environment where teachers want their students to try new methods while learning science subjects, and to think about how they learn science subjects and how they can enhance their learning. Distributed control indicates a classroom environment where autonomous learners help their teachers to make decisions about the planning of the course.

Student-student discourse indicates a classroom environment where students discuss the learning process in science classes with each other. Student voice indicates a classroom environment where students know that they can question their teachers' pedagogic plans and methods (Thomas, 2003). In the literature explaining the characteristics of a thinking–friendly classroom, it is emphasized that in such classes, teachers should monitor the process followed by their students while performing a cognitive task; students' individual differences, efforts, criticisms, and emotions should be appreciated (Costa, 1991; Kline, 2002; Robinson, Shore & Enersen, 2007); students should be encouraged to work in co-operation (Berman, 2001; Newmann, 1991; Ritchhart, 2002); and students' opinions should be monitored (Berman, 1991). In this connection, the findings of the current study meet the expectations.

Regression analysis results display a good agreement with the medium level, positive, and significant correlation coefficients found between TFCS total scores, teacher behaviors that promote thinking, student behaviors that promote thinking, and scores taken from MOLES-S. In this regard, it can be argued that with an increasing level of metacognitive orientation, thinking-friendliness also improves. Though indirectly, in literature, the findings reported by studies revealing significant correlations between learner autonomy and behaviors that promote critical thinking (Alkin-Sahin, Tunca & Oguz, 2015); the characteristics of a constructivist learning environment and the characteristics of a thinking-friendly classroom (Doganay & Sari, 2012b); metacognitive awareness, problem solving perception, and need for thinking (Karakelle, 2012); metacognitive science learning orientations and constructivist learning environment (Kirbulut & Gokalp, 2014); metacognitive awareness and problem solving skills (Kiremitci, 2011); and metacognitive awareness and the solutions to similar types of mathematical problems (Yildirim & Ersozlu, 2013) can be argued to support the findings of the current study.

Distributed control, student-student discourse, student voice, and metacognitive demands do not significantly predict behaviors that prevent thinking. As the positive attributes indicated by the relevant predictive variables do not match the literature constructed on behaviors that prevent thinking (Alkin, 2012; Innabi, 2003) and because the dimension of behaviors that prevent thinking consist of negative items, this is an expected result. Emotional support significantly predicts behaviors that prevent learning, but this relationship should be evaluated together with the low, negative, and significant correlation detected between these two dimensions. In this regard, it can be claimed that with increasing emotional support in classroom environments, behaviors that prevent thinking are reduced. Thus, the relevant finding concurs with literature.

Another important finding of the current study is that emotional support is the strongest predictor of almost all of the dependent variables. The items involved in the emotional support dimension are "students' efforts are appreciated," "students' individual differences are respected," "students and science teacher trust each other," and "students' opinions are respected." In literature, it is also emphasized that for an effective utilization of metacognition, as well as cognitive knowledge of an individual, knowledge of affective states should be monitored and organized, and an interaction between metacognitive knowledge and affective motivation needs to be formed (Hacker, 1998; Palincsar & Brown, 1987). Both the scale items and the explanations proposed in literature match with the characteristics of a thinking-friendly classroom (Berman, 1991; Costa, 1991; French & Rhoder, 2011; Kline, 2002; Newmann, 1991). Thus, the characteristics pointed out by the dimension of emotional support are essential conditions for the learning environment that promotes thinking, and this is an expected result. Alkin-Sahin, Tunca and Oguz (2015) support this finding by reporting positive medium level correlations ranging from 0.35 to 0.43 between teacher behaviors that promote student autonomy and teacher behaviors that support critical thinking.

Another important finding of the present study is that metacognitive demands are not a significant predictor or even a weak predictor of the dependent variables in terms of relative order of importance. However, metacognitive demands are expected to be a strong predictor of a learning-friendly classroom environment. An important reason for this finding, which is contrary to the expectation, may be related to the reliability of metacognitive demands. In the original form of MOLES-S developed by Thomas (2003), while there are five items in the dimension of metacognitive demands, in its version adapted by Yildiz and Ergin (2007), the number of items is reduced to two. The researchers viewed this as an important limitation of the study, and they developed new items for this dimension and noted that the reliability of the dimension should be improved.

The strong predictive relationships detected in the present study indicate that metacognitive oriented learning environments need to be developed to impart thinking skills to students. This may contribute to the education of individuals whose metacognitive awareness is high, who can use their metacognitive strategies and who can think reasonably, consistently, and effectively. Emotional support, one of the dimensions of a metacognition oriented classroom environment, is a strong and significant predictor of the characteristics of a thinking-friendly classroom. In this regard, in-service training programs would help teachers create metacognition oriented environments, which should raise the awareness of particularly the characteristics involved in the dimension of emotional support. In the current study, the investigation of the characteristics of a metacognition oriented learning environment and thinking-friendly learning classroom is limited to the measurements made in science classes. Future research may look at school subjects having different classroom environments. For such research to be widespread, scales to evaluate the characteristics of metacognitive oriented learning environments and thinking-friendly classrooms within the context of different courses should be developed. Such scales will contribute to the improvement of the reliability and validity of the existing scales and the collection of more reliable data in correlation studies. Moreover, the current study investigated the characteristics of metacognitive oriented learning environments and thinking-friendly classrooms based on student opinions. Future research may focus on teacher opinions or classroom observations.

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Üst Bilişe Yönelimli Sınıf Özelliklerinin Düşünme Dostu Sınıf Özelliklerini Yordama Düzeyi

Atıf:
Alkın-Şahin, S. (2015). The extent to which the characteristics of a metacognitive oriented learning environment predict the characteristics of a thinking-friendly classroom. *Eurasian Journal of Educational Research*, 60, 241-260
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Özet

Problem Durumu: Alanyazında üstbilişi ve düşünmeyi destekleyen öğrenme ortamlarının özelliklerine ilişkin sunulan bilgilerden hareketle, sınıfların üstbilişe yönelimli olmasının, düşünmenin öğretimi için gerekli ortamları yaratmada etkili olacağı; sınıfların üstbilişe yönelimli olma özellikleri geliştirildikçe, düşünme eğitimi için uygunluğunun da geliştirileceği düşünülmektedir. Ancak alanyazında bu tezi istatistiksel olarak test eden; üst bilişe yönelimli sınıf ortamı özellikleri ile düşünme dostu sınıf özellikleri arasındaki ilişkileri inceleyen araştırmalara rastlanamamıştır. Bu açığın temel nedeni; alanyazında, üstbilişin daha çok bileşenleri açısından (örneğin, stratejiler ve beceriler), düşünmenin ise daha çok alt becerileri açısından (örneğin, eleştirel düşünme, sorun çözme, yaratıcı düşünme becerisi) ölçülmesine olanak sağlayan ölçme araçlarının yer almasıdır. Buna bağlı olarak alanyazında üstbilişle ilgili olarak, genellikle, bireylerin üstbilişsel farkındalıklarının, becerilerinin ya da stratejilerinin ölçüldüğü çalışmaların yapıldığı dikkat çekmektedir. Benzer biçimde düşünme de genellikle bir ürün olarak ölçülmektedir. Ayrıca alanyazında, öğrencilerde farklı becerilerin/yaklaşımların geliştirilmesini destekleyen öğrenme ortamlarının özellikleri arasındaki ilişkileri inceleyen çalışmaların da oldukça sınırlı olduğu dikkat çekmektedir. Ancak son yıllarda üstbilişi ve düşünmeyi destekleyen öğrenme ortamlarının özelliklerinin ölçülmesini amaçlayan ölçme araçlarının geliştirilmesi, yukarıda sözü edilen hipotezin sınanmasına olanak sağlamaktadır.

Araştırmanın Amacı: Araştırmanın amacı, ortaokul öğrencilerinin görüşlerine göre, fen derslerinde üst bilişe yönelimli sınıf ortamı özellikleri ile düşünme dostu sınıf özellikleri arasındaki yordamsal ilişkilerin belirlenmesidir.

Araştırmanın Yöntemi: Çalışma, ilişkisel tarama modelinde yordamsal bir araştırmadır. Araştırmanın evrenini, 2014-2015 eğitim-öğretim yılında, Kütahya il merkezinde bulanan ortaokullarda öğrenim gören toplam 25.157 öğrenci oluşturmaktadır. Örnekleme girecek öğrencilerin belirlenmesinde oransız küme örnekleme tekniği kullanılmış; örneklem büyüklüğü ise 378 olarak hesaplanmıştır. Araştırmanın veri toplama araçları, Üstbilişe Yönelimli Sınıf Çevresi Ölçeği-Fen (ÜBYSÇÖ-F) ve Düşünme Dostu Sınıf Ölçeği (DDSÖ)'dir. Araştırmada üst bilişe yönelimli sınıf ortamı özellikleri ile düşünme dostu sınıf özellikleri arasındaki ilişkilerin belirlenmesi için Pearson korelasyon analizi kullanılmıştır. Düşünme dostu sınıf ortamı özelliklerinin, üst bilişe yönelimli sınıf ortamı özellikleri tarafından ne

oranda yordandığını belirlemek amacıyla ise çoklu doğrusal regresyon analizi yapılmıştır.

Araştırmanın Bulguları: Araştırmada yapılan regresyon analizi sonuçlarına göre, yordayıcı değişkenler, birlikte, DDSÖ toplam puanındaki varyansın % 53'ünü; düşünmeyi geliştirici öğretmen davranışlarındaki varyansın % 57'sini; düşünmeyi geliştirici öğrenci davranışlarındaki varyansın % 39'unu ve düşünmeyi engelleyici davranışlardaki varyansın % 6'sını anlamlı bir şekilde açıklamaktadır. Regresyon katsayılarının anlamlılığına ilişkin t testi sonuçları incelendiğinde, fen derslerinde üst bilişe yönelimli sınıf ortamı özelliklerine ilişkin bütün boyutların (duygusal destek, paylaşılan kontrol, öğrenci-öğrenci etkileşimi, öğrencinin sesi, üst bilişsel talepler), DDSÖ toplam puanlarını, düşünmeyi destekleyici öğretmen davranışlarını ve (üst bilişsel talepler değişkeni dışında) düşünmeyi destekleyici öğrenci davranışlarını anlamlı bir şekilde yordadığı belirlenmiştir. Paylaşılan kontrol, öğrenci-öğrenci etkileşimi, öğrencinin sesi ve üst bilişsel talepler, düşünmeyi engelleyici davranışlar üzerinde anlamlı düzeyde etkili değildir. İlgili yordayıcı değişkenlerin işaret ettiği olumlu özellikler; düşünmeyi engelleyen alanyazınla ve ölçekteki olumsuz ifadelerden oluşan düşünmeyi engelleyen davranışlarla örtüşmediği için bu sonuç beklenti yönündedir.

Araştırmanın Sonuçları ve Önerileri: Araştırma sonuçlarına göre, üst bilişe yönelimli sınıf ortamı özellikleri; düşünme dostu sınıf özelliklerinin (toplam puan bazında) ve bu özellikler içinde yer alan öğretmen ve öğrenci davranışlarının yaklaşık yarısını açıklamaktadır. Düşünmeyi engelleyici davranışlar, olumsuz maddelerden oluştuğu için, üst bilişe yönelimli sınıf ortamı özelliklerinin bu boyutu açıklamaması ise beklenen bir sonuçtur. Bütün bu sonuçlar, alanyazında üst bilişe yönelimli sınıf ortamı özelliklerine ve düşünme dostu sınıf özelliklerine ilişkin yapılan kuramsal açıklamaların, gerçek sınıf ortamlarında da büyük ölçüde örtüştüğüne işaret etmektedir. Regresyon analizi sonuçları; "DDSÖ toplam puanları, düşünmeyi geliştirici öğretmen davranışları ve düşünmeyi geliştirici öğrenci davranışları puanları" ile "ÜBYSÇÖ-F'den alınan puanlar" arasında bulunan orta düzeyde, pozitif ve anlamlı korelasyon katsayılarıyla da örtüşmektedir. Bu bağlamda, sınıf ortamlarının üst bilişe yönelimli olma özelliği arttıkça düşünme dostu olma özelliğinin de arttığı söylenebilir. Yordayıcı değişkenlerden duygusal destek, bağımlı değişkenlerin hemen her biri üzerinde en güçlü ve anlamlı yordayıcıyken; üst bilişsel talepler, bağımlı değişkenler üzerinde ya anlamlı bir yordayıcı değildir ya da göreli önem sırası açısından zayıftır. Araştırmadan elde edilen güçlü yordamsal ilişkiler, öğrencilere düşünme becerilerinin kazandırılması için üst bilişe yönelimli sınıf ortamlarının oluşturulması gerektiğine işaret etmektedir. Böylece hem üstbilişsel farkındalığı yüksek ve üstbilişsel stratejileri etkili olarak kullanan bireylerin hem de mantıklı, tutarlı ve etkili düşünen bireylerin yetiştirilmesine katkı sağlanacaktır. Bu araştırmada, sınıfların üstbilişi ve düşünmeyi destekleyen özellikleri yalnızca fen dersleri için yapılan ölçümlerle sınırlıdır. İleride gerek betimsel gerekse yordamsal incelemelerin yapılacağı araştırmalarda, sınıf ortamları farklı dersler için de incelenebilir. Ancak bu araştırmaların yaygınlık kazanması için, alanyazına, farklı derslerde üst bilişi ve düşünmeyi destekleyen sınıf ortamı özelliklerini ölçmeyi

amaçlayan ölçme araçlarının kazandırılması gerekmektedir. İlgili konularda geliştirilecek ölçme araçları, sınırlı sayıdaki mevcut araçların geçerlik-güvenirlikle ilgili sorunlarının çözülmesine katkı sağlayacağı gibi, ilişkisel araştırmalarda daha güvenilir bilgilerin elde edilmesine de olanak sağlayacaktır. Ayrıca araştırmada, sınıf ortamlarının üst bilişe yönelimli olması ve düşünmeyi desteklemesi, öğrenci görüşlerine göre incelenmiştir. Gelecek araştırmalarda, ilgili sınıf ortamları, öğretmen görüşleri ya da sınıf içi gözlemler yoluyla da incelebilir.

Anahtar sözcükler: Üstbiliş, düşünme, üstbilişe yönelimli sınıf ortamı, düşünme dostu sınıf ortamı, ortaokul öğrencileri