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THE EFFECTS OF INTERACTIVE BOARD APPLICATIONS SUPPORTED BY COMPUTER SIMULATIONS ON PRE-SERVICE SCIENCES TEACHERS' SELF-REGULATED LEARNING

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Abstract:
The purpose of this study is to investigate the effects of interactive boards applications supported by computer simulations on pre-service science teachers' self-regulated learning. Quasi-experimental research with pre test/ post test control group design was used in the study. Pre-service science teachers in Siirt University, education faculty, science education department, constructed study group. Sections was randomly assigned experimental and control groups. In experimental group 32 pre-service science teachers (11 male; 21 female), in control group 33 pre-service science teachers (13 male; 20 female) were assigned to the groups. In total, 65 pre-service science teachers participated to the study. "Motivated strategies for learning questionnaire" was applied as the data collection tool. The questionnaire was translated into Turkish by Büyüköztürk and et.al. (2004). During the analysis in this respect, arithmetic averages, standard deviation, independent sampling t-test and analysis of covariance (ANCOVA) were used. The study compared the pre-test and post test scores of the science teacher candidates in the experiment and control group with SPSS 16.0 statistical package software.

Keywords: interactive white board, self-regulation learning, pre-service science teachers

1. Introduction

In today's education approach, it is expected from teachers to be individuals that facilitates learning, supports learning, and guidance; from students to be individuals

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that responsible from their own learning processes, behave freely and think critically. Another important feature that is expected from students today is self-regulated learning skills. The self-regulation concept is based on Bandura's Social Cognitive Learning Theory. According to this model, first, people have the will to control their own behaviors and to shape themselves, second, people can evaluate their own performance by developing a set of internal standards and thus regulate his own behavior (Oral, 2011). In the literature related to self-regulation, many definitions are found. According to Winne (1996), self-regulation is the behavior that individuals organize according to their supergene processes using their own cognitive tactics and strategies. However, Zimmerman (2000) define self-regulation as feelings, thoughts and actions produced to achieve an academic goal. In another definition, Çiltaş (2011) states that self regulation is a work of cognitively self-motivation in the direction of self determination, goal settings and his/her working principles. Additionally, Sha and others (2012) mention about a mechanism that control, set and plan individuals' behaviors and learning. Finally, Üredi and Üredi (2007) state that self-regulation is very important factor for the individuals' life-long learning.

When the studies was examined about self regulation in the literature, it was seen that many models were developed. Some of them can be listed as; Kanfer's three-stage self-regulation model, Boekaets' adaptive learning model, Borkowski's process oriented meta-cognitive model, Winne's four stage self-regulation based learning model, Zimmerman's self-organizing based cyclic learning model and Pintrich's self-organizing based learning model. In Kanfer (1970)'s model, self-regulated learning model consists of three stages; self-monitoring, self-assessment and self-reinforcement. According to this model, learning is describing on the basis of recording learned information by using internal and external awards as a motivational tool, focusing on behavior, monitoring behavior, being conscious about behaviors and evaluating their own learning. According to Boekaerts (1996)'s model, when faced with a learning task, a student make some assessments of what he or she will achieve and the student himself is influenced by his/her own perception of learning, by his/her meta-cognitive knowledge and by his/her self-system components. Borkowski (1996) states that effective strategy usage is important to achieve an academic success in his model. In Winne (1996)'s model, self-regulated learning consists of four stages; task definition stage, goal setting and planning stage, performance stage, and assessment stage. According to this model, a student's understanding of a task consists of students' focusing on a goal, planning to reach it, making strategies, implementing strategies and directing experienced knowledge towards future needs. In Zimmerman (1998)'s model, there is a cycling nature in self-organizing learning. According to this, the feedback

taken from individual's previous learning experiences influences his/her future learning experiences. There are three interrelated cycling phases in the model, including predictive phase, will control phase and self-reflection phase. Finally, in Pintrich (2000)'s model, there are four phases: pre-thinking, planning and activation phase, tracking phase, control phase and reaction phase. Additionally all phases consists of cognitive, motivational and behavioral learning fields.

Self-regulation is closely related to the ability of students to gather attention in the learning process, to use time effectively and efficiently, to build self confidence, to establish relationship between information units and to set-reach-organize their own learning goals (Eker, 2014). Therefore, self-regulation is one of the most important educational subjects which are made researches on. In Turkey, many numbers of self-regulated learning studies are seen. First of all, Çiltaş (2011) states that self-regulated learning is important not only for lectures but also for life-long learning. Doğan and Şahin-Taşkın (2016)'s study supports this idea by adding parental effects. They searched the roles of parents on the development of self-regulated learning skills and have found that parents positively influence children's self-regulated learning skills both as model and by rewarding. Similarly, Arslan (2014) indicates that there is a significant relationship between self-regulated learning and high level thinking skills. Second, the studies related to pre-service teachers and self-regulated learning, Demirel, Erdoğan and Aydın (2014) examined the pre-service teachers' usage levels of self-regulated learning strategies. Additionally, in Yüksel (2013)'s study, the significant relationship between pre-service teachers' self-regulated learning and their instruction styles are stated. Lastly, the effect of self-regulation on students' academic achievements, the studies found that self-regulated learning is one of the predictors of mathematics achievements (Ocak & Yamaç, 2013; Üredi & Üredi, 2005). Additionally, Israel (2007) found a positive significant relationship between science self-sufficiency with self-regulated learning and academic achievement.

One of the most important goals of education is to ensure that students are trained as individuals who undertake their own learning responsibilities and control their own learning processes. Because of that, appropriate environments should be prepared for students to develop students' self-regulated learning skills. Interactive board applications supported by computer simulations can supply appropriate learning environments to improve students' self-regulated learning. In the related literature, interactive boards motivate students (Enduran & Tataroğlu, 2009; Baydaş & Others, 2011), provide positive attitudes (Pamuk & Others, 2013; Özenç & Özmen, 2014), facilitate learning (Çoklar ve Tercan, 2014), increase self-confidence (Akyüz & Others, 2014) and academic achievements (Adıgüzel, Gürbulak ve Sarıçayır, 2011). However,

studies related to the effect of interactive boards on self-regulated learning were not found in the literature. For this reason, it is thought that it is important to determine the effect of interactive board applications supported by computer simulations on self-regulated learning of pre-service teachers.

1.1 Aim of the Study

The aim of this study is to reveal the effects of interactive board applications supported by computer simulations on self-regulated learning of pre-service science teachers.

1.2 Limitations

- Study is limited with Special Teaching Methods II course which is included in Elementary Science Education Program of the year 2015-2016.
- Study is limited with the participated experimental and control group students.
- Study is limited with a data collection tool's Motivation and Learning Strategies, measuring qualities.

2. Method

2.1. Design of the Study

A quasi experimental design, pre-test/post-test control group design was used. In this design, two of the ready groups was tried to be match on certain variables (Büyüközytürk, & Others 2008). Matched groups was randomly assigned to implementation groups. However, matching does not guarantee the groups are equivalent.

2.2. Study Group

The study group consists of 4th grade pre-service science teachers enrolled to Special Teaching Methods II course in Siirt University Education Faculty in 2015-2016 Education year in Turkey. In this program, there were two sections, each including nearly 30 students. One section is randomly assigned as experimental and the other as control groups. In experimental there were 32 pre-service science teachers (21 girls; 11 boys), in control group there were 33 pre-service science teachers (20 girls; 13 boys). Totally 65 pre-service science teachers participated to the study.

2.3. Data Collection Tool

"Motivation and Learning Strategies" scale, which was developed by Pintrich and others (1991) and translated to Turkish by Büyüköztürk and Others (2004) by making reliability and validity studies, was used for this study. Adaptation studies of the scale

were done by using 852 students from two universities. The scale includes 81 items and all items are rated in seventh likert type. (1) indicates "*it is absolutely wrong for me"* and (7) "*it is absolutely correct for me"*. There are 6 factors for Motivation and 9 factor for learning strategies in the scale. These factors and related Cronbach Alpha reliability coefficients are seen in Table 1.

Table 1: Reliability coefficients for motivation and learning strategies scale factors

Motivation	**Reliability Coefficient**	**Learning Strategies**	**Reliability Coefficient**
Intrinsic goal orientation	,59	Rehearsal	,62
Extrinsic goal orientation	,63	Elaboration	,74
Task value	,80	Organization	,61
Control of learning beliefs	,52	Critical thinking	74
Performance related to self-efficacy	,86	Meta-cognitive regulation	,75
Text anxiety	,69	Time and study environmental management	,61
		effort regulation	,41
		Peer learning	,46
		Help seeking	,49

As seen in Table 1, Cronbach Alpha reliability coefficients for motivation changes from ,52 to ,86 and for learning strategies from ,41 to ,75. Confirmatory factor analysis results show that $\chi^2/df=4.47$; RMSEA=0.06; CFI=.82; GFI=.88 for motivation and, $\chi^2/df=2.26$; RMSEA= 0.07; CFI=.70; GFI=.78 for learning strategies.

2.4 Procedure

Procedure of this study starts with theoretical preparation by making literature review, designing methodology, determining data collection tool and computer simulations used in interactive boards. Then implementation was carried out in Special Teaching Methods II course which was two hour theoretical and two hour practical. All the applications was carried out by the researcher and pre-service science teachers. This process lasted ten weeks except for the data collection.

The steps in the procedure are as followings:

A. Preparation Step: In experimental group, one of the researchers and an instructor from Computer and Instructional Technologies Department examined how pre-service teachers can design an instruction with computer simulations. They introduced web-sites related to computer simulations (https://phet.colorado.edu.tr & www.eba.gov.tr). In control group, similar to the experimental one, researcher and

instructor give information to pre-service teachers about the usage of interactive boards. Computer simulations were not introduced.

B. Pre-testing Step: The data collection tool was applied in both experimental and control groups. Testing lasted 50 minutes in each group.

C. Implementation Step: In experimental group, pre-service science teachers determined a subject to present by using interactive boards and computer simulations. 20 minutes was given to all pre-service teachers to present their subject in classroom environment. All presentations was observed by one of the researchers. In control group, pre-service science teachers prepared 20-minutes presentations related to Special Teaching Methods II curriculum (activities in science education course book). In both groups, all pre-service teachers prepared lesson plans for their own presentations and these plans was checked by the researcher in class during the presentation.

D. Post-testing Step: After the implementation step, the same data collection tool in pre-testing step was applied as post-test in both groups.

2.4. Data Analysis

The data was analyzed by using SPSS 16.0 statistical program. Arithmetic mean, standard deviation and independent samples t-test values was calculated for experimental and control group students' pre/post test scores. Covariance analysis (ANCOVA) was done to determine whether there is a significant difference on between groups' pre and post test scores.

3. Findings

The findings of the study related to reveal the effects of interactive board applications supported by computer simulations on self-regulated learning of pre-service science teachers are presented below. The findings of motivational strategies of pre-service science teachers are demonstrated in Table 2.

As seen from the arithmetic mean scores of pre-service science teachers in experimental group in Table 2, there is an increase in the scores of intrinsic goal orientation, task value, control of learning beliefs and performance related to self-efficacy. On the other hand, there is a decrease in the scores of extrinsic goal orientation and text anxiety. In control group, while there is an increase in the values of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs and performance related to self-efficacy, there is a decrease only in the value of text anxiety

Table 2: Results related to motivational strategies of groups

		Experimental Group				Control Group			
Motivational Strategies		**X**	**SS**	**t**	**P**	**X**	**SS**	**t**	**P**
Intrinsic goal orientation	Pre test	5,56	,91	-,524	,602*	5,91	,71	-,662	,511*
	Post test	5,67	,82			6,05	,81		
Extrinsic goal orientation	Pre test	4,45	1,18	,578	,559*	4,46	1,34	-,377	,707*
	Post test	4,27	1,29			4,59	1,27		
Task value	Pre test	5,53	,88	-1,887	,064*	5,69	,81	-1,583	,119*
	Post test	5,90	,69			6,02	,76		
Control of learning Beliefs	Pre test	5,27	,82	-,404	,688*	5,14	,90	-2,908	**,005****
	Post test	5,35	,83			5,72	,62		
Performance related to self-efficacy	Pre test	5,46	,89	-1,500	,139*	5,50	,86	-1,067	,290*
	Post test	5,76	,68			5,75	,97		
Text anxiety	Pre test	3,60	1,30	2,010	**,049****	3,87	1,09	1,790	,079*
	Post test	2,98	1,12			3,37	1,06		

*p>.05; **p<.05

When pre-service science teachers' t-test results of motivational strategies was considered for experimental group, it was found that there was a significant difference on text anxiety (t=2.010; p<.05) scores. Despite this, it was determined that there were no significant difference on the scores of intrinsic goal orientation (t=-,524; p>.05), extrinsic goal orientation (t=,578; p>.05), task value (t=-1,887; p>.05), control of learning beliefs (t=-,404; p>.05) and performance related to self-efficacy (t=-,1,500; p>.05). For control group, there is only significant difference on the variable of control of learning beliefs (t=-2,908; p<.05) and for th other variable it was not found a statistically significant difference between pre and post test scores. The findings of learning strategies of pre-service science teachers are demonstrated in Table 3.

Table 3: Results related to learning strategies of groups

		Experimental Group				Control Group			
Motivational Strategies		**X**	**SS**	**t**	**P**	**X**	**SS**	**t**	**P**
Rehearsal	Pre test	5,16	,99	-,1309	,195*	5,41	,80	-1,786	,079*
	Post test	5,48	,97			5,77	,77		
Organization	Pre test	5,53	,94	-,926	,358*	5,75	,83	-1,296	,200*
	Post test	5,75	,94			6,00	,70		
Elaboration	Pre test	5,56	,87	-,560	,577*	5,69	,77	-1,382	,172*
	Post test	5,68	,86			5,95	,63		
Critical thinking	Pre test	5,05	,89	-1,493	,141*	5,26	,87	-1,391	,169*
	Post test	5,74	2,48			5,58	,85		
Help seeking	Pre test	5,07	1,01	1,177	,244*	4,95	,99	-,068	,946*
	Post test	4,80	,85			4,96	,90		

Peer learning	Pre test	4,31	1,13	,340	,735*	4,55 1,18	-,518 ,606*
	Post test	4,19	1,52			4,72 1,38	
Meta-cognitive regulation	Pre test	5,10	,65	-,499	,620*	5,21 ,63	-,699 ,487*
	Post test	5,18	,60			5,31 ,51	
Effort regulation	Pre test	4,06	,77	-,520	,604*	4,49 ,77	1,670 ,100*
	Post test	4,16	,68			4,12 ,95	
Time and study environmental management	Pre test	4,57	,67	,006	,995*	4,81 ,62	1,036 ,305*
	Post test	4,57	,73			4,65 ,56	

*p>.05; **p<.05

As seen from Table 3, for both experimental and control group pre-service teachers, there was an increase in the arithmetic mean scores of rehearsal, organization, elaboration, critical thinking and meta-cognitive regulation. On the other hand, there was a decrease in the scores of help seeking and peer learning. In effort regulation score, there was an increase in experimental group and decrease in control group. In time and study environmental management strategy, there was no change in experimental group and decrease in control group. According to the t-test results for learning strategies, it was not found any statistically significant difference for all learning strategies. Covariance analysis was performed to find out whether there was an effect of implementation process or not. ANCOVA results are given in Table 4.

Table 4: Results of corrected arithmetic mean scores and covariance analysis for motivational strategies

Motivational Strategies	**Corrected Arithmetic Mean Scores of Experimental Group**	**Corrected Arithmetic Mean Scores of Control Group**	**F**	**P**
Intrinsic goal orientation	5,74	5,98	1,493	,227*
Extrinsic goal orientation	4,27	4,59	1,542	,240*
Task value	5,92	5,99	,149	,701*
Control of learning beliefs	5,34	5,74	4,811	**,032****
Performance related to self-efficacy	5,77	5,75	,008	,927*
Text anxiety	3,04	3,30	1,138	,290*

*p>.05; **p<.05

When corrected arithmetic mean scores of experimental and control groups were examined in Table 4, control of learning belief score was 5,34 for experimental group and 5,74 for control group. In the result of covariance analysis, it was found that this difference was significant. Additionally, it was seen that the corrected mean scores of

intrinsic goal orientation, extrinsic goal orientation, task value and text anxiety scores experimental group were lower than control group's ones. The differences in these variables were not significant due to covariance analysis results. As a result of these, it can be said that interactive board applications supported by computer simulation do not have an effect on pre-service science teachers' motivational strategies. In table 5, Corrected arithmetic mean scores of groups and covariance analysis results are demonstrated for experimental and control groups.

Table 5: Results of corrected arithmetic mean scores and covariance analysis for learning strategies

Motivational Strategies	**Corrected Arithmetic Mean Scores of Experimental Group**	**Corrected Arithmetic Mean Scores of Control Group**	**F**	**P**
Rehearsal	5,54	5,70	,692	,409*
Organization	5,96	5,79	,725	,398*
Elaboration	5,71	5,91	1,447	,234*
Critical thinking	5,83	5,48	,633	,430*
Help seeking	4,78	4,90	1,016	,318*
Peer learning	4,28	4,63	1,316	,256*
Meta-cognitive regulation	5,20	5,29	,507	,479*
Effort regulation	4,18	4,09	,203	,654*
Time and study environmental management	4,60	4,62	,021	,885*

*p>.05; **p<.05

According to Table 5, when the corrected learning strategies arithmetic mean scores of pre-service science teachers was examined, it was found that the arithmetic mean scores of organization, critical thinking and effort regulation were higher in experimental group than control group. On the other hand, it was determined that the experimental group had lower rehearsal, elaboration, help seeking, peer collaboration and metacognitive regulation learning strategies than those scores of the control group in terms of arithmetic mean scores. As a result of the applied covariance analysis, this difference was not significant. In this case, it can be said that interactive board applications supported by computer simulations have no meaningful effect on learning strategies of pre-service science teachers.

4. Conclusion and Recommendation

In this research, the effect of interactive board applications supported by computer simulations on pre-service science teachers self-regulated learning strategies was searched. When the related literature was examined, it has found that both computer simulations and interactive board applications have positive effects on students' motivation and academic achievements (Ateş, 2010; Atam & Tekdal, 2010; Beeland, 2002; Büyükkara, 2011; Çinici & Others 2013; Çolaklar, Tercan, 2014; Efe & Others 2011; Enduran & Tataroğlu, 2009; Kırbağ Zengin, Kırılmazkaya & Keçeci, 2011; Polat & Özcan, 2014; Özden, 2005; Sarı & Güven, 2013). However, there were no enough number of studies searching the effects of interactive boards supported by computer simulation on self-regulated learning strategies.

In this research, when the motivational strategies pre/post test scores of pre-service science teachers were examined, it was found that there was an increase on the arithmetic mean scores of internal and extrinsic goal orientation, task value, control of learning beliefs and performance related to self-efficacy. However, these increases were not statistically significant. On the other hand, there were a decrease on the score of text anxiety and it was found statistically significant. According to this result, it can be said that computer simulations supported interactive board application has a positive effect on pre-service science teachers' exam anxieties. In the literature, internal and extrinsic goal orientation factors constitute "*task value*" main component of motivational strategies, control of learning beliefs and performance related to self-efficacy constitute "expectation" and text anxiety constitutes "affective" (Büyüköztürk & Others, 2004). According to these, in the current research, it can be concluded that value and expectation main components of motivational strategies do not influenced from computer simulations supported interactive board applications, on the contrary, they have an effect on affective main component. In this research, when the motivational strategies pre/post test scores of pre-service science teachers were examined, it was found that there was an increase on the arithmetic mean scores of rehearsal, organization, elaboration, metacognitive regulation and critical thinking. On the other hand, there was a decrease in the scores of help seeking and peer collaboration. In another saying, learning by memorization (rehearsal), interpreting new learning (elaboration), selecting appropriate knowledge and determining main idea (organization), making critical assessment (critical thinking), determining targets, testing own knowledge and correcting behaviors (Meta-cognitive regulation) were developed factors with the computer simulations supported interactive board applications. On the other hand, there was a decrease on the strategies like determining

needs help (help seeking) and learn with cooperative learning (peer collaboration) strategies. However, the related difference were not found as statistically significant as a result of the t-test analysis. In the literature, rehearsal, elaboration, organization and critical thinking are classified as "*cognitive strategies*", planning, monitoring and organization as "*meta-cognitive strategies*" and effort regulation, time and study environmental management, peer collaboration and help seeking as "*source management*" main components (Büyüköztürk & Others 2004). As a result of this finding, it can be said that computer simulations supported interactive boards do not have meaningful effect on cognitive, meta-cognitive and source management main components of learning strategies. In an experimental study, Güvenç (2011) stated that cooperative learning supported by representative materials did not create a significant effect on pre-service literature teachers' learning strategies like rehearsal, process, organization, critical thinking, self-organization, time and study environmental management, peer collaboration, help seeking and effort regulation.

As a conclusion of the study, which aimed to find out the possible effects of interactive board applications supported by computer simulations on self-regulated learning strategies, it has been determined that these applications were not sufficiently effective on motivational and learning strategies in the participated groups. In addition to this, the same research could be repeated with different and large sample groups to find out these possible effects.

References

1. Adıgüzel, T., Gürbulak, N. & Sarıçayır, H. (2011). Akıllı Tahtalar Ve Öğretim Uygulamaları. *Mustafa Kemal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 15(8), 457-471.
2. Arslan, S. (2014). An Investigation of the Relationships between Metacognition and Selfregulation With Structural Equation. *International Online Journal of Educational Sciences, 6* (3), 603-611.
3. Akyüz, H.İ., Pektaş, M., Kurnaz, M.A. & Kabataş-Memiş, E. (2014). Akıllı Tahta Kullanımlı Mikro Öğretim Uygulamalarının Fen Bilgisi Öğretmen Adaylarının TPAB'larına ve Akıllı Tahta Kullanımına Yönelik Algılarına Etkisi, *Cumhuriyet International Journal Of Education*, 3(1), 1-14.
4. Baydaş ,Ö., Esgice, M., Kalafat, Ö., & Göktaş , Y. (2011). Etkileşimli Tahtaların Öğretim Süreçlerine Katkıları. *5th International Computer & Instructional Technologies Symposium,* 22-24 September, Fırat University, Elazığ: Turkey.

5. Blaton, B., & Helms-Breazcale, R (2000). Gains in Self-Efficacy: Using Smart Board Interactivewhiteboard Technology in Special Education Classrooms. https://smarterkids.org/research/paper2.asp
6. Boekaerts, M. (1996). Self-Regulated Learning at The Junction of Cognition and Motivation. *European Psychologist*, 1(2), 100-112.
7. Büyüköztürk, Ş., Akgün, Ö.E., Özkahveci Demirel, F. (2004). Güdülenme ve Öğrenme Stratejileri Ölçeğinin Türkçe Formunun Geçerlilik ve Güvenirlik Çalışması. *Kuram ve Uygulamada Eğitim Bilimleri*, 4 (2), 207-209.
8. Canca, D. (2005). *Cinsiyete Göre Üniversite Öğrencilerinin Kullandıkları Bilişsel ve Bilişüstü Öğrenme Stratejileri Ve Akademik Başarıları Arasındaki İlişkilerin İncelenmesi*. Yayınlanmamış Yüksek Lisans Tezi, Yıldız Teknik Üniversitesi, Sosyal Bilimler Enstitüsü, İstanbul.
9. Çiltaş,A.(2011). Eğitimde Öz-Düzenleme Öğretiminin Önemi Üzerine Bir Çalışma. *Mehmet Akif Ersoy Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 3(5), 1–11.
10. Çoklar, N., & Tercan, İ. (2014). Akıllı Tahta Kullanan Öğretmenlerin Akıllı Tahta Kullanımına Yönelik Görüşleri. *İlköğretim Online, 13(1),* 48-61.
11. Demirel, M., Erdoğan, Ö., & Aydın, Ö. (2014). Öğretmen adaylarının Öz-Düzenleyici Öğrenme Stratejilerini Kullanma Düzeylerinin İncelenmesi. *Uluslararası Eğitim Programları ve Öğretim Çalışmaları Dergisi*. 4(8), 69-84.
12. Doğan, M.F., & Fatih-Taşkın, Ç. (2016). Öğrencilerin Öz-Düzenlemeli Öğrenme Becerilerinin Gelişiminde Anne ve Babaların Rolü. *Uluslararası Eğitim Programları ve Öğretim Çalışmaları Dergisi*. 6(12), 1-18.
13. Erduran, A., & Tataroğlu, B. (2009). Eğitimde Akıllı Tahta Kullanımına İlişkin Fen Ve Matematik Öğretmeni Görüşlerinin Karşılaştırılması. *9th International Educational Technology Conference* (IETC 2009), 14-21.
14. Güvenç, H. (2011). Çalışma Günlüklerinin 6. Sınıf Öğrencilerinin Öz Düzenlemeli Öğrenmeleri Üzerindeki Etkileri. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *41*(41), 206-218.
15. İsrael, E. (2007). *Öz-Düzenleme Eğitimi, Fen Başarısı Ve Öz-Yeterlilik,* Yayımlanmamış Doktora Tezi, Dokuz Eylül Üniversitesi, Eğitim Bilimleri Enstitüsü
16. Pamuk, S., Çakır, R., Ergun, M., Yılmaz, H. B., & Ayas, C. (2013). Öğretmen ve Öğrenci Bakış Açısıyla Tablet PC ve Etkileşimli Tahta Kullanımı: Fatih Projesi Değerlendirmesi. *Educational Sciences: Theory & Practice, 13(*3), 1799-1822.

17. Pintrich, P. R. (2000). *The Role Of Goal Orientation İn Self-Regulated Learning.* In M., Boekaerts & P. R., Pintrich (Eds.), *Handbook Of Self-Regulation (Pp.13-39).* San Diego, Ca: Academic Press.
18. Ocak, G., ve Yamaç, A. (2013). İlköğretim Beşinci Sınıf Öğrencilerinin Öz-Düzenleyici Öğrenme Stratejileri, Motivasyonel İnançları, Matematiğe Yönelik Tutum ve Başarıları Arasındaki İlişkinin İncelenmesi. *Kuram ve Uygulamada Eğitim Bilimleri.* 13(1), 369-387.
19. Oral, B. (Ed.).(2011). *Öğrenme Öğretme Kuram ve Yaklaşımları.* Ankara: Pegem Yayınları.
20. Özenç, E.G., & Özmen, Z.K. (2014). Akıllı Tahtayla İşlenen Fen ve Teknoloji Dersinin Öğrencilerin Başarısına ve Derse Karşı Tutumlarına Etkisi. *Türkiye Sosyal Araştırmalar Dergisi,* 182 (182), 137-152.
21. Senemoğlu, N. (2007). *Gelişim Öğrenme ve Öğretim Kuramdan Uygulamaya*. Ankara: Gönül Yayıncılık
22. Sha, L., Looi, C. K., Chen, W., & Zhang, B. H. (2012). Understanding Mobile Learning from The Perspective of Self-Regulated Learning, *Journal of Computer Assisted Learning, 28*(4), 366-378.
23. Üredi, I., & Üredi, L. (2005). İlköğretim 8. Sınıf Öğrencilerinin Özdüzenleme Stratejileri ve Motivasyon İnançları. *Mersin Üniversitesi Eğitim Fakültesi Dergisi*. 1, 2, 250-260.
24. Üredi, I. & Üredi, L. (2007). Öğrencilerin Öz-Düzenleme Becerilerini Geliştiren Öğrenme Ortamının Oluşturulması. *Edu 7*, 2(2), 1─29.
25. Türel, Y.K. (2010). Developing Teachers' Utilization of Interactive Whiteboards. In D. Gibson & B. Dodge (Eds.), *Proceedings Of Society For Information Technology & Teacher Education International Conference 2010*,Chesapeake, Va: Aace. (Pp.3049-3054).
26. Yüksel, İ. (2013). Öğretimsel Stil Tercihlerinin Öz-Düzenleme Beceri Düzeylerini Yordama Gücü. *Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi*, *20*, 212-229.
27. Winne, P.H. (1996). A Metacognitive View of Individual Differences in Self-Regulated Learning. *Learning and Individual Differences*, 8, 327–353.
28. Zimmermann, B.J. (1989). A Social Cognitive View Of Self-Regulated Academic Learning. *Journal Of Educational Psychology*, 81, 329-339.
29. Zimmerman, B.J. (2000). *Attaining Self-Regulation: A Social Cognitive Perspective.* In Boekaerts, M., Pintrich, P., & Zeodmer, M. (Eds.), *Handbook Of Self-Regulation*. Academic Press